

APPLICATION ON NOTIFICATION – Category 2

Applicant:	B/P Asset Pty Ltd C/- Ekistics Planning and Design
Development Number:	252/E002/19
Nature of Development:	Nursing home and retirement living accommodation in the form of a residential flat building to be constructed in stages with associated administration and community facilities, basement, semi-basement and at-grade car parking, advertising, landscaped communal space, swimming pool, fencing, earthworks and removal of three (3) regulated trees and one (1) significant tree
Development Type:	Merit
Subject Land:	Lot 1000 Woodville Road, St Clair
Development Plan:	Charles Sturt Council Development Plan
Zone / Policy Area:	District Centre Zone, Woodville Policy Area 5, Railway Station Precinct 21
Contact Officer:	Ben Scholes
Phone Number:	(08) 8402 1861
Consultation Start Date:	Tuesday 19 February 2019
Consultation Close Date:	5:00PM Tuesday 5 March 2019
<p>During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders St, Adelaide, during normal business hours. Application documentation may also be viewed during normal business hours at the Charles Sturt Council office (if identified on the public notice).</p>	

Written representations must be received by the close date (indicated above) and can either be posted, hand-delivered or emailed to the State Commission Assessment Panel. **Any representations received after the close date will not be considered.**

Postal Address:

The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Street Address:

Development Division
Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
ADELAIDE

Email Address: scapreps@sa.gov.au

Fax Number: (08) 8303 0753

DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: DPTI

APPLICANT: B/P Asset Pty Ltd

Postal Address: c/o Ekistics Planning and Design
1/16 Vardon Avenue, Adelaide SA 5000

Owner: Urban Renewal Authority

Postal Address: Level 9 (West) Riverside Center North
Terrace Adelaide SA 5000

BUILDER: TBA

Postal Address: _____

Licence No: _____

CONTACT PERSON FOR FURTHER INFORMATION

Name: Richard Dwyer

Telephone: 7231 0286 [work] _____ [Ah]

Fax: _____ [work] _____ [Ah]

EXISTING USE: Open space, and vacant land

FOR OFFICE USE

Development No: _____

Previous Development No: _____

Assessment No: _____

- ☐ Complying
☐ Non Complying
☐ Notification Cat 2
☐ Notification Cat 3
☐ Referrals/Concurrences
☐ DA Commission

Application forwarded to DA

Commission/Council on

/ /

Decision: _____

Type: _____

Date: / /

	Decision required	Fees	Receipt No	Date
Planning:	_____	_____	_____	_____
Building:	_____	_____	_____	_____
Land Division:	_____	_____	_____	_____
Additional:	_____	_____	_____	_____
Development Approval				

DESCRIPTION OF PROPOSED DEVELOPMENT: Aveo Residential Aged Care Facility (Nursing Home) and Retirement Living Development (Residential Flat Buildings) associated signage, carparking, tree removal, resident swimming pool, earthworks, fencing
LOCATION OF PROPOSED DEVELOPMENT: Lot 1000 Woodville Road

House No: _____ **Lot No:** 1000 **Street:** Woodville Road **Town/Suburb:** St Clair

Section No [full/part] _____ **Hundred:** _____ **Volume:** 6200 **Folio:** 474

Section No [full/part] _____ **Hundred:** _____ **Volume:** _____ **Folio:** _____

LAND DIVISION:

Site Area [m²] _____ **Reserve Area [m²]** _____ **No of existing allotments** _____

Number of additional allotments [excluding road and reserve]: _____ **Lease:** **YES** ☐ **NO** ☐

BUILDING RULES CLASSIFICATION SOUGHT: _____ **Present classification:** _____

If Class 5,6,7,8 or 9 classification is sought, state the proposed number of employees: **Male:** _____ **Female:** _____

If Class 9a classification is sought, state the number of persons for whom accommodation is provided: _____

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises: _____

DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 2008 APPLY? **YES** ☐ **NO** ☒

HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 2008 LEVY BEEN PAID? **YES** ☐ **NO** ☒

DEVELOPMENT COST [do not include any fit-out costs]: \$ 152,610,714.30

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 2008.

SIGNATURE: _____

Dated: 06 / 12 / 2018

Geoffrey Earl Grady
Chief Executive Officer



Government
of South Australia

DEVELOPMENT REGULATIONS 2008
Form of Declaration (Schedule 5 clause 2A)

To: Department of Planning Transport and Infrastructure

From: Aaron Grieger (BESTEC)

Date of Application: 10 / 12 / 2018

Location of Proposed Development: _____

House No: _____ Lot No: 1000 Street: Woodville Road

Town/Suburb: St. Clair

Section No (full/part): _____ Hundred: _____

Volume: 6200 Folio: 474

Nature of Proposed Development:

A staged Aged Care and Retirement Living development in the form of a Nursing Home comprising 144 beds, a Residential Flat Building comprising 341 Independent Living Units, an associated community facility and administration building, advertising, carparking, a resident swimming pool, landscaping, fencing and associated earthworks as well as the removal of four (4) Regulated Trees (including one [1] Significant Tree)

I Aaron Grieger (from BESTEC) ~~being the applicant~~ a person acting on behalf of the applicant (delete the inapplicable statement) for the development described above declare that the proposed development will involve the construction of a building which would, if constructed in accordance with the plans submitted, not be contrary to the regulations prescribed for the purposes of section 86 of the Electricity Act 1996. I make this declaration under clause 2A(1) of Schedule 5 of the Development Regulations 2008.

Signed: _____

Date: 10 / 12 / 2018



**Government
of South Australia**

Note 1

This declaration is only relevant to those development applications seeking authorisation for a form of development that involves the construction of a building (there is a definition of 'building' contained in section 4(1) of the Development Act 1993), other than where the development is limited to –

- a) an internal alteration of a building; or
- b) an alteration to the walls of a building but not so as to alter the shape of the building.

Note 2

The requirements of section 86 of the Electricity Act 1996 do not apply in relation to:

- a) an aerial line and a fence, sign or notice that is less than 2.0 m in height and is not designed for a person to stand on; or
- b) a service line installed specifically to supply electricity to the building or structure by the operator of the transmission or distribution network from which the electricity is being supplied.

Note 3

Section 86 of the Electricity Act 1996 refers to the erection of buildings in proximity to powerlines. The regulations under this Act prescribe minimum safe clearance distances that must be complied with.

Note 4

The majority of applications will not have any powerline issues, as normal residential setbacks often cause the building to comply with the prescribed powerline clearance distances. Buildings/renovations located far away from powerlines, for example towards the back of properties, will usually also comply.

Particular care needs to be taken where high voltage powerlines exist; or where the development:

- is on a major road;
- commercial/industrial in nature; or
- built to the property boundary.

Note 5

An information brochure: 'Building Safely Near Powerlines' has been prepared by the Technical Regulator to assist applicants and other interested persons.

This brochure is available from council and the Office of the Technical Regulator. The brochure and other relevant information can also be found at sa.gov.au/energy/powerlinesafety

Note 6

In cases where applicants have obtained a written approval from the Technical Regulator to build the development specified above in its current form within the prescribed clearance distances, the applicant is able to sign the form.

18 December 2019

REF No.: 00411-001

Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
ADELAIDE SA 5000

Attention: Ben Scholes

Dear Ben,

RE: DEVELOPMENT APPLICATION: AVEO ST CLAIR INTEGRATED RETIREMENT COMMUNITY

Please find enclosed with this letter a development application for the Aveo St Clair Integrated Retirement Community development proposed for Lot 1000 Woodville Road, St Clair.

Enclosed with this letter are the completed application forms, a cheque for the prescribed fee and a Planning Statement prepared by Ekistics with the following appendices:

- **Appendix 1** – Certificate of Title;
- **Appendix 2** – Alexander Symonds survey plan;
- **Appendix 3** – Brown Falconer architectural plans and design statement;
- **Appendix 4** – Greenhill Landscape Master Plan;
- **Appendix 5** – Tree Environs Tree Report;
- **Appendix 6** – GTA Consultants Traffic Impact Assessment;
- **Appendix 7** – Greenhill Fire Truck Access/Egress Plans
- **Appendix 8** – Resonate Planning Stage Acoustic Assessment;
- **Appendix 9** – Greenhill Siteworks and Drainage Plans;
- **Appendix 10** – Colby Industries Waste Management Plan;
- **Appendix 11** – Trio Signage Specifications
- **Appendix 12** – BESTEC Site Infrastructure Report;
- **Appendix 13** – LBW Co. Environmental Status Letter

We would like to take this opportunity to thank you for the assistance and the advice you have provided concerning the development and we look forward to working with you on this project.

Should you require any additional information please do not hesitate to contact the undersigned on (08) 7231 0286.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Rob', with a stylized flourish at the end.

Rob Gagetti

Associate



**AVEO ST. CLAIR
PLANNING STATEMENT**

INTEGRATED NURSING HOME
AND RETIREMENT VILLAGE
(RESIDENTIAL FLAT BUILDING)

Date:

Prepared for: Aveo

December 2018



Proprietary Information Statement

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Document Control

Revision	Description	Author	Date
V1	Draft Planning Statement	Rob Gagetti	12 December 2018
V2	Reviewed by Richard Dwyer	Rob Gagetti	13 December 2018
V3	Final Report	Rob Gagetti	17 December 2018

Approved by:



R. Dwyer Managing Director

Date: 17 December 2018

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1. Executive Summary

Category	Details
PROJECT	Aveo St Clair Integrated Nursing Home and Retirement Village (Residential Flat Building)
ADDRESS OF SITE	Lot 1000 Woodville Road, St Clair
CERTIFICATES OF TITLE	Lot 1000 in Certificate of Title Volume 6200 Folio 474
ALLOTMENT AREA	37,406m ²
SITE AREA	28,016m ²
FRONTAGE	St. Clair Avenue – 314.26m Woodville Road – 74.19m Actil Avenue – 160.44m
LOCAL GOVERNMENT	City of Charles Sturt
RELEVANT AUTHORITY	State Planning Commission (SPC) Delegate -State Commission Assessment Panel (SCAP)
PRE LODGEMENT PANEL MEETINGS	PLP #1: 27 August 2018 PLP #2: 10 October 2018 PLP #3: 07 December 2018
DEVELOPMENT PLAN	City of Charles Sturt Development Plan (consolidated 13 September 2018)
ZONING	District Centre Zone
POLICY AREA/PRECINCT	Woodville Policy Area 5 Precinct 21 Railway Station
EXISTING USE	The development site accommodates an unoccupied recreation building and associated carpark and private roadway (Glynis Nunn Drive) which connects with Woodville Road.
PROPOSAL DESCRIPTION	A staged Aged Care and Retirement Living development in the form of a Nursing Home comprising 144 beds, a Residential Flat Building comprising 341 Independent Living Units, associated administration and community facilities, advertising, carparking, a resident swimming pool, landscaping, fencing and associated earthworks as well as the removal of four (4) Regulated Trees (including one [1] Significant Tree)
NATURE OF DEVELOPMENT	'Consent use' for assessment on merit
REQUIRED CONSENTS	Development Plan Consent (Section 34 of the Development Act, 1993) Public realm improvements (Section 221 of the Local Government Act, 1999)
REFERRALS/CONCURRENCES	<ul style="list-style-type: none"> Formal Referral: Renewal SA - Affordable Housing Branch Consultation: City of Charles Sturt
PUBLIC NOTIFICATION	Category 2
APPLICANT	Aveo
CONTACT PERSON	Richard Dwyer or Rob Galletti Ekistics Planning and Design – (08) 7231 0286
OUR REFERENCE	#00411

2. Introduction/Background

This planning statement has been prepared in support of the Aveo St Clair Integrated Nursing Home and Residential Flat Building (Retirement Village) proposed for Lot 1000 Woodville Road, St Clair (the 'site').

This planning statement provides information about the subject site and proposed development and addresses the merits of the development application against the relevant provisions of the City of Charles Sturt Development Plan (Consolidated 13 September 2018).

For the purposes of this statement, the Charles Sturt Development Plan will be referred to as the 'Development Plan', the *Development Act 1993* will be referred to as the 'Act' and the *Development Regulations 2008* will be referred to as the 'Regulations'.

Our assessment of the development has considered the following plans and supporting documentation:

- » **Appendix 1** – Certificate of Title;
- » **Appendix 2** – Alexander Symonds survey plan;
- » **Appendix 3** – Brown Falconer architectural plans and design statement;
- » **Appendix 4** – Greenhill Landscape Master Plan;
- » **Appendix 5** – Tree Environs Tree Report;
- » **Appendix 6** – GTA Consultants Traffic Impact Assessment;
- » **Appendix 7** – Greenhill Fire Truck Access/Egress Plans
- » **Appendix 8** – Resonate Planning Stage Acoustic Assessment;
- » **Appendix 9** – Greenhill Siteworks and Drainage Plans;
- » **Appendix 10** – Colby Industries Waste Management Plan;
- » **Appendix 11** – Trio Signage Specifications
- » **Appendix 12** – BESTEC Site Infrastructure Report;
- » **Appendix 13** – LBW Co. Environmental Status Letter

3. The Site and Locality

3.1 The Site

A site and surrounds image is provided in **Figure 3.1**.

The site is located at Lot 1000 Woodville Road and is formally identified within Certificate of Title Volume 6200, Folio 474. The Certificate of Title and Deposited Plan is attached as **Appendix 1**.

The site incorporates easements which run along the southern boundary of the subject site as follows:

- Easement marked 'A' to the Distribution Lessor Corporation; and
- Easement marked 'B' to the Minister for Infrastructure.

The Certificate of Title also includes the following note which relates to site contamination:

"Application pursuant to section 103P(2) of the Environment Protection Act 1993 noting that the site contamination audit report has been prepared in respect of the within land"

Environmental considerations are discussed in detail within Section 6.13 of this statement.

Figure 3.1 Site and Surrounds Image

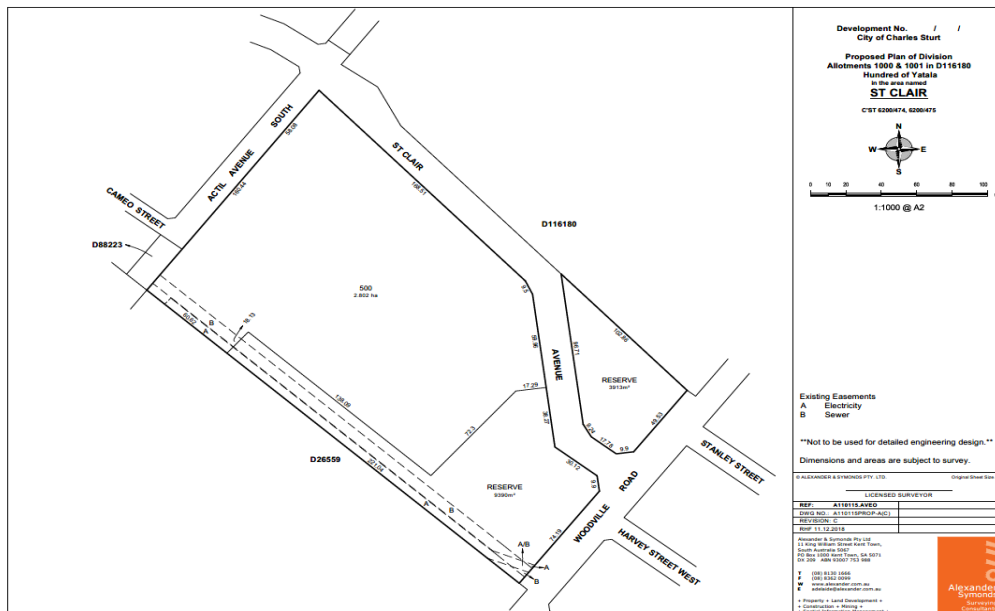


The development site comprises a total area of 28,016m² and the site survey attached as **Appendix 2** indicates that the land is relatively flat, but for a minor fall towards the northern corner. Site levels vary between approximately 9.2 metres and 7.9 metres Australian Height Datum (AHD).

Tree Survey carried out by Tree Environs (**Appendix 5**) confirms that the allotment accommodates 32 trees, including fifteen (15) Regulated Trees and ten (10) Significant Trees. The majority of these are located along the southern boundary of the site (adjacent the railway corridor), and towards the front of the allotment (adjacent the frontage to Woodville Road). Notable vegetation also runs along the sites frontage to Actil Avenue South. However, the majority of this vegetation consists of non-regulated trees, located on an earth mound which occupies the frontage to Actil Avenue South. Drawing DA048 of **Appendix 3** identifies the location of all regulated and non-regulated trees situated on the site, together with those Regulated trees overhanging the site.

The site will occupy approximately two-thirds of the allotment, and it is intended that the balance of the allotment comprising an area of 9,390m² will be vested in Council as public open space/reserve. The creation of this open space will form part of a separate Plan of Division¹, which will also seek to create two separate allotments for the Retirement Village and Nursing Home. Lot 1001 comprising an area of 3913m² is also to be vested in Council as public open space. The intended location and configuration of the proposed open space is illustrated in **Figure 3.2** below.

Figure 3.2 Future allotment and reserve configuration (proposed)



Source: Alexander Symonds

¹ Council has expressed their in-principle support for the creation of the public open space.

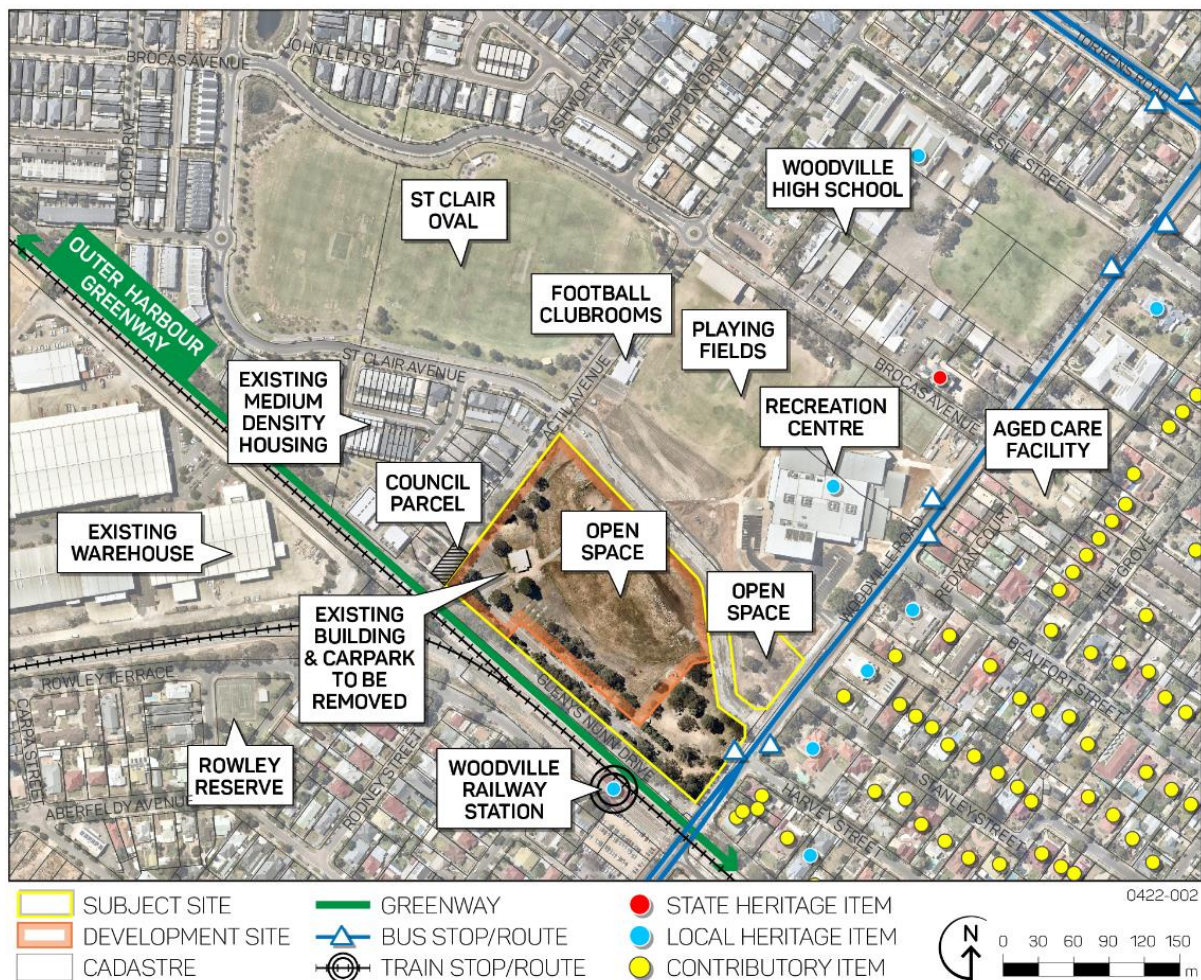
A roadway (which is in private ownership and was formerly referred to as Glynis Nunn Drive) runs along the western boundary of the site and connects with an existing carpark occupying the north-western corner of the allotment. Directly to the east of the carpark is a vacant building which was previously used as sporting clubrooms. Other minor site improvements include three (3) cricket nets, public toilets, barbeque facilities and playground equipment situated within the future reserve fronting Woodville Road.

3.2 The Locality and Surrounding Development

3.2.1 Surrounding Land Uses and Features

Existing land uses found within the locality are demonstrated spatially in *Figure 3.3* below.

Figure 3.3 Surrounding Land Uses



The broader locality is characterised by a mixture of residential, community, recreational, commercial and educational uses.

Land situated to the south-west of the site, on the opposite side of the Woodville Railway Station accommodates low density residential development which primarily takes the form of single storey detached

dwellings. Land directly to the north-west of the site (also on opposite side of the rail corridor) accommodates commercial and light industrial development situated within the Urban Employment Zone.

The site is bound by Actil Avenue South to the north-west which provides vehicle access to a combination of one (1) and two (2) storey detached dwellings. Land beyond these adjoining residences accommodates low to medium density residential development including one (1) and two (2) storey detached and semi-detached dwellings, row dwellings and Residential flat buildings. To the north of the site is a large expanse of open space accommodating several soccer pitches and a cricket pitch.

Land located on the opposite side of the St Clair Avenue extension accommodates a variety of community and recreational uses including the St. Clair Recreation Centre, Vipers football clubrooms and a sporting oval. Land beyond these adjoining uses accommodates low density residential development, and the Woodville High School.

Land adjoining the site to south-east (on the opposite side of Woodville Road) primarily accommodates low density residential development in the form of one (1) and two (2) storey detached dwellings, together with a Place of Worship and a Resthaven Community Services facility.

3.2.2 Surrounding Road Network

The site is bound by Woodville Road to the south-east, St. Clair Avenue to the north-east and Actil Avenue South to the north-west.

Woodville Road is generally aligned in a north-east/south-west direction and accommodates two traffic lanes travelling in each direction. Woodville Road is identified as a 'secondary arterial road', and is estimated to carry in the order of 21,400 vehicles per day.

St. Clair Avenue is generally aligned in a north-west/south-east direction and accommodates single traffic lanes travelling in each direction. To the north-east, the site fronts the recently constructed extension to St Clair Avenue which connects with Woodville Road. The St. Clair Avenue extension accommodates on-street parking, pedestrian pathways, a designated bicycle lane and two pedestrian crossings which connect the subject site to various community and sporting facilities situated on the opposite side of the road. The development will have a primary frontage to St Clair Avenue, with the majority of traffic accessing the development from this road.

Actil Avenue South adjoins the site to the north and is generally aligned in a north-east/south-west direction. The street accommodates on-street parallel parking and also connects with the Outer Harbour Greenway to the south of the site.

3.2.3 Public Transport facilities, Pedestrian and Cycling Infrastructure

The following public transport, pedestrian and cycling infrastructure is situated in close proximity to the subject site:

- Bus Stop 222 is located on Woodville Road, and approximately 150 metres south of the subject site;
- The Woodville Railway Station adjoins the subject site to the south-west and provides a scheduled high frequency service of 15 minutes or less between 7:30am and 6:30pm Mondays to Fridays, and a scheduled service frequency of 30 minutes or less during the evening, and on Saturdays, Sundays and public holidays;
- Pedestrian footpaths are located on both sides of St Clair Avenue and Woodville Road, together with the western side of Actil Avenue South;
- The Outer Harbour Greenway adjoins the site to the south-west and provides a shared pedestrian and cycling path which travels adjacent the Outer Harbour Railway Line, connecting with the Central Business District and the St Clair development to the north of the subject site.
- A cycling path has been recently been constructed on the north-eastern side of the St. Clair Avenue extension.

3.2.4 Local Heritage Items

The location of heritage listed places situated in proximity the subject site is illustrated in **Figure 3.3** above.

Although the site does not accommodate any heritage listed buildings, the following Local Heritage Listed Places are located on land within the general locality of the site:

- The Woodville Railway Station situated to the south of the site;
- The recently constructed St. Clair Youth complex situated to the east (which we understand has been retained and incorporated into the design of the redeveloped St. Clair Recreation Centre);
- A dwelling located at 90 Woodville Road;
- The Ukrainian Catholic Church of St Volodymyr and Olha located at 92A Woodville; and
- A former dwelling which now forms part of the Resthaven Community Services facility located at 96 Woodville Road.

A number of contributory items are also situated on the opposite side of Woodville Road, and are illustrated in **Figure 3.3**.

4. Proposed Development

4.8 Land Use

The proposed development involves the establishment of a Nursing Home comprising 144 beds, a Retirement Living Development in the form of a Residential Flat Building comprising 341 Independent Living Units (ILU's) together with associated administration and community facilities, basement, semi-basement and at-grade carparking, advertising, landscaped communal open space, a resident swimming pool, fencing, associated earthworks, and the removal of four (4) Regulated Trees (including one [1] Significant Tree).

4.8.1 Retirement Living Development

The retirement living component of the application involves the staged development of a Residential Flat Building accommodating a total 341 dwellings in the form of Independent Living Units (ILU's). Schedule 1 of the Regulations defines a Residential Flat Building as follows:

Residential Flat Building means a single building in which there are 2 or more dwellings, but does not include a semi-detached dwelling, row dwelling or a group dwelling.

All proposed buildings on site will be structurally connected by the basement carpark to form one single building that will also be structurally connected to the Nursing Home via the basement carpark.

Technically, the entire development therefore comprises one large interconnected single building, but for the purposes of this Planning Statement has been described as seven buildings/stages.

The Residential Flat Building will accommodate six (6) different apartment typologies with slight variations also proposed for each apartment type. The apartment typology matrix is provided below in **Table 4.1**.

Table 4.1 Retirement Living (Independent Living Units)

Apartment Type Number	Type	Typical Floor Area (m2)	Typical Balcony Area (m2)	Apartment No. Building 1	Apartment No. Building 2	Apartment No. Building 3	Apartment No. Building 4	Apartment No. Building 5	Apartment No. Building 7	Total of each type
01	2 Beds, 2 Baths	84	8.75	10	20	20			16	66
01A	2 Beds, 2 Baths	84	8.75		10	10	5		10	35
01B	2 Beds, 2 Baths	82	8.75	8			4	9		21
01C	2 Beds, 2 Baths	81	8.75	10	10	10	10	10	6	56
02	2 Beds, 1.5 Baths	76	8.75	8			5	10		23
02A	2 Beds, 1.5 Baths	76	8.75				5			5
03	2 Beds, 1 Bath	74	8.75				5			5
03A	2 Beds, 1 Bath	74	8.75				5			5
04	1 Bed, 1 Bath	62	6.0	5	5	5	5	6	3	29
04A	1 Bed, Study, 1 Bath	62	6.0	5	5	5	6	5	3	29
05	3 Beds, 2 Baths	106	14.2	8	5			5	3	21
05A	2 Beds, Study, 2 Baths	106	14.2			10				10
05B	2 Beds, 2 Baths	96	14.2	5				5		10
05C	3 Beds, 2 Baths	96	14.2		5				3	8
05D	3 Beds, 2 Baths	96	14.2	3						3
05E	3 Beds, 2 Baths	110	11.5					5		5
05F	3 Beds, 2 Baths	100	11.5					5		5
06	2 Beds, 2 Baths	125	8.5				5			5
Total										341

4.8.2 Ancillary community facilities and administration areas

The ground and first floor of Building 1 will accommodate a variety of services and facilities which will be accessible to all residents of the St Clair Integrated Retirement Community.

Resident facilities will include a gymnasium, internal and external dining areas, together with an associated demonstration kitchen for cooking classes, a lounge area together with an associated bar and two rooms designated for arts and craft activities. Level 1 of Building 1 will also accommodate a community library, two (2) consulting rooms, a hair salon and associated amenities.

The ground floor of Building 1 will also be used as an Aveo administration area to support the day to day operations of the development. The internal configuration of the administration area will include a reception area, boardroom, staff room, two sales rooms and office for the village manager. The ground floor of Building 1 will also accommodate the entry lobby, a reception and waiting area, together with associated amenities including storage areas and bathrooms.

4.8.3 Residential Aged Care Facility (Nursing Home)

Building 6 will be used as a Nursing Home comprising a total of 144 resident rooms.

The Nursing Home will be occupied by residents requiring full-time care. A 'Nursing Home' is defined within Schedule 1 of the Regulations as follows:

***Nursing home** means a place for the care of the aged and infirm where no car of outpatients surgery is undertaken.*

4.9 Built Form

Architectural plans together with a design statement prepared by Brown Falconer are attached to the planning statement as **Appendix 3**.

4.9.1 Retirement Living Buildings

As previously discussed, the ILU's will be situated within Buildings 1 to 5 and Building 7.

Buildings 1 to 5 will comprise five (5) storeys and a building height of 17.3 metres above the Ground Floor Level. This height excludes the height of semi basement walls protruding above ground and the height of roof top mechanical plant. Rooftop mechanical plant will be enclosed by 2 metre high mechanical plant screens. Semi basement parking will extend to a maximum height of 1.8 metres above ground level.

Although all buildings will be structurally connected via basement carpark ramps, Buildings 2, 3 and 7 will also be connected via an external link accommodating shared lifts and stairwells. Notwithstanding, these external links will be offset from the primary facades to reduce buildings mass.

Building 7 will also comprise five (5) storeys and a maximum height of 20.5 metres. However, this building will transition down in height to three (3) storeys along the Actil Avenue South frontage, to deliver a built form which is sympathetic with lower scaled residential development found within the adjoining Residential Zone. Perspectives of Buildings 1 and 2 are illustrated in **Figure 4.1** and **Figure 4.2** below.

Figure 4.1 St. Clair Avenue Entry – Building 1 and 2



Figure 4.2 Building 1 Entry



The buildings have been sited and orientated around a 'Central Garden' which is the focal point of the development. Large windows, terraced areas and balconies have been built into the design of each building to

maximise passive surveillance of this open space, encourage community interaction and capitalise on the views of this landscape space.

Each building has been designed with a dual frontage, thereby ensuring that the development is orientated to address public and communal open spaces, the surrounding road network and the railway corridor to the south-west.

A materials pallet for the development is attached as **Appendix 3** (*drawing DA181*).

Each building will be constructed in a variety of different materials and complementary colours to enhance visual interest and create a sense of identity.

External wall cladding will comprise 'brick snap' pre-cast concrete panels and 'form liner' patterned precast panels, finished in warm neutral colours and tones. Variations in designs and colour schemes are proposed for each building to create a sense of individuality.

The buildings have also been designed with a variety of vertical and horizontal building elements including vertical feature screen blades constructed in anodised aluminium, vertically and horizontally proportioned windows and sliding doors which open out onto recessed balconies, horizontal feature framework panels for additional articulation and visual interest and a finned feature entry to define the Porte Cochre.

4.9.2 Nursing Home

The Nursing Home will be located within Building 6.

The Nursing Home will comprise five (5) storeys and a maximum height of 17.3 metres above Ground Floor Level. Mechanical plant will be fixed to the roof of the building and will be enclosed by a high louvred screen extending 2 metres above roof level.

The north-western end of the Building 6 is situated within the Transition Area and accordingly, the building height transitions down in scale to three levels at the interface with Actil Avenue South. The building has been designed to address the at-grade carpark, and the buildings primary entry will be defined by a blade entry structure which is designed with vertical fins which extend across the Porte Cochre and continue to the roof of the building. The vertical fins will be juxtaposed by horizontal precast panels which extend along all building facades. Although access to the site is via the carpark to the east, the building has also be designed to address Actil Avenue South.

A materials palette for the development is attached as **Appendix 3** (*drawing DA215*).

Building materials used for the Nursing Home are similar to those used on the Retirement Village. The ground floor will be constructed in Brick Snap pre-cast concrete to define the buildings podium, with upper levels walls constructed in Former Liner patterned precast concrete panels. Horizontal and vertically proportioned windows enclosed in anodised framework will be used on all elevations to maximise fenestration.

The building will be finished in a variety of warm neutral tones selected to complement the existing residential character of the locality as well as to maximise articulation and visual interest.

A north-eastern perspective of the Nursing Home is illustrated in **Figure 4.3**.

Figure 4.3 *Nursing Home: North-Eastern Perspective*



4.10 Transport, Parking and Access

A comprehensive traffic and parking assessment has been undertaken by GTA Consultants and is attached as **Appendix 6**.

The development will be provided with a total of 416 parking spaces for residents, Aveo employees and visitors. The majority of parking spaces will be provided within basement or semi basement levels. In particular, the basement carparks will be provided with:

- 345 ILU resident spaces (including five disabled parking spaces);
- 50 Nursing Home and visitor parking spaces (including one disabled parking space);
- 25 gopher parking spaces evenly distributed between each Residential Flat Building;
- Two (2) bicycle parking spaces adjacent the entry to the Nursing Home; and
- One (1) bicycle parking spaces adjacent the entry to the Retirement Village.

The basement carpark configuration effectively removes all vehicle traffic from the landscaped spaces to create a highly pedestrianised ground level. Visually, this design feature ensures the majority of vehicle movements and parking spaces are screened from public view. Each basement carpark will be connected by grade compliant vehicle ramps, for improved traffic circulation and basement carparks will be connected to a limited number of at grade spaces including:

- Ten (10) visitor and employee parking spaces servicing the Retirement Living Development and ground floor Aveo administration area; and
- Eleven (11) at-grade visitor parking spaces servicing the Nursing Home.

The at-grade parking spaces will be separated by a central garden, to create a pedestrian orientated environment which has also been designed to accommodate emergency service vehicle movements.

The at-grade parking area servicing the Nursing Home will be accessed via Actil Avenue South, whilst the at-grade parking spaces servicing the Retirement Village will be accessed via a driveway connecting with St Clair Avenue. Ramps connecting with the at-grade carparks will provide access to basement levels. A roller door (or similar) and a swipe card entry facility or remote controlled system will be used to manage access rights to basement levels for each resident, employees, visitors and authorised contractors. In most instances it is anticipated that visitors of both the Nursing Home and Retirement Village will utilise the at-grade carparking rather than basement carparking.

Resident parking will be delivered in stages as described within Section 4.8 of this Planning Statement. The staged provision of resident parking has been carefully designed to ensure each building is provided with sufficient onsite parking for each stage of development.

The largest service vehicle expected to access the site will be a 10 metre long refuse vehicle.

The Nursing Home service yard situated in the western corner of the site will be accessed via a separate service vehicle entry point connecting with Actil Avenue South.

The GTA Report also suggests that the Nursing Home will be accessed by several other service vehicles for the following collections/deliveries:

- Food/kitchen deliveries to occur approximately four (4) times daily;
- Linen collection and deliveries to occur approximately twice weekly; and
- Other miscellaneous deliveries such as courier supplies, medical supplies etc. to occur approximately five (5) times daily.

GTA conclude that the majority of the above-mentioned deliveries and collections will be by light vehicles, and the largest delivery vehicle is not expected to exceed an 8.8 metre Medium Rigid Vehicle (MRV).

The at-grade parking areas will also be provided with designated set down and collection points for community buses and emergency services vehicles, including a Bariatric Ambulance.

Each at-grade parking space and internal pathways meandering through the Central Garden has also been designed to accommodate fire vehicle movements. Swept turning paths for emergency service vehicles are attached as **Appendix 7**.

4.11 Waste Management

Colby Industries have prepared a comprehensive Waste Management Plan which is attached to this report as **Appendix 10. Table 4.2** has been extracted from the Colby Report, and provides a breakdown on the anticipated weekly waste generation rates, collection frequency and collection service provider.

Table 4.2 Waste Storage and bin schedule for Routine Services

Storage Area	Service	Waste volume (L/week)	Collection Point(s)	Service Provider	Collection (No/week) Frequency	Bins collected (up to, per event)			
						No	Size		
Building 1	General Waste	5120	RACF Service Yard	Council	Weekly	5	1,100	L	Skip
	Dry Comingled Recycling	3980				4	1,100	L	Skip
	Food waste*	1490				3	660	L	Skip
	Confidential Paper (At-call)	75		Private	Every 3-4 weeks	1	240	L	MGB
	Medical Waste (At-call)	20			Every 2-4 weeks	1	80	L	MGB
Building 2	General Waste	3600		Council	Weekly	4	1,100	L	Skip
	Dry Comingled Recycling	3000				3	1,100	L	Skip
	Food waste*	1200				2	660	L	Skip
Building 3	General Waste	3300				3	1,100	L	Skip
	Dry Comingled Recycling	2750				3	1,100	L	Skip
	Food waste*	1100				2	660	L	Skip
Building 4	General Waste	2970				3	1,100	L	Skip
	Dry Comingled Recycling	2480				3	1,100	L	Skip
	Food waste*	990				2	660	L	Skip
Building 5	General Waste	3720				4	1,100	L	Skip
	Dry Comingled Recycling	3100				3	1,100	L	Skip
	Food waste*	1240				2	660	L	Skip
Building 7	General Waste	2640				3	1,100	L	Skip
	Dry Comingled Recycling	2200				2	1,100	L	Skip
	Food waste*	880				2	660	L	Skip
RACF (Building 6)	General Waste	12325	RACF Basement	Private	3	5	1,100	L	Skip
	Dry Comingled Recycling	7143			3	3	1,100	L	Skip
	Food waste	2960			3	2	660	L	Skip
	Confidential Paper	420			1	3	140	L	MGB
	Medical Waste	440			1	4	140	L	MGB
	Sanitary Waste (AHP)	1080			2	1	660	L	Skip

Source: Coby Industries Waste Management Report

Retirement living residents, together with staff and/or cleaners of the community centre and ground floor administration area (located within Building 1) will transport waste via internal lifts to the designated bin storage rooms provided within each basement carpark. Each room will be equipped with the following waste bins, in the numbers prescribed in Table 4.1:

- General waste – 1100 litre skip bin;
- Recycling – 1100L skip bin; and
- Food waste disposal – 660 litre skip bin (with compostable bag liner) once this service is eventually provided by Council's waste contractors.

The Nursing Home will also have an appropriately sized bin storage area situated within the basement carpark. Waste will be collected by staff and/or cleaners and transferred to the Nursing Home bin storage room. In addition to general waste, recycling and food waste, waste generated by the Nursing Home will also include confidential paper, medical waste and sanitary waste.

All bin storage rooms have been appropriately sized to accommodate the nature and volume of waste to be generated, according to waste collection frequency. Further, all bin storage rooms will be ventilated with negative pressure to avoid odour build-up and transmission.

Bins associated with the Nursing Home and Retirement Village will be transferred from individual storage rooms to the designated service yard via a bin lift situated within the Nursing Home basement carpark using a motorised tug vehicle, similar to the vehicle displayed in **Figure 4.4** below.

Figure 4.4 Example of a motorised tug



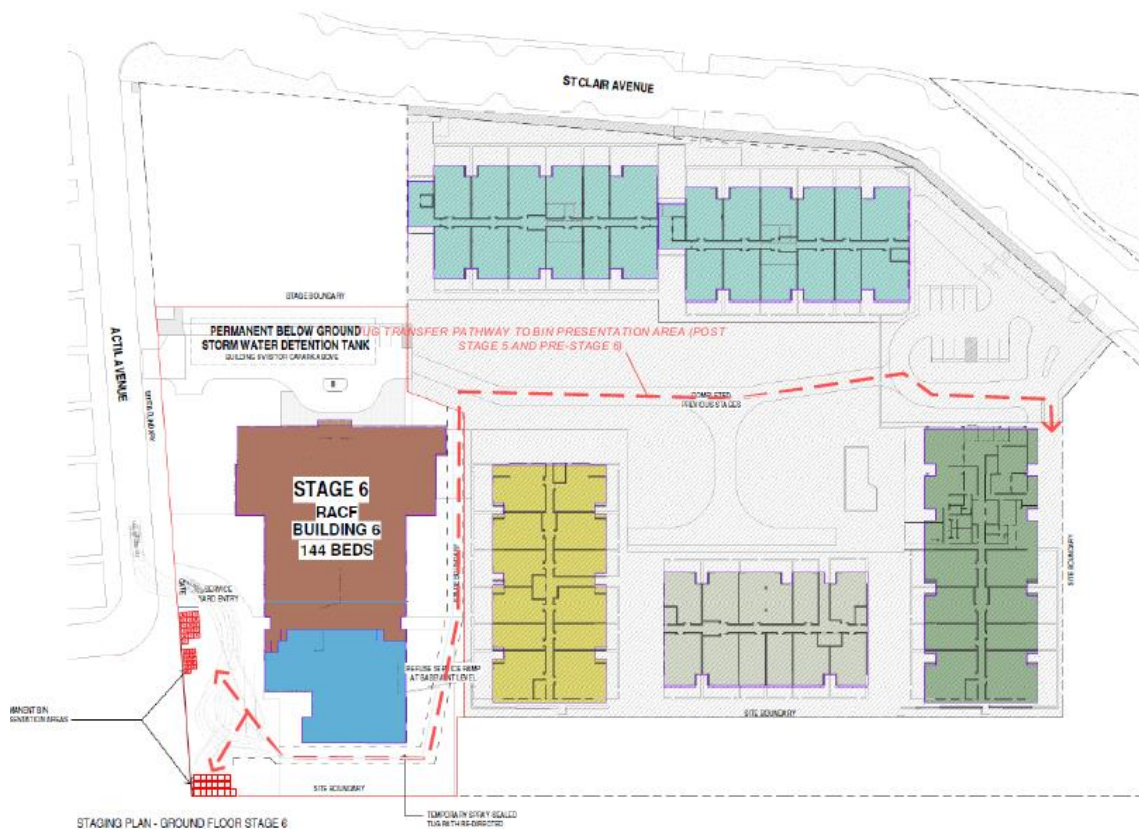
Source: Coby Industries Waste Management Report

Until the Building 6 basement carpark has been constructed, bins collected from Buildings 1 to 5 will be transferred to a temporary bin presentation area situated to the west of the Nursing Home (in the same location as the permanent bin presentation area). The tug vehicle will transfer waste collected from the basements of Buildings 1 to 5, via the Building 1 carpark ramp and a temporary spray sealed transfer pathway to the presentation area.

Following construction of the Nursing Home, the motorised tug will transfer the waste via the basement carparks and bin lift to the permanent bin presentation area.

Figure 4.5 taken from Colby Industries Waste Management Plan illustrates the temporary waste transfer pathway and bin presentation area to be used whilst Stage 6 construction works are taking place.

Figure 4.5 Temporary bin presentation area during Stage 6



Source: Colby Industries Waste Management Plan

It is noted that the modifications to the location of the temporary waste transfer pathway will need to be made to accommodate various stages of the development. The design and location of each temporary waste transfer pathway is illustrated in the GTA Traffic Impact Assessment. We also note that the temporary waste transfer pathways and temporary bin presentation area will be constructed in spray sealed bitumen to assist with the management of dust.

The anticipated frequency of each service is articulated in **Table 4.2** above. It is expected that waste generated by the operation of the Retirement Village (Buildings 1 to 5 and Building 7) will be collected by Council's waste contractor. Waste generated by the operation of the Nursing Home (Building 6) will be collected by a private contractor.

The basement carpark of Building 7 has also been designed with a designated vehicle and bin washdown area. Until such time that Building 7 is constructed, bin cleaning services will out-sourced to an external consultant.

4.12 Stormwater Management

A conceptual Stormwater Management Plan has been prepared by Greenhill Engineers, and is attached to this report as **Appendix 9**.

Surface and roof water collected from Stages 1 to 5 will initially discharge into a temporary detention basin. The temporary detention basin will eventually be replaced with a formal underground detention, which is to be installed as part of the Stage 6 construction works. The detention tank will be designed to limit stormwater discharge rates during the 1 in 100 year Annual Recurrence Interval (ARI) to pre-development 1 in 100 year ARI flows.

The drainage system also includes the installation of a Gross Pollutant Trap (i.e. Ecosol GPT 4300 or similar) to maintain water quality.

4.13 Open Space, Landscaping and Public Realm

4.13.1 Regulated and Significant Tree Removal

The tree survey prepared by Tree Environs (**Appendix 5**) confirms that the allotment accommodates 32 trees, including 15 Regulated Trees and Ten (10) Significant Trees.

Although the development has been carefully designed to retain the majority of the trees located on the site, the application does involve the removal of three (3) Regulated Trees and one (1) Significant Tree including:

- **Significant Tree 20:** Ficus Macrophylla (Moreton Bay Fig)
- **Regulated Tree 21:** Corymbia Maculata (Spotted Gum)
- **Regulated Tree 23:** Pinus Halepensis (Aleppo Pine)
- **Regulated Tree 24:** Eucalyptus Spathulata (Swamp Mallet)

Additional trees are to be removed, however none of these are Regulated under the Development Act.

Images of each of the Regulated and Significant Trees proposed to be removed are displayed in **Figures 4.6** below.

Figure 4.6 Regulated and Significant Trees to be Removed

Tree 20: Ficus Macrophylla (Moreton Bay Fig)



Tree 24: Eucalyptus Spathulata (Swamp Mallett)



Tree 21: Corymbia Maculata



Tree 22: Pinus Halepensis



4.13.2 Communal Open Space, Landscaping & Fencing

A comprehensive Landscape Master Plan has been prepared by Greenhill, and is attached to this Planning Statement as **Appendix 4**.

A key design feature of the development is the large area of communal open space, designed to significantly enhance amenity, encourage resident interaction and create a highly permeable pedestrian environment.

Landscaping will be grouped into zones according to function. Each building will overlook a Central Garden designed to deliver a picturesque outlook from courtyards and balconies, and will also accommodate a variety of activity zones for residents, including a sensory garden, resident swimming pool and entertainment area, family barbeque areas, a communal vegetable garden and a grassed multi-function area to be used for a variety of recreation and leisure activities. Three (3) separate dementia sensory gardens will also be exclusively available for residents of the Nursing Home.

Landscape treatments will be installed along the St Clair Avenue frontage to screen the semi-basement parking, provide privacy to ground floor courtyards and delineate public and private spaces.

At-grade parking spaces will also be extensively landscaped with a selection of low maintenance trees and shrubs, designed to soften the visual impact of hard stand areas.

Finally, a combination of taller trees and shrub planting will be placed along the frontage to Actil Avenue South to create a visual buffer at the interface with adjacent residential development.

A Fencing and Screening Plan forms part of the Landscape Master Plan (Dwg. SK003 of **Appendix 4**). Ground level courtyards, communal open space areas and services areas will be enclosed by various forms of fencing including:

- Colorbond® fencing constructed to heights of 1.8 metres and 2.4 metres to enclose the Dementia Sensory Garden; and the bin presentation area;
- 1 metre high open style fencing to enclose ground floor courtyards whilst still accommodating views for passive surveillance;
- 1 metre high hand rails to be installed along pedestrian pathways;
- 1.8 metre high privacy screens to be installed between courtyards; and
- 1.8 metre high open style fencing to enclose the Central Garden.

Figure 4.7 provides images of the various fencing types proposed for the development.

Figure 4.7 Proposed fencing styles



4.13.3 Site Permeability

The Landscape Masterplan in **Appendix 4** includes a Movement and Wayfinding Plan (Drawing SK002).

Footpaths will traverse open areas, connecting each building, maximising permeability and connecting the site with the adjacent railway corridor (including the Outer Harbor Greenway) and the St Clair Recreation Centre situated to the north-east of the site.

As previously discussed, the main pedestrian pathway traversing the Central Garden has also been designed to accommodate emergency service vehicle access.

Wayfinding and signage will be installed throughout the communal open space area to improve navigation for residents and visitors alike.

4.13.4 Public Realm Improvements

A pedestrian pathway is proposed to be installed by Aveo within the public realm along the southern alignment of St Clair Avenue. This pathway will connect with proposed internal pathways within the site together with the existing footpath on the western side of St Clair Avenue.

The footpath will be constructed in stages commensurate with construction of Buildings 1, 2 and 7.

A separate consent from Council is required to construct the footpath, pursuant to Section 221 of the *Local Government Act 1999*.

4.14 Advertising

A comprehensive signage plan has been prepared for the development, and is attached as **Appendix 11**.

Six (6) signage types are proposed, including:

- A **Type 1** Entry feature signage attached to the base of the Porte Cochre;
- Two (2) **Type 2** corner feature wall signs to be installed at the St Clair Avenue/Actil Avenue South intersection and at the entry with to the Nursing Home carpark;

- Twenty-six (26), **Type 3** flag poles constructed to a height of five (5) metres, with 2 metre high by 0.75 metre wide flags and spaced ten (10) metres apart;
- Three (3) **Type 4** illuminated 'Aveo' signs attached to the facades of Building 1, 2 and 3;
- A **Type 5** double sided, five (5) metre high pylon located at the entry the at-grade carpark servicing the Retirement Village;
- Four (4) **Type 6** banner signs attached to the semi basement walls of Buildings 1, 4 and 5.

4.15 Staged Construction

Given the scale of the project, the development is proposed to be constructed in stages. Accordingly, separate Building Rules Consents and staged Development Approvals will be sought for each stage.

The proposed staging arrangement for each building is illustrated in Drawings DA160 to 176 and is summarised below in **Table 4.3**.

Table 4.3 Staging Plan

Stage	Description of works
1	<ul style="list-style-type: none"> • Building 1 • Swimming pool and landscaped area surrounding swimming pool including pedestrian pathway • Landscaping and fencing surrounding the building and carpark • St. Clair Avenue access and parking area • Bin presentation area/loading zone & screen fencing • Temporary detention basin • Council footpath along part of St. Clair Avenue • Removal of Trees 20, 21, 22 & 24
2	<ul style="list-style-type: none"> • Building 2 • Landscaping and fencing surrounding the building and internal pedestrian pathway extension
3	<ul style="list-style-type: none"> • Building 3 • Landscaping and fencing surrounding the building and pedestrian pathway extension • Extension of proposed Council footpath
4	<ul style="list-style-type: none"> • Building 4 • Landscaping and fencing surrounding the building and pedestrian pathway extension
5	<ul style="list-style-type: none"> • Building 5 • Landscaping and fencing surrounding the building • Realignment of the temporary spray-sealed refuse transfer path
6	<ul style="list-style-type: none"> • Building 6 (Nursing Home Building) • New visitor parking area • Installation of permanent below ground detention tank • Landscaping and fencing surrounding the building • Realignment of the temporary spray-sealed refuse transfer path • Adjustments to existing bin presentation area (following construction of Nursing Home)
7	<ul style="list-style-type: none"> • Building 7 • Landscaping and fencing surrounding the building • Completion of Council footpath

Staged development approvals are also likely to be sought for individual components of each proposed building such as piling, capping beams, bulk excavation, sub-structure / super structure and architectural and services fit out.

4.16 Operative Period of Consent

Given the scale of the overall project, the applicant seeks an extension to the operative period of consent for the development to facilitate the staged construction of the project.

In particular, it is requested that the period prescribed under Regulation 48(1)(b)(i) of the Regulations for the substantial completion of the project be extended to a period of 10 years from the operative date of the Development Plan Consent.

Taking into consideration the scale of the development the extended timeframe required for the development works to be substantially completed is reasonable. It is anticipated that each stage of construction will occur every 1 to 1.5 years (subject to market demand for ILU's).

5. Procedural Requirements

5.8 Relevant Authority

By letter dated 13 August 2018, Mark Williams (Acting State-Coordinator-General) confirmed that the State Commission Assessment Panel (SCAP) would be the Relevant Authority responsible for the assessment of the development, in accordance with Schedule 10 cl. 20 of the Regulations.

5.9 Nature of Development and Assessment Pathway

The proposed development is perhaps best described as a staged Aged Care and Retirement Living development in the form of a Nursing Home comprising 144 beds, a Retirement Living Development in the form of a Residential Flat Building comprising 341 Independent Living Units with associated administration and community facilities, car parking, advertising, landscaping, a resident swimming pool, fencing, associated earthworks and the removal of four (4) Regulated Trees (including one [1] Significant Tree)

All elements of the development are neither listed as ‘complying’ or ‘non-complying’ within the District Centre Zone of the Development Plan. Accordingly, the application is a ‘**Consent**’ development to be assessed on merit against the relevant provisions of the Development Plan.

5.10 Public Notification

The subject site is located within the District Centre Zone, but is adjacent to land which is located within the Residential Zone, Residential Character and Industry Zone. Accordingly, pursuant to Schedule 9, Part 2, cl. 18(c) of the Development Regulations, the development is subject to Category 2 public notification given the development involves the construction of a building on a site that is adjacent to land which is located within a different zone.

5.11 Agency Referrals

The proposed development involves the provision of affordable housing (applying the criteria determined under regulation 4 of the *South Australian Housing Trust (General) Regulations, 1995*) and the development will therefore require referral to the Minister Administering the *Housing and Urban Development (Administrative Arrangements) Act, 1995* via **Renewal SA**.

In accordance with Regulation 38(2)(b), the State Planning Commission (SPC) is also required to consult with the **City of Charles Sturt**.

6. Development Plan Assessment

6.8 Overview

The subject land is located within the City of Charles Sturt and accordingly, the proposed development must be assessed against the Charles Sturt Council Development Plan (Consolidated 13 September 2018).

The subject land is located within **Precinct 21 Railway Station** and **Woodville Policy Area 5** of the **District Centre Zone**. The subject site is also located within the 'Core' and 'Transition' Areas, as illustrated on *Concept Plan Map ChSt/24: Precinct 21 Railway Station*. **Figure 6.1** shows the relevant Zoning and Policy Areas for the subject site and the surrounding land.

Figure 6.1 Zoning and Policy Areas



Although the site is located within Precinct 21 Railway Precinct, Precinct Map ChSt/9 refers to Precinct 21 Recreation/Education. We note that during the first Prelodgement Planning meeting, all parties acknowledged the error within the Development Plan and agreed that the application should be correctly assessed against the Precinct 21 Railway Precinct provisions.

The following Development Plan provisions are considered most pertinent to the assessment of this application:

ZONE		
District Centre Zone	Woodville Policy Area 5	Precinct 21 Railway Precinct
OBJ: 1, 2 & 3	OBJ: 1, 2, 3, 5 & 7	PDC: 16, 17, 18, 19, 20, 21, 22, 23, 24,
PDC: 1, 3, 4, 5, 6, 7, 8, 9 & 10	PDC: 1, 2, 3 & 4	25, 26, 27, 28, 29, 31, 32, 33, 34, 35,
	Desired Character Statement	36, 37, 38, 40, 42, 43, 45, 46, 47, 48 & 49
GENERAL SECTION		
Centres and Retail Development	Crime Prevention	Design and Appearance
OBJ: 1, 2, 3, 4 & 5	OBJ: 1	OBJ: 1 & 2
PDC: 1, 2 & 3	PDC: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13 & 14	PDC: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 & 21
Energy Efficiency	Hazards	Heritage Conservation
OBJ: 1 & 2	OBJ: 7 & 8	OBJ: 1
PDC: 1, 2, 3, 4 & 5	PDC: 12	PDC: 1
Heritage Places	Infrastructure	Interface between Land Uses
OBJ: 1 & 2	PDC: 1 & 4	OBJ: 1 & 2
PDC: 7		PDC: 1, 2, 3, 4, 5 & 6
Landscaping, Fences and Walls	Medium and High Rise Development (3 or more storeys)	Natural Resources
OBJ: 1 & 2	OBJ: 1, 2 & 4	OBJ: 1, 2, 3, 5, 6, 7, 9 & 10
PDC: 1, 2, 3, 4 & 5	PDC: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15	PDC: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15 & 16
Open Space and Recreation	Orderly and Sustainable Development	Regulated Trees
OBJ: 1, 2, 3 & 4	OBJ: 1, 3, 4 & 6	OBJ: 1 & 2
PDC: 1, 2, 3, 5, 8 & 12	PDC: 1, 3 & 8	PDC: 1, 2 & 3
Residential Development	Significant Trees	Supported Accommodation, Housing for Aged Persons and People with Disabilities
OBJ: 1, 2, 3 & 5	OBJ: 1 & 2	OBJ: 1
PDC: 1, 3, 4, 5, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26 & 28	PDC: 1, 2, 3 & 4	PDC: 1, 2, 3, 4, 5 & 6

Transportation and Access

OBJ: 2 & 4

PDC: 1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 30, 34, 35, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49 & 55

Waste

OBJ: 1 & 2

PDC: 2, 5 & 6

Affordable Housing Overlay

OBJ: 1 & 2

PDC: 1

Advertisements

OBJ: 1, 2 & 3

PDC: 1, 2, 3, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16 & 19

Noise and Air Emissions Overlay

OBJ: 1

PDC: 1

TABLES AND MAPS

Concept Plans

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The following provides an assessment of the proposed development against the more relevant Development Plan provisions.

6.9 Land Use

The following objectives and PDC's are particularly relevant to the assessment of each proposed land use:

District Centre Zone

Obj 1: *A centre that accommodates a range of retail facilities, offices, consulting rooms, and cultural, community, public administration, entertainment, educational, religious and residential facilities to serve the community and visitors within the surrounding district distributed across five distinct centres within the following suburbs....Woodville*

PDC 1: *The following forms of development are envisaged in the zone*

- *Affordable housing in **Precinct 21 Railway Station***
- *Aged care accommodation*
- *Residential flat building in **Precinct 21 Railway Station***

Woodville Policy Area 5

PDC 2 *A large mix of activities including medium and high density housing supported by a mix of compatible land uses to make use of the public transport facilities serving the centre.*

PDC 3 *The concentration of activities of office, retail, restaurant and residential activities between Port Road and the rail station around the Civic Centre and in the Core Area within Precinct 21 Railway Station as shown on Concept Plan Map ChSt/24 - Precinct 21 Railway Station.*

PDC 17 *The following types of development, or a combination thereof, are envisaged in the precinct as identified on Concept Plan Map ChSt/24 - Precinct 21 Railway Station:*

Core Area

- Affordable housing
- Aged persons accommodation
- Residential Flat Building
- Retirement Village
- Supported accommodation

Transition Area

- Affordable housing
- Aged persons accommodation
- Residential Flat Building
- Retirement Village
- Supported Accommodation

PDC 22 *Development should primarily take the form of:*

(a) in the Core Area - residential flat buildings, row dwellings, non-residential buildings and buildings comprising two or more land uses with non-residential land uses on the ground floor

(b) in the Transition Area - residential flat buildings and row dwellings, with small scale shops and offices.

The following extract from Woodville Policy Area 5 Desired Character Statement provides further guidance on the desired land use outcomes contemplated for the Precinct:

The Railway Station precinct will feature an attractive, high-quality mix of medium to high density with a range of cafes, shops and offices and quality public open spaces focused around a bustling and revitalised Woodville Railway Station.

and:

Residential development will be restricted to the Core Area and Transition Area as shown on Concept Plan Map ChSt/24 - Precinct 21 Railway Station and will include a variety of adaptable housing types that cater for a range of household types, ages and life cycle stages, including residential flat buildings and row dwellings, aged and student accommodation and serviced apartments.

In alignment with the above-mentioned provisions, the development involves the establishment of an Aged Care facility (Nursing Home) and Retirement Living development (Residential Flat Buildings comprising ILU's).

The subject site is located within an 'Affordable Housing Designated Area'. Pursuant to the 'Affordable Housing Overlay' the relevant provisions of the Affordable Housing Overlay state:

OBJ 1 *Affordable housing that is integrated into residential and mixed use development.*

PDC 2 *Development that comprises a range of affordable dwelling types that cater for a variety of household structures.*

PDC 1 *Development comprising 20 or more dwellings should include a minimum of 15 per cent affordable housing unless the development is to occur in stages and it can be demonstrated that any shortfall in affordable housing from any stage of development will be accommodated in another stage or stages.*

In accordance with the Affordable Housing Overlay, the development is proposed to deliver a minimum 15% of housing product as Affordable Housing. In accordance with the Affordable Housing Gazette notice (*Determination of Criteria for the Purposes of the Concept of Affordable Housing, Regulation 4 of Development Act 1993*) affordable housing will be secured by a legally binding agreement with Renewal SA to confirm the commitment to deliver 15% affordable housing in the proposed development.

As previously discussed, the subject site is located within the 'Core' and 'Transition' Areas of the Railway Station Precinct, and Policy Area PDC 17 provides guidance on the land use outcomes specifically envisaged for these areas. Affordable housing, aged persons accommodation, supported accommodation, retirement villages and residential flat buildings are all listed as envisaged land uses for the 'Core' and 'Transition' areas.

Figures 6.2 and **6.3** have been sourced from the Australian Bureau of Statistics and indicate that the Charles Sturt population aged 50 years and over is on the rise, and exceeds the statistical average for greater Adelaide. Accordingly, the development will provide both low and high dependency housing options to cater for the local aging population.

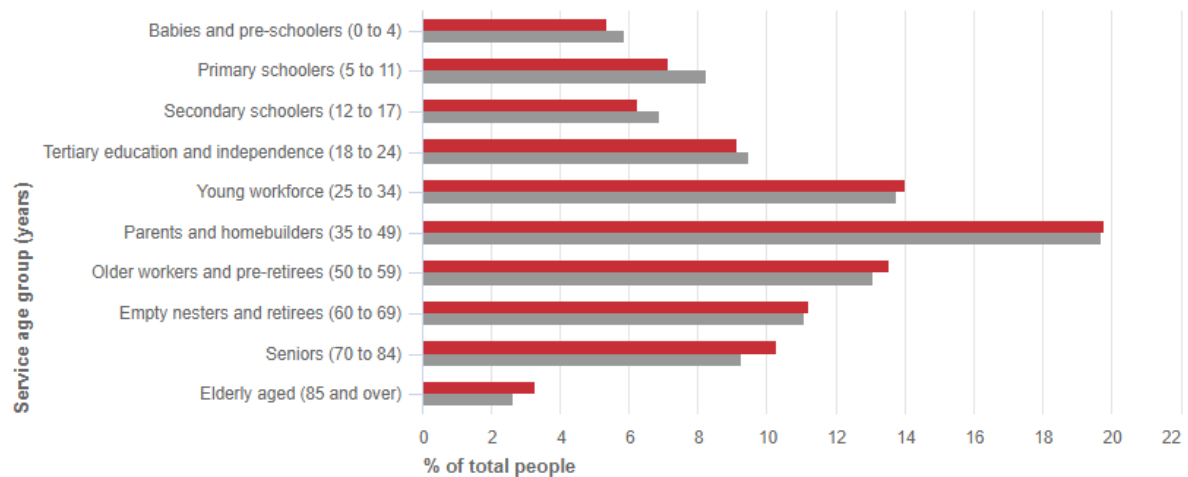
Figure 6.2 Age Structure for the City of Charles Sturt

Age structure - service age groups, 2016

export

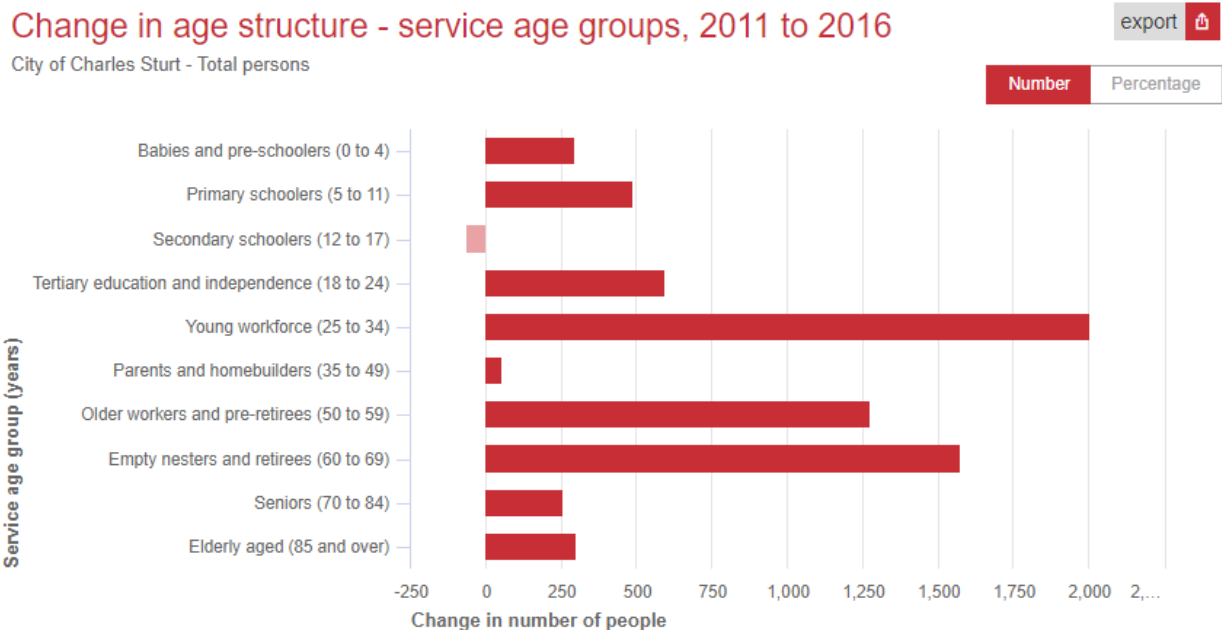
Total persons

City of Charles Sturt Greater Adelaide



Source: ABS. Census of Population and Housing, 2016, compiled by profile i.d. and presented on the City of Charles Sturt Website

Figure 6.3 Change in age structure for the City of Charles Sturt



Source: ABS. Census of Population and Housing, 2016, compiled by profile i.d. and presented on the City of Charles Sturt Website

The ground floor of Building 1 will also accommodate a range of facilities and services to support the intended use of the site for aged care and retirement living. Such services and facilities will include an Aveo office/administration area, a lounge and bar area, café, gymnasium and library. The provision of these services and facilities is highly aligned with the Supported Accommodation provisions of the Development Plan, and in particular, PDC 1:

PDC 1 *Supported accommodation (including nursing homes, hostels, retirement homes, retirement villages, residential care facilities and special accommodation houses) and housing for aged persons and people with disabilities should be:*

(a) located within walking distance of essential facilities such as convenience shops, health and community services and public and community transport

Other complementary services and facilities in close proximity to the site include the adjoining Woodville Train Station, Outer Harbor Greenway (providing bicycle and pedestrian pathways) proposed public open space adjoining the site to the south and the St Clair Recreation Centre (currently under construction).

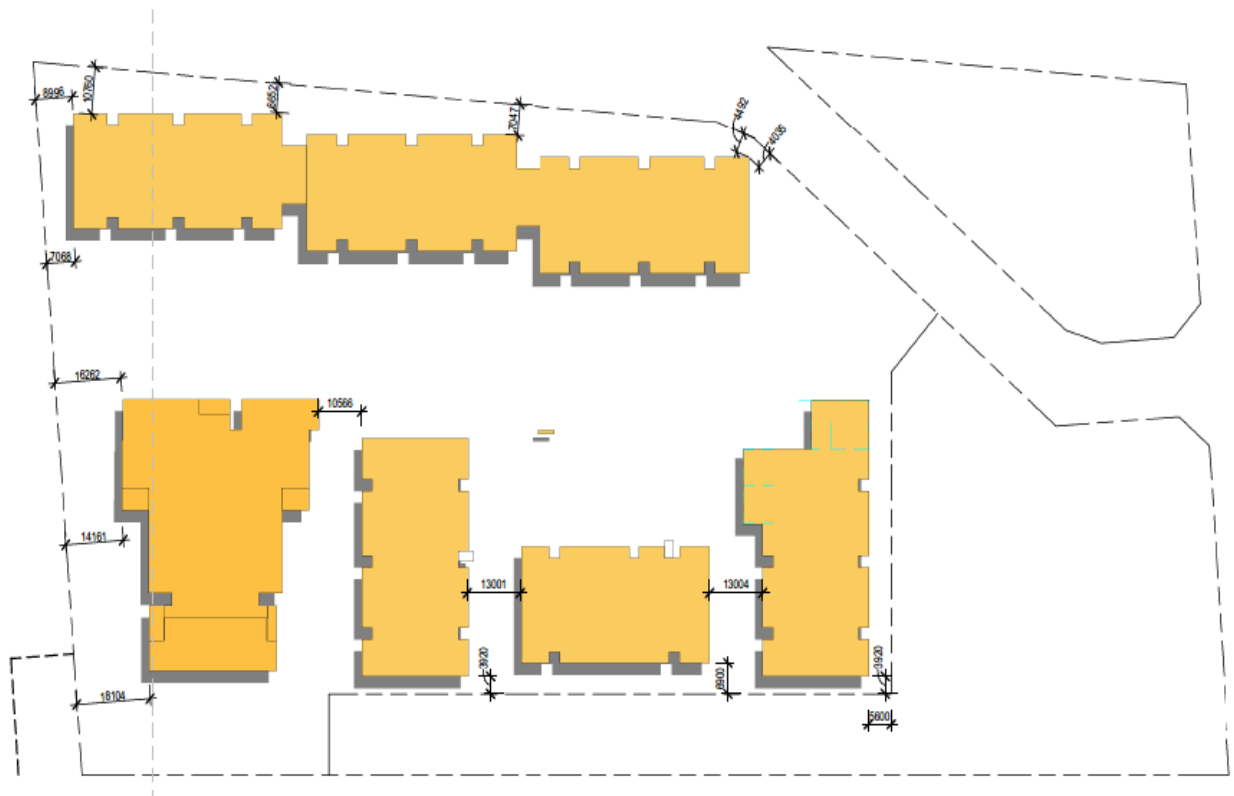
The proposed use of the land for aged care and retirement living is therefore highly aligned with the relevant land use provisions of the Development Plan.

6.10 Building Design

6.10.1 Setbacks and Orientation

Buildings 1 to 5 and the south-eastern end of Building 7 are located within the 'Core' Area, and will have a primary frontage to St Clair Avenue. The Nursing Home and the north-western end of Building 7 is situated within the 'Transition' Area and will have a primary frontage to Actil Avenue South. Proposed building setbacks are displayed in **Figure 6.4**.

Figure 6.4 *Building setbacks (excluding basement levels)*



Source: Brown Falconer Architectural Plans

Policy Area PDC 43 prescribes a minimum primary frontage setback of 3 metres for buildings situated within the Transition Area. Although the Development Plan does not stipulate minimum setback from primary frontages for buildings located within the Core Area, the Desired Character Statement for the Precinct suggests that larger buildings should “*frame the street by being aligned close to the street*”.

Policy Area PDC 34 also suggests that new buildings should be designed to address public open spaces and defined pedestrian and cycling routes.

The Nursing Home and Building 7 will be set back 14.1 metres and 7 metres respectively from Actil Avenue South. The generous setbacks proposed will satisfy the Development Plan intent of minimising the visual impact of development on existing residential properties situated within the adjoining Residential Zone to the north.

Buildings 2, 3 and 7 will address St. Clair Avenue, and ground level courtyards extending toward St. Clair Avenue will be enclosed by landscaping and raised garden walls which will frame the street and create the desired 'urban edge' envisaged by the Development Plan.

In accordance with Policy Area PDC 34, Building 1 will address future open space and Woodville Road to the south-east, whilst Building 4 will be orientated to address Outer Harbor Greenway adjoining the site to the south-west.

In addition, each building faces into the site, providing views of the Central Garden and maximising opportunities for passive surveillance of communal open space.

For reasons outlined above, the development has been designed to achieve the relevant Development Plan provisions relating setbacks and building orientation.

6.10.2 Building Height, Scale and Density

The subject site is located at the interface with the Residential Zone to the north-west, where lower density residential development exists. The following extract from the Precinct 21 Railway Station Desired Character provides guidance on the desired built form outcome contemplated at this interface:

To minimise the impacts on development in adjacent zones, the land to the south west of the new collector road (St Clair Avenue) within the precinct will be developed as a more intensive core separated from nearby lower density residential zones by a less intensely developed area as illustrated in Concept Plan Map ChSt/24 - Precinct 21 Railway Station.

and

Development in the Core and Transition Areas will be within defined building envelopes that manage the location and scale of buildings to achieve high quality urban design. Buildings at the interface of the precinct will create an appropriate transition of development scale and massing.

The following Policy Area provisions relate to building height and scale, and are intended to achieve the above-mentioned desired outcomes:

PDC 40 *Except where airport building height restrictions prevail or PDC 41 or 42 apply, building heights (excluding any rooftop located mechanical plant or equipment) should be consistent with the following parameters:*

Designated area	Minimum building height	Maximum building height
Core Area	No minimum	5 storeys and up to 20.5 metres
Transition Area	No minimum	5 storeys and up to 20.5 metres

PDC 42 *Building development fronting Actil Avenue should be a maximum of 3 storeys in height.*

Each building has been designed to satisfy the maximum building heights prescribed within PDC 40, with buildings transitioning down in scale from five (5) storeys within the 'Core Area', to three (3) storeys within the 'Transition Area', to achieve a highly compatible building scale, sympathetic to the scale of lower density residential development situated on the opposite side of Actil Avenue South. **Figure 6.5** provides a perspective of the proposed built form relative to existing residential development along Actil Avenue South.

Figure 6.5 Actil Avenue South/St Clair Avenue Building Perspective



Source: Brown Falconer Architectural Plans

Policy Area PDC 28 states that “residential development should aim to achieve a minimum net residential density of 70 dwellings per hectare in the Core and 60 dwellings per hectare in the Transition Area”. The development involves the creation of 341 dwellings (ILU’s) on a site comprising 28,016m². The development will therefore achieve a net density of approximately 121 dwellings per hectare, which satisfies the minimum net density outcome prescribed by the Development Plan.

Further to the above discussion, the development is closely aligned with the relevant built form and density provisions of the Development Plan. In particular the development will achieve a building scale and height which accords with the Development Plan, whilst achieving a medium density outcome which comfortably exceeds the desired minimum density envisaged for the Precinct.

6.10.3 External Finishes and Appearance

The following Development Plan provisions are particularly relevant to the assessment of the building design and appearance:

Woodville Policy Area 5

PDC 32 *In the Core Area the ground and first floor of buildings of 4 or more storeys should be built:*

- (a) to dimensions to allow for adaptation to a range of land uses, including retail, office and residential without the need for significant change to the building*
- (b) so that the ground floor primary frontage of buildings is visually permeable, transparent or clear glazed to promote active street frontages and maximise passive surveillance.*

PDC 36 *Buildings should feature contemporary designs that are reflective of the existing character of Woodville by:*

- (a) including walls above ground level that achieve a high 'solid to void' ratio*
- (b) using building materials such as brick, timber and corrugated iron.*

PDC 37 *Street facades should have a strong sense of verticality and visual interest with buildings sited close to the street and incorporating both (a) and (b):*

- (a) balconies and verandas or awnings to provide pedestrian shelter*
- (b) a diversity of materials, roof styles and fenestration.*

General Section: Design and Appearance

OBJ 1 *Development of a high architectural standard and appearance that responds to and reinforces positive aspects of the local environment and built form.*

PDC 1 *Buildings should reflect the desired character of the locality while incorporating contemporary designs that have regard to the following:*

- (a) building height, mass and proportion*
- (b) external materials, patterns, colours and decorative elements*
- c) roof form and pitch*
- (d) façade articulation and detailing*
- (e) verandas, eaves, parapets and window screens.*

PDC 4 Structures located on the roofs of buildings to house plant and equipment should be screened from view and form an integral part of the building design in relation to external finishes, shaping and colours.

PDC 15 Buildings should be designed and sited to avoid extensive areas of uninterrupted walling facing areas exposed to public view.

PDC 18 In mixed use areas, development facing the street should be designed to activate the street frontage(s)

by:

- (a) including features that attract people to the locality such as frequent doors and display windows,
- (b) minimising the frontage for fire escapes, service doors, plant and equipment hatches
- (c) avoiding undercroft or ground floor vehicle parking that is visible from the primary street frontage
- (d) using colour, vertical and horizontal elements, roof overhangs and other design techniques to provide visual interest and reduced massing.

PDC 20 Outdoor storage, loading and service areas should be:

- (a) screened from public view by a combination of built form, solid fencing and/or landscaping.
- (b) conveniently located and designed to enable the manoeuvring of service and delivery vehicles
- (c) sited away from sensitive land uses.

PDC 21 Adequate access should be provided to the rear of any site for servicing purposes, especially where a building does not extend to the rear boundary.

General Section: Medium and High Rise Development (3 or more storeys)

PDC 1 Buildings should:

- (a) achieve a human scale at ground level through the use of elements such as canopies, verandas or building projections
- (b) provide shelter over the footpath where minimal setbacks are desirable

(c) ensure walls on the boundary that are visible from public land include visually interesting treatments to break up large blank façades.

The following extract from the Precinct Desired Character Statement is also particularly relevant to the external appearance and design of buildings:

The design of buildings throughout the precinct will feature contemporary designs which also complement the existing character of Woodville. To achieve this, large expanses of glass above ground level will be avoided through the use of a mixture of solid wall surfaces and recessed balcony and window voids, reflective of existing built forms. Building materials will reflect the existing materials within the locality such as brick, timber and corrugated iron.

A diversity of materials, roofs and fenestration will be utilised to create visual interest.

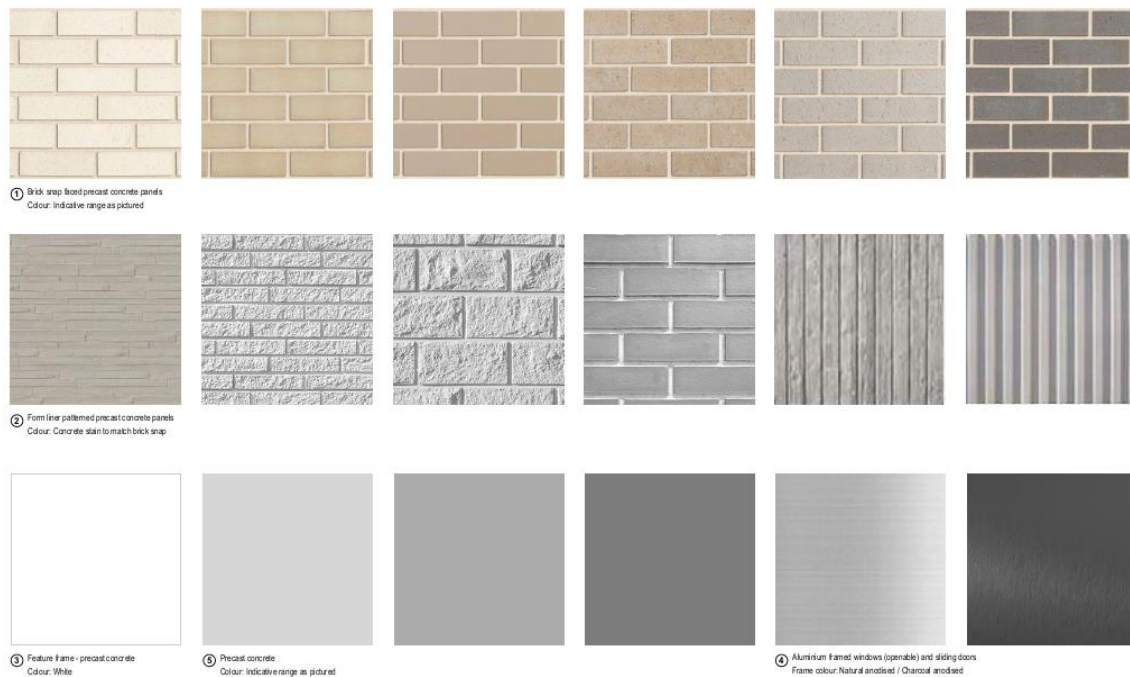
The design of larger and mixed use buildings will feature:

- *buildings that frame the street spaces by being aligned close to the street*
- *buildings that create a strong sense of verticality*
- *buildings that incorporate verandas or awnings to provide pedestrian shelter and balconies, either projecting or recessed, to create light and shade*
- *buildings that have active frontages where the primary entrance is via the street rather than internal arcades*
- *buildings that have strong variation in elevations*
- *buildings with interesting roof shapes and lines.*

Each building has been designed with multiple frontages and all elevations are characterised by high degrees of articulation and fenestration. In accordance with Design and Appearance PDC 15, extensive areas of uninterrupted walling facing the public realm will be absent from the design of each building.

Wall cladding will primarily consist of two forms of pre-cast concrete materials including brick snap faced concrete panels and former line precast concrete panels – a highly durable, unpainted material which is stained to achieve the desired colour effect. Importantly, these pre-cast concrete panels will be finished in a variety of different colours, textures and patterns to achieve a high degree of articulation to all building facades. Each building will be finished in a selection of warm neutral tones, which will be highly compatible with existing residential development found within the locality. The material pallet for the Retirement Village is illustrated in **Figure 6.6 below**. Similar materials also proposed for the Nursing Home.

Figure 6.6 Material Pallet: Pre-cast concrete materials and textures



Source: Brown Falconer Architectural Plans

In accordance with Design and Appearance PDC 1 and PDC 18, additional visual interest will be achieved by using a variety of horizontal and vertical building elements, including pre-cast concrete framework and vertical screen blades to primary facades which will assist to define building entries. Roof overhangs, together with staggered building lines and recessed balconies will also be used to create building depth, and to reduce the apparent scale and bulk of each building when viewed from the public realm.

At ground level, contrasting wall cladding materials and colours and raised concrete garden walls will be used to create a clearly defined podium. This horizontal banding technique has also been used at upper levels to assist with breaking the vertical scale and mass of buildings. In accordance with Policy Area PDC 32, large sliding doors will also open out to ground level courtyards which overlook public spaces to achieve activation and maximise passive surveillance at street level,

At roof level, mechanical plant will be placed towards the centre of each roof, and will be enclosed by louvred screens, as required by Design and Appearance PDC 4.

In our opinion, the development exhibits a high degree of architectural merit which will respond well to the context of the locality and will include appropriate levels of varied (yet complementary) building materials, colours and design features to enhance articulation and visual interest.

6.10.4 Relationship to the Public Realm

The following Development Plan provisions seek to ensure buildings are designed, sited and orientated to achieve strong connections with the public realm:

General Section: Design and Appearance

PDC 13 *Buildings (other than ancillary buildings, group dwellings or buildings on allotments with a battle axe configuration) should be designed so that their main façade faces the primary street frontage of the land on which they are situated.*

PDC 14 *Buildings, landscaping, paving and signage should have a coordinated appearance that maintains and enhances the visual attractiveness of the locality.*

PDC 15 *Buildings should be designed and sited to avoid extensive areas of uninterrupted walling facing areas exposed to public view.*

PDC 16 *Building design should emphasise pedestrian entry points to provide perceptible and direct access from public street frontages and vehicle parking areas.*

PDC 19 *Where zero or minor setbacks are desirable, development should incorporate shelter over footpaths to enhance the quality of the pedestrian environment.*

Woodville Policy Area 5

PDC 32 *In the Core Area the ground and first floor of buildings of 4 or more storeys should be built:*

.....

(b) so that the ground floor primary frontage of buildings is visually permeable, transparent or clear glazed to promote active street frontages and maximise passive surveillance.

PDC 39 *Side streets and rear lane access ways should be designed to:*

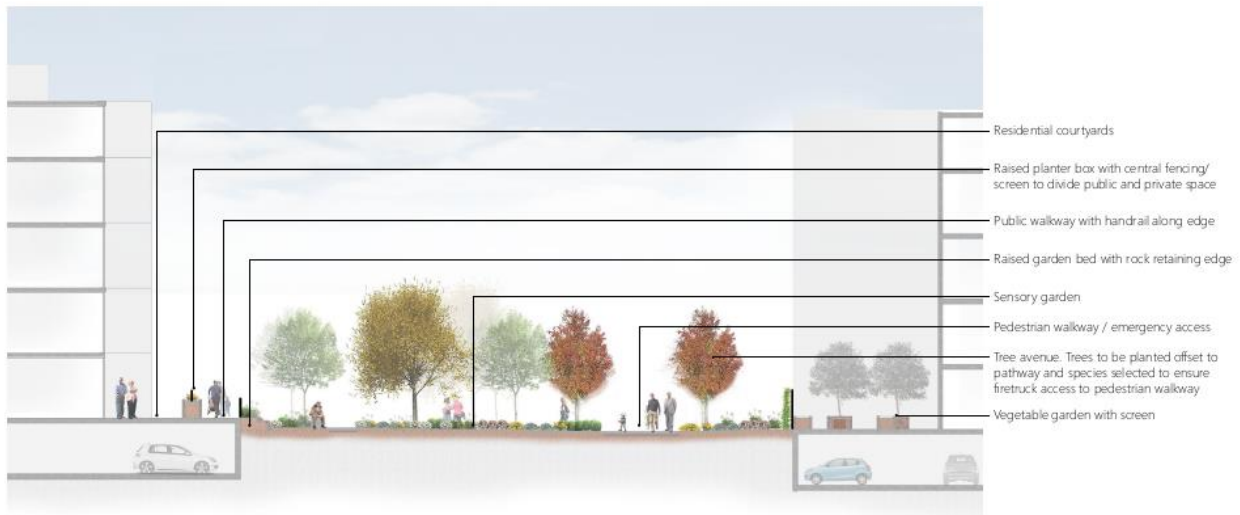
(a) provide space between buildings that reduces building mass and creates a more interesting public realm

(b) achieve active frontages at a lower intensity than the primary street frontage.

As previously discussed, all buildings have been designed with dual frontages to address internal communal space, public streets and other public spaces (i.e. future public open space and the Outer Harbor Greenway). Apartment balconies will overlook these spaces, and ground floor courtyards will extend towards property boundaries to strengthen the connection between public and private realms. In lieu of using solid fencing, the demarcation between private courtyards and public spaces will be achieved through passive design techniques such as landscaping and minor garden walls as indicatively illustrated in **Figure 6.7**. These design initiatives will

create an inclusive environment, enhance the attractiveness of the development when viewed from the public realm, promote active frontages and maximise passive surveillance of public and semi-public spaces.

Figure 6.7 Indicative ground floor cross section



Source: Greenhill Landscape Master Plan

Internally, landscaped spaces will include park benches, shared facilities such as community vegetable gardens, activity spaces, a communal swimming pool and barbeque facilities, which will also encourage interaction between residents.

The development has therefore been designed to positively contribute to the public realm and the location and design of courtyards and landscaping will create an attractive environment which will also encourage social interaction.

6.11 Occupant Amenity

6.11.1 Private & Communal Open Space

Residential Development PDC 13 sets out the more qualitative design provisions with respect to Private Open Space. Residential Development PDC 14, 17 and 18 set out the quantitative requirements relating to the provision of private open space located at ground level (PDC 14) and upper levels (PDC 17).

PDC 13: *Private open space (available for exclusive use by residents of each dwelling) should be provided for each dwelling and should be sited and designed:*

- (a) to be accessed directly from the internal living areas of the dwelling*
- (b) to be generally at ground level (other than for residential flat buildings) and to the side or rear of a dwelling and screened for privacy*
- (c) to take advantage of, but not adversely affect, natural features of the site (d) to minimise overlooking from adjacent buildings*

- (e) to achieve separation from bedroom windows on adjoining sites
- (f) to have a northerly aspect to provide for comfortable year round use
- (g) not to be significantly shaded during winter by the associated dwelling or adjacent development
- (h) to be partly shaded in summer
- (i) to minimise noise or air quality impacts that may arise from traffic, industry or other business activities within the locality
- (j) to have sufficient area and shape to be functional, taking into consideration the location of the dwelling, and the dimension and gradient of the site.

PDC 14: Dwellings should provide private open space in accordance with the following provisions:

Site area per dwelling (square metres)	Minimum area excluding any area at ground level at the front of the dwelling (square metres)	Minimum dimension (metres)	Minimum area to be provided at the rear or side of the dwelling, and be directly accessible from a habitable room (square metres)
<200 or within Integrated Medium Density Policy Area 20	8 where the dwelling has one bedroom or comprises a Studio (where there is no separate bedroom)	2	8
	11 where the dwelling has two bedrooms	2	11
	15 where the dwelling has 3 or more bedrooms	2	15

PDC 17: Dwellings located above ground level should provide private open space in accordance with the following table:

Dwelling type	Minimum area of private open space
Studio (where there is no separate bedroom)	No minimum requirement
One bedroom dwelling	8 square metres
Two bedroom dwelling	11 square metres
Three + bedroom dwelling	15 square metres

PDC 18 Private open space located above ground level should have a minimum dimension of 2 metres and be directly accessible from a habitable room.

Table 6.1 summarises the quantity of private open space provided for each apartment type.

Table 6.1 Private open space summary per apartment type

Upper Levels				Courtyard Level		
<i>Apartment Type Number</i>	<i>Type</i>	<i>Typical Balcony Area (m²)</i>	<i>POS Development Plan Requirements (m²)</i>	<i>Apartment Type Number</i>	<i>Typical Courtyard Area (m²)</i>	<i>POS Development Plan Requirements (m²)</i>
01	2 Beds, 2 Baths	8.75	11	01C	33 - 49	11
01A	2 Beds, 2 Baths	8.75	11	02	32-47	11
01B	2 Beds, 2 Baths	8.75	11	02A	31	11
01C	2 Beds, 2 Baths	8.75	11	03	32	11
02	2 Beds, 1.5 Baths	8.75	11	03A	36	11
02A	2 Beds, 1.5 Baths	8.75	11	04	20-32	8
03	2 Beds, 1 Bath	8.75	11	04A	20-30	11
03A	2 Beds, 1 Bath	8.75	11	05	45-90	11
04	1 Bed, 1 Bath	6	8	05B	48-63	11
04A	1 Bed, Study, 1 Bath	6	8	05C	47	15
05	3 Beds, 2 Baths	14.2	15	05E	59	15
05A	2 Beds, Study, 2 Baths	14.2	11	05F	40	15
05B	2 Beds, 2 Baths	14.2	11	06	45	11
05C	3 Beds, 2 Baths	14.2	15			
05D	3 Beds, 2 Baths	14.2	15			
05E	3 Beds, 2 Baths	11.5	15			
05F	3 Beds, 2 Baths	11.5	15			
06	2 Beds, 2 Baths	8.5	11			

Table 6.1 identifies that all ground level apartments will be provided with generous quantities of private open space which exceed the minimum open space requirements prescribed by the Development Plan. Residential Development PDC 19 states that the minor shortfalls in the provision of upper level balcony private open space can substituted for an equivalent amount of communal open space in prescribed circumstances:

PDC 19 *Private open space may be substituted for the equivalent area of communal open space where:*

- (a) at least 50 per cent of the communal open space is visually screened from public areas of the development*
- (b) ground floor communal space is overlooked by habitable rooms to facilitate passive surveillance*
- (c) it contains landscaping and facilities that are functional, attractive and encourage recreational use*
- (d) each dwelling is still provided with an area of useable private open space of at least 8 square metres with a minimum dimension of 2 metres directly accessible from a habitable room.*

The Central Garden will provide functional communal open spaces in accordance with PDC 19. In particular:

- The Central Garden will be placed within the centre of the site and will be screened by the proposed buildings fronting St Clair Avenue;
- Apartment balconies and ground floor courtyards will overlook the Central Garden to facilitate passive surveillance;
- The Central Garden will include a number of functional activity spaces and facilities designed to enhance physical activity and resident interaction;
- In accordance with Residential Development PDC 18, the private open space of all ILU's exceed a dimension of 2 metres; and
- In accordance with Residential PDC 13(a), all apartments will also have direct access to private open space from internal living spaces.

Accordingly, the shortfall in private open space of 2m² for Apartment 4 and 4A represents a minor departure from the provisions of the Development Plan given the generous quantity and high quality communal open space to be provided for the development.

Enclosed Dementia Sensory Gardens will also be provided for exclusive use by Nursing Home residents to cater for the unique needs of these residents in accordance with Supported Accommodation, PDC 1:

PDC 1 *Supported accommodation (including nursing homes, hotels, retirement homes, retirement villages, retirement villages, residential care facilities and special accommodation houses) and housing for aged persons and people with disabilities should be:*

.....

- (e) provided with public and private open space and landscaping to meet the needs of residents*

For the reasons outlined above, the development generally accords with the open space provisions of the Development Plan.

6.11.2 Storage

Domestic storage requirements for apartments are identified within Medium and High Rise Development (3 or more storeys) PDC 12:

PDC 12 *Dwellings should provide a covered storage area, specifically for the storage of sundry items which would not normally be stored within kitchen cupboards or wardrobes, which is not less than 8 cubic meters and located one or more of the following areas:*

- (a) *In the dwellings (but not including a habitable room)*
- (b) *In a garage, carport or outbuilding*
- (c) *Within an on-site communal facility*

Table 6.2 summarises the volume of storage space allocated to each apartment type.

Table 6.2 Storage volumes per apartment type

Apartment Type	Linen Cupboard m ³	Study storage m ³	Entry storage cupboard m ³	Laundry storage m ³	Carpark cage	Total storage m ³	Total number of apt type
1	1.4	0.7	-	0.5	5.4	8.0	66
1A	1.4	0.7	-	0.5	5.4	8.0	35
1B	1.4	0.7	-	0.5	5.4	8.0	21
1C	1.4	-	-	0.5	5.4	7.3	56
2	2.3	-	-	0.3	5.4	8.0	23
2A	2.3	-	-	0.3	5.4	8.0	5
3	0.9	-	-	0.3	5.4	6.6	5
3A	1.1	-	-	0.4	5.4	8.3	5
4	1.7	-	-	0.3	5.4	7.4	29
4A	1.7	4.0	-	0.3	5.4	11.4	29
5	5.7	-	-	0.4	5.4	11.5	21
5A	5.7	3.8	-	0.4	5.4	15.3	10
5B	2.8	-	-	0.7	5.4	8.9	10
5C	2.8	-	-	0.7	5.4	8.9	8
5D	0.8	-	-	0.3	5.4	6.5	3
5E	2.5	1.0	3.4	0.4	5.4	12.7	5
5F	1.9	-	1.5	0.4	5.4	9.2	5
6	2.8	4.0	6.8	0.4	5.4	19.4	5

Storage cages will be located within each basement carpark. Each storage cage will be 2.7 metres wide, 0.95 metres deep and 2.1 metres high. Additional storage will also be provided in cupboards located within non-habitable rooms.

Excluding Apartment Types 1C, 3, 4 and 5D, all other apartments (of which there are 248) will be provided with storage volumes which meet or exceed the prescribed storage rates set out in the Development Plan, and the average volume of storage space of 8.8m³ for all apartments also exceeds the minimum storage space requirement prescribed by the Development Plan. We also note that Apartment Types 1C, 3, 4 and 5D will still be provided with a reasonable level of storage space and in our opinion, the shortfall in storage space for these apartments represents a minor departure from the storage provisions of the Development Plan.

Finally, it is noted the development provides a surplus of parking and the shortfall in storage capacity for the four apartment types could be addressed by converting surplus parking spaces into storage space (if required).

For the reasons outlined above, the development is generally consistent with the storage provisions set out in the Development Plan.

6.11.3 Internal Overlooking (within the site)

The following provisions of the Development Plan are relevant to the assessment of overlooking:

General Section: Medium and High Rise Development (3 or more Storeys)

PDC 4 *The visual privacy of ground floor dwellings within multi-storey buildings should be protected through the use of design features such as the elevation of ground floors above street level, setbacks from the street and the location of verandas, windows, porticos or the like.*

PDC 5 *Residential buildings (or the residential floors of mixed use buildings) should:*

(a) have adequate separation between habitable room windows and balconies from other buildings to provide visual and acoustic privacy for dwelling occupants and allow the infiltration of daylight to interior and outdoor spaces

(b) ensure living rooms have, at a minimum, a satisfactory short range visual outlook to public or communal space.

General Section: Design and Appearance

PDC 11 *Development should minimise direct overlooking of habitable rooms and private open spaces of dwellings through one or more of the following measures:*

(b) building setbacks from boundaries (including building boundary to boundary where appropriate) that interrupt views or that provide a spatial separation between balconies or windows of habitable rooms.

The following design strategies are proposed to prevent unreasonable levels of overlooking from dwellings (ILU's) and Nursing Home Rooms:

- Generous setbacks between buildings and full height screens between adjoining balconies will prevent unreasonable views between apartments;
- Screens will be used at ground level to separate private courtyards and prevent views between ground floor apartments; and
- A combination of raised courtyard levels, landscaping and concrete garden walls will prevent unreasonable views into ground level courtyards from public spaces.

Accordingly, the development has been designed to maintain opportunities for passive surveillance of the public realm (adjoining streets and public open space) and internal communal open space without resulting in unreasonable overlooking of the private open space of proposed dwellings on site.

6.11.4 Apartment and Nursing Home Acoustic Amenity

The subject site is located in proximity to adjacent railway corridor, and accordingly is subject to an assessment against the Noise and Air Emission Overlay provides. Objective 1 of the Overlay seeks to ensure that development is appropriately designed to *“protect community health and amenity from adverse impacts of noise and air emissions”*.

Resonate acoustic engineers have prepared an acoustic assessment of the proposed development which has taken into account the relevant noise requirements of the Development Plan, Minister's Specification SA 78B, and the SA Environment Protection Noise Policy (the 'Policy') (**Appendix 8**).

The noise assessment performed by Resonate makes the following conclusions:

- Whilst mechanical plant selections and noise data are not available at this stage, it is expected that noise emissions from external mechanical plant associated with the development can meet the relevant criteria with standard mitigations measures.
- The impact of noise generated by the adjacent railway corridor has been assessed against the Minister's Specification SA 78B, and Resonate conclude that the impact of noise can be appropriately managed by adopting the recommended façade treatment strategies outlined within the report.
- Resonate have identified the St Clair Recreation Centre (SCRC) as a potential source of external noise. Although the SCRC is beyond the scope of assessment against the Specification, building facades will be treated in accordance with the recommendations outlined within acoustic report to ensure an appropriate level of occupant amenity is maintained for residents.

Further to the above discussion, the acoustic assessments conclude that the relevant objective noise standards will be achieved preserve amenity for proposed future Aveo residents.

6.11.5 Energy Efficiency and Thermal Comfort

The following Development Plan provisions seek to ensure buildings are appropriately orientated and designed to conserve energy and create a comfortable living conditions for occupants of the Nursing Home and Retirement Village:

Energy Efficiency

- OBJ 1** *Development designed and sited to conserve energy and minimise waste.*
- OBJ 2** *Development that provides for on-site power generation including photovoltaic cells and wind power.*
- PDC 1** *Development should provide for efficient solar access to buildings and open space all year around.*
- PDC 2** *Buildings should be sited and designed so that the open spaces associated with the main activity areas face north for exposure to winter sun.*
- PDC 3** *Buildings should be sited and designed to ensure adequate natural light and winter sunlight is available to the main activity areas of adjacent buildings.*
- PDC 4** *Roof pitches should facilitate the efficient use of solar hot water services and photovoltaic cells.*
- PDC 5** *Development should be designed to minimise consumption of non-renewable energy through designing the roof of buildings with a north facing slope to accommodate solar collectors.*
- PDC 6** *Public infrastructure, including lighting and telephones, should be designed to generate and use renewable energy.*

Medium and High Rise Development (3 or more storeys)

- PDC 9** *Multi-storey buildings should:*
 - (a) minimise detrimental micro-climatic and solar access impacts on adjacent land or buildings, including effects of patterns of wind, temperature, daylight, sunlight, glare and shadow*
 - (b) incorporate roof designs that enable the provision of rain water tanks (where they are not provided elsewhere), photovoltaic cells and other features that enhance sustainability.*
- PDC 11** *Development of 5 or more storeys, or 21 metres or more in building height (excluding the rooftop location of mechanical plant and equipment), should be designed to minimise the risk of wind tunnelling effects on adjacent streets by adopting one or more of the following:*

(a) a podium at the base of a tall tower and aligned with the street to deflect wind away from the street

(b) substantial verandas around a building to deflect downward travelling wind flows over pedestrian areas

(c) the placement of buildings and use of setbacks to deflect the wind at ground level.

The development includes the following Ecologically Sustainable Development (ESD) initiatives:

- The use of high efficiency mechanical plant, LED light fittings and glazing, with all residential apartments achieving individual 5 star efficiency 'ACCURATE' ratings, together with an average 6 star energy efficiency rating;
- time clock controlled high efficiency lighting to be installed to reduce energy consumption;
- High efficiency Variable Refrigerant Volume (VRV) air conditioning will be used within the Nursing Home and associated community facility and administration area;
- Water preservation strategies including:
 - » the installation of high efficiency sanitary and tapware fixtures and fittings, designed in accordance with the Water Efficiency Labelling Scheme; and
 - » dual flush water efficient water closets;
- The use of sustainable buildings materials including:
 - » timbers sourced from certified sustainably managed forests; and
 - » low Volatile Organic Compound (VOC) content paints, sealants and other finishes.

In addition, we also note the following sustainable building design initiatives:

- The dual frontage design and north-west orientation of Buildings 2, 3, 4 and 7 will ensure that all apartments will (as a minimum) have access to morning or afternoon sun, and all living areas and bedrooms of all apartments will be provided with at least one window to maximise access to natural light;
- The shadow diagrams prepared for the development (Drawing. No. DA015 of **Appendix 3**) demonstrate that communal open spaces, including activity and recreation spaces (such as the community swimming pool) will receive access to generous levels of natural light for most of the day;
- All apartments have been designed with multiple openings placed in different locations to encourage natural cross ventilation from cooling breezes;
- Recessed, balconies will provide shade to private open space during summer months;

- Landscaping within communal open space, at-grade car parks and along north and west facing walls (e.g. Building 7) will reduce summer heat loads and maintain comfortable climatic conditions at ground level;
- Deciduous plantings will provide shade during summer months and natural light and warmth throughout cooler months; and
- Recessed balconies together with generous street setbacks will minimize the effects of wind tunneling on residents and pedestrians.

Accordingly, the application is highly aligned within the relevant Energy Efficiency provisions of the Development Plan.

6.12 Crime Prevention

The following Development Plan provisions are considered most relevant to the assessment of Crime Prevention Through Environmental Design (CPTED):

- OBJ 1** *A safe, secure, crime resistant environment where land uses are integrated and designed to facilitate community surveillance.*
- PDC 1** *Development should be designed to maximise surveillance of public spaces through the incorporation of clear lines of sight, appropriate lighting and the use of visible permeable barriers wherever practicable.*
- PDC 2** *Buildings should be designed to overlook public and communal streets and public open space to allow casual surveillance.*
- PDC 3** *Development should provide a robust environment that is resistant to vandalism and graffiti.*
- PDC 4** *Development should provide lighting in frequently used public spaces including those:*
- (a) along dedicated cyclist and pedestrian pathways, laneways and access routes*
-*
- PDC 5** *Development, including car park facilities should incorporate signage and lighting that indicate the entrances and pathways to, from and within sites.*
- PDC 6** *Landscaping should be used to assist in discouraging crime by:*
- (a) screen planting areas susceptible to vandalism*
- (b) planting trees or ground covers, rather than shrubs, alongside footpaths*
- (c) planting vegetation other than ground*
- PDC 7** *Buildings and street addresses should be easily identified to assist orientation.*
- PDC 8** *Site planning, buildings, fences, landscaping and other features should clearly differentiate public, communal and private areas.*

PDC 9 *Buildings should be designed to minimise and discourage access between roofs, balconies and windows of adjoining dwellings.*

PDC 12 *Service lanes and alleyways should be designed and located to maximise community safety.*

PDC 13 *Development should provide a clear separation between the private and public domain.*

PDC 14 *Development should be designed and managed to ensure that users are aware of how to safely gain access to, around, and within the development, site or locality*

The development includes the following design strategies which are intended to create a safe and crime resistant environment:

- Buildings have been designed with dual frontages, and apartment windows, balconies and ground floor courtyards will maximise the opportunity for passive surveillance of internal communal open space and external public spaces, including:
 - » St. Clair Avenue and Actil Avenue South;
 - » sporting ovals situated on the opposite side St Claire Avenue;
 - » the railway corridor and the adjoining Woodville Railway Station;
 - » future public open space addressing Woodville Road;
 - » the internal Central Garden; and
 - » at grade parking areas;
- Windows to activity rooms and terraced areas at upper levels of the Nursing Home will provide opportunities for passive surveillance of public spaces including the Central Garden, Actil Avenue South and the at-grade Nursing Home carpark;
- Balconies have been designed with full height screens to prevent access between balconies of different dwellings;
- Large expanses of solid walling has been minimised, and landscaping placed between exposed walls and street boundaries will reduce opportunities for vandalism (i.e. graffiti);
- Public and communal open space has been designed to clearly delineate the public and private realm and promote a sense of territoriality and ownership through physical features expressed in the design including:
 - » raised landscape planter boxes and paving treatments to delineate boundaries; and
 - » permeable barriers (landscaping, raised garden walls and screened semi-basement walls) to separate the public and private realm;
- As illustrated in the Movement and Wayfinding Plan (**Appendix 9**), wayfinding signage and pathways will be used to facilitate navigation to key facilities and building entries;

- Lighting will be designed in accordance with the Australian Standards, and will be installed throughout the communal open space and parking areas to accommodate passive surveillance of these spaces, facilitate navigation and deter criminal activity;
- In accordance with the Landscape Master Plan attached as **Appendix 9**, transparent fencing will be installed between the at-grade carparking areas and Central Garden to prevent unauthorised entry into the communal open space whilst still maintaining sightlines through the site;
- The proposed undercroft and basement car park has been designed with:
 - » an open and clear layout with long continuous wall surfaces containing minimal bends, projections or obstructions to minimise opportunities for concealment;
 - » basement carpark wayfinding will be provided with signage and 'colour coding' to assist with site legibility and permeability; and
 - » basement entry/exit points will be secured by a roller door (or similar) and access to basement levels will be managed by a swipe card or remote control system.

In addition to the above CPTED initiatives, we note that a Personal Service Response System will be installed throughout communal spaces. This 'push button' system provides residents with 24-hour access to security in the event of an emergency. A push-button pendant will also be provided to Aveo residents which means security assistance can be requested by any resident, from any location at any time.

The application is therefore closely aligned within the relevant Crime Prevention provisions of the Development Plan, and the development has been designed to prioritise the safety of Aveo residents, visitors and staff, whilst outward views into existing public spaces will improve surveillance of these areas.

6.13 Interface Considerations

The following discussion considers potential interface impacts of the development on existing residential development situated to the north-west of the site, on the opposite side of Actil Avenue South. Potential interface impacts relate to the following:

- Overlooking into private open space areas of existing residential properties;
- Overshadowing of existing residential properties; and
- The noise-related impact of passenger and service vehicle movements on existing residential amenity.

6.13.1 Overlooking - Properties external to the site

The closest residential properties are to situated to the north-west of the site, on the opposite side of Actil Avenue South. Excluding the Row Dwelling located at 1 St Clair Avenue, the private open space for all other existing dwellings is situated to the rear (north) of each dwelling, and will therefore be screened from view.

The north-western elevation of Building 7 is orientated towards the private open space of 1 St. Clair Avenue. Notwithstanding, the façade of Building 7 will be setback approximately 15 metres from this property and the

area between the Building 7 and Actil Avenue South will be generously landscaped to obstruct views into the open space of this adjacent residential property.

For the reasons outlined above, the development has been designed to address unreasonable levels of overlooking into the private open space of existing residential properties in accordance with the following provisions of the Development Plan:

General Section: Design and Appearance

PDC 11 *Development should minimise direct overlooking of habitable rooms and private open spaces of dwellings through one or more of the following measures:*

- (b) Building setbacks from boundaries (including building boundary to boundary where appropriate) that interrupt views or that provide a spatial separation between balconies or windows of habitable rooms*

General Section: Landscaping Fences and Walls

PDC 1 *Development should incorporate open space and landscaping in order to:*

.....

- (h) maintain privacy*

6.13.2 Overshadowing

The following Development Plan provisions are relevant to the assessment of overshadowing.

Woodville Policy Area 5

PDC 33 *Except in Core Areas, development of 3 or more storeys in height should ensure that:*

- (a) north-facing windows to habitable rooms of existing dwelling(s) on the same allotment, and on adjacent allotments, receive at least 3 hours of direct sunlight over a portion of their surface between 9.00 am and 3.00 pm on 21 June.....*

General Section – Design and Appearance

PDC 9 *The design and location of buildings should enable direct winter sunlight into adjacent dwellings and private open space and minimise overshadowing of:*

- (a) windows of main internal living areas*
- (b) ground level private open space*
- (c) upper-level private balconies that provide the primary open space area for dwelling*
- (d) solar collectors (such as solar hot water systems and photovoltaic cells).*

Medium and High Rise Development (3 or more storeys)

PDC 9 Multi-storey buildings should:

- (a) *minimise detrimental micro-climatic and solar access impacts on adjacent land or buildings, including effects of patterns of wind, temperature, daylight, sunlight, glare and shadow*

Shadow diagrams have been prepared for the development and are attached as **Appendix 3** (DA 105). The shadow diagrams confirm that the development will not overshadow residential properties situated within the adjoining Residential Zone during the winter solstice. Similarly, generous setbacks between buildings will ensure that all proposed apartments and communal open space areas are not unreasonably overshadowed.

6.13.3 External Acoustic considerations

The Interface between Land Uses provisions seek to ensure that interface impacts resulting from the generation of noise are appropriately managed so development does not detrimentally impact on the amenity of the locality. Interface between Land Uses PDC 8 also requires development to be designed to achieve the relevant Environment Protection (Noise) Policy criteria when assessed at the nearest existing noise sensitive premises.

The Resonate acoustic report (**Appendix 8**) considers the noise impact of passenger and service vehicle movements on dwellings situated on the north-western side of Actil Avenue South. Resonate make the following conclusions:

- Additional noise generated by passenger vehicles access the site via Actil Avenue South are not expected to exceed the maximum day-time and night-time noise criteria prescribed within the Noise Policy; and
- To comply with the Noise Policy, refuse collection services will need to comply with Division 3, Clause 28 of the Noise Policy, which requires collection to occur between the following hours:
 - » 9:00am and 7:00pm on a Sunday or other public holiday;
 - » 7:00am and 7:00pm on any other day.

To achieve the requirements of the Noise Policy, the applicant confirms that refuse will only be collected between the hours prescribed above. This matter may be addressed via an appropriately worded condition attached to the Development Plan Consent.

Further to the above-mentioned discussion, the volume and nature of vehicle movements generated by the development is expected to satisfy the requirements of the Noise Policy. Accordingly, the development has been appropriately designed address interface impacts relating to noise.

6.14 Landscaping Fencing & Tree Removal

6.14.1 Landscaping and Fencing

A comprehensive Landscape Master Plan has been prepared by Greenhill and is attached to this Planning Statement as **Appendix 4**. The landscaping design has been assessed against the following Policy Area and General Section provisions of the Development Plan:

Woodville Policy Area 5

PDC 35 *Masonry fences should be no more than 1.2 metres in height to maintain sight lines between buildings and the street, and to improve safety through passive surveillance.*

General Section: Landscaping Fences and Walls

OBJ 1 *The amenity of land and development enhanced with appropriate planting and other landscaping works, using locally indigenous plant species where possible.*

OBJ 2 *Functional fences and walls that enhance the attractiveness of development.*

PDC 1 *Development should incorporate open space and landscaping in order to:*

- (a) complement built form and reduce the visual impact of larger buildings (eg taller and broader plantings against taller and bulkier building components)*
- (b) enhance the appearance of road frontages*
- (c) screen service yards, loading areas and outdoor storage areas*
- (d) minimise maintenance and watering requirements*
- (e) enhance and define outdoor spaces, including car parking areas*
- (f) maximise shade and shelter*
- (g) assist in climate control within buildings*
- (h) maintain privacy*
- (i) maximise stormwater re-use*
- (j) complement existing, including native vegetation, vegetation*
- (k) contribute to the viability of ecosystems and species*
- (l) promote water and biodiversity conservation*
- (m) minimise heat absorption and reflection.*

PDC 2 *Landscaping should:*

- (a) include the planting of locally indigenous species where appropriate*
- (b) be oriented towards the street frontage*
- (c) result in the appropriate clearance from powerlines and other infrastructure being maintained*

PDC 4 *Fences and walls, including retaining walls, should:*

- (a) not result in damage to neighbouring trees*
- (b) be compatible with the associated development and with existing predominant, attractive fences and walls in the locality*
- (c) enable some visibility of buildings from and to the street to enhance safety and allow casual surveillance*
- (d) incorporate articulation or other detailing where there is a large expanse of wall facing the street;*
- (e) assist in highlighting building entrances*
- (f) be sited and limited in height, to ensure adequate sight lines for motorists and pedestrians especially on corner sites*
- (g) in the case of side and rear boundaries, be of sufficient height to maintain privacy and/or security without adversely affecting the visual amenity or access to sunlight of adjoining land*
- (h) be constructed of non-flammable materials*
- (i) be incorporated as part of the development where the established character of the locality involves front fences.*

PDC 5 *Front fencing should be open in form to allow cross ventilation and access to sunlight.*

Landscaping for the development has been designed to enhance amenity, encourage resident interaction and create functional activity areas for Aveo residents. Key features of the landscape design are summarised below:

- Landscaping will be planted along street frontages to enhance the streetscape appeal of the development;
- Landscaping and raised garden walls to be placed around the perimeter of ground floor apartment courtyards will act as a visual barrier to distinguish between private, public and semi-public spaces, and court yard areas, as well as to provide shade and privacy to open space and ground floor living areas;

- Carefully selected medium height shrubs and clean trucked trees will accommodate outward views into public and semi-public spaces for passive surveillance;
- Tree and shrub planting and raised planters will be used to screen the bin presentation yard, and will also create a visual buffer to the adjoining railway corridor;
- Landscaping along the southern boundary of the site will supplement the existing stand of mature vegetation which lines this boundary, enhancing amenity for users of the adjoining Outer Harbor Greenway;
- Landscaping will be used to screen the length of semi-basement walls extending above natural ground thereby reducing the visual impact of these structures when viewed from the public realm;
- The Actil Avenue South frontage will be densely vegetated with shrubs and trees to create a visual buffer at the interface with the adjoining Residential Zone;
- Landscaping throughout the at-grade carparks will soften the visual impact of hard stand areas and provide shade for vehicles;
- Landscaping placed along the edge of the semi-basement carpark walls protruding above natural ground level will be used to obstruct views of these walls from the public realm;
- The landscaping plan includes a selection of hardy, drought tolerate species (including native plantings) selected for their aesthetic appeal, durability and low maintenance attributes;
- Apartments and Nursing Home rooms will overlook a Central Garden, which will include a number of functional activity spaces designed to encourage physical activity and resident interaction, including:
 - » a multi-functional area capable of being used for passive recreation and leisure activities;
 - » a sensory garden with raised garden beds, water features, arbor structures, seating and internal pathways;
 - » a swimming pool and resident entertaining area;
 - » family barbeque areas; and
 - » A community vegetable garden;
- Dementia sensory gardens will be provided for Nursing Home Residents and these spaces will also be designed to create a safe and familiar experience for patients with dementia; and
- Deciduous trees will be planted within communal open spaces and adjacent courtyards providing access to natural light during winter months whilst creating shade and passive cooling during summer months.

The landscaping proposed for the development is therefore closely aligned with the relevant provisions of the Development Plan and will significantly enhance resident amenity as well as the appearance of the development when viewed from the public realm.

A Fencing and Screening Plan is included within the Landscape Master Plan (Dwg. SK003).

Ground level courtyards facing into the site will be enclosed by 1 metre high open style fencing attached to 1 metre high raised planter bed walls. In accordance with Policy Area PDC 35, together with Landscaping Fences and Walls PDC 4(c) and (g), this fencing has been designed to achieve an appropriate level of security and privacy for residents, whilst still maintaining sightlines into communal open space areas for passive surveillance.

Courtyards orientated towards the public realm (i.e. public streets and open space) will be enclosed by raised planter bed walls attached to semi-basement walls, and solid fencing to courtyards addressing the public realm has been avoided to reduce the visual impact of the development and in particular.

The Central Garden will be separated from at-grade carparks by 1.8 metre high open style fencing. This style of fencing has been selected to maintain unobstructed sightlines into each carpark from the Central Garden (and vice versa), whilst the physical barrier provided by the 1.8 metre high fence will demarcate public and private spaces and will prevent unauthorised access into the Central Garden.

The amount of fencing proposed within communal open space areas has been intentionally restricted to create an inclusive environment that encourages interaction between residents. In accordance with PDC 4(e), fencing within the Central Garden will primarily be limited to 1 metre high handrails which run along pedestrian pathways and lead to building entrances, together with a swimming pool fence, designed in accordance Australian Standard: *AS 1926.1 – Safety Barriers for Swimming Pools*.

A Colorbond® fence reaching a height of 2.4 metres will enclose the Dementia Sensory Gardens, and the height of this fence is required to provide a safe and secure environment for Nursing Home Residents. The length of fence visible from the public realm will be limited and in our opinion, the fence will not have an adverse impact on the amenity of the locality.

PDC 4(a) requires that fencing is designed to protect trees overhanging the subject site. As discussed within Section 6.8, fencing located within the Tree Protection Zones (TPZ's) of Trees 1 and 2 will be constructed using concrete pad footings (in lieu of strip footings) and lightweight materials to protect root zones from damage.

Finally, the service yard/presentation area will be screened by 1.8 metre high Colorbond® fencing in accordance with Design and Appearance PDC 2.

As discussed above, all proposed fencing has been carefully selected to minimise visual impact, maintain sightlines and passive surveillance of public spaces, and to provide a safe and secure environment for residents. In our opinion, the fencing proposed for the development is closely aligned with the relevant provisions of the Development Plan.

6.15 Regulated and Significant Tree Removal

The development involves the removal of four (4) Regulated trees, including one (1) Significant Tree. The trees are labelled Tree 20, 21, 23 and 24 on the Tree Plan attached as **Appendix 3** (Drawing drawing 048).

Aboricultural information relating to each tree is provided in **Table 6.3**. This information has been extracted from the Tree Environs report attached to this Planning Statement as **Appendix 5**.

Table 6.3 *Regulated and Significant Tree Assessment*

Tree #	Species	Circumference (metres)	Health	Structure	Risk	Life Expectancy	Retention Value
20	Significant Ficus Macrophylla (Moreton Bay Fig)	5.72	Below average, foliage with burnt tips; Major dieback NW side; Dead vascular tissue on western and upper sides of branches; Primary epicormic growth	Poor structure; Canopy biased to south east; Dead and decaying trunk wood (NW side); Structural cracks developing; Instability increasing during root decay on NW side and canopy bias to SE	Moderate	<10 years	Low
21	Regulated Corymbia Maculata (Spotted gum)	2.70	Below average foliage density, foliage chlorotic	Average structure Irregular crown form with several previous branch failures. Bark inclusion caused two branch failures	Low	<10 years	Low
23	Regulated Pinus Halepensis (Aleppo Pine)	2.98	Good	Good	Low	20 to 50 years	High
24	Regulated Eucalyptus Spathulata (Swamp mallett)	2.05	Below average foliage density – average, dead branches – moderate, short life expectancy	Average, irregular canopy and sparse crown	Low	<10	Low

Source: Tree Environs Tree Survey

The tree survey prepared by Tree Environs confirms that the allotment accommodates a total of 32 trees, including fifteen (15) Regulated Trees and ten (10) Significant Trees.

The development has been designed to retain the majority of Regulated and Significant Trees located on the allotment. All trees to be retained are located along the southern boundary of the site (adjacent the rail corridor) and to the south-east of the site, between Building 1 and Woodville Road. These trees (together with a large number of non-regulated trees) are located within an area of land which is intended to be vested in Council as public open space.

The proposed public open space comprises an area of 9,390m², and has been designed in accordance with *Concept Plan Map ChSt/24: Precinct 21 Railway Station*. The design of this open space together with the retention of mature vegetation is closely aligned with Desired Character statement for Precinct 21 which states:

Open space and landscaping forms an integral part of the precinct. New open space areas will soften the built form and create quality public spaces. These will include 22 per cent of the land to the south west of the St Clair Avenue extension being developed as open space along the Woodville Road frontage and an additional area of land in this locality to be developed as a playing field. Other open space areas will include a shared-use recreational trail along the former Glenys Nunn Drive and an internal pocket park to provide further recreational opportunities for residents.

The intent is that the majority of existing Significant and Regulated Trees will be retained as landscape features within areas of open space. In particular, the existing Red Gums alongside the railway line will be retained within the shared-use recreational trail.

The arborist report also makes note that Tree 20 and 21 and 24 are in poor health and have a limited useful life expectancy. Accordingly, the removal of these trees does not offend and is aligned with the following provisions of the Development Plan:

General Section: Regulated Trees

PDC 2 *A regulated tree should not be removed or damaged other than where it can be demonstrated that one or more of the following apply:*

(a) *The tree is diseased and its life expectancy is short*

.....

(d) *Development that is reasonable and expected would not otherwise be possible*

General Section: Significant Trees

PDC 3 *Significantly trees should be preserved, and tree-damaging activity should not be undertaken, unless:*

(a) *In the case of removal*

(i) *The tree is diseased and its life expectancy is short*

Although no arboricultural justification exists for the removal of Tree 23, Regulated Tree Objective 2 seeks to achieve “*development in balance with preserving regulated trees*”. Regulated Trees PDC 2 also states that a Regulated Tree may be removed where “*development that is reasonable and expected would not otherwise be possible*”. As previously discussed, the majority of existing vegetation will be retained, and the proposed development therefore achieves an appropriate balance between the preservation of trees and achieving a development outcome for a medium density Retirement Village development and Nursing Home, which is consistent with the relevant provisions of the Development Plan.

The site will also be extensively landscaped to compensate for the loss of amenity resulting from the removal of Tree 23, and pursuant to Section 42(4) of the Act, nine (9) replacement trees will be planted to the reasonable satisfaction of the relevant authority.

A Regulated and Significant Tree (Trees 1 and 2, respectively) are also located within Council land and overhang the southern boundary of the site. The Tree Protection Zone for each tree extends into the secure courtyard area of the Nursing Home, together with the bin presentation area. The development has been designed to protect the trees in the following ways:

- The secure courtyard will be landscaped and no part of the development will encroach into the TPZ of Tree 2; and
- Fencing within the TPZ of both trees will be constructed in light-weight post and rail framework and pier footings to minimise root disturbance.

Subject to the implementation of the above-mentioned strategies, Tree Environs conclude that the development is unlikely to have an adverse impact on either tree.

Finally, we note that no part of the development will encroach into the TPZ of any other tree to be retained onsite.

Accordingly, the development has been designed to minimise tree damaging activity to Regulated and Significant Trees in accordance with the following provisions of the Development Plan:

General Section: Regulated Trees

PDC 1 *Development should have minimum adverse effects on regulated trees.*

PDC 3 *Tree damaging activity other than removal should seek to maintain the health, aesthetic appearance and structural integrity of the tree.*

General Section: Significant Trees

PDC 2 *Development should be undertaken so that it has a minimum adverse effect on the health of a significant tree.*

PDC 4 *Development involving ground work activities such as excavation, filling, and sealing of surrounding surfaces (whether such work takes place on the site of a significant tree or otherwise) should only be undertaken where the aesthetic appearance, health and integrity of a significant tree, including its root system, will not be adversely affected.*

6.16 Advertising

Signage specifications are attached as **Appendix 11**. The following Advertisements provisions are particularly relevant to the assessment of the signage proposed for development:

General Section: Advertisements

- OBJ 1** *Urban and rural landscapes that are not disfigured by advertisements and/or advertising hoardings.*
- OBJ 2** *Advertisements and/or advertising hoardings that do not create a hazard.*
- OBJ 3** *Advertisements and/or advertising hoardings designed to enhance the appearance of the building and locality.*
- PDC 1** *Advertising and/or advertising hoardings should have regard to the suitable outdoor advertising types outlined in Table ChSt/3 – Suitable Outdoor Advertising Types.*
- PDC 2** *The location, siting, design, materials, size, and shape of advertisements and/or advertising hoardings should be:*
- (a) consistent with the predominant character of the urban or rural landscape*
 - (b) in harmony with any buildings or sites of historic significance or heritage value in the area*
 - (c) coordinated with and complement the architectural form and design of the building they are to be located on.*
- PDC 3** *The number of advertisements and/or advertising hoardings associated with a development should be minimised to avoid:*
- (a) clutter*
 - (b) disorder*
 - (c) untidiness of buildings and their surrounds*
 - (d) driver distraction.*
- PDC 5** *The content of advertisements should be limited to information relating to the legitimate use of the associated land.*
- PDC 8** *Advertisements and/or advertising hoardings attached to buildings should not be sited on the roof or higher than the walls of a building, unless the advertisement or advertising hoarding is appropriately designed to form an integrated and complementary extension of the existing building.*
- PDC 15** *Freestanding advertisements and/or advertising hoardings should be:*
- (a) limited to only one primary advertisement per site or complex*

(b) of a scale and size in keeping with the desired character of the locality and compatible with the development on the site.

PDC 19 *Advertisements and/or advertising hoardings incorporating any flags, bunting, streamers, or suspended objects should:*

(a) be placed or arranged to complement and accord with the scale of the associated development

(b) other than flags, not be positioned higher than the building they are attached or related to

(c) not be displayed in residential areas.

The following forms of advertisements are also listed as non-complying within Precinct 21 Railway Station:

Advertisements and/or advertising hoarding that:

(a) Is roof mounted and projects above the roof line;

(b) Protrudes above the top of the parapet;

(c) Is animated or flashing;

(d) Is freestanding on Woodville Road

The development incorporates six (6) different signage typologies including:

- An entry feature sign attached to the base of the Building 1 Porte Cochere;
- A corner feature wall sign to be placed at the entry to the at-grade Nursing Home carpark;
- Five (5) metre high flag pole signs accommodating 2 metre high and 0.75 wide flags to be installed along the frontage to St Clair Avenue, and partially along the frontage to Actil Avenue South;
- Two illuminated signs attached to the facades of Buildings 2 and 7;
- A five (5) metre high, double sided pylon to be placed adjacent the entry to the at-grade carpark; and
- Marketing banner signage to be placed along semi-basement carpark walls facing the railway corridor to the south-west and future public open space to the south-east.

All signs have been designed to address the advertising restrictions listed within the non-complying table.

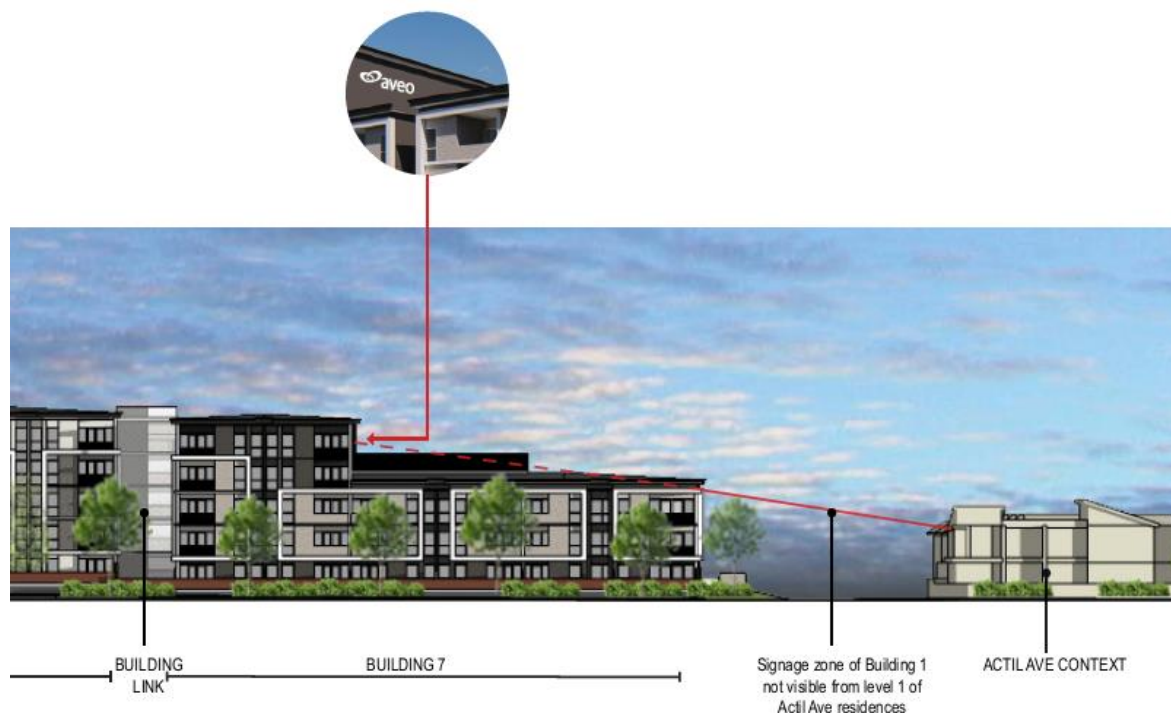
Table ChSt/3 *Suitable Outdoor Advertising Types* discourages the installation of free-standing signs within the Woodville Policy Area. Notwithstanding, we note that the free-standing sign will be placed in the eastern corner of the site, and will be substantially separated from residential properties and Woodville Road. Views of the free-standing sign from residential properties will therefore be restricted. The sign will also comprise a modest height of five (5) metres, which is appropriate when considered in context with the overall scale of the proposed development and the extent of site frontage to both St Clair Avenue and Actil Avenue South. Accordingly, we

are of the opinion that the design, height and location of the free-standing sign is appropriate when considered in the context of the site and proposed nature of the development.

Flag pole signs are also proposed along the sites frontage to St Clair Avenue and Actil Avenue South up to the driveway access to the at-grade carpark. The number of flag poles to be placed along the frontage to Actil Avenue South has been intentionally restricted to minimise the visual impact on adjacent residential properties to the north-west. Notwithstanding, it is important to note that the site is located within a District Centre Zone, where signage is an appropriate and envisaged form of development. In our opinion the extent of signage proposed at the interface with the adjoining Residential Zone is reasonable and will not have an adverse impact on the character or amenity of the locality. We also note that the flag poles will reach a height of five (5) metres, which is well below the height of all proposed buildings.

Three (3) internally illuminated signboards are proposed to be attached to the south-eastern façade of Building 2, southern façade of Building 1 and the north-western façade of Building 7. The Building 7 sign will be orientated towards the adjacent Residential Zone. However, **Figure 6.8** illustrates that direct line of site of this sign from adjacent residential properties on Actil Avenue South will be restricted. All illuminated signs are also conservatively sized particularly when considered in context with the scale of proposed built form on site.

Figure 6.8 Building 7 illuminated signage: Line of Sight Diagram



Source: Brown Falconer Architectural Plans

Four (4) marketing banner signs are proposed to be attached to the semi-basement walls protruding above natural ground level. Because the signs are to be installed along the base of the buildings, their overall impact on the amenity of the locality will be negligible. We also note that the signs will be orientated towards the adjacent railway corridor and Woodville Road, and will not be highly visible from residential properties.

The proposed signage scheme for the development generally satisfies the relevant provisions of the Development Plan for the reasons summarised below:

- The signs are integrated with the design of the development and are appropriately sited and scaled to complement the building design and façade treatment;
- The scale of all signage is relatively modest in the context of the proposed building scale, and the proposed signs will be professionally constructed utilising durable and weather resistant materials;
- Signage along the Actil Avenue South frontage has been intentionally restricted to minimise visual impact on adjacent residential properties;
- Content to be displayed will be limited to information relating to the legitimate use of the land as a Retirement Village and Nursing Home;
- The proposed illuminated signs will not flash, blink, move or rotate, and will be illuminated in accordance with the relevant Australian Standards.
- Given their location and height above ground level and their setback from public roads, the proposed illuminated advertising displays will not cause discomfort to an approaching driver or create difficulty in the driver's perception of the road or persons or objects on the road.

6.17 Traffic and Parking

The application has been assessed against the relevant Transportation and Access provisions of the Development Plan. These provisions primarily relate to the provision and design of parking spaces, traffic circulation, together with the impact of the proposed development on the surrounding road network. Each of these matters are addressed below.

6.17.1 Parking Demand and Supply

The proposed development will deliver 416 onsite parking spaces to be provided in stages commensurate with the construction of each building. **Table 6.4** provides a breakdown of the number of parking spaces supplied for each stage:

Table 6.4 Staged parking supply summary

Stage	No of Parking Spaces Underground	No of Parking Spaces At-Grade	Total No of Parking Spaces
Retirement Village Parking			
Stage 1	71	10	81
Stage 2	59	-	59
Stage 3	57	-	57
Stage 4	46	-	46
Stage 5	61	-	61
Stage 7	51	-	51
RACF Parking			
Stage 6	50	11	61

Source: GTA Traffic Impact Assessment

Policy Area PDC 47 prescribes the following parking rates for both residential and non-residential development:

PDC 47 *Vehicle parking should be provided at the following rates:*

(a) *for residential development, 0.75 car parking spaces per dwelling*

.....

(d) *all other non-residential uses, 3 car parking spaces per 100 square metres of gross leasable floor area at ground floor level and 1.5 car parking spaces per 100 square metres of gross leasable floor area above ground floor level.*

Policy Area PDC 48 also suggests that a lesser parking rate may be applied to a development in prescribed circumstances including (amongst other things) where the development is adjacent to a designated pedestrian and/or cycling path, or the proposed development is located in close walking distance to readily accessible and high frequency public transport. The development site is adjacent the Outer Harbor Greenway and is also located within 400 metres of the Woodville railway station, which provides high frequency rail services.

Accordingly, the site is also situated within a 'Designated Area'.

Although the parking rate requirements prescribed by PDC 47 and 48 are relevant to the proposed development, the more specific parking rates for selected land uses set in Table ChSt/2 and Table ChSt/2A have also been considered by GTA to accurately identify the likely parking demand for the non-residential components of the development (i.e. the Nursing Home and ancillary community facility and Aveo administration area). The Development Plan parking rates considered by GTA in the assessment of the development are outlined below in **Table 6.5**.

Table 6.5 Development Plan parking rate requirements

Use	Parking Rate	Development Plan Source
Independent Living Units	0.75 spaces per ILU	Precinct PDC 47
Supported accommodation (RACF)	1 space for every 3 rooms	Table ChSt/2: Off Street Vehicle Parking Requirements
Non-residential development excluding tourist accommodation (Aveo community facility and administration area)	Minimum – 3 spaces per 100 square metres of gross leasable floor area	Table ChSt/2A: Off Street Vehicle Parking Requirements for Designated Areas

The empirical assessment performed by GTA has also considered the ILU parking rates set out in the RTA document: *Guide to Traffic Generating Developments*. This document identifies a parking rate of two (2) spaces per three (3) ILU's, plus one (1) visitor space per five (5) ILU's.

Applying the above-mentioned parking rates, **Table 6.6** summarises the anticipated parking demand and supply for each stage of development.

Table 6.6 Parking demand and supply summary

Completed Stage	Parking Spaces Provided Following Stage Completion	Development Plan Assessment	Empirical Assessment	Parking Space Surplus	
				Development Plan	Empirical Assessment
Retirement Village Parking					
Stage 1	81	49	55	32	26
Stage 2	140	94	107	46	33
Stage 3	197	139	159	58	38
Stage 4	243	180	207	63	36
Stage 5	304	225	259	79	45
Stage 7	355	258	297	97	58
RACF Parking					
Stage 6	61	48	48	13	13

Source: GTA Traffic Impact Assessment

Table 6.6 illustrates that the development will satisfy the peak parking demands for each stage of development and accordingly, GTA conclude that the “*proposed development readily satisfies the parking assessment requirements*”.

Transportation and Access PDC 38 also requires development to provide a sufficient number of conveniently located disabled parking spaces. The development will provide a total a total of six (6) disabled parking spaces, which exceeds the minimum prescribed parking rate set in the *National Construction Code 2016*. The parking spaces will also be conveniently located adjacent complementary facilities including lifts and gopher parking spaces located within each basement carpark. The staged provision of disabled parking is summarised in **Table 6.7**.

Table 6.7 Staged provision of disabled parking

Completed Stage	Parking Spaces Provided Following Stage Completion	Accessible Parking Space Rate	Accessible Parking Spaces Required (Accumulative)	Proposed Accessible Parking Spaces (Accumulative)
Retirement Village Parking				
Stage 1	81	1 space for every 100 parking spaces	1	2
Stage 2	140		2	2
Stage 3	197		2	3
Stage 4	243		3	4
Stage 5	304		4	5
Stage 7	355		4	5
Retirement Village Total			4	5
RACF Parking				
Stage 6	61	1 space for every 100 parking spaces	1	1
RACF Total			1	1

Source: GTA Traffic Impact Assessment

6.17.2 Parking Design

Policy Area PDC 49 suggests that development should be designed with basement, undercroft or multilevel parking in lieu of at-grade parking. The development is highly aligned with this provision in that the majority of carparking will be located at basement level. Concealing the parking spaces from public view will significantly improve the appearance of the development when viewed from the public realm.

Transportation and Access PDC 34(e) and PDC 40 also require carpark to be designed in accordance with the requirements of *Australian Standard AS 2890 Parking Facilities*.

The GTA report concludes that the parking layouts have generally been designed in accordance with Australian Standard/New Zealand Standard for Off Street Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009) in relation to the dimension of parking bays and parking aisle widths, clearance distances from building columns, the design of circulation aisles, head height clearance requirements, internal ramp gradients, vehicle sightlines and the provision of blind aisle extensions. GTA note that minor amendments will need to be made to the design of two parking spaces located within the basement carpark of Building 4. The design changes are required to achieve strict compliance with the Australian Standards. Noting the surplus of parking available for the development, it is appropriate for these minor amendments to be addressed during the detailed design phase of the development.

Accordingly, we are of the opinion that the development will provide sufficient onsite parking to comfortably satisfy the expected parking demand, and that the parking layout has been designed in accordance with the relevant Australian Standards to accommodate safe and convenient vehicle movements for each development stage.

6.17.3 Bicycle Parking

Transportation and Access PDC 20 prescribes a bicycle parking rate of 3 spaces per 50 employees. The Development Plan does not prescribe a bicycle parking rate for dwellings.

We understand that 52 employees will service the Nursing Home, and another eight (8) employees will manage the operations of the Retirement Village. The development therefore attracts a parking rate of three (3) bicycle spaces for the Nursing Home, and one (1) bicycle parking space for the Retirement Village.

Three (3) bicycle parking spaces will be provided adjacent the Nursing Home entry, and one (1) bicycle parking spaces will be provided adjacent the entry to the Retirement Village. The supply of bicycle parking therefore meets the prescribed rates set out in the Development Plan.

6.17.4 Other parking requirements

The parking layout also takes into consideration the unique needs of the elderly residents and the carpark has generally been designed in accordance with the Development Plan provisions relating to Supported Accommodation, Housing for Aged Persons and People with Disabilities. In accordance with Supported Accommodation PDC 2(h) and PDC 5(d), each basement carpark will be provided with designated gopher parking spaces, conveniently located adjacent lifts and disabled parking spaces.

6.17.5 Service Vehicle Movements

Transportation and Access PDC 14 requires development to be designed to accommodate on-site loading, unloading and manoeuvring of all traffic likely to enter the development site.

Waste Collection

The development will be serviced by a number of vehicles for the collection of waste.

Waste will be collected from local bin storage rooms by small tug vehicles with attached bin trailers. Tug vehicle swept turning paths for stages of construction are provided within the GTA Report.

It is noted that Buildings 1 to 3 will have dead-end aisles until extensions to the basement carparks are constructed during future stages. In these instances, tug vehicles will be disconnected from the bin trailers, individually turned around and reattached to complete the collection service.

It is envisaged that Retirement Village waste will be collected by Council's waste contractor, whilst waste generated by the operation of the Nursing Home is intended to be collected by a private waste contractor.

The bin presentation area will be constructed during Stage 1 and will be situated to the west of the Nursing Home. The tug vehicle will transport bins via the connected basement carparks and bin lift to the presentation area, which has been designed to accommodate the anticipated movements of a 10 metre long refuse vehicle (being the largest refuse vehicle expected to access the site for the collection of waste). Swept turning paths for

the temporary bin presentation area to service Stages 1 to 5, and the permanent bin presentation area (installed during stage 6) are provided on pages 21 to 23 of the GTA report.

The Safe Intersection Sight Distance (SISD) analysis performed by GTA also confirms adequate sight lines of motorists travelling along Cameo Street for service vehicles exiting the bin presentation area onto Actil Avenue South.

Other Deliveries and Collections

The bin presentation area will also be used as a loading area for the collection and delivery of other items including food/kitchen supplies, linen supplies and other miscellaneous supplies (i.e. stationary, medical supplies etc.). GTA confirm that collections and deliveries will be made by vehicles not exceeding an 8.8 MRV. The delivery/presentation area has been designed to accommodate 10 metre long vehicles movements, and will therefore accommodate all anticipated delivery vehicle movements associated with the operation of the Nursing Home.

All deliveries for the Retirement Village will be made by light vehicles via the at-grade carpark. This carpark has been designed to accommodate these vehicle movements.

It is anticipated that the Retirement Village and Nursing Home will be serviced by 7.0 metre long mini buses for the collection and transportation of residents. Residents will be collected from Port Cocheres located adjacent the entries to Buildings 1 and 6. Swept turning paths for these vehicle movements are provided on Page 35 of the GTA Report.

Emergency Service Vehicle

Supported Accommodation PDC 3(b) also requires Nursing Homes (supported development) to provide convenient access for emergency service vehicles.

Fire truck swept turning paths prepared for the development are attached as **Appendix 7** and demonstrate that at-grade carpark and internal pathways connecting each building have been designed to accommodate fire vehicle movements.

Further, GTA confirm that the Port Cocheres and at-grade carparks have been designed to accommodate vehicle movements of a 7.3 metre Bariatric Ambulance. Swept turning paths for these vehicle movements are provided on pages 36 and 37 of the GTA report.

6.17.6 Traffic Volumes and Distribution

Anticipated traffic volumes have been determined using the traffic generation rates found within the document: *Technical Direction 04a: Guide to Traffic Generating Developments – Updated Traffic Surveys*, together with the information contained within the GTA Generation Database.

Estimates on the peak hour and daily traffic volumes to be generated by the development are summarised in **Tables 6.8, 6.9 and 6.10**.

Table 6.8 AM Peak Hour Traffic Generation Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	0.21 trips per dwelling	72
Office	61 sq.m	1.6 trips per 100 sq.m	1
Supported Accommodation	144 Beds	0.24 trips per bed	35
AM Peak Hour Total			108

Source: GTA Traffic Impact Assessment

Table 6.9 PM Peak Hour Traffic Generation Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	0.21 trips per dwelling	72
Office	61 sq.m	1.2 trips per 100 sq.m	1
Supported Accommodation	144 Beds	0.31 trips per bed	45
PM Peak Hour Total			118

Source: GTA Traffic Impact Assessment

Table 6.10 Daily Traffic Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	2.1 trips per dwelling	716
Office	61 sq.m	11 trips per 100 sq.m	7
Supported Accommodation	144 Beds	1.97 trips per bed	284
Daily Total			1007

Source: GTA Traffic Impact Assessment

The above Figures indicate that the development will generate in the order of 108 AM and 118 PM peak hour trips, together with 1,007 daily trips. The directional distribution of the traffic is predicted by GTA to be as follows:

Road Network Distribution

- St Clair Avenue: 15%
- Woodville Road: 85%

Site Access Distributions

- St Clair Avenue: 70%
- Actil Avenue South: 30%

Figures 6.9, 6.10 and **6.11** illustrate the anticipated directional distribution of traffic assuming a 50:50 split in incoming and outgoing traffic for each period.

Figure 6.9 AM Peak Hour Volumes and Distribution



Source: GTA Traffic Assessment

Figure 6.10 PM Peak Hour Volumes and Distribution



Source: GTA Traffic Assessment

Figure 6.11 Daily Volumes and Distribution



Source: GTA Traffic Assessment

The above diagrams indicate that the majority of traffic will enter and exit the site via St Clair Avenue (via Woodville Road), and GTA conclude that the additional traffic to be generated by the development is not expected to compromise the function or safety of the surrounding road network.

6.18 Stormwater Management

A concept Stormwater Management Plan and Siteworks plan has been prepared by Greenhill and is attached to this report as **Appendix 9**. An additional letter prepared by Greenhill dated 30 November 2018 is also attached as **Appendix 9**.

Roof water and surface water collected from the site will discharge into a temporary detention basin for Stages 1 to 5. The temporary basin will then be replaced by an underground detention tank which will be constructed in Stage 6.

Importantly, the detention tank has been designed to satisfy the following Natural Resources and Hazards provisions of the Development Plan which are intended mitigate peak flows, prevent flooding and manage the rate and duration of stormwater discharge from the site:

General Section: Natural Resources

PDC 8 *Water discharged from a development site should:*

.....

(b) not exceed the rate of discharge from the site as it existed in pre-development conditions (our emphasis)

PDC 9 *Development should include stormwater management systems to protect it from damage during a minimum of a 1 in 100 year average return interval flood.*

PDC 10 *Development should have adequate provision to control any stormwater over-flow run-off from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.*

PDC 11 *Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.*

General Section: Hazards

OBJ 10: *Development that does not cause land, air or water contamination*

PDC 6: *Development, including earthworks associated with development, should not do any of the following:*

.....

(f) increase the risk of flooding of other land

Greenhill confirm that stormwater currently collected from the site eventually discharges to the existing St Clair Development wetland and detention basin situated to the north-west of the site. Greenhill also confirm that the detention basin was designed and constructed to account for stormwater flows to be generated by the proposed development site.

The detention system has also been designed in accordance with the Council conditions attached to the original plan of division to create Lot 1000 and Lot 1001 (D.A 252/2895/15). Consistent with the requirements of Natural Resources PDC 8, the conditions attached to the consent also require that post development stormwater rates shall be managed for a minor storm event of 1 in 5 years, and a major storm event of 1 in 100 years:

“detention sizing has been undertaken based on limiting the minor 5-year ARI post development flows in the underground system to the predevelopment 5-years ARI, the combined underground pipe network and the overland flow from the site during the 100-years ARI limited to the predevelopment 100-year ARI.”

The detention system has therefore been designed in accordance with the requirements of Natural Resources PDC 8 which requires that water discharged from the site should not “exceed the rate of discharge from the site as it existed in pre-development conditions”.

Greenhill also conclude that the anticipated discharge rate generated by development during a major storm event is estimated to be less than 0.23m³/s. This flow rate is well below the capacity of the receiving drainage network, which Greenhill estimate is capable of receiving in excess of 1m³/s of water. With the detention tank installed, the St Clair Development wetland is capable of accommodating post development flows. The detention system therefore satisfies the requirements of Hazards PDC 6 as stormwater discharge rates will be managed to address the risk of flooding to downstream properties.

The Development Plan also includes Water Sensitive Urban Design (WSUD) initiatives which are intended to preserve water quality and minimise pollutant transfer to receiving waters. A Gross Pollutant Trap (GPT) will be installed to treat water and meet the following Environment Protection Authority (EPA) targets:

- 90% reduction in litter/gross pollutants;
- 45% reduction in average annual total nitrogen;
- 60% reduction in average annual phosphorous;
- 80% reduction in average annual suspended solids.

With the GPT installed, the drainage system for the development will satisfy the following Natural Resource provisions of the Development Plan relating to water quality:

PDC 8 *Water discharged from a development site should:*

- (a) Be of a physical, chemical and biological condition equivalent or better than its pre-developed state*

PDC 12 *Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, litter and other contaminants to the stormwater system.*

The Stormwater Management Plan prepared by Greenhill demonstrates that the development has been designed to satisfy the relevant Natural Resources and Hazards of the Development Plan.

6.19 Waste Management

A comprehensive Waste Management Plan has been prepared by Colby Industries, and is attached to this Planning Statement as **Appendix 10**. The Waste Management Plan has been assessed against the following provisions of the Development Plan:

General Section: Medium and High Rise Development (3 or more storeys)

PDC 13 *The design of driveway crossovers, parking area, accessways and elements that interact with the public realm should safely and efficiently accommodate the collection of waste and recycling materials.*

PDC 14 *Development should provide a dedicated area for the on-site storage, collection and sorting of recyclable materials and waste that is consistent with following:*

- (a) easily and safely accessible to the collection*
- (b) easily and safely accessible to residents and collection service providers*
- (c) well screened and secure to prevent vandalism and theft*
- (d) designed to reduce odour and discourage vermin*

PDC 15 *Development with a gross floor area of 2000 square metres or more should provide for the communal storage and management of waste*

General Section: Residential Development

PDC 27 *Site facilities for group dwellings, multiple dwellings and residential flat buildings should include:*

(c) household waste and recyclable material storage areas of a size suitable for the expected volume, located away from dwellings, screened from public view and in an area easily accessible for waste collection.

The Waste Management Plan has been designed in accordance with the above-mentioned provisions relating to waste storage and disposal, as summarised below:

- Each building will have a dedicated waste storage room situated within the basement carpark (PDC 15);
- Each waste storage room has been appropriately designed to accommodate the anticipated nature and volume of waste to be generated by development (PDC 27);
- In accordance with PDC 27, the following design and management practices will be implemented to manage odour and vermin:
 - » the bin storage areas will be negatively pressured and mechanically ventilated; and
 - » building 7 will include a bin wash-down bay (and bin cleaning activities will be outsourced to contractor until Building 7 has been constructed).
- The transfer pathways from apartments and Nursing Home rooms to local waste storage areas, and then to the bin presentation area have been designed in accordance with the document: *South Australian Practice Guide – Waste Management in Residential or Mixed Use Developments*, and Colby Industries have concluded that “based on the current plans, these requirements for transfer pathways in the Development appear to be generally satisfied”;
- In accordance with PDC 14, the development will be provided with a communal bin presentation area for all stages of development, which will be screened from the public realm by 1.8 metre high colorbond fencing along the frontage to Actil Avenue South; and
- Each basement carpark and waste transfer pathway has been designed to accommodate tug vehicle movements, and the transfer of waste from local bin storage rooms to the bin presentation area.

6.20 Infrastructure & Building Services

Infrastructure PDC 1 seeks to ensure that development is capable of being connected to all essential services and infrastructure:

PDC 1 *Development should not occur without the provision of adequate utilities and services, including:*

(a) electricity supply

(b) water supply

(c) drainage and stormwater systems

- (d) waste disposal*
- (e) effluent disposal systems*
- (f) formed all-weather public roads*
- (g) telecommunications services*
- (h) social infrastructure, community services and facilities*
- (i) gas services.*

A Site Infrastructure Report prepared by BESTEC is attached as **Appendix 12**. The report provides a summary of the infrastructure and major plant arrangements for electrical, hydraulic and fire protection services for each stage of development.

The Site Infrastructure Report confirms that the site is capable of being connected all essential services and infrastructure, including sewer, water, electrical and communication services, and fire protections services.

6.21 Environment (Site Contamination)

The following Hazards provisions of the Development Plan seek to ensure that contaminated sites are remediated to a standard capable of accommodating the intended use of land:

- OBJ 7** *Protection of human health and the environment wherever site contamination has been identified or suspected to have occurred.*
- OBJ 8** *Appropriate assessment and remediation of site contamination to ensure land is suitable for the proposed use and provides a safe and healthy living and working environment.*
- PDC 10** *Development that does not cause land, air or water contamination.*
- PDC 12** *Development, including land division, should not occur on contaminated land or on potentially contaminated land unless either of the following applies:*
 - (a) remediation of the site is undertaken to a standard that makes it suitable and safe for the proposed use;*
 - (b) the site will be maintained in a condition, or the development will be undertaken in a manner, that*
 - (c) will not pose a threat to the health and safety of the environment or to occupiers of the site or land in the locality.*

The letter prepared by LBW Co. (LBW) (attached as **Appendix 13**) has been and outlines the environmental remediation status of the subject site.

LBW was commissioned by Aveo to undertake a site contamination assessment of Lot 1000 to identify the nature and extent of site contamination, and to outline site remediation works which would need to be carried out to make the site suitable for its intended use as a Nursing Home and Retirement Village.

Although the site investigations have identified contaminated soil, the letter prepared LBW states that the site can be remediated to a standard suitable for its intended sensitive use as a Nursing Home and Retirement Village:

“Remediation works will include the excavation and removal of all fill from the site, followed by a validation assessment to confirm successful remediation. The remediation works will be subject to a new SCAR to be prepared by Mr Graeme Miller of Senversa Ptd Ltd, acting for Renewal SA.”

LBW also note that the remediation process is a relatively simple process and can be addressed via appropriately worded condition(s) attached to the Planning Consent:

“The new SCAR has been commissioned, so the planning approval authority can have confidence that the site will be made suitable for the intended use and verified via the new SCAR prior to Development Approval”

It is LBWco’s opinion that the remediation and validation of the site is a straight forward matter and accordingly, the planning consent should be granted with a simple condition that requires the SCAR to be completed and submitted to the authority prior to the granting of development approval.”

In light of the above findings and recommendations, it is appropriate for the planning authority to apply an appropriately worded condition of approval that a Site Contamination Audit Report (SCAR) be prepared prior to Development Approval being issued.

7. Conclusion

This development application seeks approval for a staged Aged Care and Retirement Living development in the form of a Nursing Home comprising 144 beds, a Residential Flat Building comprising 341 Independent Living Units, associated administration and community facilities, advertising, carparking, a resident swimming pool, landscaping, fencing and associated earthworks as well as the removal of four (4) Regulated Trees (including one [1] Significant Tree), on land located at Lot 1000, Woodville Road, St Clair.

Following an inspection of the subject site and locality, a review of the proposed plans and associated documentation accompanying the application and a detailed assessment of the proposed development against the relevant provisions of the Charles Sturt Council Development Plan, we have formed the opinion that the proposed development represents appropriate and orderly development that deserves favourable consideration for approval given:

- The proposed development seeks to establish an integrated retirement living and aged care facility which is highly aligned with the Railway Station Precinct where a Nursing Home and Retirement Village are envisaged forms of the development;
- The development will provide a minimum of 15% affordable housing in accordance with the relevant Policy Area and Affordable Housing Overlay provisions;
- The development will include an ancillary community facility which will provide a range of complementary services and facilities, consistent with Support Accommodation provisions of the Development Plan;
- The proposed building will be provided with dual orientation to internally address the Central Garden and externally address the public realm to maximise opportunities for passive surveillance;
- Building setbacks generally accord with the relevant provisions of the Development Plan and generous setbacks from Actil Avenue South will assist to minimise the visual impact of the development at the interface with the adjacent Residential Zone;
- The height, scale and density of the development is highly aligned with the relevant provisions of the Development Plan in that:
 - » Buildings will transition from a maximum height of five (5) storeys within the 'Core Area' down to three (3) storeys within the 'Transition Area'; and
 - » The development will achieve an approximate net density of 121 dwellings per hectare which exceeds the minimum net densities prescribed by the Development Plan of 70 dwellings within the 'Core Area' and 60 dwellings within the 'Transition Area';

- The Nursing Home and Retirement Village buildings exhibit a high degree of architectural merit and expression and in particular:
 - » Each building will be constructed in a variety of durable building materials to achieve a high degree of architectural merit;
 - » Consistent with the Precinct provisions, the development features a contemporary design and visual presence which has been achieved through a variety of vertical and horizontal building elements;
 - » All buildings have been orientated to address the public realm with large windows and balconies to all elevations;
 - » Variations in design and colours are proposed for each building to create a sense of identity;
- The development has been designed to adhere to Crime Prevention Through Environmental Design (CPTED) principles with apartments and Nursing Home rooms designed to provide good passive surveillance over the public realm and communal areas;
- A high level of amenity will be provided for future residents with dwellings designed with good access to day light, ventilation, outlook, useable private and communal open space and adequate storage;
- The development has been designed to achieve positive environmental outcomes particularly in relation energy and water conservation, and all apartments have been designed to achieve individual 5 star energy efficiency ACCURATE ratings, and an average 6 star energy efficiency rating collectively;
- The proposed advertising signage is integrated with the design of the development, are relatively modest and restrained in the context of the scale of the development and have been designed to identify the site to passing traffic without adversely impacting on the amenity of the locality;
- Apartment balconies and windows and nursing home windows will not overlook the private open space or living areas of existing adjoining residential properties;
- A combination of landscape screening, balcony screens and generous setbacks between apartments will address unreasonable overlooking between apartments;
- Landscaping throughout the communal open space area, at grade car park and around the perimeter of the site will significantly enhance the amenity of the locality and provide functional and interesting communal open spaces to support the sites use as a Nursing Home and Retirement Village;
- When considered on merit, the removal of four (4) Regulated Trees (including one [1]) Significant Tree is appropriate given:
 - » Three (3) of the trees (including the Significant Tree) are in poor health and have short useful life expectancies;
 - » the development has been designed to retain and protect 21 Regulated Trees (including nine [9] Significant Trees), and the proposed removal of four trees is appropriate when weighed

- against the Zone and Policy Area objectives and PDC's to accommodate a reasonable medium to high density development outcome consistent with objectives of the Development Plan;
 - » the loss of amenity resulting from the removal of the trees will be replaced by the additional landscaping proposed; and
 - » Pursuant to Section 42 (4) of the Act, nine (9) replacement trees will be planted to the reasonable satisfaction;
- The Traffic Impact Assessment undertaken by GTA consultants confirms that:
 - » The proposed supply of 395 basement carpark spaces together with 21 at-grade parking spaces will satisfy the parking demand and also meet the minimum parking rate requirements stipulated within the Development Plan;
 - » The proposed parking layout is consistent with the dimensional requirements as set out in the Australian/New Zealand Standards for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009);
 - » The provision of six (6) disabled parking spaces exceeds the requirements for disabled parking prescribed within the *National Construction Code 2016*;
 - » The development will accommodate three (3) Nursing Home bicycle parking spaces and one (1) Retirement Village parking spaces, which exceeds the bicycle parking rates prescribed within the Development Plan;
 - » The bin presentation area, loading area and all at-grade parking areas have been designed to accommodate all service and delivery vehicle movements including a 10 metre long refuse vehicle, community buses and light vehicles;
 - » The at-grade carpark and Central Garden has been designed to accommodate emergency service vehicle movements;
 - » The basement carpark spaces have been designed to accommodate tug vehicle movements for the transfer of waste from local bin storage areas to the bin presentation area;
 - » The volume and distributional direction of traffic to the be generated by the development can be accommodated by the existing road network; and
 - » Each stage of development has been designed to accommodate all anticipated vehicle movements;
- The Stormwater Management Plan prepared by Greenhill demonstrates that, subject to detailed design, stormwater can be suitably managed onsite and that stormwater discharged from the site will not exceed pre-development conditions in accordance the provisions of the Development Plan;
- Resonate have confirmed that the development has been designed to satisfy the requirements of the of the *Environment Protection (Noise) Policy 2007*, and that the development is also capable of being designed to satisfy the requirements of the Minister's Specification SA 78B. Accordingly, the

development will maintain an appropriate level of amenity for existing residents, and will also achieve an appropriate level of amenity for future Aveo residents;

- A Waste Management Plan prepared by Colby Industries has demonstrated that there is adequate and convenient provision for the suitable collection, storage, management and removal of waste from the site;
- A Service Infrastructure Report prepared by BESTEC demonstrates that the proposed development can be economically and efficiently serviced with required power, sewer, potable water, gas and communications infrastructure; and
- Subject to required soil removal and disposal, LBWco confirm that the site can be suitably managed and remediated as necessary to ensure that it is suitable and safe for its intended use.

For the reasons outlined above, the proposed development is aligned with the relevant provisions of the Charles Sturt Council Development Plan, and warrants Development Plan Consent.

Appendix 1. Certificate of Title

Appendix 2. Survey Plan

Alexander Symonds

Appendix 3. Architectural Plans, perspectives and design statement

Brown Falconer

Appendix 4. Landscape Master Plans

Greenhill

Appendix 5. Tree Report

Tree Environs

Appendix 6. Traffic Impact Assessment

GTA Consultants

Appendix 7. Fire Truck Access/Egress Plans

Greenhill

Appendix 8. Acoustic Report

Resonate

Appendix 9. Stormwater Management Plan and Siteworks Plan

Greenhill

Appendix 10. Waste Management Plan

Colby Industries

Appendix 11. Signage Specifications

Trio Sign Solutions

Appendix 12. Site Infrastructure Report

BESTEC

Appendix 13. Environmental Status Letter

LBW Co.

REAL PROPERTY ACT, 1886



The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6200 Folio 474

Parent Title(s) CT 6063/756
Creating Dealing(s) RTU 12824130
Title Issued 23/11/2017 Edition 1 Edition Issued 23/11/2017

Estate Type

FEE SIMPLE

Registered Proprietor

URBAN RENEWAL AUTHORITY
OF LEVEL 9 (WEST) RIVERSIDE CENTRE NORTH TERRACE ADELAIDE SA 5000

Description of Land

ALLOTMENT 1000 DEPOSITED PLAN 116180
IN THE AREA NAMED ST CLAIR
HUNDRED OF YATALA

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A ON D116180 TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (T 1369661)


SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B ON D116180 TO THE MINISTER FOR INFRASTRUCTURE (T 3701089)

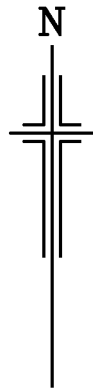
Schedule of Dealings

Dealing Number	Description
12084194	APPLICATION PURSUANT TO SECTION 103P(2) OF THE ENVIRONMENT PROTECTION ACT 1993 NOTING THAT A SITE CONTAMINATION AUDIT REPORT HAS BEEN PREPARED IN RESPECT OF THE WITHIN LAND

Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL
Registrar-General's Notes	NIL
Administrative Interests	NIL

PURPOSE:		DIVISION		AREA NAME:		ST CLAIR		APPROVED:		<div><div>D116180</div><div>SHEET 1 OF 3</div><div>58108_text_01_v05_Version_5</div></div>	
MAP REF:		6628/40/G, 6628/40/K		COUNCIL:		CITY OF CHARLES STURT		MATT HOLST 17/07/2017			
LAST PLAN:		D84492		DEVELOPMENT NO:				DEPOSITED: ORAZIO DEANGELIS 15/11/2017			
AGENT DETAILS:		ALEXANDER & SYMONDS PTY LTD 1ST FLOOR 11 KING WILLIAM ST KENT TOWN SA 5067 PH: 81301666 FAX: 83620099			SURVEYORS CERTIFICATION:		I Mark Antony Peter Williams , a licensed surveyor do hereby certify - 1) That this plan has been made from surveys carried out by me or under my personal supervision and in accordance with the Survey Act 1992. 2) That the field work was completed on the 16th day of June 2017 14th day of July 2017 Mark Antony Peter Williams Licensed Surveyor				
AGENT CODE:		ALSY									
REFERENCE:		A110115LTO(A)									
SUBJECT TITLE DETAILS:											
PREFIX	VOLUME	FOLIO	OTHER	PARCEL	NUMBER	PLAN	NUMBER	HUNDRED / IA / DIVISION	TOWN	REFERENCE NUMBER	
CT	6063	756		ALLOTMENT(S)	1	D	84492	YATALA			
CT	6063	757		ALLOTMENT(S)	2	D	84492	YATALA			
OTHER TITLES AFFECTED: CT 5821/918 , CT 6089/325											
EASEMENT DETAILS:											
STATUS	LAND BURDENED	FORM	CATEGORY	IDENTIFIER	PURPOSE	IN FAVOUR OF				CREATION	
EXTINGUISH	2002(WOODVILLE ROAD)	LONG	EASEMENT(S)	A IN D84492		DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000)				T 1369661	
EXTINGUISH	2002(WOODVILLE ROAD)	LONG	EASEMENT(S)	B IN D84492		THE MINISTER FOR INFRASTRUCTURE				T 3701089	
EXISTING	1000	LONG	EASEMENT(S)	A		DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000)				T 1369661	
EXISTING	1000	LONG	EASEMENT(S)	B		THE MINISTER FOR INFRASTRUCTURE				T 3701089	
ANNOTATIONS:											



REFERENCE MARKS

CNR	BEARING	FROM	DIST	PM NO
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2	124°58'	PM FD	2.13	6628/8878
5	307°22'	PM FD	0.98	6628/25305

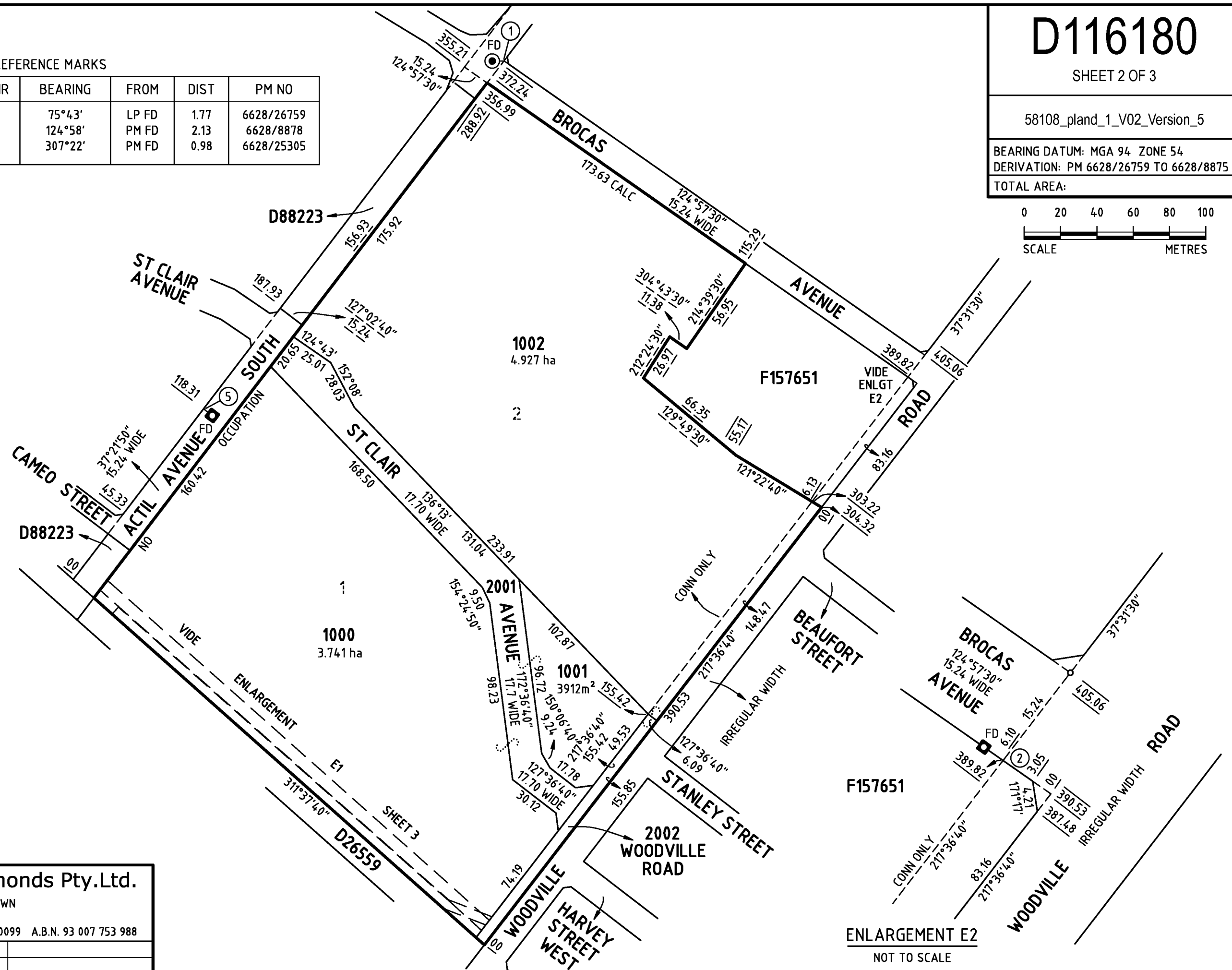
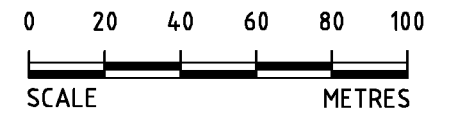
D116180

SHEET 2 OF 3

58108_pland_1_V02_Version_5

BEARING DATUM: MGA 94 ZONE 54
DERIVATION: PM 6628/26759 TO 6628/8875

TOTAL AREA:



Alexander & Symonds Pty.Ltd.

11 KING WILLIAM STREET, KENT TOWN
P.O. BOX 1000 KENT TOWN 5071
Tel (08) 8130 1666 Fax (08) 8362 0099 A.B.N. 93 007 753 988

REFERENCE A110115LTO(A)

MW 09/06/2017

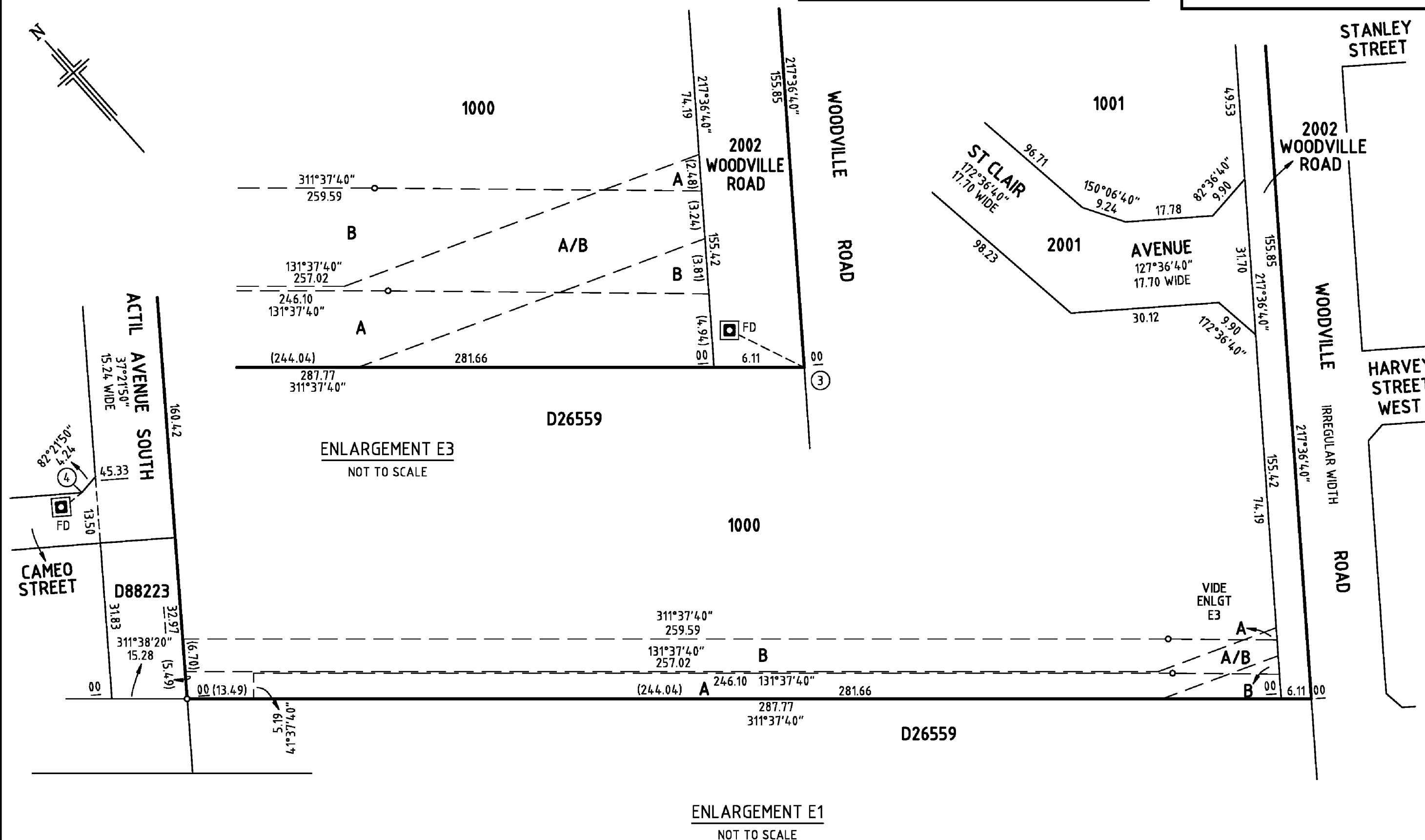
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P.O. BOX 1000 KENT TOWN 5071
Tel (08) 8130 1666 Fax (08) 8362 0099 A.B.N. 93 007 753 988

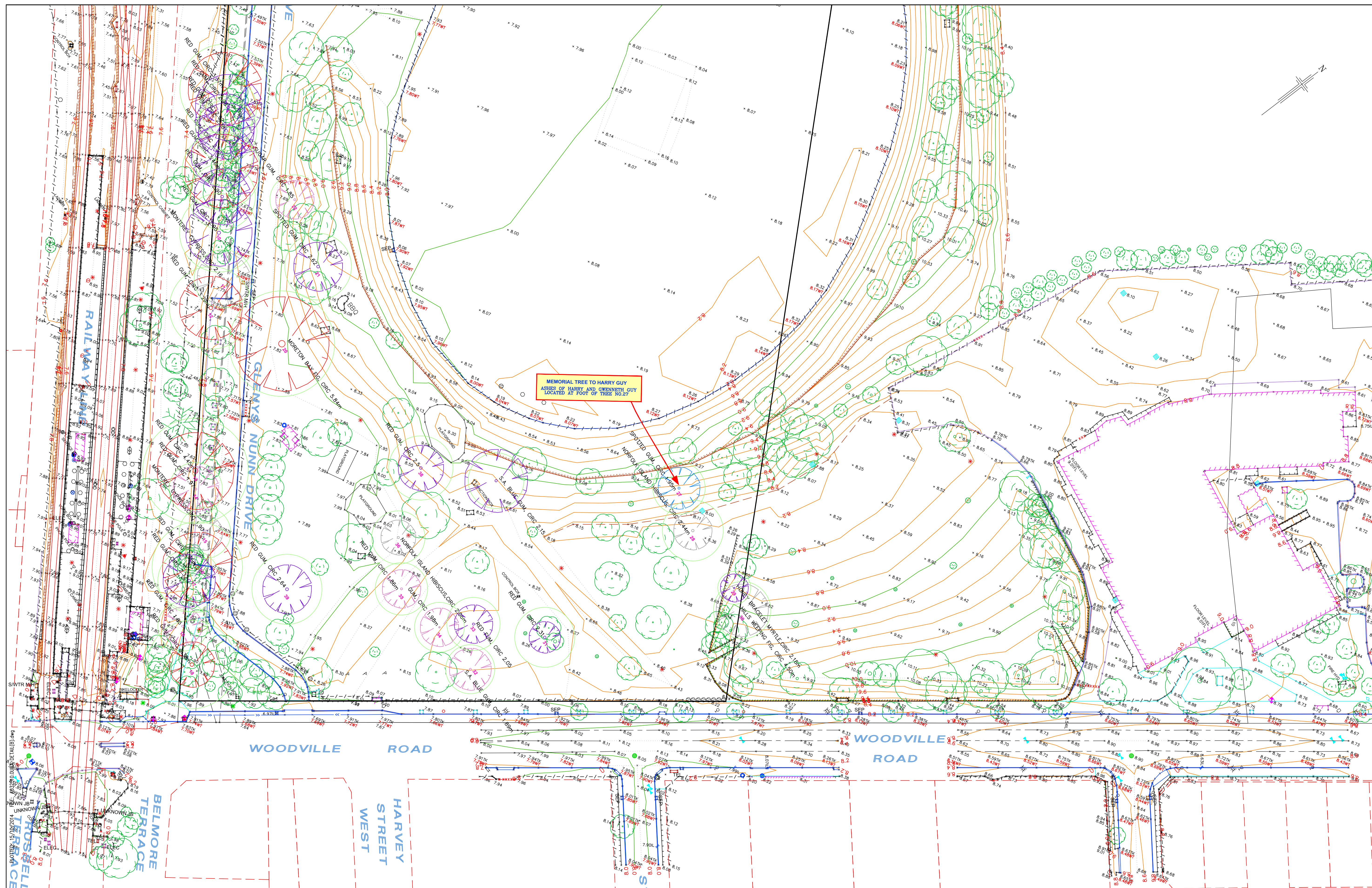
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SHEET 3 OF 3

58108_pland_2_V03_Version_5





02.07.2013 A 13.10.2014 B		Current Cadastre Overlayed Updated 39 Trees Based on Tree Report	RES AMP	47.51TK TOP KERB 48.00TK WATER TABLE 45.16FL FLOOR LEVEL 48.12BL INVERT LEVEL or 48.12BL TAP WATER METER SPRINKLER / IRRIG VALVE or HYDRANT DOMESTIC OUTLET DOWNPIPE DOMESTIC SUMP STORMWATER WHOLE SEP / GRATING	TREE PROTECTION ZONE TEL, COMM, PILLAR / PIT TRAFFIC LIGHT SIGN / BUS SIGN LITTER BIN MAIL BOX / SIGNAL BOX TRUCK MACHINE ROAD / ELEC. SERVICE WATER SV / PP ELEC. / GAS METER GAS SERVICE	LEGEND PSM PEG / TBM SURVEY MARKS BOREHOLE POWER / LIGHT POLE CABLE MARKER STORE / WOODEN POLE POST / BOLLARD WATER MH / ID / SP UNKNOWN POINT / SERVICE	TREE NUMBER EDGE OF VEGET. ROAD SIGN / HOARD. TREE / SHRUB TREE - SIGNIFICANT TREE - REGULATED TREE - EXAMINED TREE - MEMORIAL TREE - EXEMPT SPECIES	BOTTOM OF BANK TOP OF BANK CHANGE OF GRADE DRAIN SEWER PIPE UG TEL, COMM. UG WATER PIPE UG BUILDING WALL CONCRETE FENCE GATE	NOTES: BOUNDARIES OF SUBJECT LAND HAVE BEEN SURVEYED BASED ON PD 84492. PROPERTY BOUNDARIES PLOTTED AS RED DASHED LINES HAVE BEEN COMPILED FROM DCDB DATA. DCDB ACCURACY IS LIMITED TO SEVERAL METRES. DCDB DATA HAS BEEN PROVIDED FOR INFORMATION PURPOSES ONLY. COORDINATES BASED ON 6628/9054 HEIGHT DATUM BASED ON: 6628/25305 CANTOUR INTERVAL: 0.2m TREES 1-39 ARE BASED ON THE TREE REPORT PREPARED BY TREE ENVIRON'S PTY LTD.	 0 5 10 20 30 40 50 m 1:500 ORIGINAL SHEET SIZE A1 © ALEXANDER & SYMONDS PTY. LTD. COORDINATES: MGA 94 SURVEY: A&S 2010 HEIGHT DATUM: AHD DRAWN: RES 26.06.2013 DATA FILE: A032510.0URA FLD/LVL BOOK: CHECKED: RES	Alexander & Symonds Pty Ltd 11 King William Street Kent Town, South Australia 5087 PO Box 1000 Kent Town, SA 5071 DX 209 ABN 93007 753 988 T (08) 8130 1666 F (08) 8362 0099 W www.alexander.com.au E adelade@alexander.com.au + Property + Land Development + + Construction + Mining + + Spatial Information Management +	DRAWING No. A032510.0URA Detail SHEET 1 OF 2 REVISION B
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Design Statement

Project	Aveo St Clair	Date	13/12/2018
Prepared by	Mario Dreosti	Job No	2017045

The fundamental premise which underpins the proposed Aveo St Clair Integrated Retirement Community is to provide a welcoming, safe and enabling community for older people.

The development will be a community for older independent people in 341 apartments with an associated residential aged care component of 144 places. The co-location of care provides a potential whole of life continuum for residents.

The community centre at the heart of the project will offer a range of services and facilities for residents and their family and friends. The community centre is considered an extension of each residents apartment and designed to promote a range of social interactions from village wide events to more personal family or friend gatherings.

In order to achieve this aspiration a number of design principles were established:

- Connection with and access to the broader community
- Provision of individual living units with high amenity and accessibility
- Provision of areas and opportunities for activities which foster a strong Aveo community
- Consideration of real and perceived individual safety
- Ability for staged development over time

The urban planning and architectural response to these principles has led to outline approaches to the design resolution.

Orientation and Aspect

Analysis of the views and access to sunlight from each quadrant of the site led to the overall layout which places the higher scaled independent living apartments with views over sporting grounds, common areas and the large internal gardens with the more introspective and lower scaled residential aged care facility adjacent to residential neighbors.

Buildings have been placed to provide an urban edge to street frontages and establishes an orientation which has been proven through sun shade modelling to provide morning or afternoon sun to the terrace or balcony of every single apartment during the day.

Context and Scale

The overall project has been broken down into buildings which range from 3 to 5 storey's in scale and provide neighborhoods of 44 to 62 residents in each individual building. In direct compliance with the development plan, the location of buildings with different height profiles steps down towards the residential interface at Actil Avenue.

This approach of individual but connected buildings presents outwardly as a descaled streetscape with variation and articulation and internally allows residents to generate individual identities, entry points and sense of smaller neighborhoods within the larger community.

Architectural Expression

The open space planning surrounding the buildings seeks to generate clear points of access with individual building identities and common areas arranged and planned with great access to natural sunlight throughout the year. Within the apartments, particular attention has been paid to the usability and aspect of all habitable areas and to views from balconies.

The undercroft car parking provides an undercover and secure environment for residents and removes all resident vehicular traffic from the communal gardens within the site. In addition, the undercroft provides a weather-protected link between all buildings to allow residents safe access to the community centre on days of inclement weather. The connection also assists with the management of waste. The level of the undercroft car parking has been used to manage the interface at the public edges of the site so that private terraces are elevated above the footpath and road level providing a balance between activation and oversight and a sense of personal privacy and security. Within the development the garden levels are matched with ground floor of the buildings for easy access.

With the intention to create a community, the gardens have been designed as a series of spaces with identities for different uses and the whole of the space is centered around the community centre and pool area as a focal point of activity.

All the buildings share a common design language which is residential in detailing and timeless in materiality. There is variation between each separate structure with particular emphasis on identifiable and unique entry points so that the whole development will present as a community but with articulation and individual identity.

The use of podium and horizontal banding techniques assists with breaking the vertical scale of the larger buildings and the different aspects for each set of apartments has informed the solid to void ratios in the facade which assists with changes in character.

The overall development will present as a respectful addition to the existing context which meets development plan aspirations to increase scale and density. It will activate the public realm through residential presence and also a legible community entry point and provides residents a strong community identity with a range of outdoor spaces that cover the spectrum from public to semi private to fully private spaces.

DRAWING SCHEDULE

DA001	SITE PLAN
DA002	EXISTING SITE PLAN
DA003	BUILDING LAYOUT
DA004	UNDERCROFT LAYOUT
DA010	UPPER FLOOR PLANS
DA015	SUN DIAGRAMS
DA048	EXISTING TREES PLAN
DA100	APARTMENT TYPES OVERALL PLAN
DA101	GROUND FLOOR PLAN - BUILDING 1
DA102	FIRST FLOOR PLAN - BUILDING 1
DA103	SECOND FLOOR PLAN - BUILDING 1
DA104	THIRD AND FOURTH FLOOR PLAN - BUILDING 1
DA105	GROUND FLOOR - BUILDING 2
DA106	TYPICAL PLAN - BUILDING 2
DA107	GROUND FLOOR PLAN - BUILDING 3
DA108	TYPICAL PLAN - BUILDING 3
DA109	GROUND FLOOR - BUILDING 4
DA110	TYPICAL PLAN - BUILDING 4
DA111	GROUND FLOOR BUILDING 5
DA112	TYPICAL PLAN - BUILDING 5
DA113	GROUND FLOOR PLAN - BUILDING 7
DA114	FIRST & SECOND FLOOR PLAN - BUILDING 7
DA115	THIRD AND FOURTH FLOOR PLAN - BUILDING 7
DA120	ROOF PLAN - OVERALL
DA130	STREETSCAPE ELEVATIONS PAGE 1 OF 2
DA131	STREETSCAPE ELEVATIONS PAGE 2 OF 2
DA132	BUILDING 1 ELEVATIONS
DA133	BUILDING 2 ELEVATIONS
DA134	BUILDING 3 ELEVATIONS
DA135	BUILDING 4 ELEVATIONS
DA136	BUILDING 5 ELEVATIONS
DA137	BUILDING 7 ELEVATIONS
DA138	OPTIONAL WINTER GARDEN GLAZING
DA140	OVERALL SITE SECTIONS
DA141	SITE SECTIONS SHEET 01
DA150	APARTMENT TYPES PLAN - PAGE 1 OF 3
DA151	APARTMENT TYPES PLAN - PAGE 2 OF 3
DA152	APARTMENT TYPES PLAN - PAGE 3 OF 3
DA160	STAGING PLAN - GROUND FLOOR STAGE 1
DA161	STAGING PLAN - GROUND FLOOR STAGE 2
DA162	STAGING PLAN - GROUND FLOOR STAGE 3
DA163	STAGING PLAN - GROUND FLOOR STAGE 4
DA164	STAGING PLAN - GROUND FLOOR STAGE 5
DA165	STAGING PLAN - GROUND FLOOR STAGE 6
DA166	STAGING PLAN - GROUND FLOOR STAGE 7
DA170	STAGING PLAN - UNDERCROFT STAGE 1
DA171	STAGING PLAN - UNDERCROFT STAGE 2
DA172	STAGING PLAN - UNDERCROFT STAGE 3
DA173	STAGING PLAN - UNDERCROFT STAGE 4
DA174	STAGING PLAN - UNDERCROFT STAGE 5
DA175	STAGING PLAN - UNDERCROFT STAGE 6
DA176	STAGING PLAN - UNDERCROFT STAGE 7
DA180	SITE PERSPECTIVE
DA181	MATERIALS & FINISHES
DA190	SIGNAGE DRAWING
DA200	RACF SITE PLAN
DA201	RACF BASEMENT FLOOR PLAN
DA202	RACF GROUND FLOOR PLAN
DA203	RACF FIRST FLOOR PLAN
DA204	RACF SECOND FLOOR PLAN
DA205	RACF THIRD FLOOR PLAN
DA206	RACF FOURTH FLOOR PLAN
DA210	RACF ELEVATIONS
DA215	RACF PERSPECTIVES & FINISHES

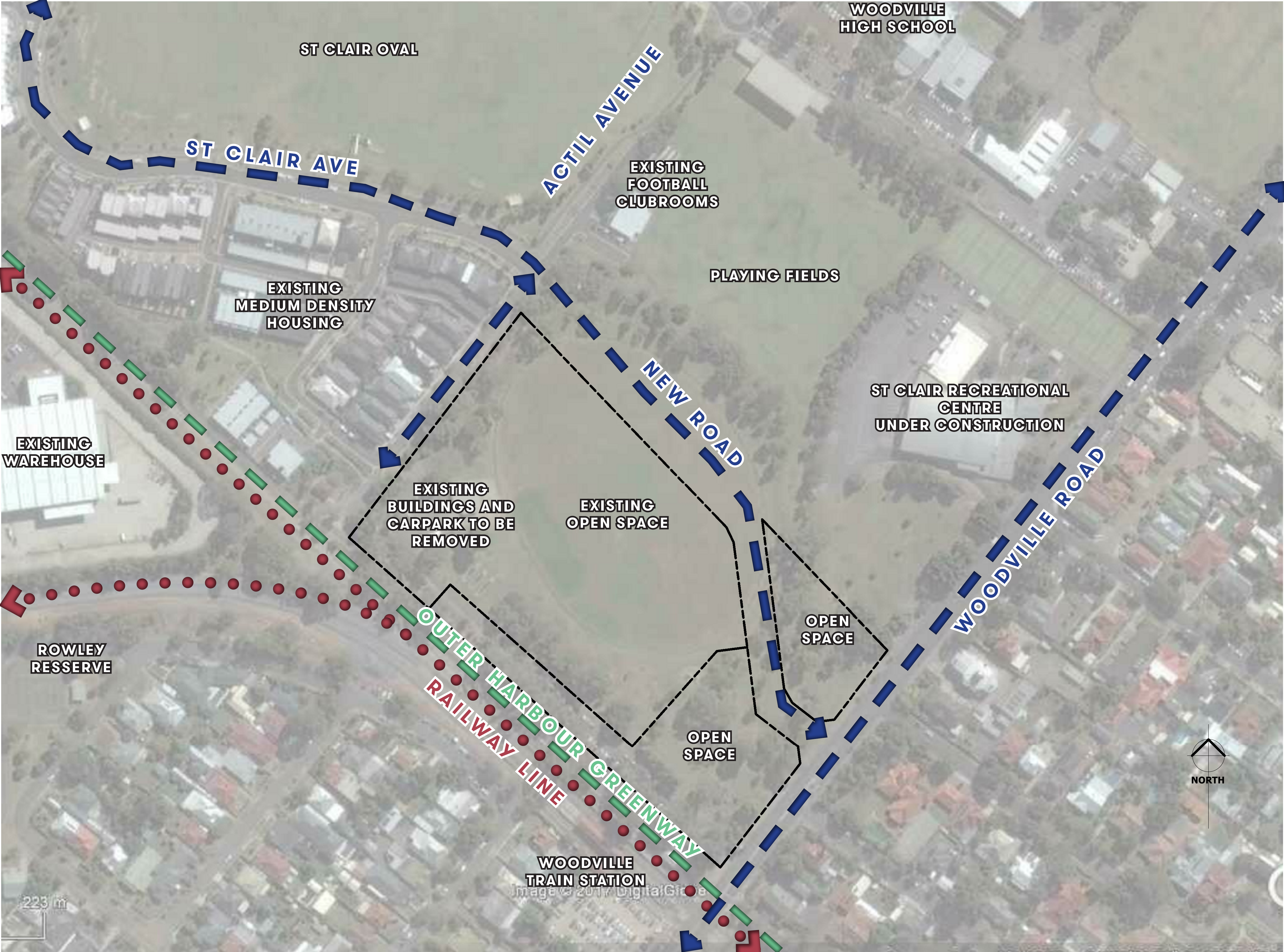
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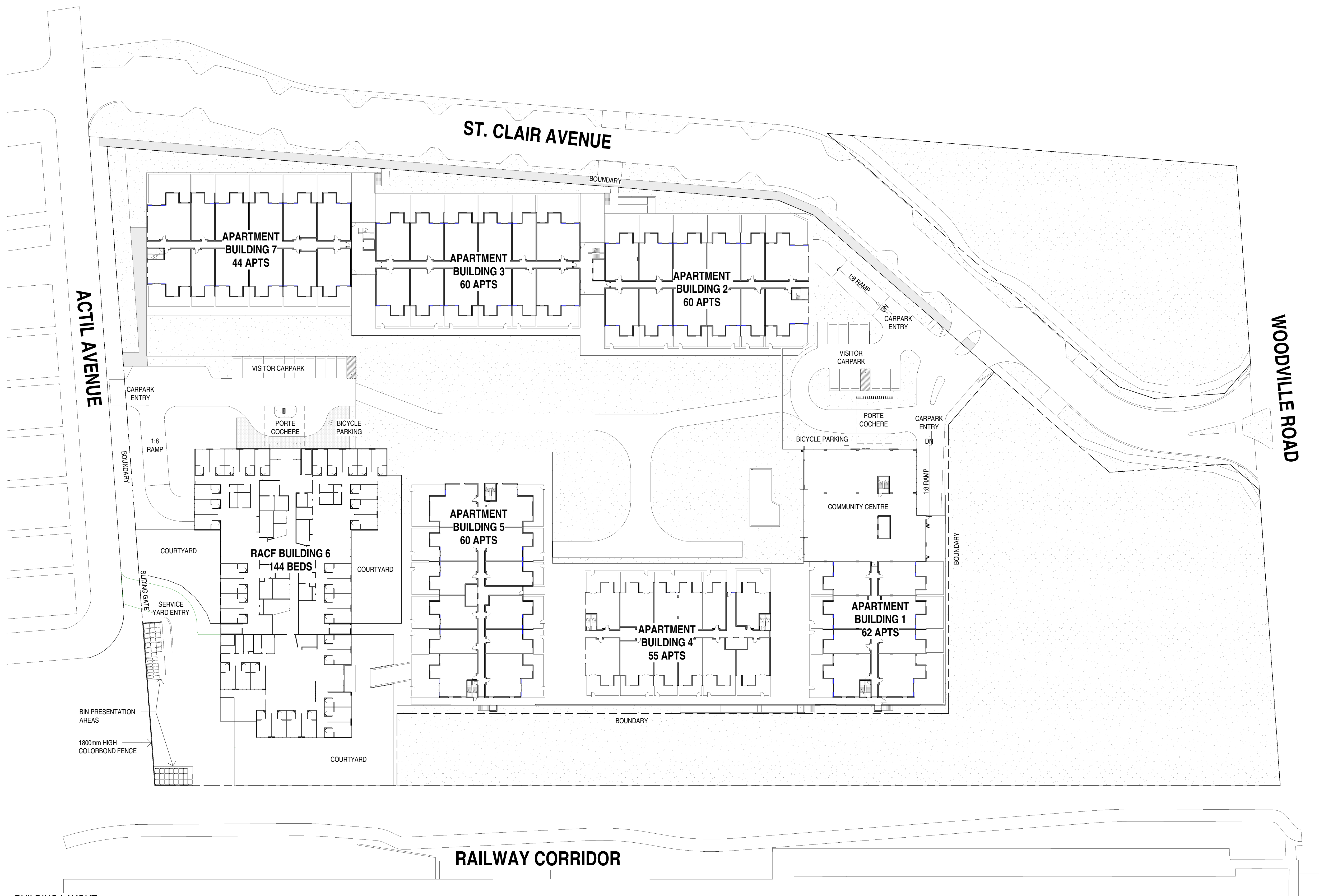
ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

SITE PLAN



SITE PLAN





BUILDING LAYOUT
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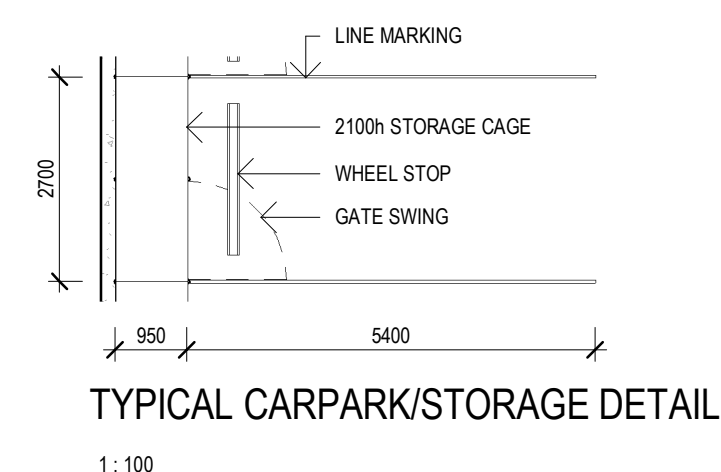
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2	ISSUED FOR INFORMATION	23/08/18
3	ISSUED FOR INFORMATION	10/09/18
4	ISSUED FOR INFORMATION	25/09/18
5	ISSUED FOR INFORMATION	26/09/18
6	ISSUED FOR INFORMATION	28/09/18
7	ISSUED FOR INFORMATION	16/11/18
8	ISSUED FOR INFORMATION	21/11/18
9	ISSUED FOR INFORMATION	23/11/18
10	ISSUED FOR INFORMATION	30/11/18
11	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

RACE VISITOR AND
STAFF ENTRY

ACTIL AVENUE

ST. CLAIR AVENUE

INDEPENDENT LIVING
APARTMENT ENTRYINDEPENDENT LIVING
APARTMENT ENTRY395 TOTAL
UNDERCROFT
CARPARKS

UNDERCROFT PLAN

1:300

BROWN
FALCONER28 Chesser Street, Adelaide, South Australia 5000
Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

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UNDERCROFT LAYOUT

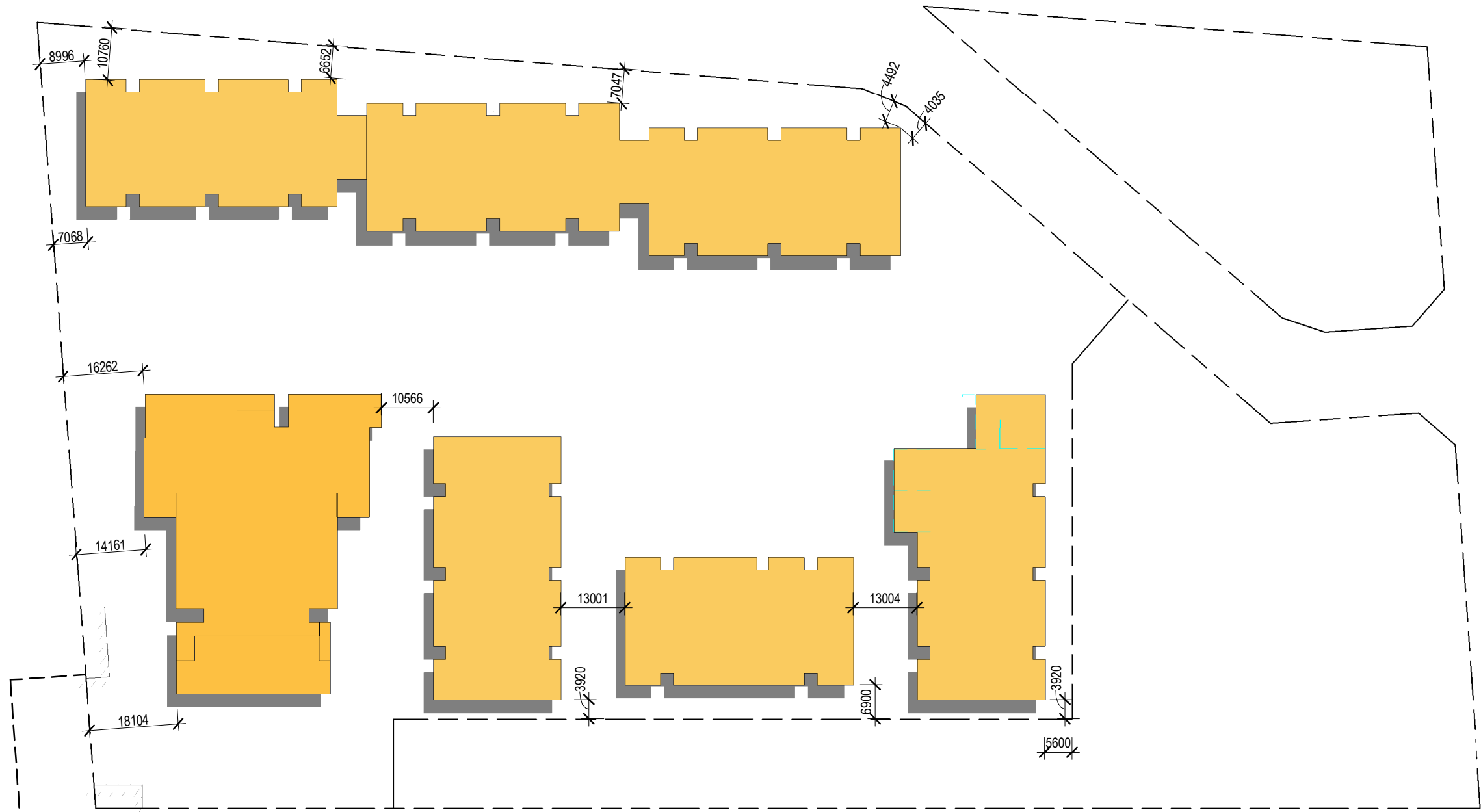
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Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA004 Rev. 11 A1 SHEET

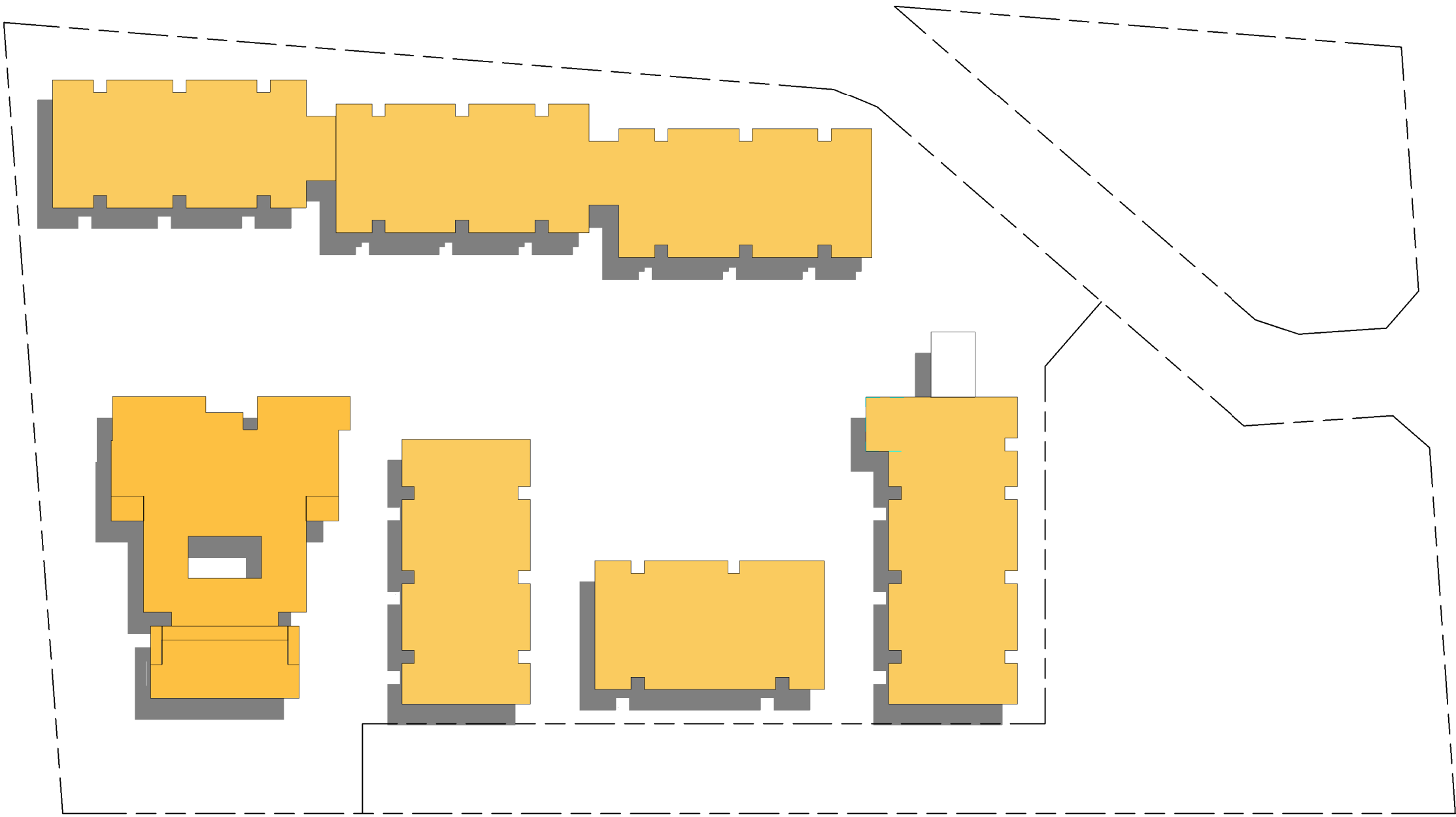
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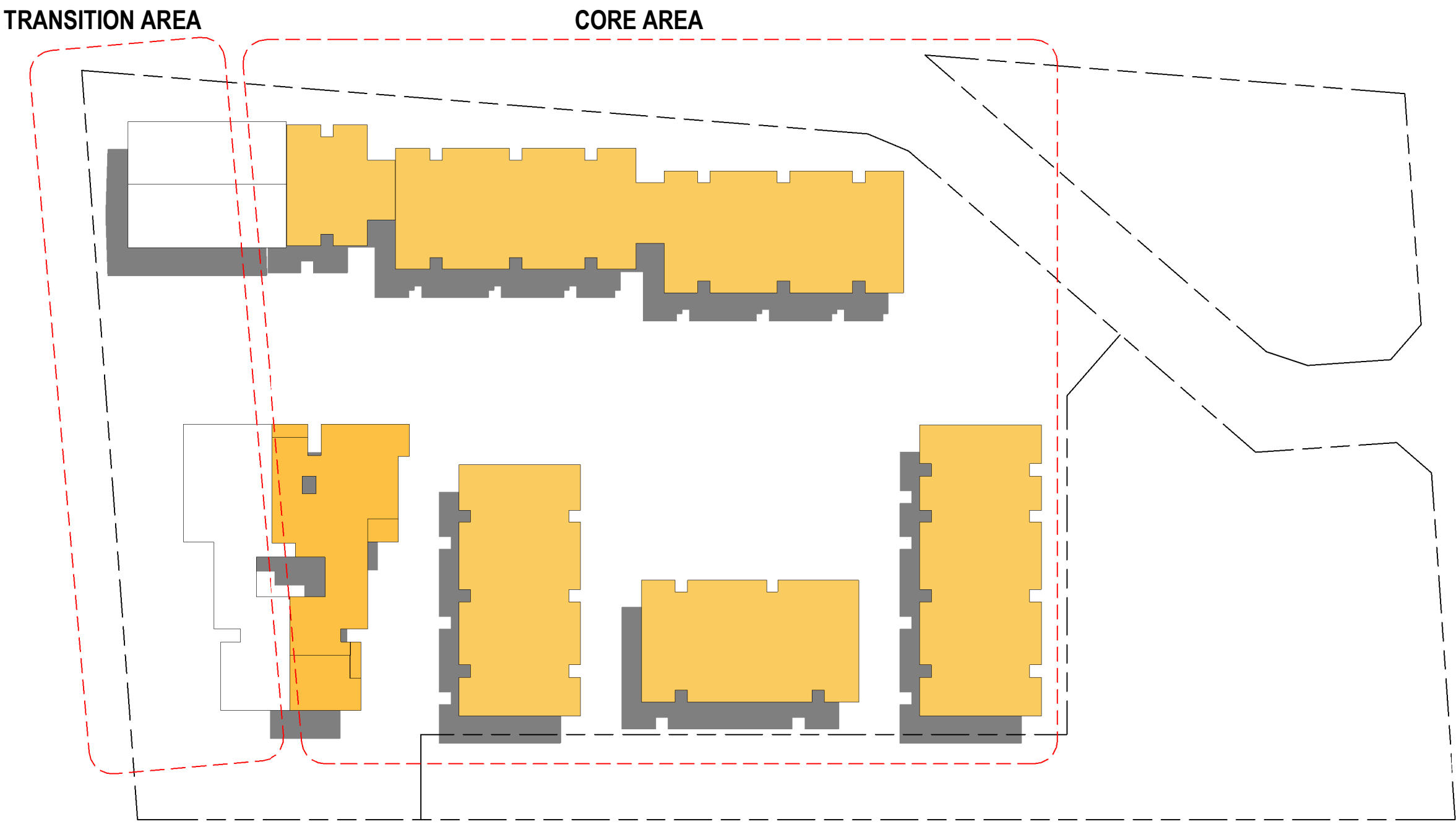
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2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



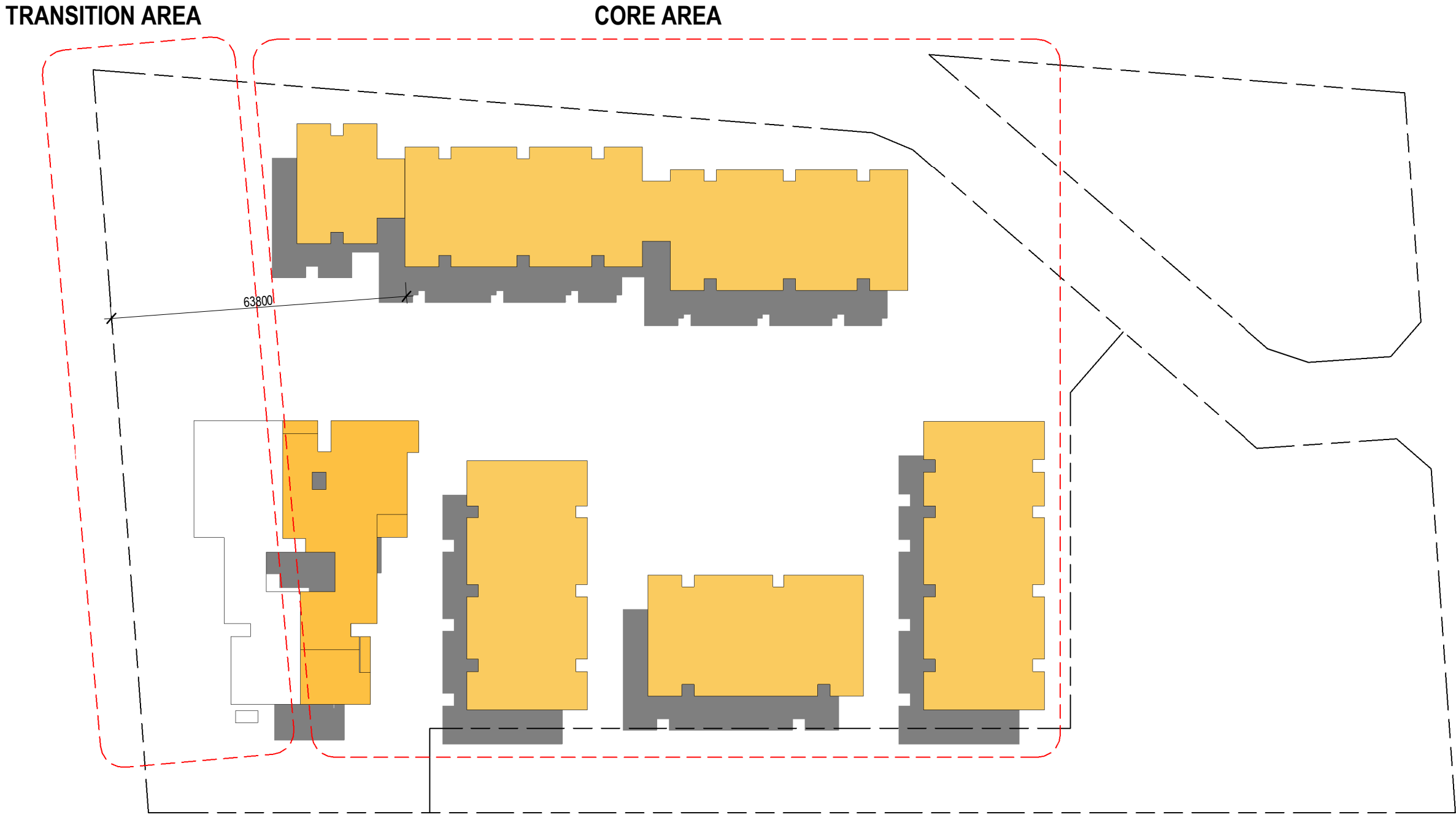
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SECOND FLOOR PLAN
1 : 1000



THIRD FLOOR PLAN
1 : 1000



FOURTH FLOOR PLAN
1 : 1000

**BROWN
FALCONER**
28 Chesser Street, Adelaide, South Australia 5000
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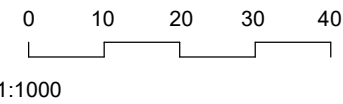
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RETIREMENT COMMUNITY

UPPER FLOOR PLANS

Scale 1 : 1000
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA010 Rev: 2 A1 SHEET



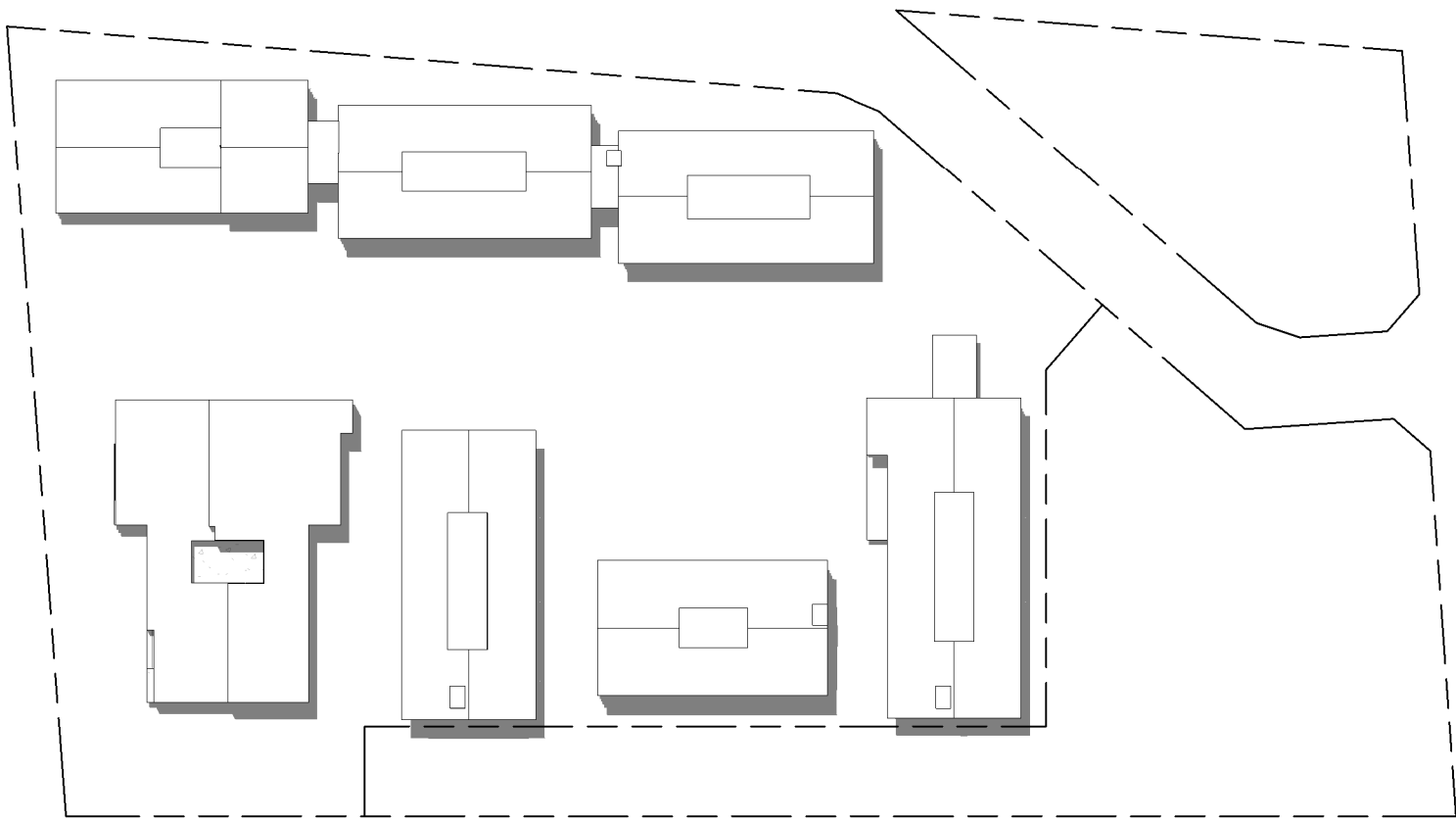
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Rev.	Amendment	Date
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2	ISSUED FOR INFORMATION	30/11/18
3	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



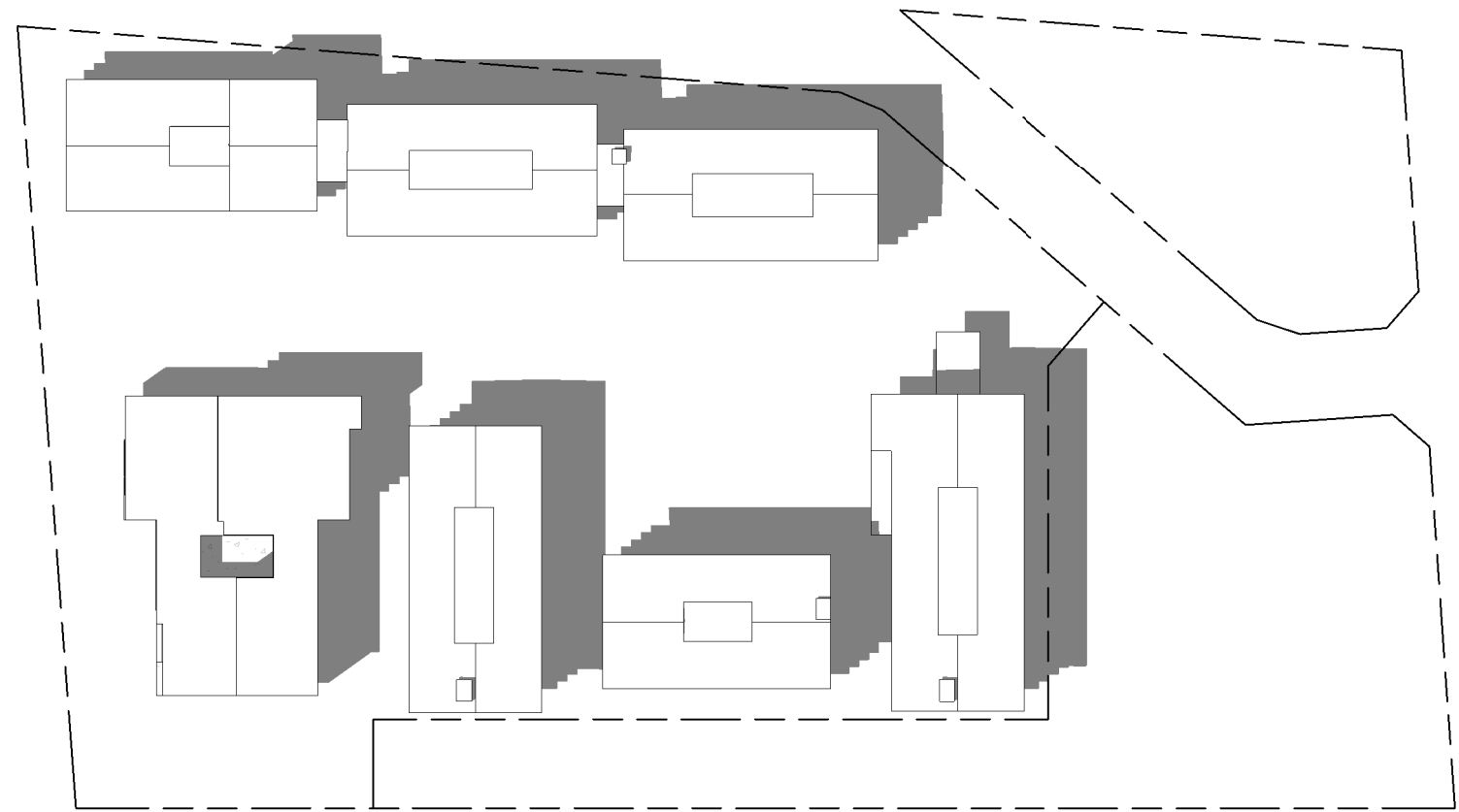
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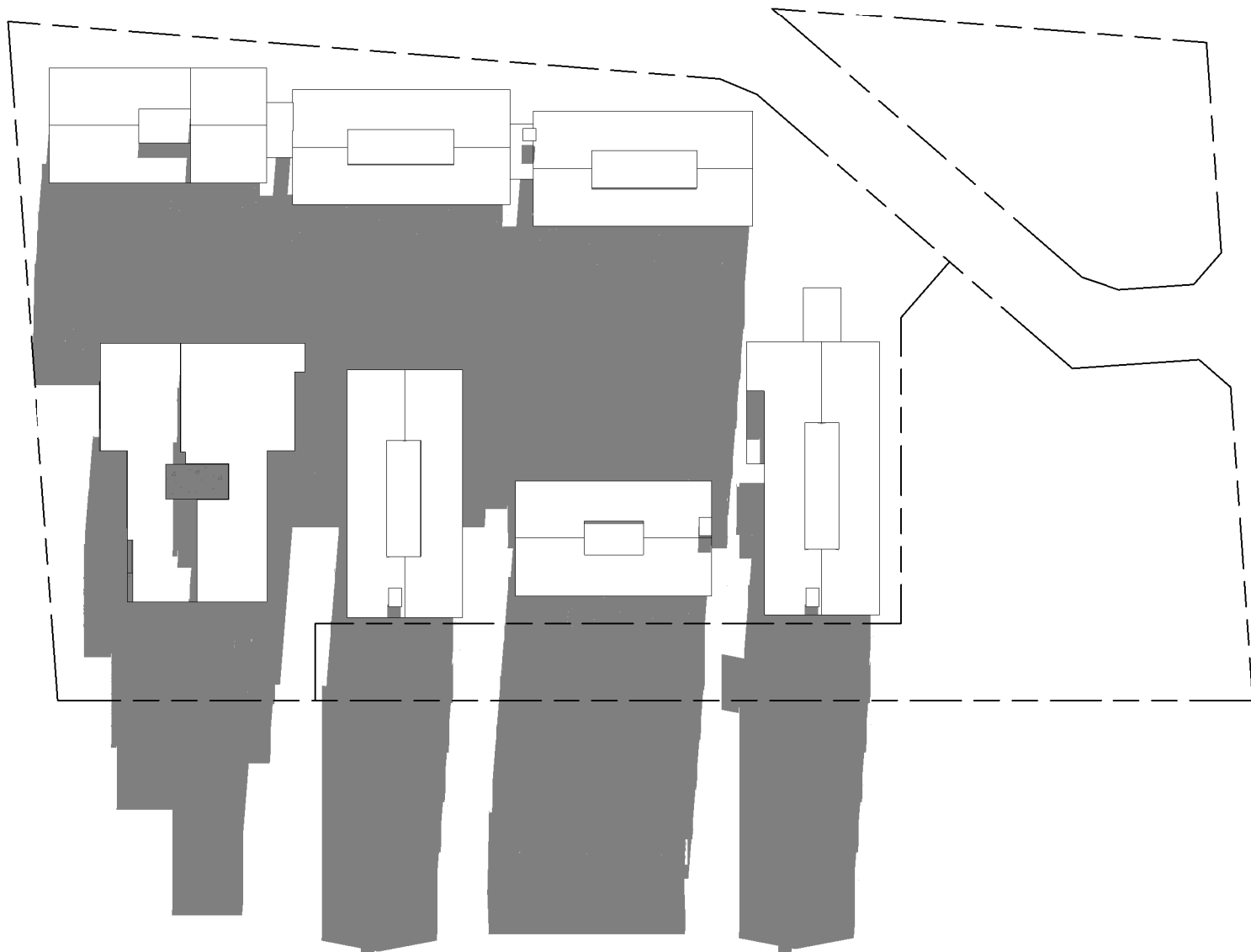
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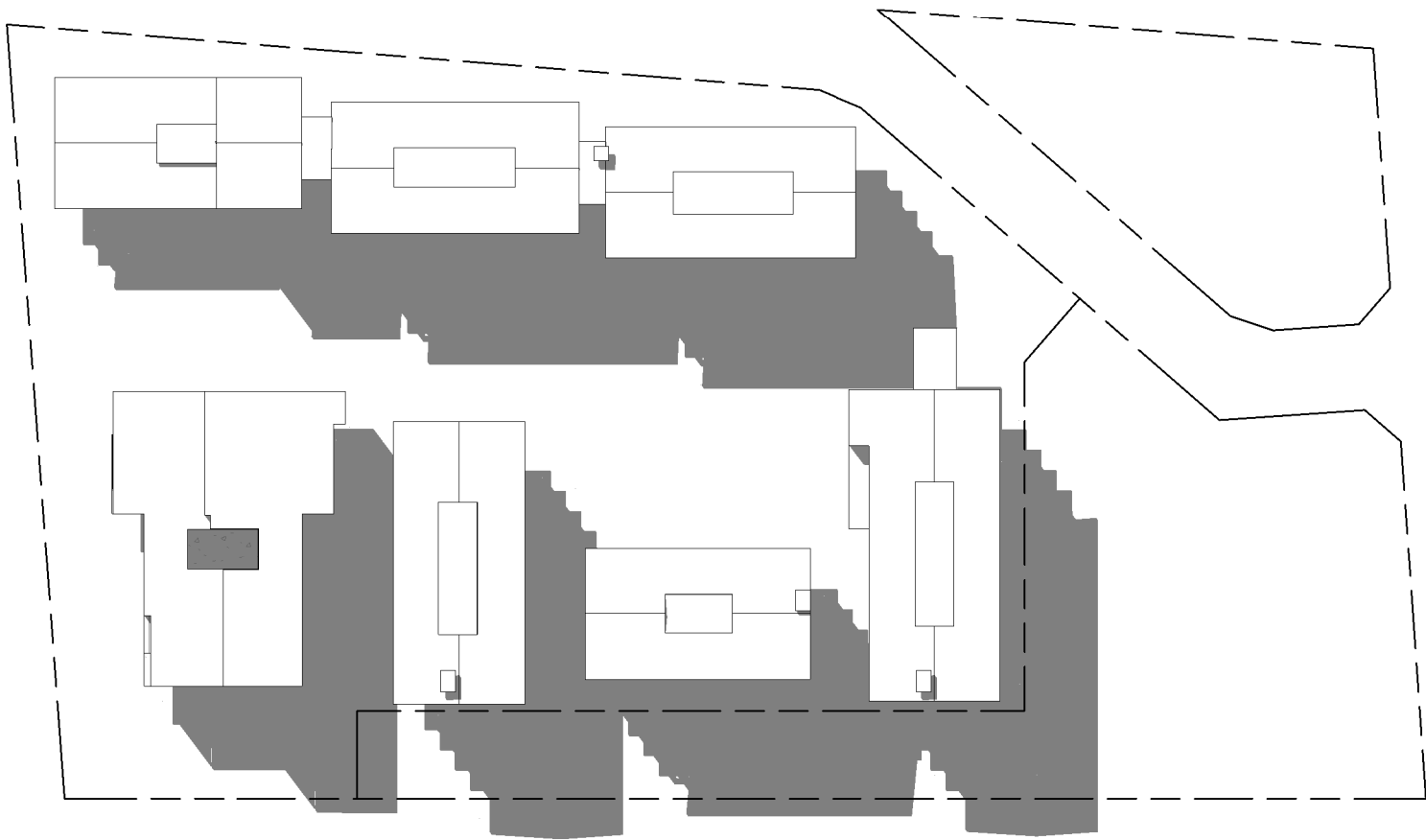
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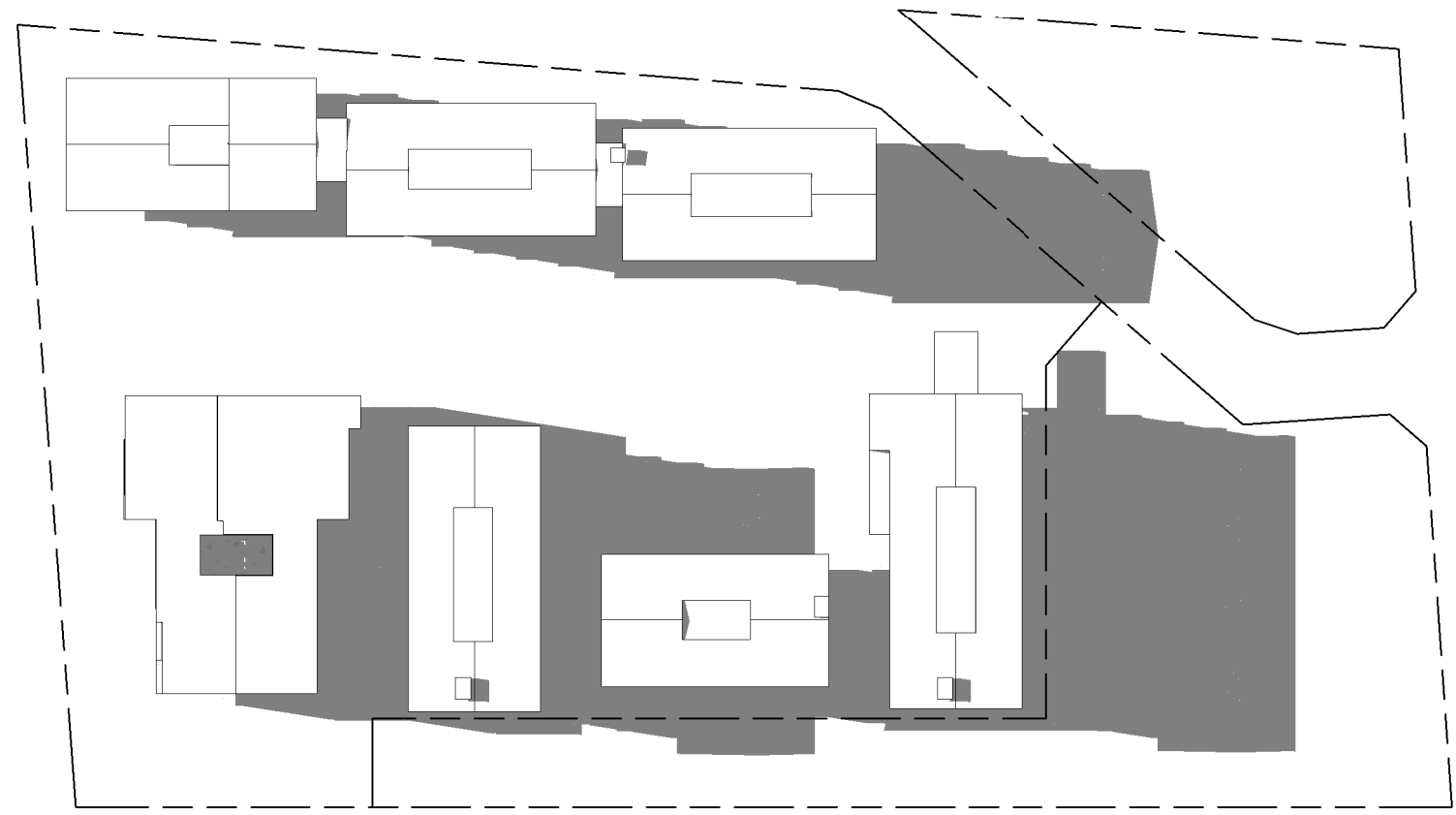
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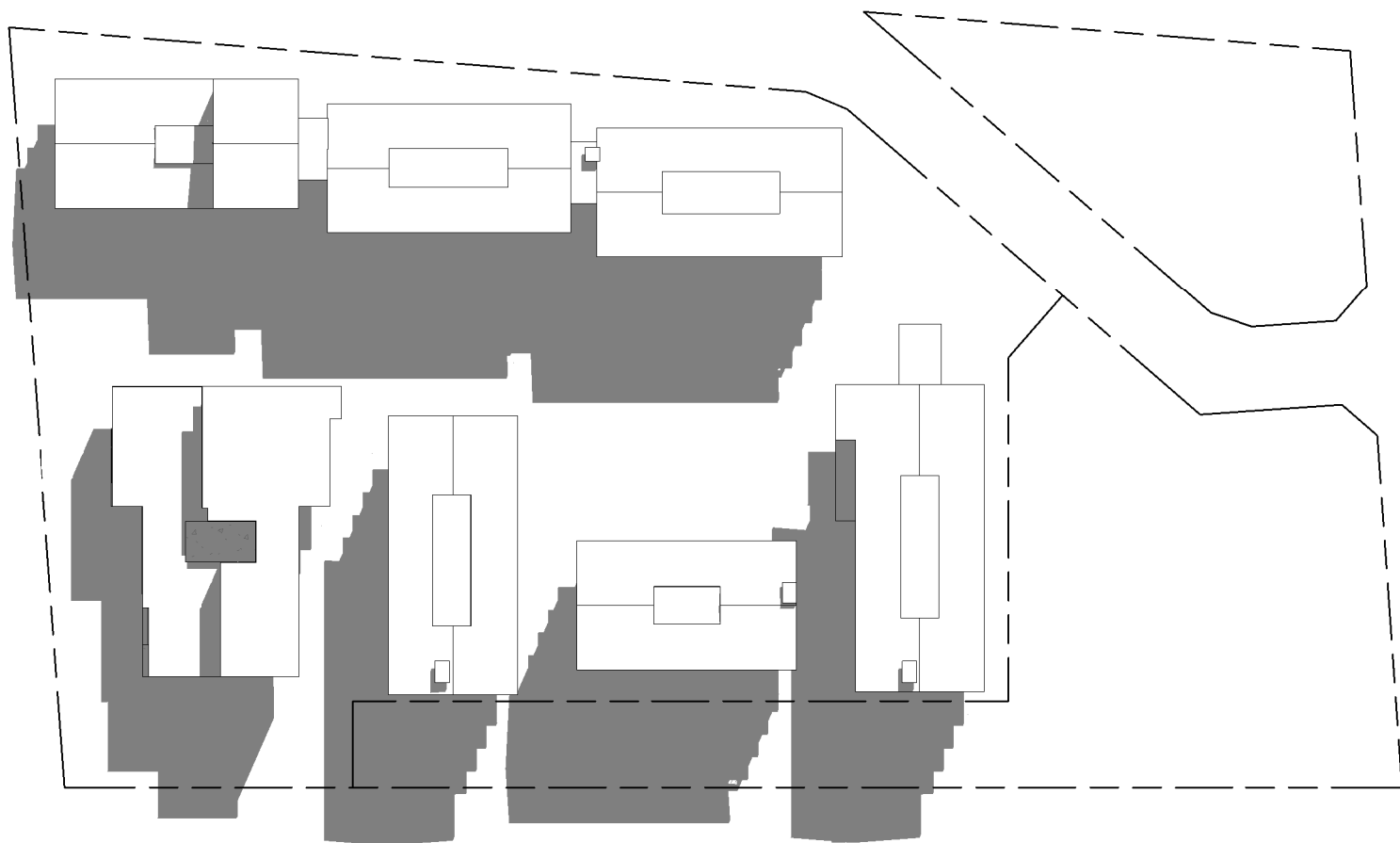
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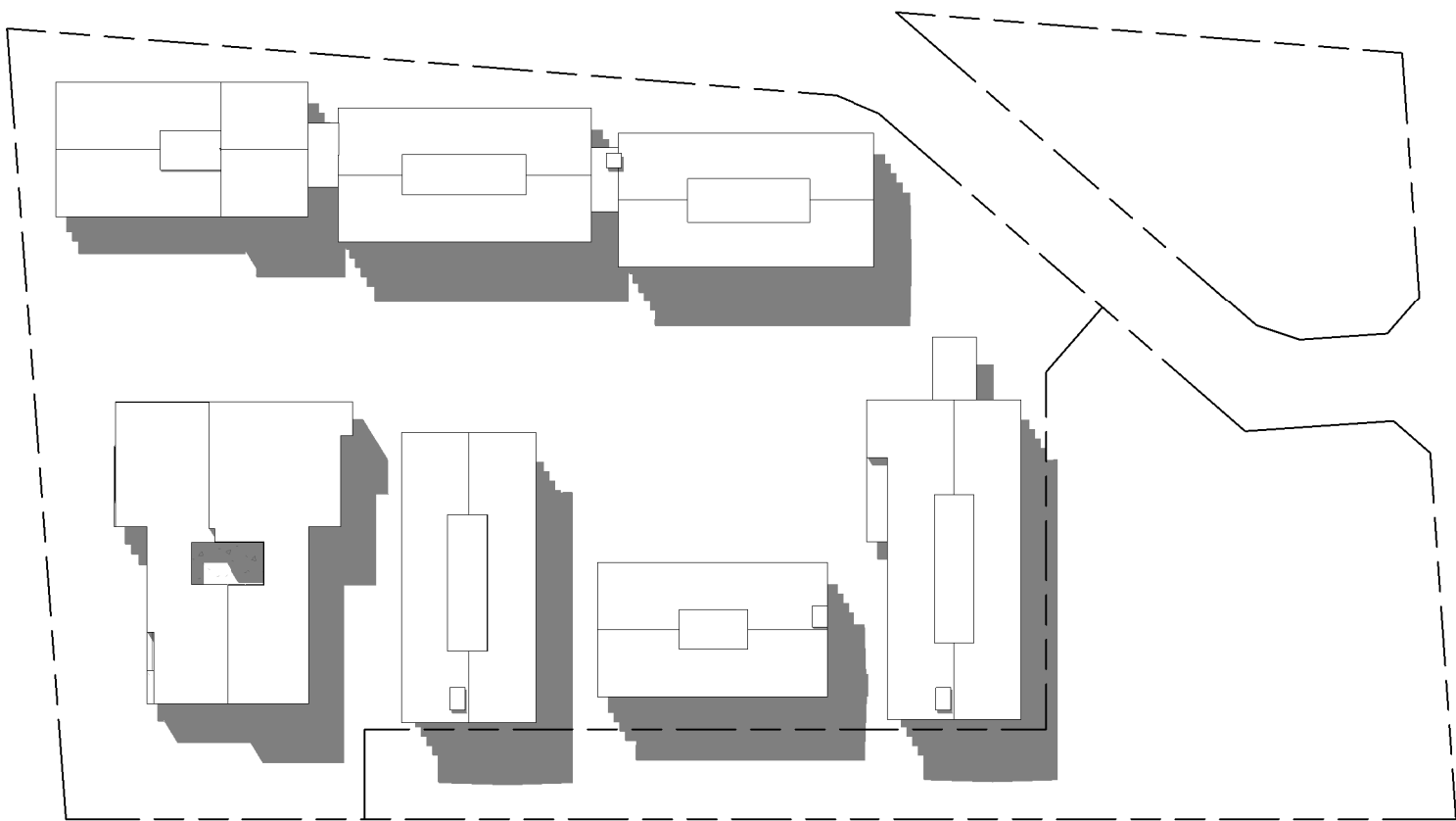
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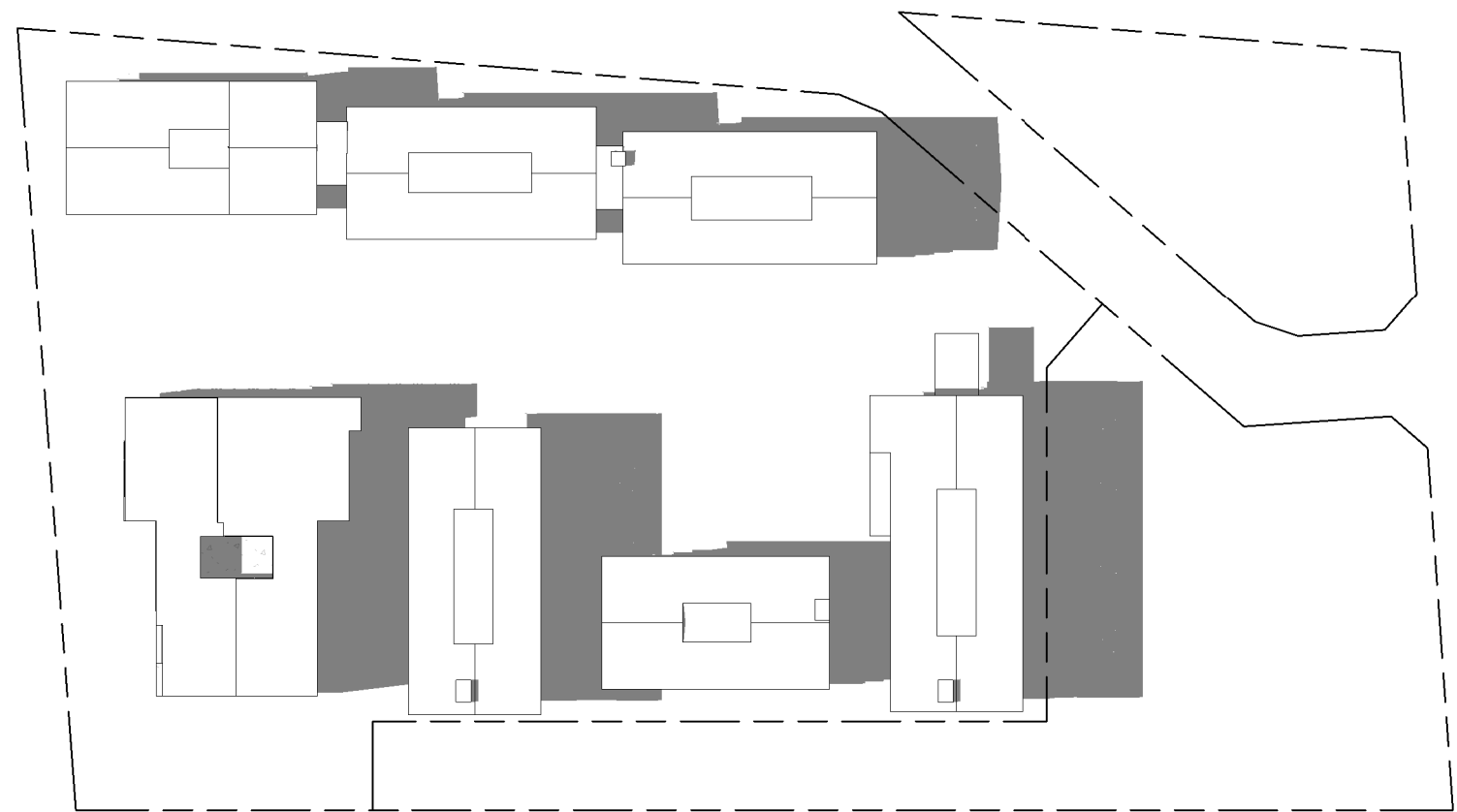
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SUNSHADING DIAGRAM EQUINOX - 12pm

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SUNSHADING DIAGRAM EQUINOX - 3pm

1 : 1500

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1:1000

Scale 1 : 1500
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA015 Rev: 3 A1 SHEET



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AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

SUN DIAGRAMS

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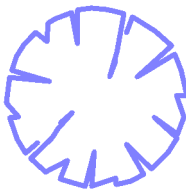
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Rev.	Amendment	Date
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2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

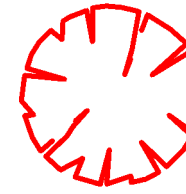
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TREE NUMBER

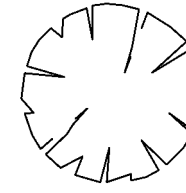
REGULATED TREES



SIGNIFICANT TREES



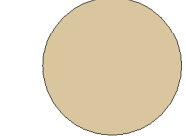
TREES NOT REGULATED



TREE PROTECTION ZONE



REGULATED/ SIGNIFICANT TREE TO BE REMOVED



TREE PLAN LEGEND

1 : 500

TREE PLAN

1 : 500

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EXISTING TREES PLAN

Scale 1 : 500

Drawn BF

Date 11/12/18

Job No. 2017045

Dwg No. 3144 DA048 Rev: 2 A1 SHEET





APARTMENT TYPES OVERALL PLAN

1 : 500

C:\Users\bhinton\Documents\2017045 - AVEO ST CLAIR - DA-RevC_bhinton.rvt 11/12/2018 2:39:50 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

BUILDING 1 - GROUND FLOOR PLAN

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GROUND FLOOR PLAN - BUILDING 1

Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA101 Rev: 2 A1 SHEET



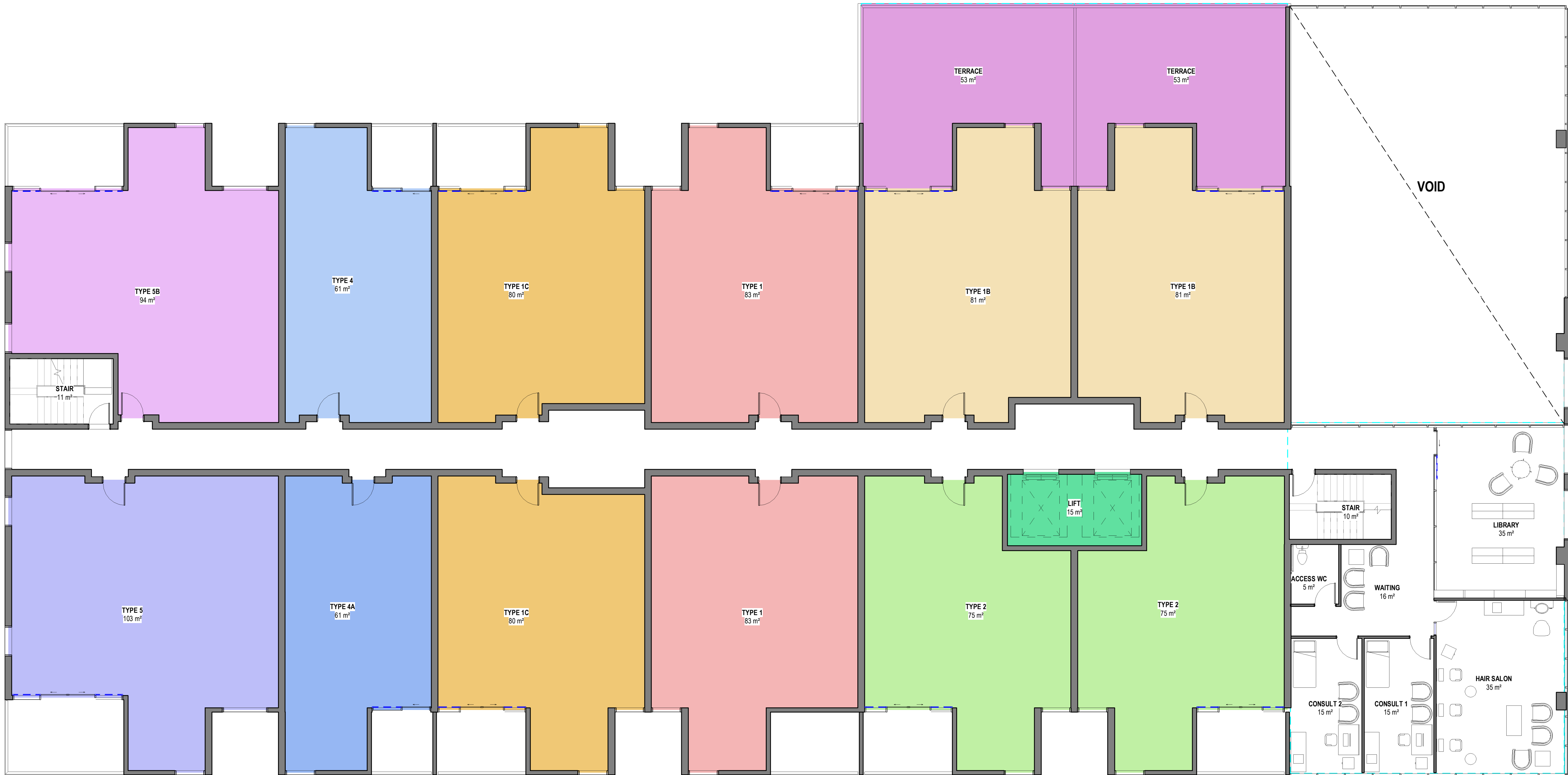
DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:39:58 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

BUILDING 1 - LEVEL 1

1 : 100



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FIRST FLOOR PLAN - BUILDING 1

Scale 1 : 100
Drawn Author
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA102 Rev: 2 A1 SHEET



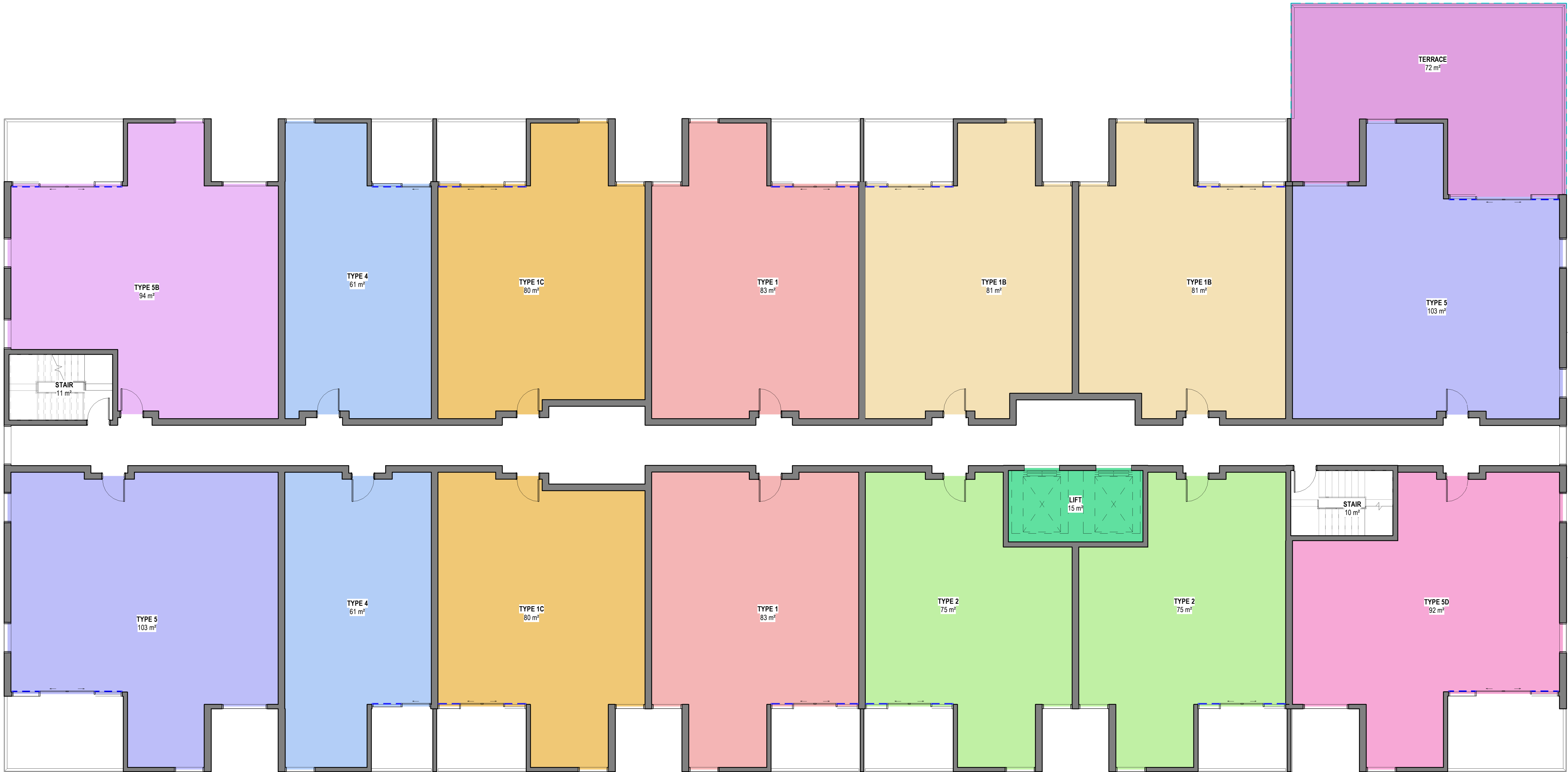
DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:40:01 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

BUILDING 1 - LEVEL 2

1 : 100



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SECOND FLOOR PLAN - BUILDING 1

Scale 1 : 100
Drawn Author
Date 11/12/18
Job No. 2017045

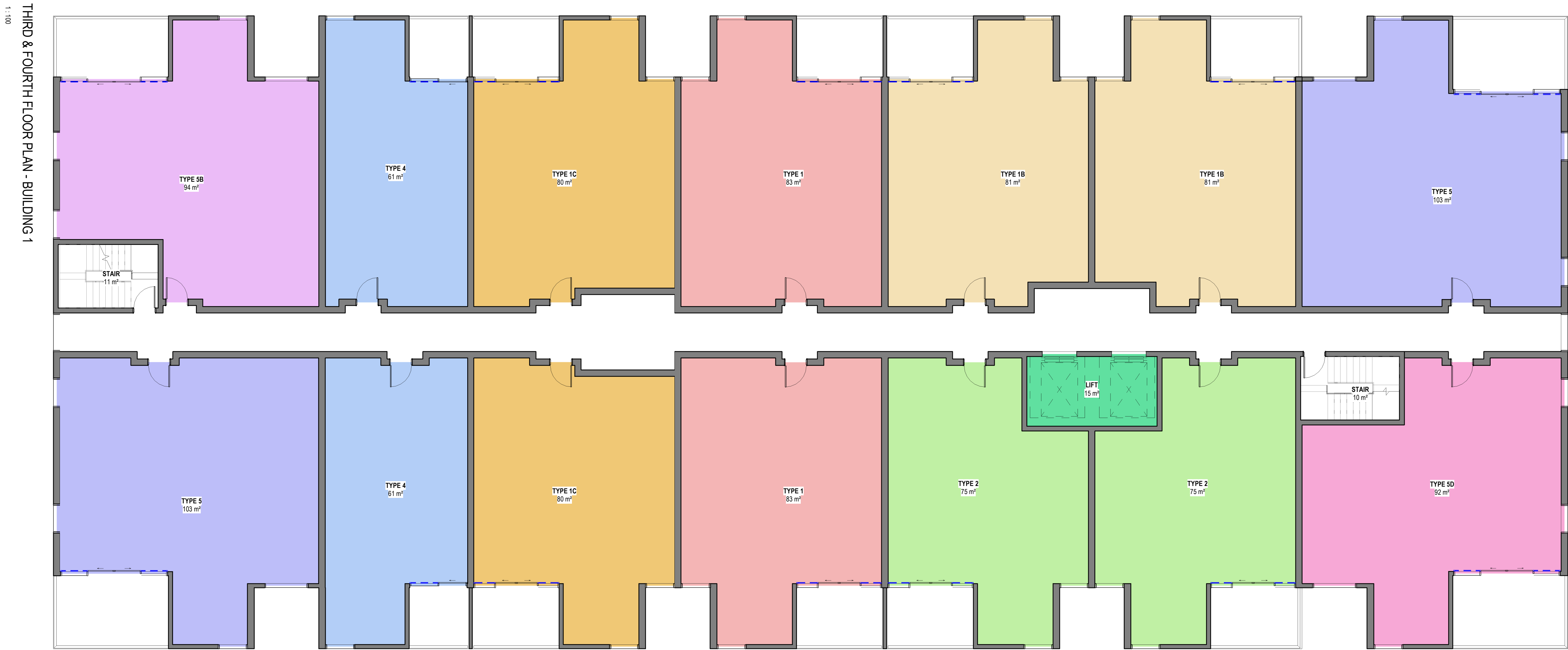
Dwg No. 3144 DA103 Rev: 2 A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:40:05 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	25/09/18
2	ISSUED FOR INFORMATION	28/09/18
3	ISSUED FOR INFORMATION	23/11/18
4	ISSUED FOR INFORMATION	30/11/18
5	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



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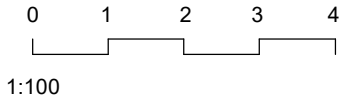
AVEO

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THIRD AND FOURTH FLOOR PLAN -
BUILDING 1

Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. **3144 DA104** Rev: **5** A1 SHEET





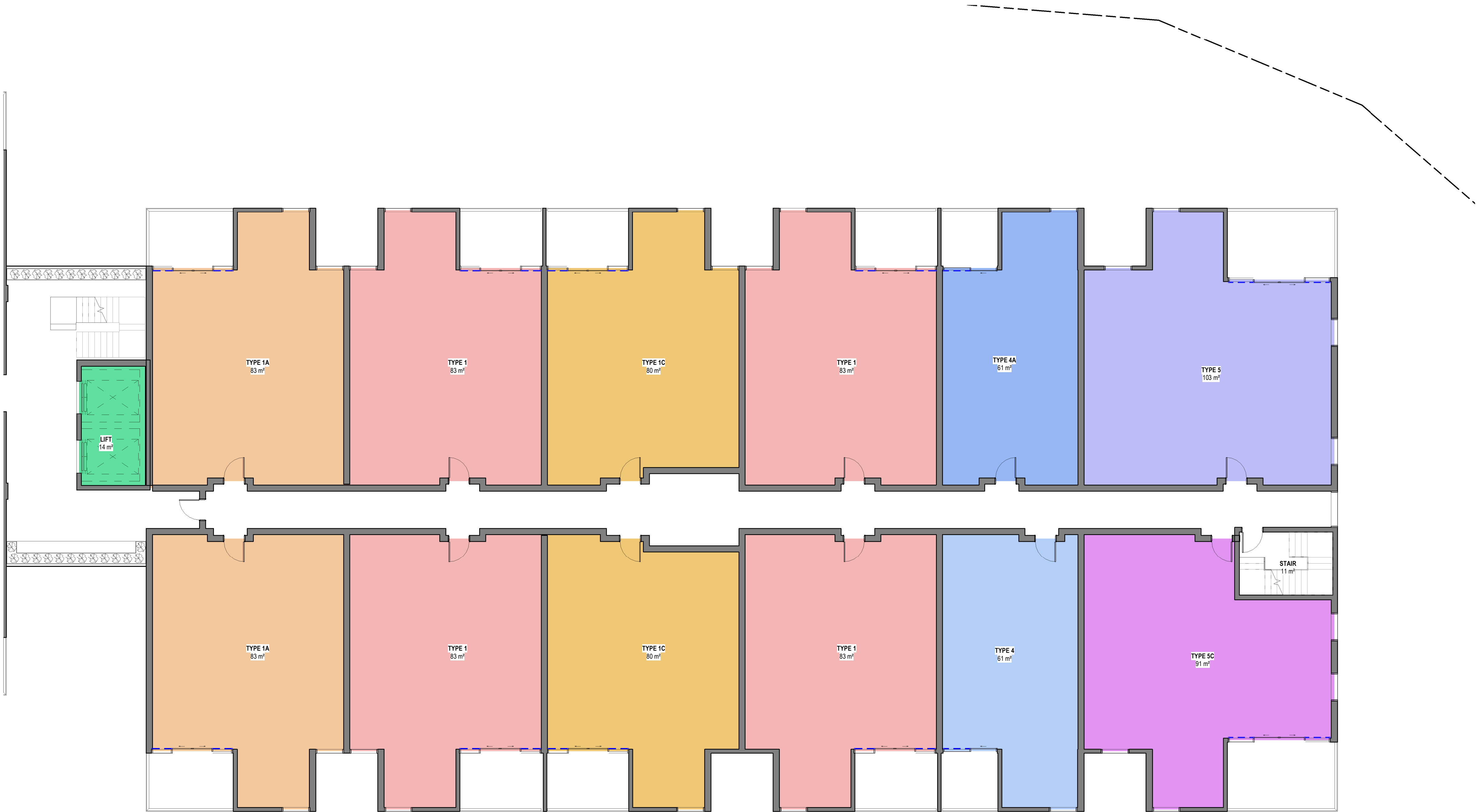
BUILDING 2 - GROUND FLOOR PLAN

1 : 100

DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:40:12 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	25/09/18
2	ISSUED FOR INFORMATION	23/11/18
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4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



TYPICAL PLAN - BUILDING 2

1:100

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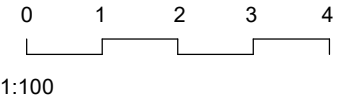
28 Chesser Street, Adelaide, South Australia 5000
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ABN 65 007 846 586 brownfalconer.com.au

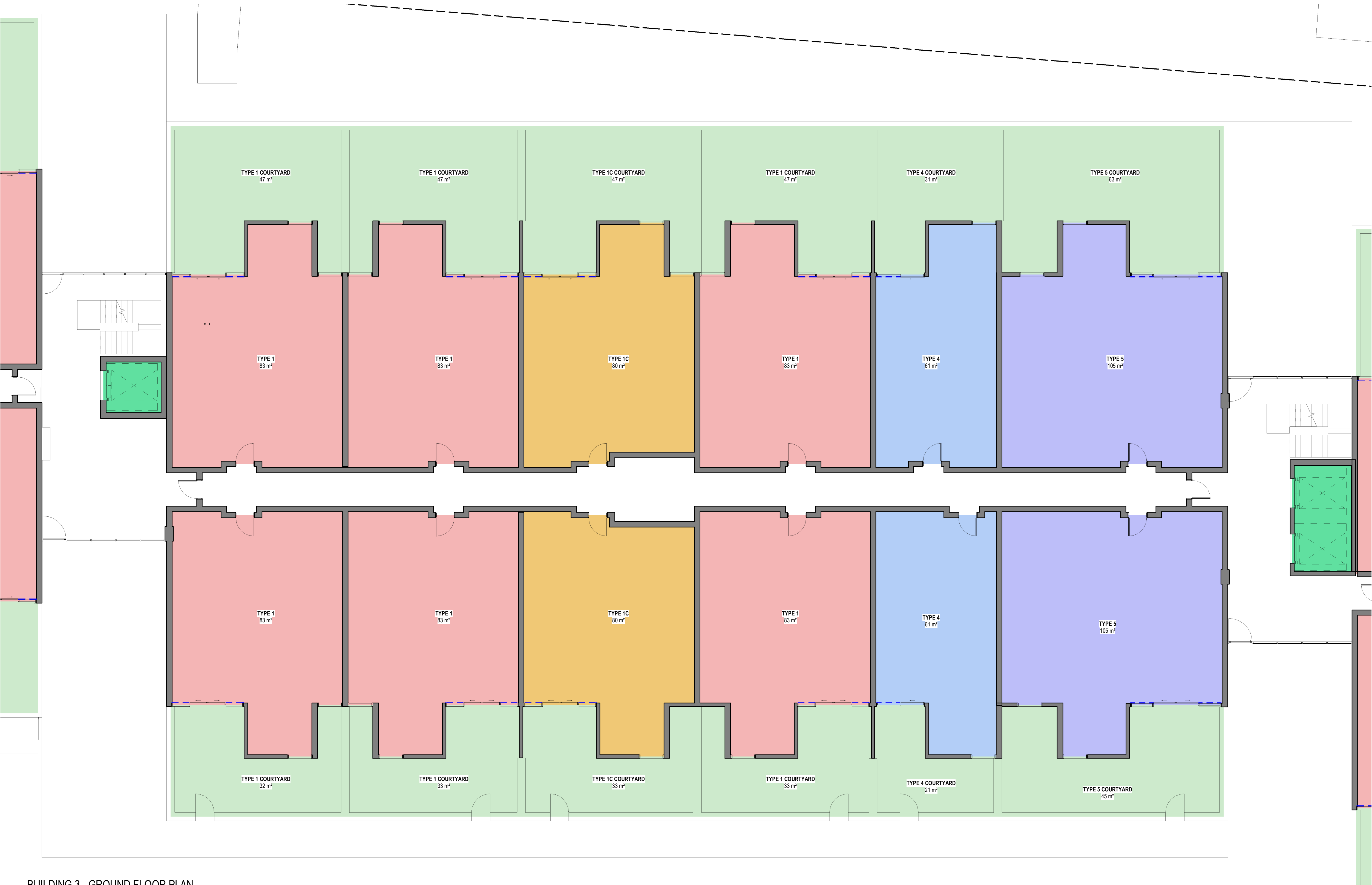
AVEO

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TYPICAL PLAN - BUILDING 2

Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045
Dwg No. **3144 DA106** Rev: **4** A1 SHEET





BUILDING 3 - GROUND FLOOR PLAN

1 : 100

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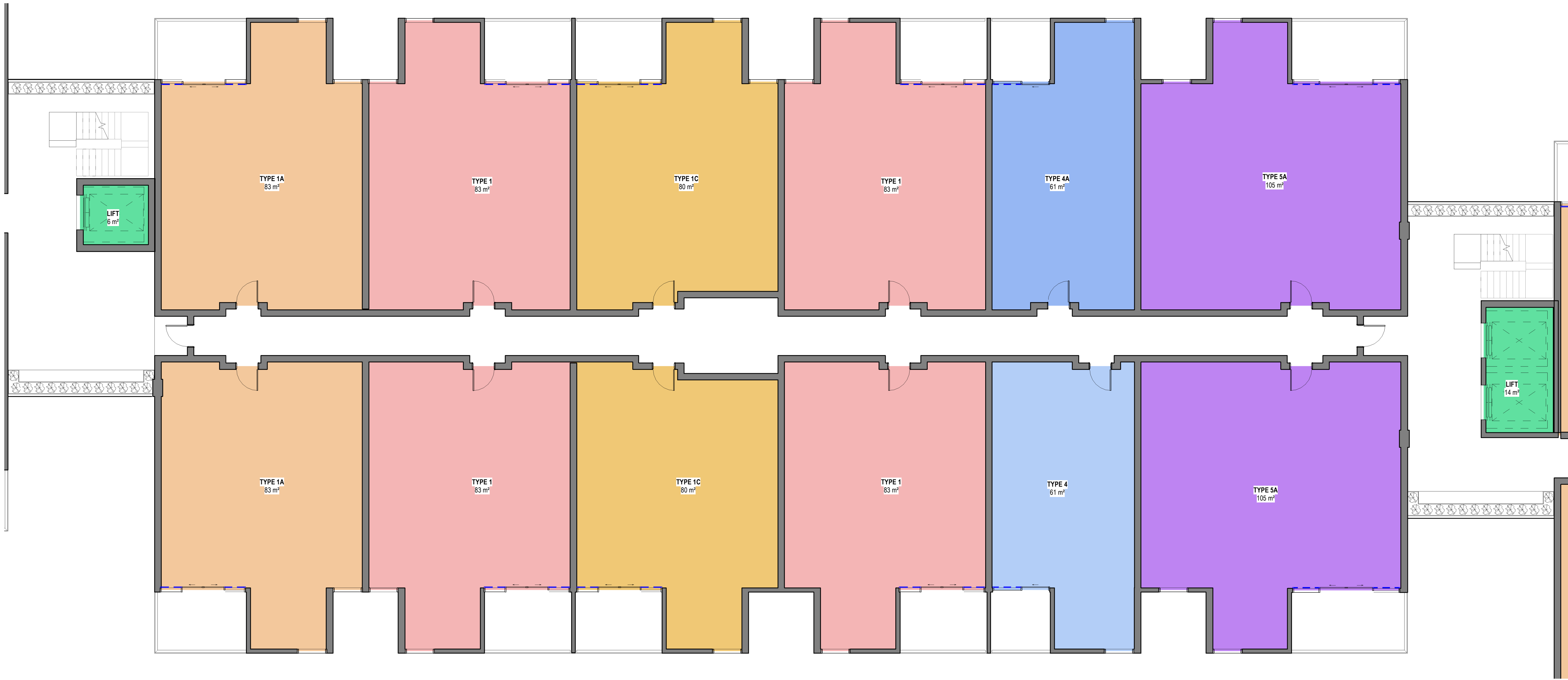
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GROUND FLOOR PLAN - BUILDING 3

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ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:40:19 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	25/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



TYPICAL PLAN - BUILDING 3

1 : 100

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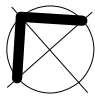
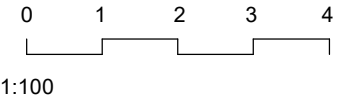
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TYPICAL PLAN - BUILDING 3

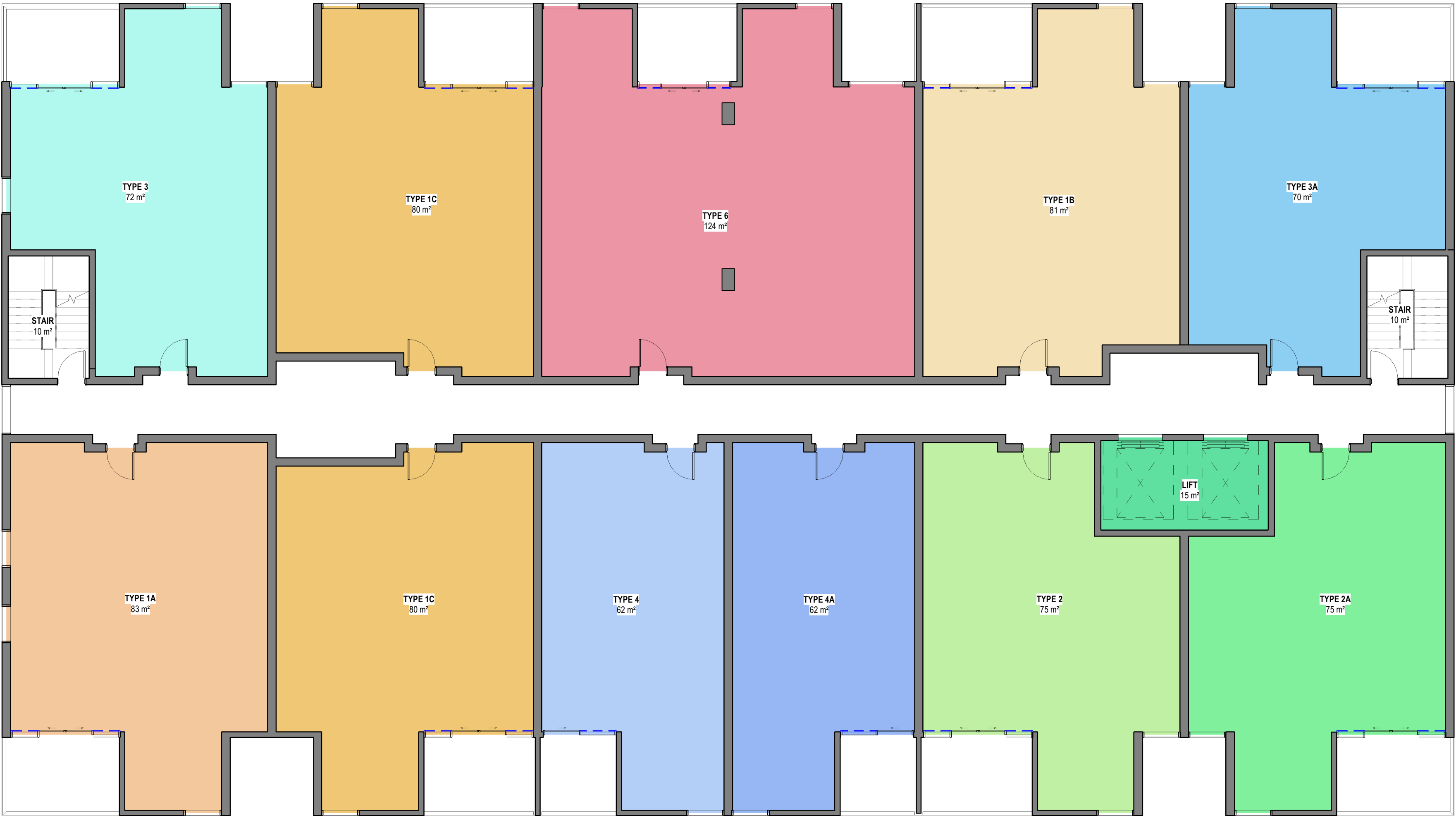
Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045
Dwg No. **3144 DA108** Rev: **4** A1 SHEET





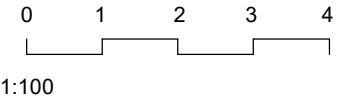
BUILDING 4 - GROUND FLOOR PLAN

1 : 100



TYPICAL PLAN - BUILDING 4

1 : 100



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ISSUED FOR DEVELOPMENT APPROVAL
11/12/2018 2:40:30 PM

Rev.	Amendment	Date
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BUILDING 5 - GROUND FLOOR PLAN

1 : 100



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GROUND FLOOR BUILDING 5

Scale 1 : 100
Drawn Author
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA111 Rev: 2 A1 SHEET

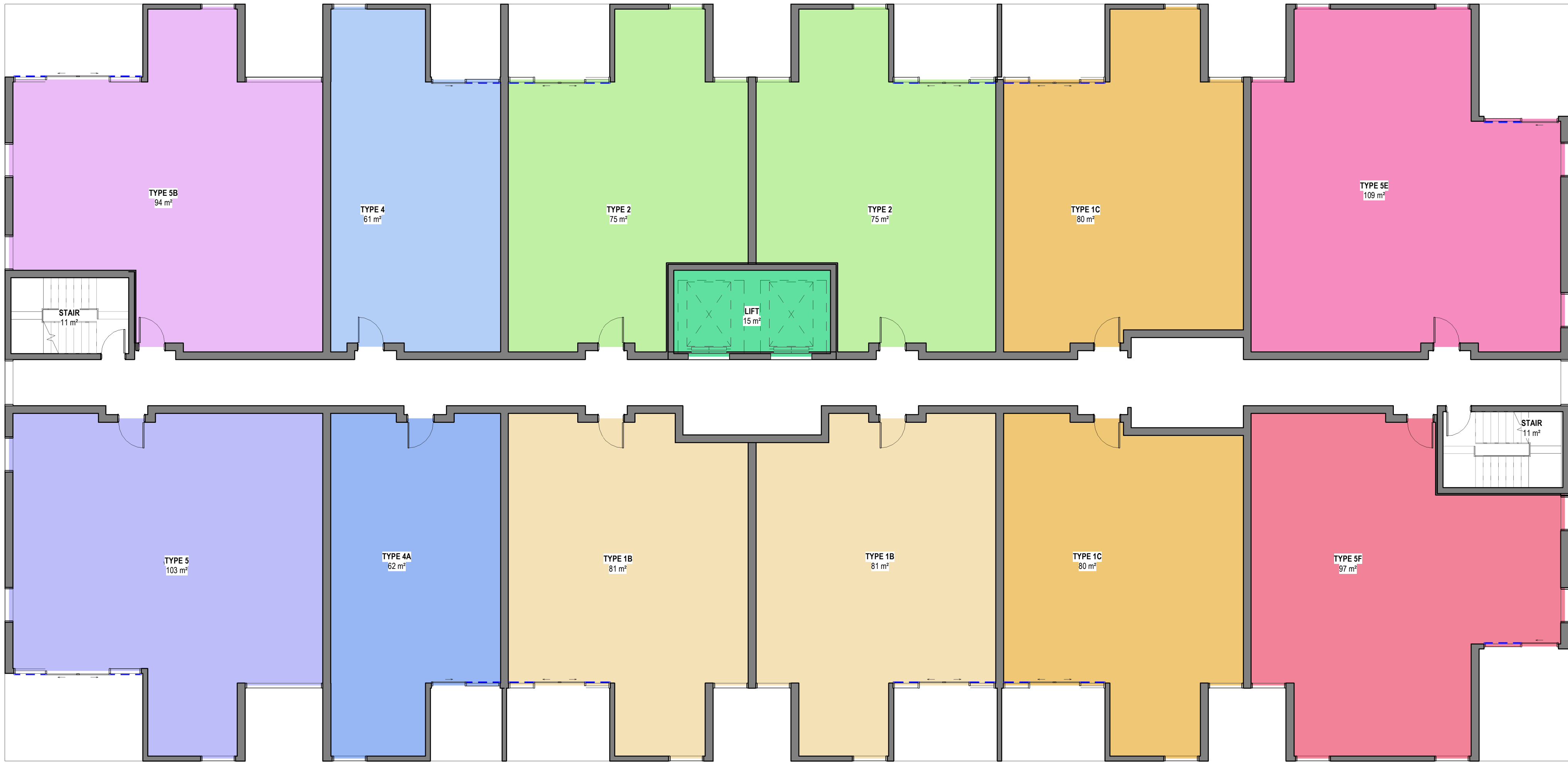


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11/12/2018 2:40:33 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	25/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
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TYPICAL PLAN - BUILDING 5
1 : 100



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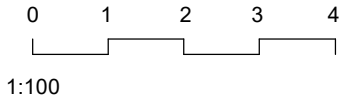
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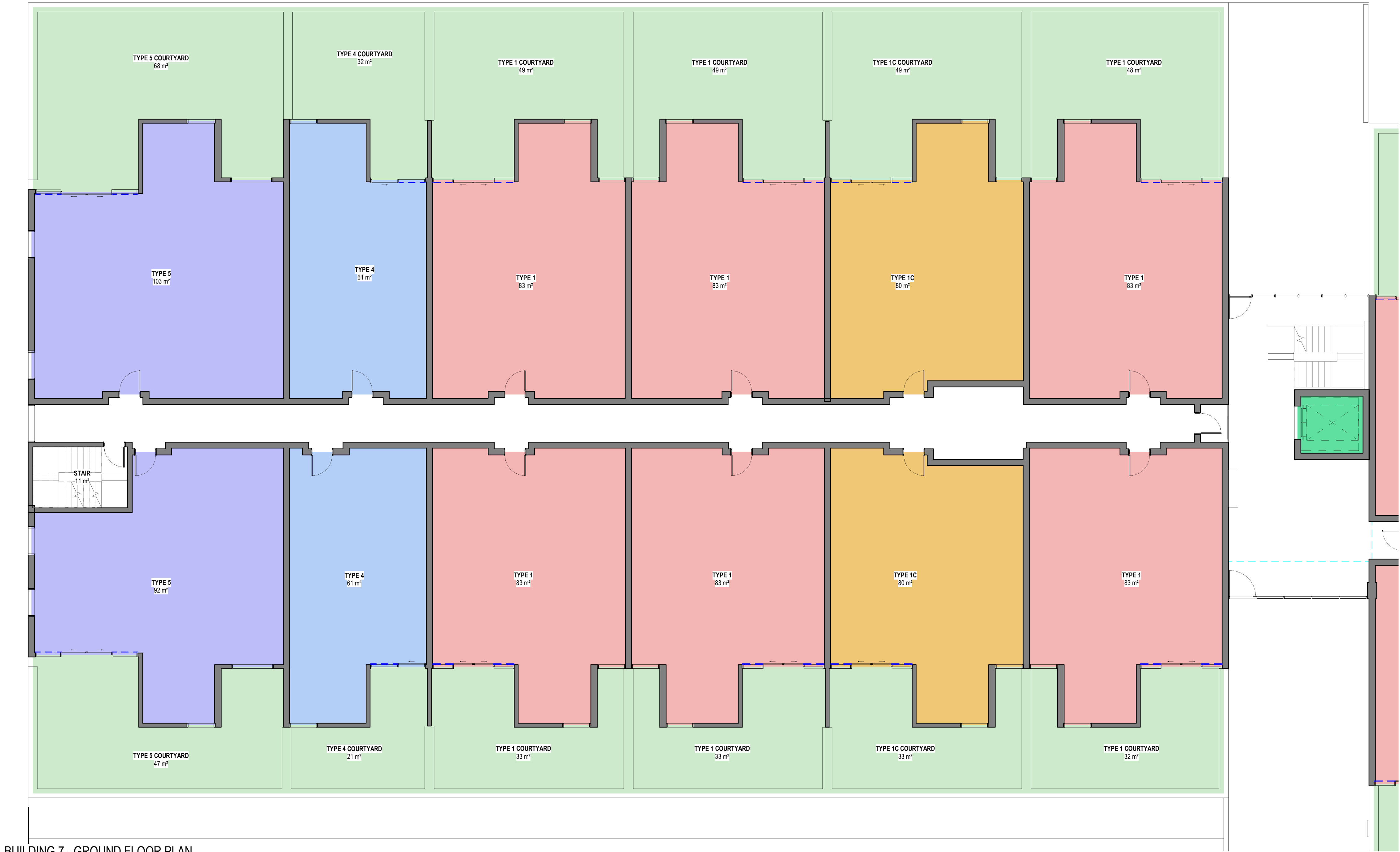
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TYPICAL PLAN - BUILDING 5

Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA112 Rev: 4 A1 SHEET





BUILDING 7 - GROUND FLOOR PLAN

1 : 100

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GROUND FLOOR PLAN - BUILDING 7

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1	ISSUED FOR INFORMATION	25/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
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TYPICAL PLAN - BUILDING 7

1 : 100

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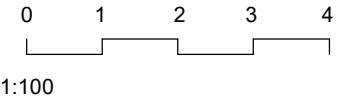
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FIRST & SECOND FLOOR PLAN -
BUILDING 7

Scale 1 : 100
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. **3144 DA114** Rev: **4** A1 SHEET





THIRD FLOOR PLAN - BUILDING 7

1 : 100

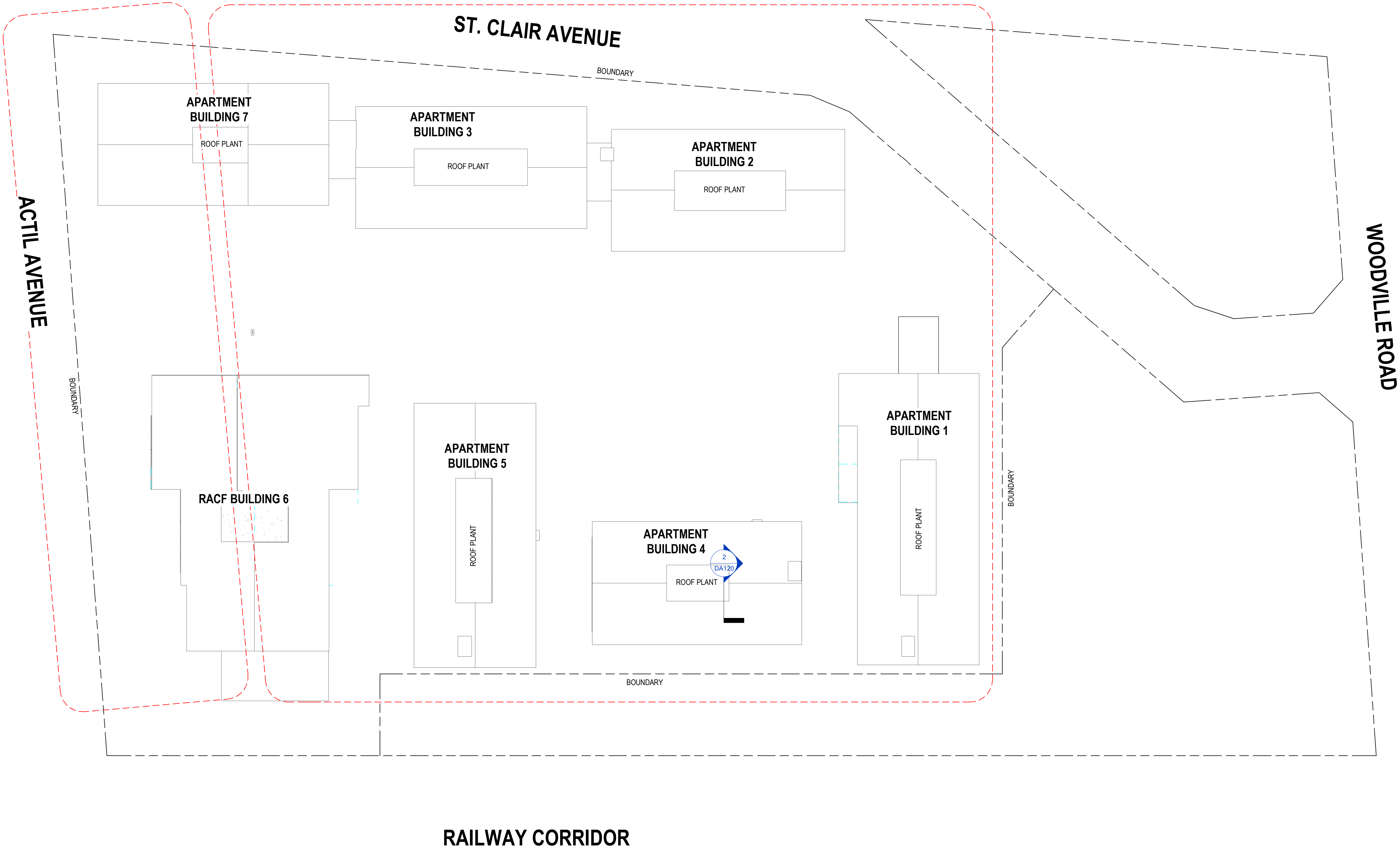


FOURTH FLOOR PLAN - BUILDING 7

1 : 100

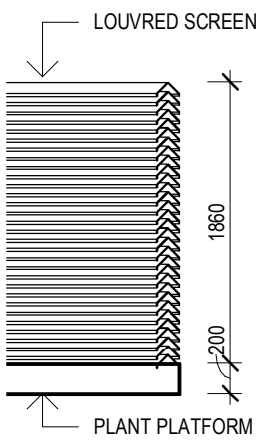
TRANSITION AREA

CORE AREA



ROOF PLAN

1 : 500



PLANT PLATFORM SECTION

1 : 50

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
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STREETSCAPE ELEVATIONS PAGE
1 OF 2

Scale
Drawn BF
Date 11/12/18
Job No. 2017045
Dwg No. **3144 DA130** Rev: **2** A1 SHEET



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1	ISSUED FOR INFORMATION	30/11/18
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ACTIL AVE CONTEXT

BUILDING 7
(BEYOND)

RACF BUILDING 6

BUILDING 7
(BEYOND)

BUILDING 5

BUILDING 3
(BEYOND)

BUILDING 4

BUILDING 2
(BEYOND)

BUILDING 1

SOUTH WEST STREETSCAPE



BUILDING 1

BUILDING 2

BUILDINGS 3 AND 7
(BEYOND)

SOUTH EAST STREETSCAPE

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STREETSCAPE ELEVATIONS PAGE
2 OF 2

Scale
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Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA131 Rev: 2 A1 SHEET



Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
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BUILDING 1 NE ELEVATION

1 : 200



BUILDING 1 SE ELEVATION

1 : 200



BUILDING 1 SW ELEVATION

1 : 200



BUILDING 1 NW ELEVATION

1 : 200

MATERIALS AND FINISHES PALETTE



Building 2 - Reference Elevation

- 1 Brick snap faced precast concrete panels
Colour: Warm light grey
- 2 Form liner patterned precast concrete panels
Colour: Warm light grey concrete stain to match brick snap
- 3 Feature screen blades
Colour: Champagne tone anodised aluminium
- 4 Aluminium framed windows (openable) and sliding doors
Frame colour: Charcoal / Natural anodised
- 5 Precast concrete
Finished: Warm mid grey concrete stain
- 6 Precast concrete balustrade
Colour: Warm light grey concrete stain to match brick snap
- 7 Courtyard privacy screen
Colour: Charcoal tone anodised aluminium
- 8 Precast concrete garden wall / planter
Colour: Ochre

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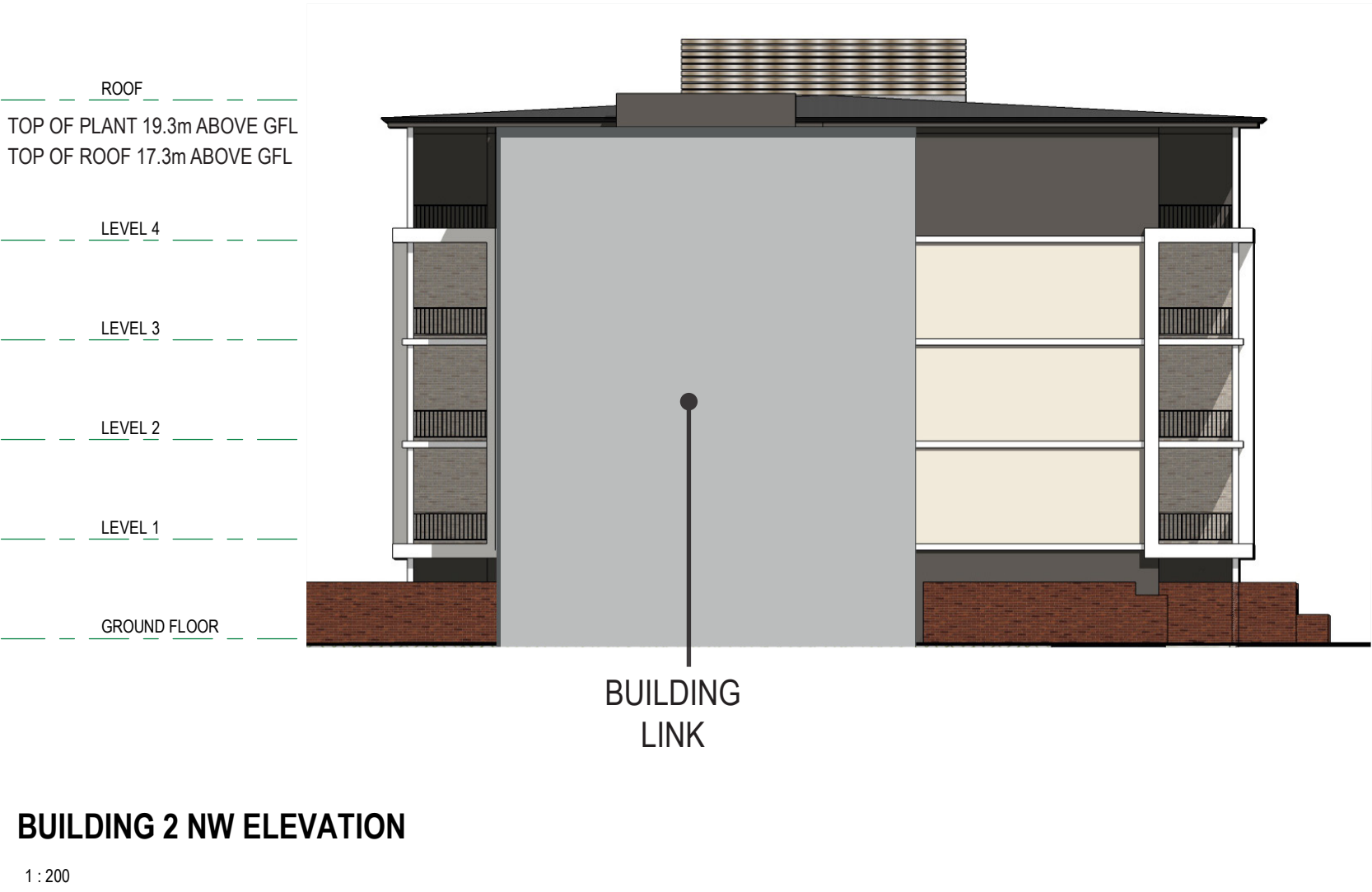
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BUILDING 1 ELEVATIONS

Scale
Drawn BF
Date 11/12/18
Job No. 2017045
Dwg No. 3144 DA132 Rev: 2 A1 SHEET



MATERIALS AND FINISHES PALETTE



Building 2 - Reference Elevation

- 1

Brick snap faced precast concrete panels

Colour: Warm light grey
- 2

Form liner patterned precast concrete panels

Colour: Warm light grey concrete stain to match brick snap
- 3

Feature frame - precast concrete

Colour: White
- 4

Aluminium framed windows (openable) and sliding doors

Frame colour: Charcoal / Natural anodised
- 5

Precast concrete

Finished: Warm mid grey concrete stain
- 6

Metal balustrade

Colour: Champagne tone anodised aluminium
- 7

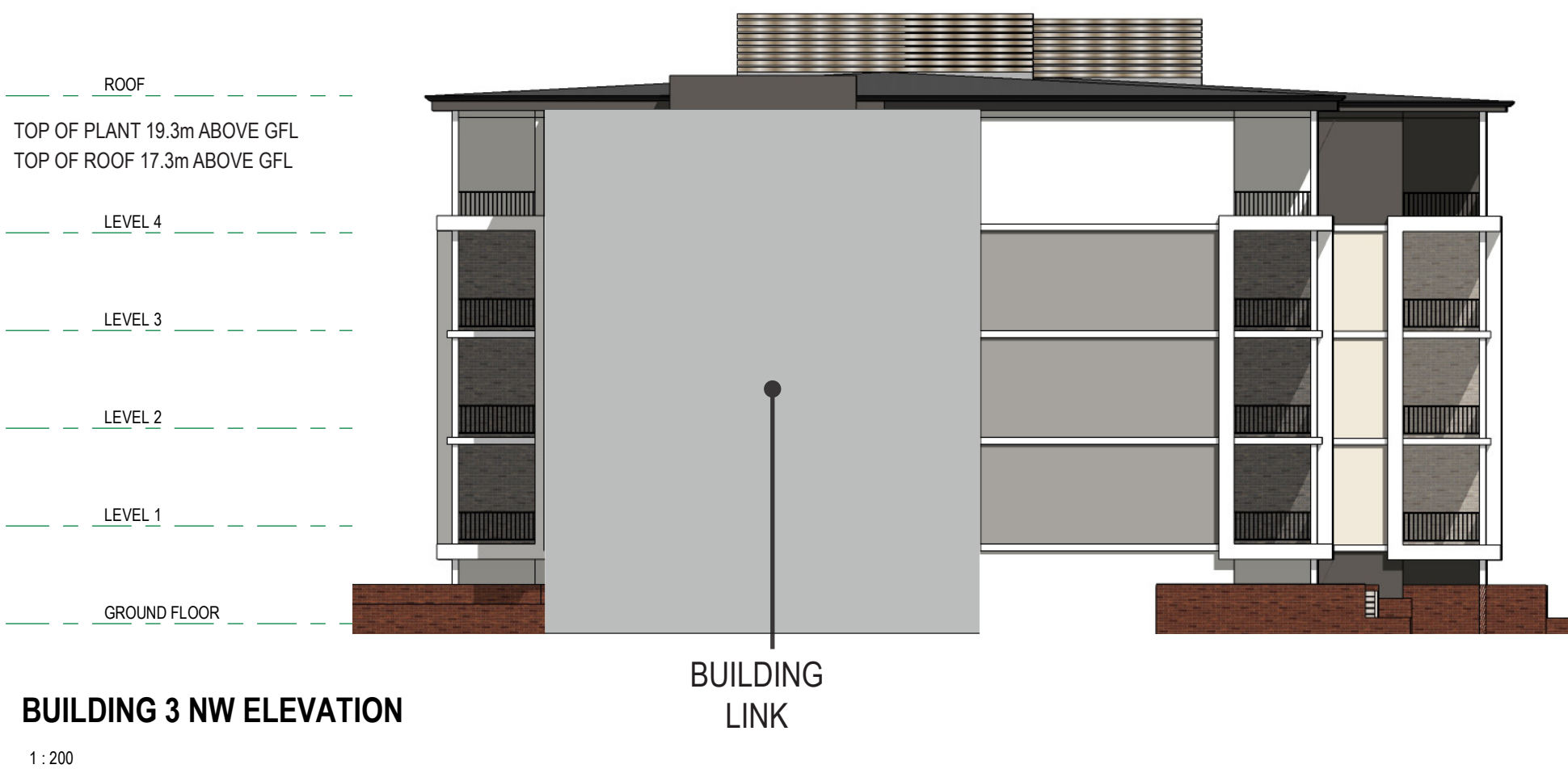
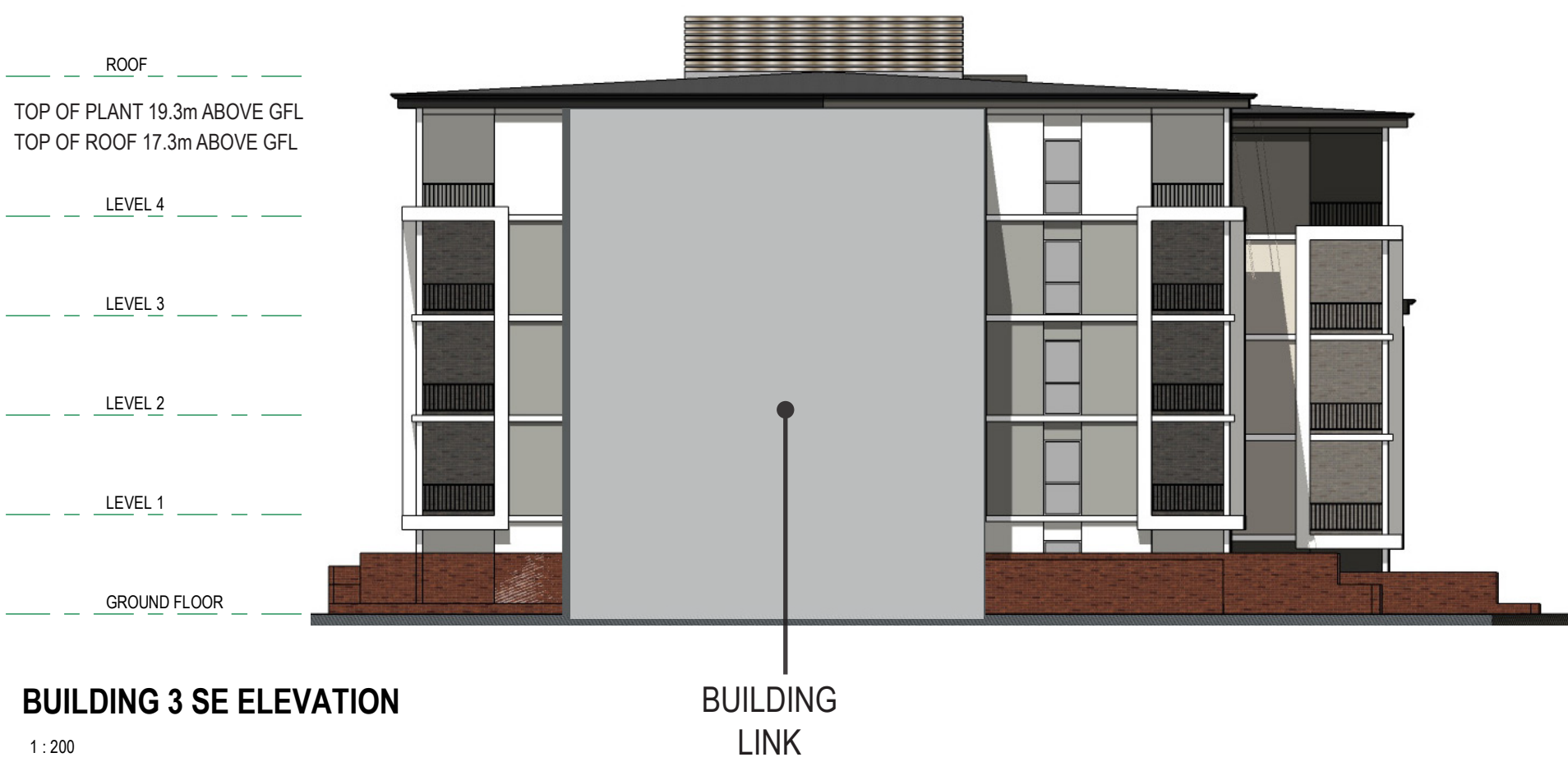
Courtyard privacy screen

Colour: Champagne tone anodised aluminium
- 8

Precast concrete garden wall / planter

Colour: Ochre

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
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MATERIALS AND FINISHES PALETTE



Building 3 - Reference Elevation

- 1 Brick snap faced precast concrete panels
Colour: Warm mid grey
- 2 Form liner patterned precast concrete panels
Colour: Warm mid grey concrete stain to match brick snap
- 3 Feature frame - precast concrete
Colour: White
- 4 Aluminium framed windows (openable) and sliding doors
Frame colour: Natural anodised
- 5 Precast concrete
Finished: Warm light grey concrete stain
- 6 Metal balustrade
Colour: Champagne tone anodised aluminium
- 7 Courtyard privacy screen
Colour: Champagne tone anodised aluminium
- 8 Precast concrete garden wall / planter
Colour: Ochre

Rev.	Amendment	Date
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BUILDING 4 NE ELEVATION

1 : 200



BUILDING 4 SE ELEVATION

1 : 200



BUILDING 4 SW ELEVATION

1 : 200



BUILDING 4 NW ELEVATION

1 : 200

MATERIALS AND FINISHES PALETTE



Building 4 - Reference Elevation

- ① Brick snap faced precast concrete panels
Colour: Warm light grey
- ② Form liner patterned precast concrete panels
Colour: Warm light grey concrete stain to match brick snap
- ③ Feature frame - precast concrete
Colour: White
- ④ Aluminium framed windows (openable) and sliding doors
Frame colour: Charcoal / Natural anodised
- ⑤ Precast concrete
Finished: Warm mid grey concrete stain
- ⑥ Metal balustrade
Colour: Champangne tone anodised aluminium
- ⑦ Courtyard privacy screen
Colour: Charcoal tone anodised aluminium
- ⑧ Precast concrete garden wall / planter
Colour: Ochre

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BUILDING 4 ELEVATIONS

Scale
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Date 11/12/18
Job No. 2017045
Dwg No. 3144 DA135 Rev: 2 A1 SHEET



BUILDING 5 NE ELEVATION

1 : 200



BUILDING 5 SE ELEVATION

1 : 200



BUILDING 5 SW ELEVATION

1 : 200



BUILDING 5 NW ELEVATION

1 : 200

MATERIALS AND FINISHES PALETTE



Building 5 - Reference Elevation

- 1 Brick snap faced precast concrete panels
Colour: Warm mid grey
- 2 Form liner patterned precast concrete panels
Colour: Warm mid grey concrete stain to match brick snap
- 3 Feature frame - precast concrete
Colour: White
- 4 Aluminium framed windows (openable) and sliding doors
Frame colour: Natural anodised
- 5 Precast concrete
Finished: Warm light grey concrete stain
- 6 Metal balustrade
Colour: Champagne tone anodised aluminium
- 7 Courtyard privacy screen
Colour: Champagne tone anodised aluminium
- 8 Precast concrete garden wall / planter
Colour: Ochre



BUILDING 7 NE ELEVATION
1 : 200

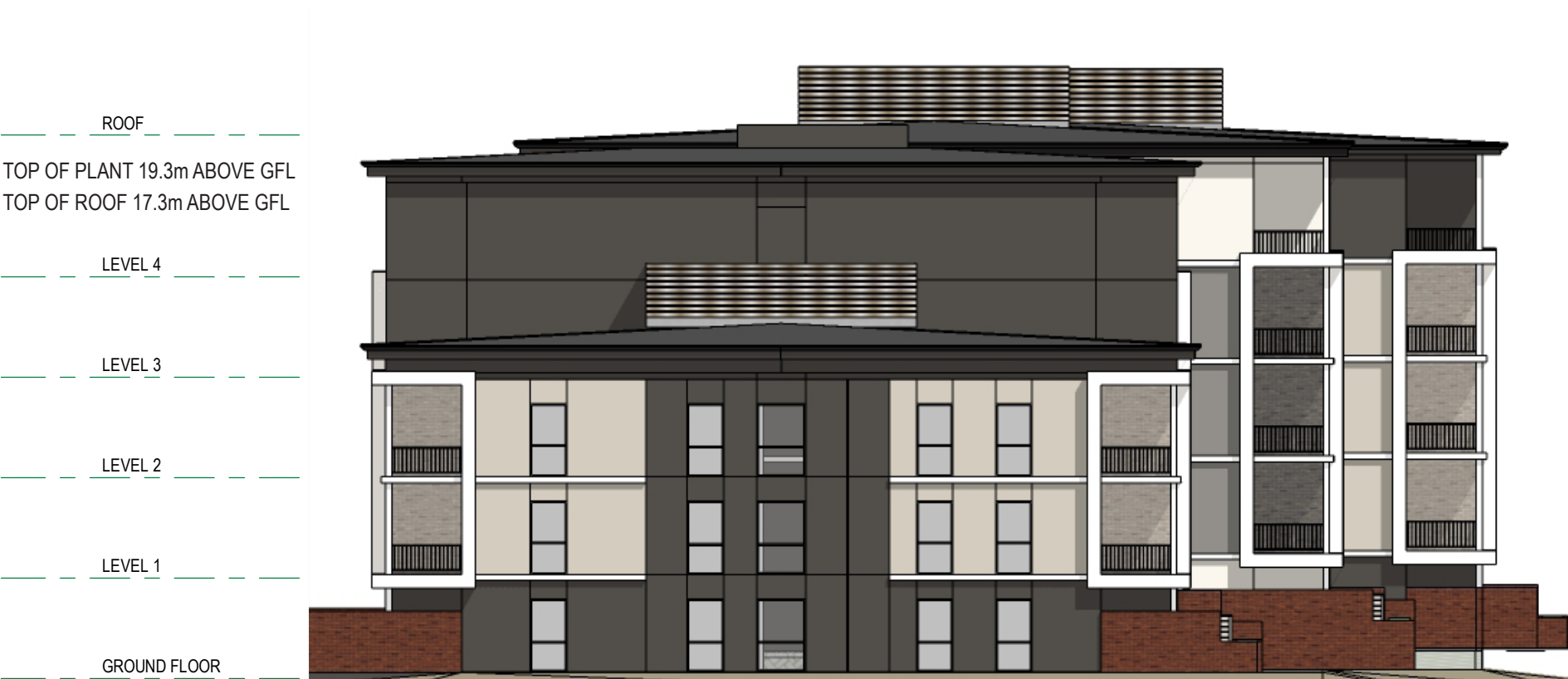


BUILDING 7 SE ELEVATION
1 : 200

BUILDING LINK



BUILDING 7 SW ELEVATION
1 : 200



BUILDING 7 NW ELEVATION
1 : 200

MATERIALS AND FINISHES PALETTE



Building 7 - Reference Elevation

- 1 Brick snap faced precast concrete panels
Colour: Warm light grey
- 2 Form liner patterned precast concrete panels
Colour: Warm light grey concrete stain to match brick snap
- 3 Feature frame - precast concrete
Colour: White
- 4 Aluminium framed windows (openable) and sliding doors
Frame colour: Charcoal / Natural anodised
- 5 Precast concrete
Finished: Warm mid grey concrete stain
- 6 Metal balustrade
Colour: Champangne tone anodised aluminium
- 7 Courtyard privacy screen or Plant screen 1.8m high
Colour: Champangne tone anodised aluminium
- 8 Precast concrete garden wall / planter
Colour: Ochre



BUILDING 1



BUILDING 2



BUILDING 3



BUILDING 4



BUILDING 5

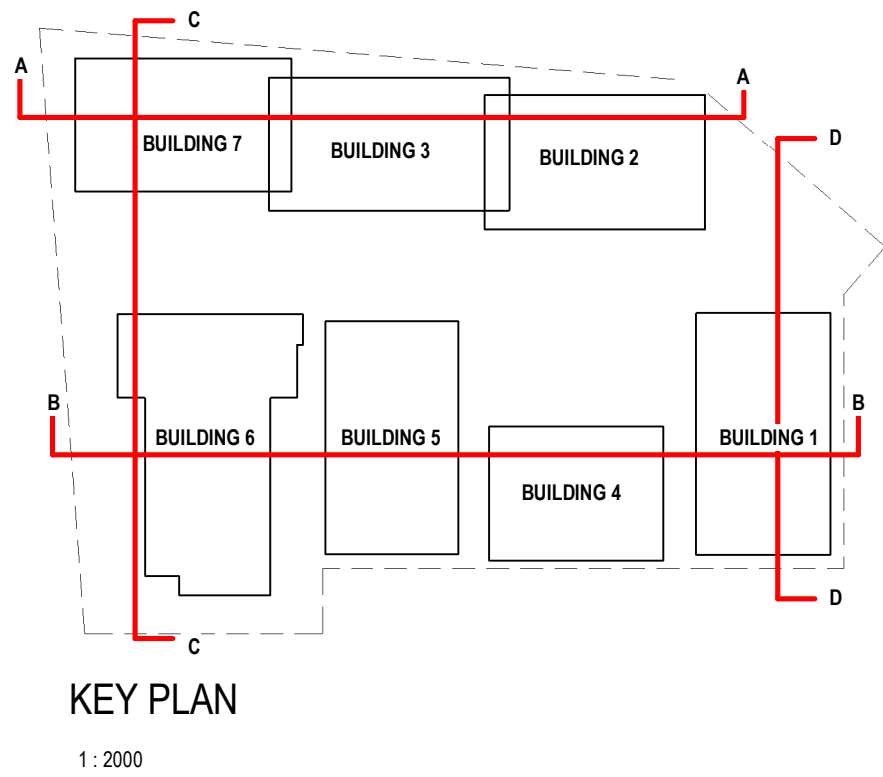
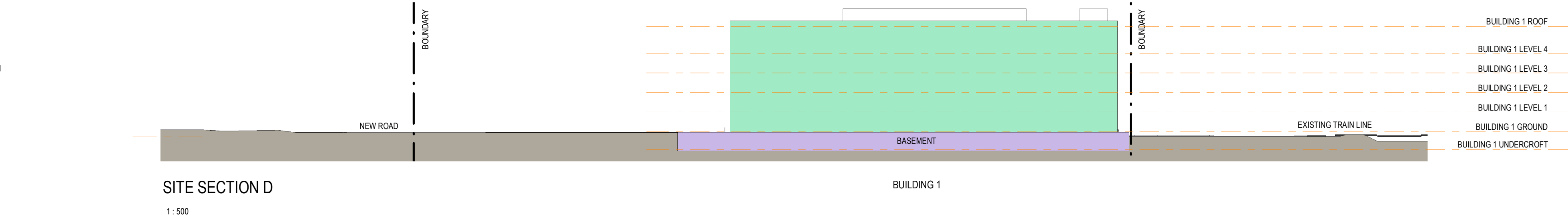
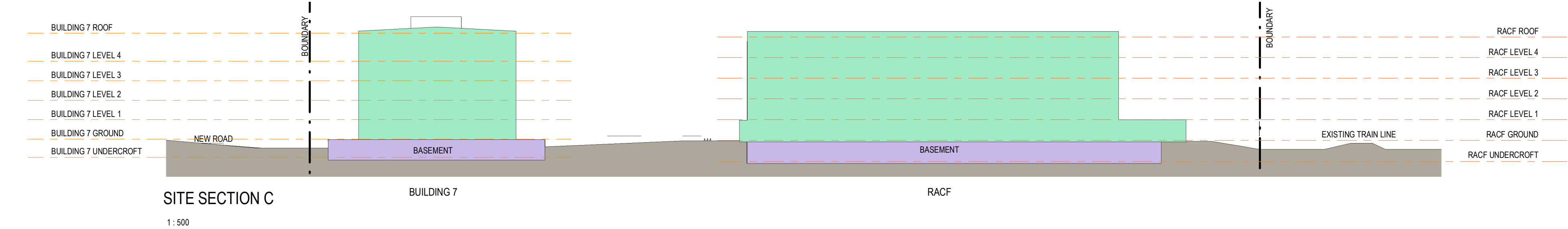
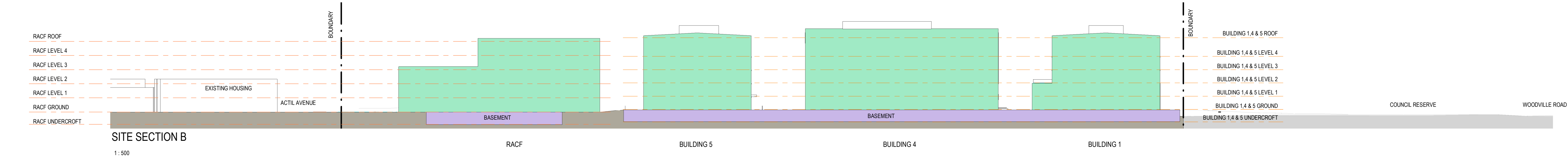
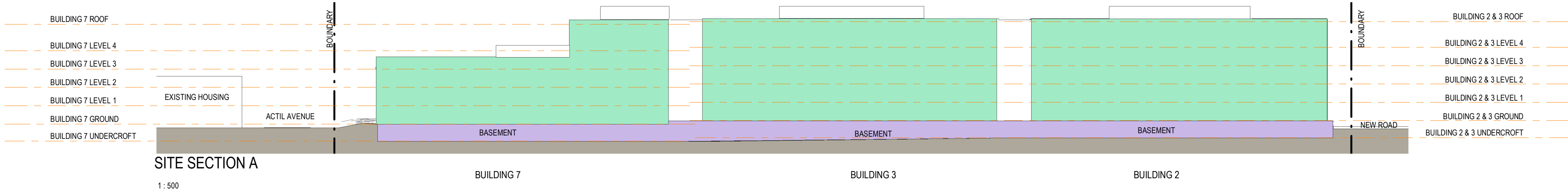


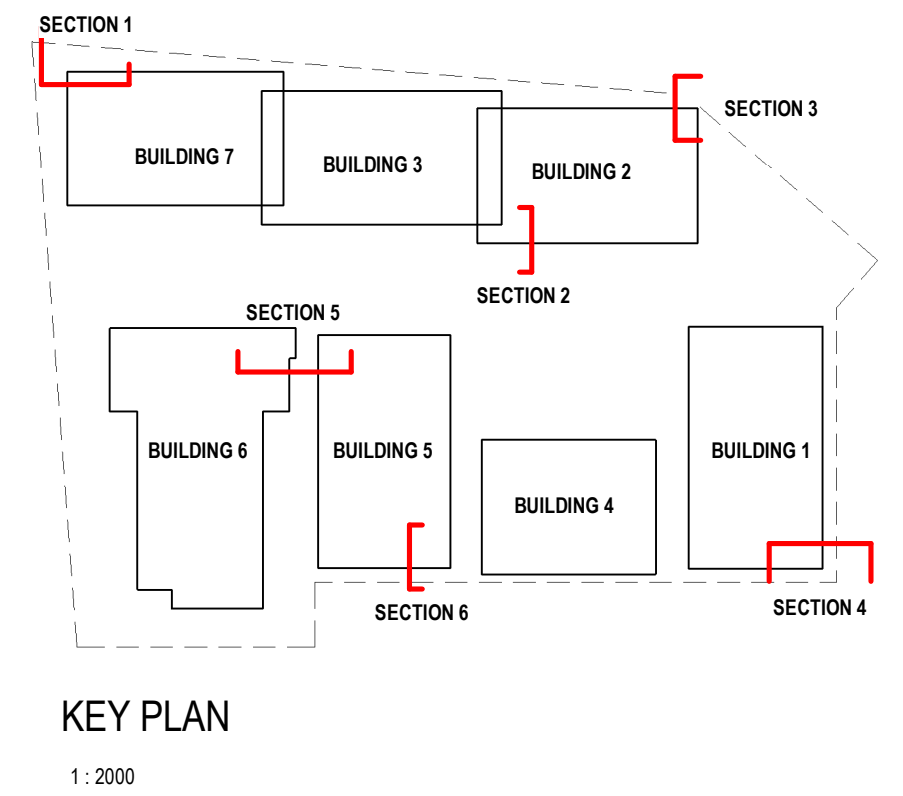
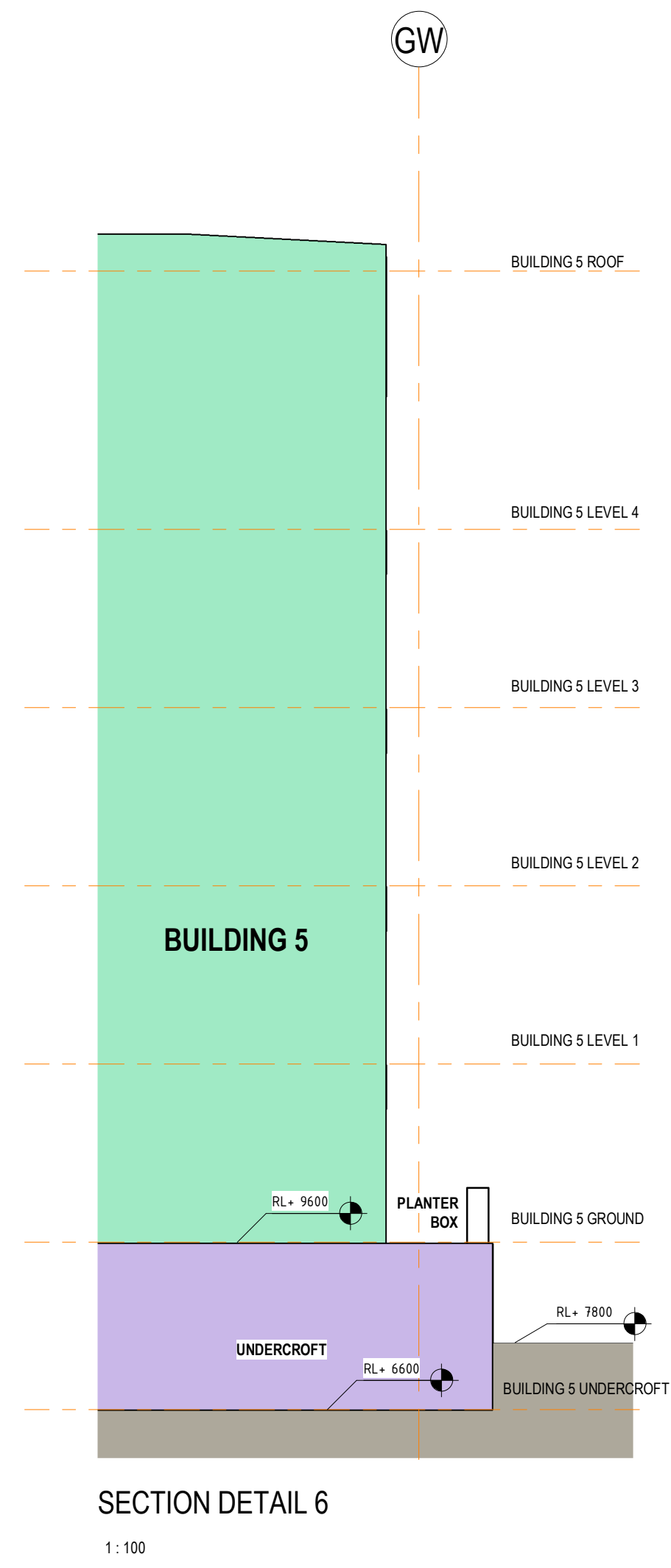
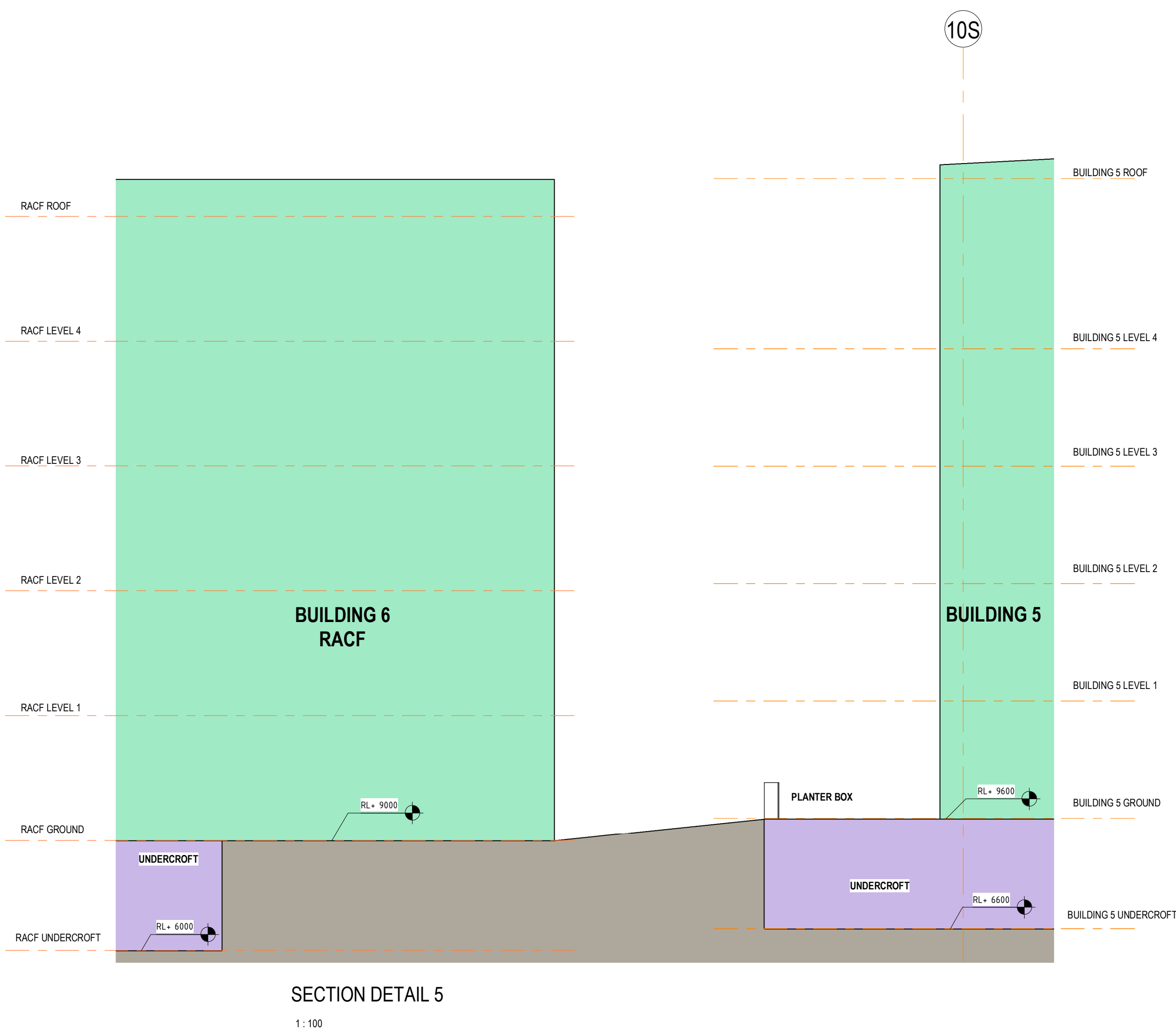
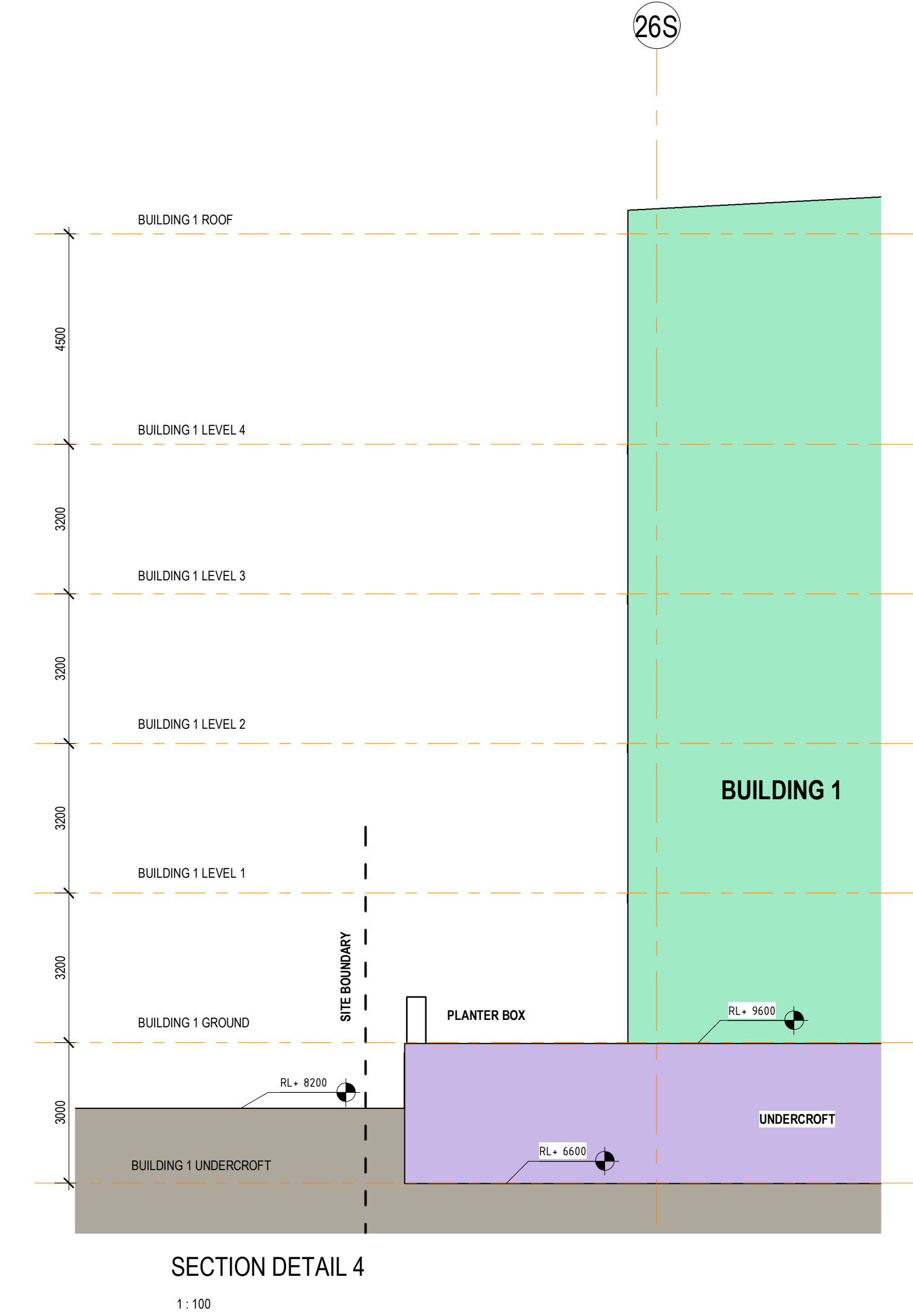
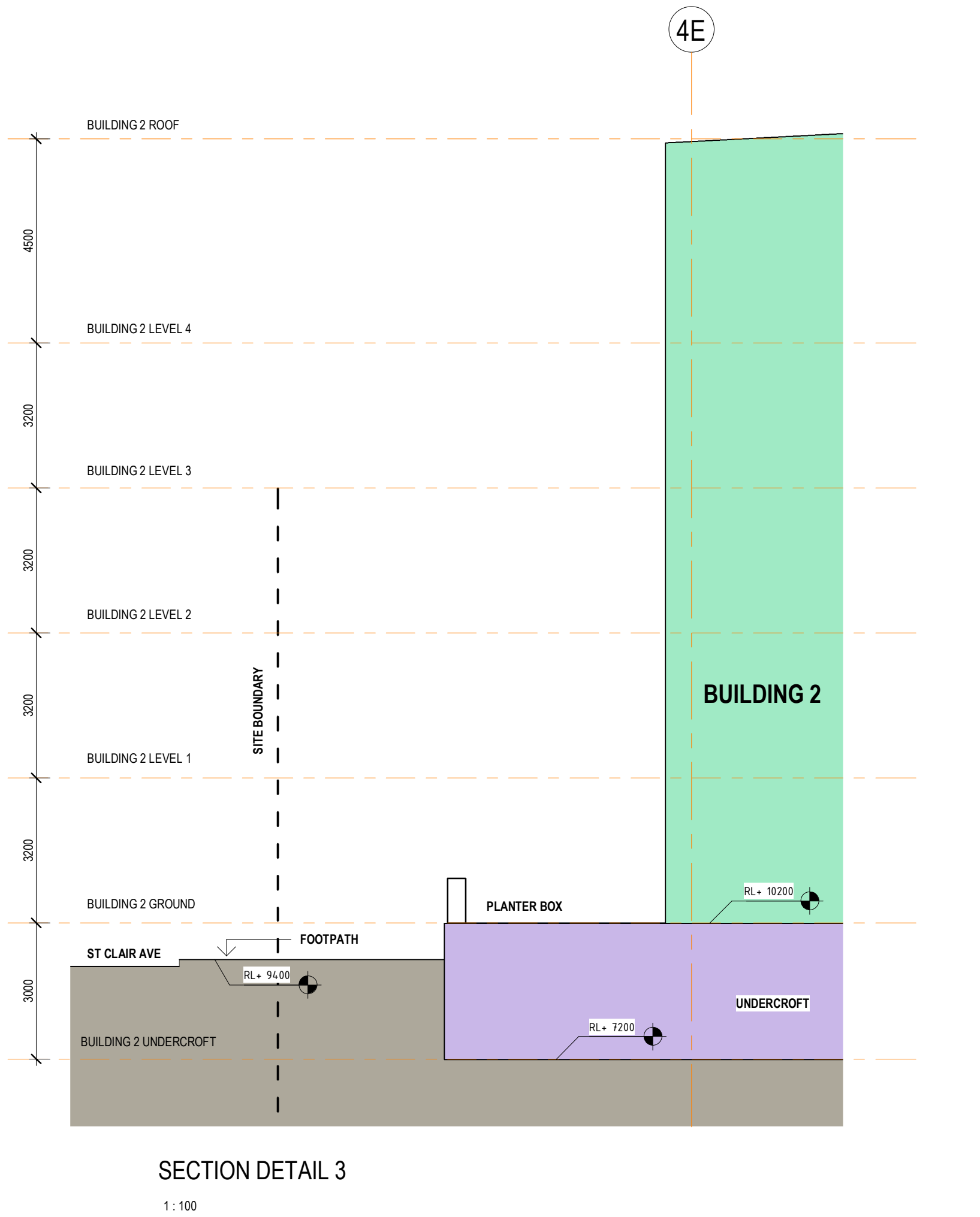
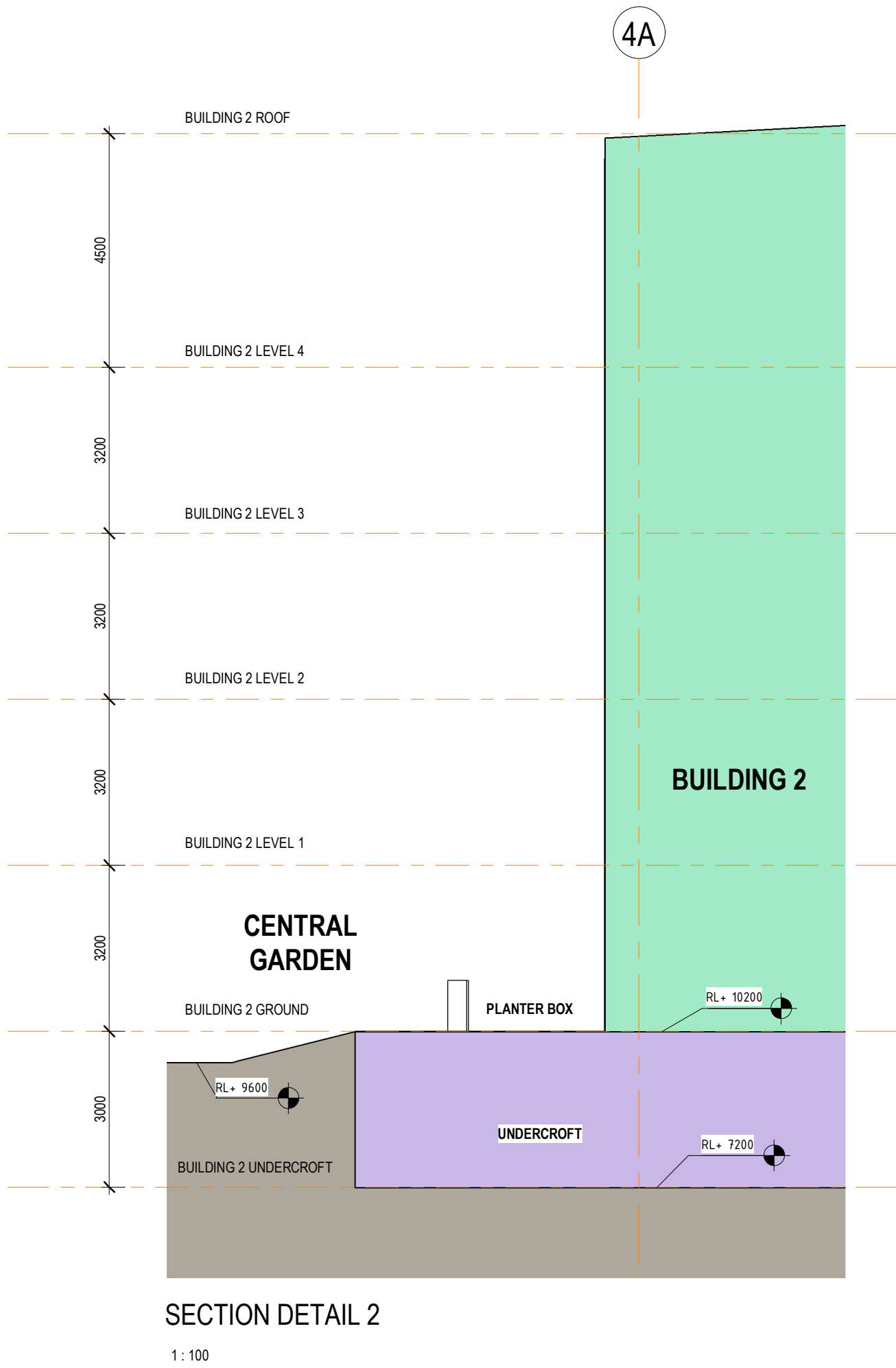
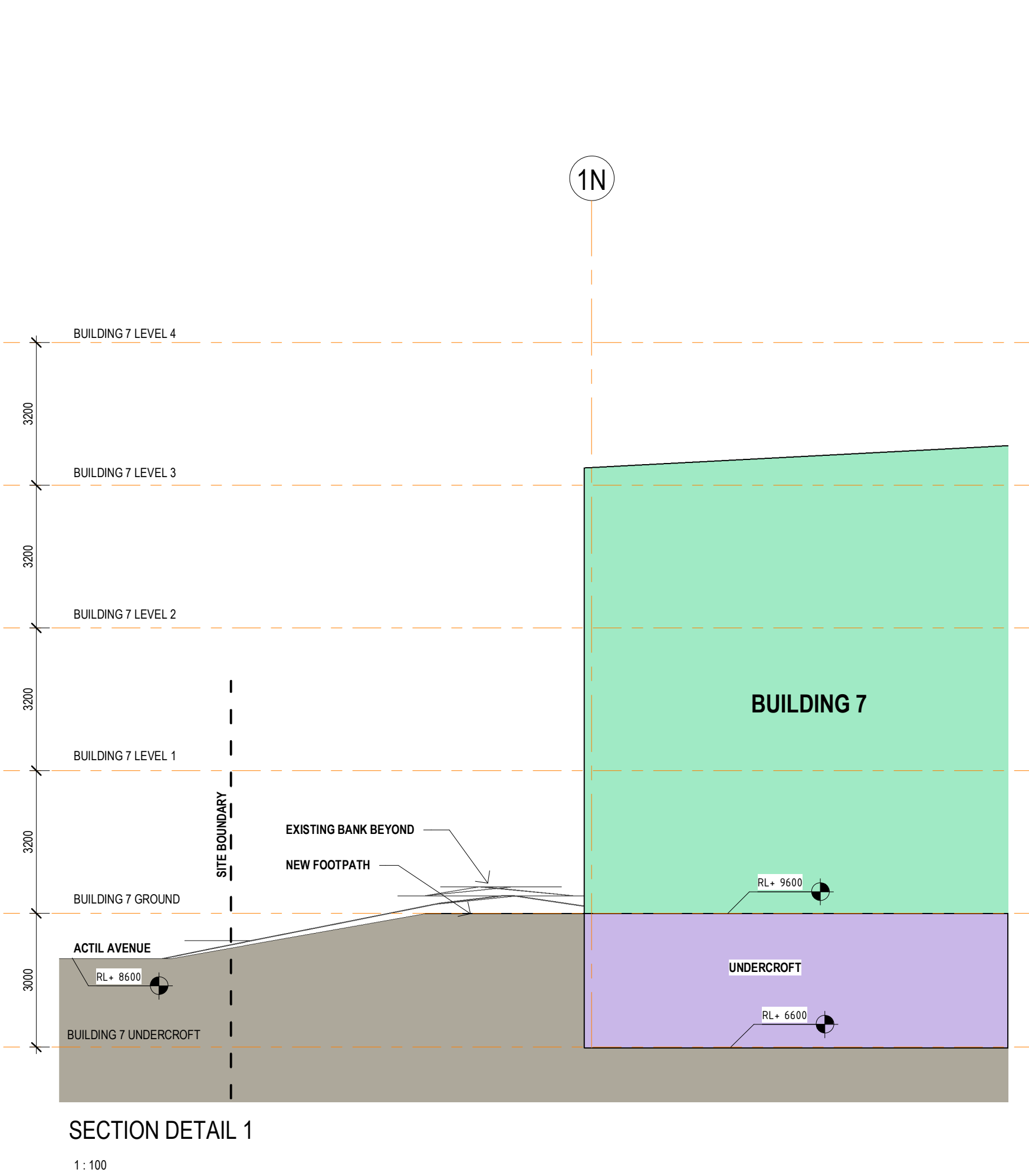
BUILDING 7



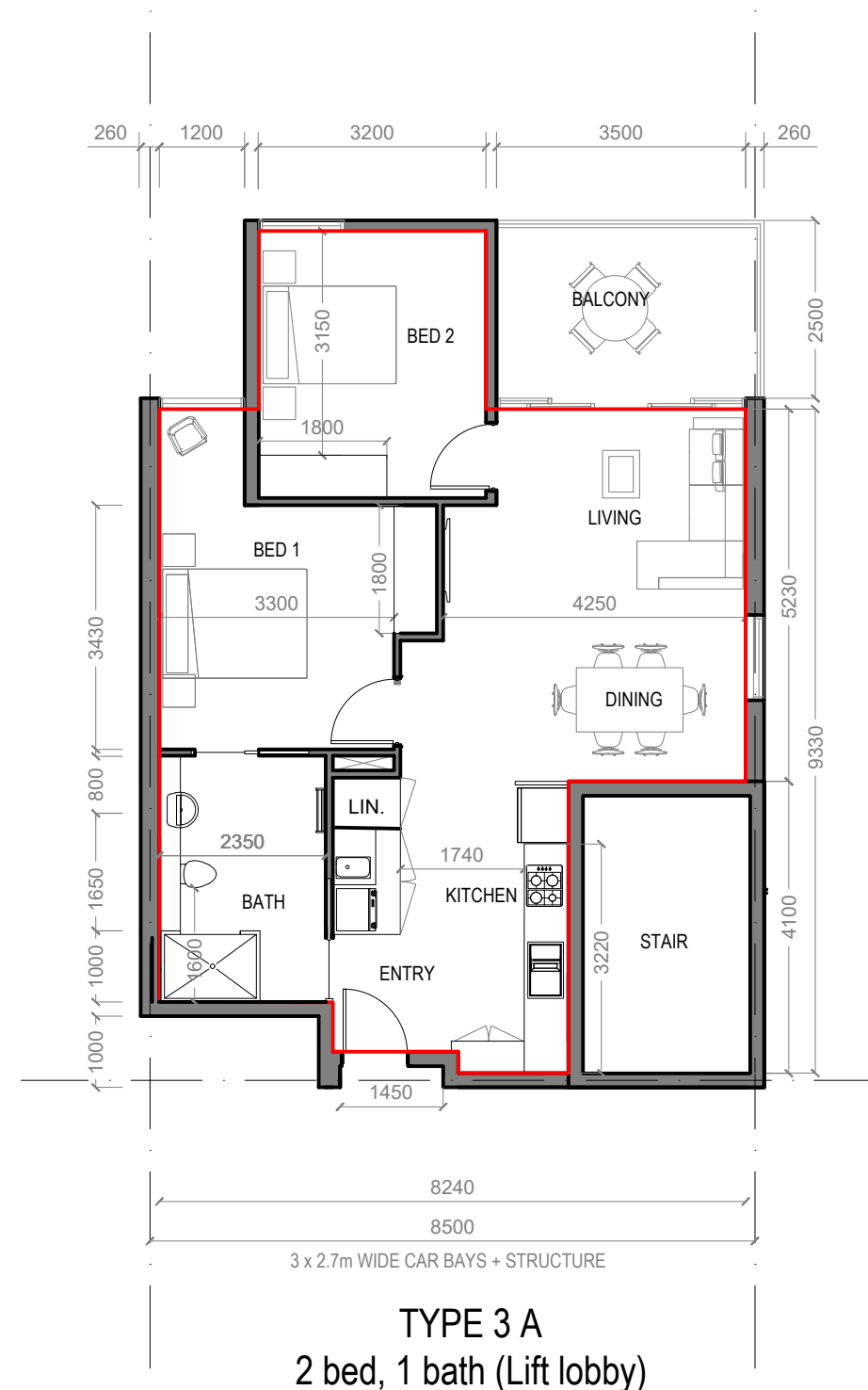
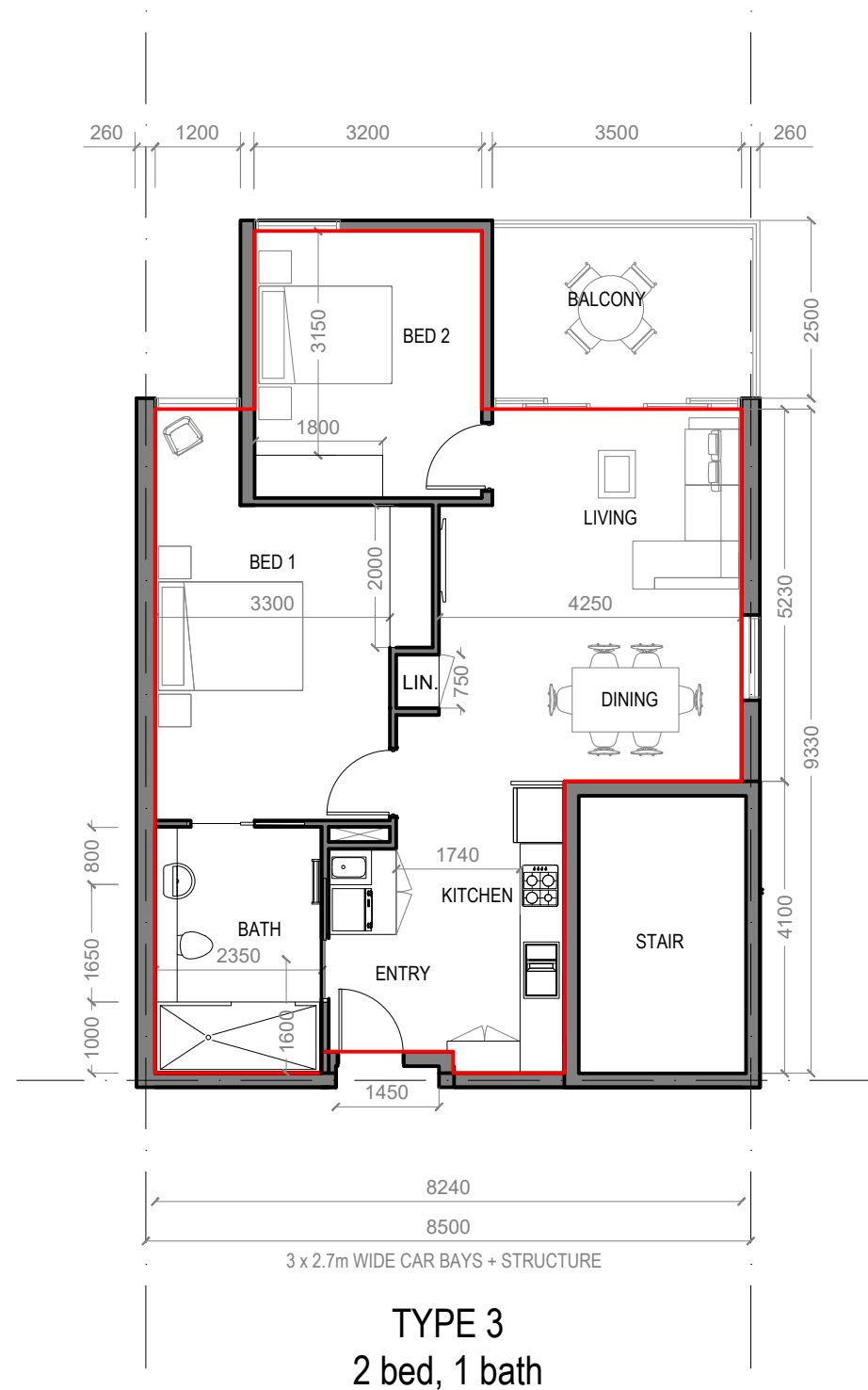
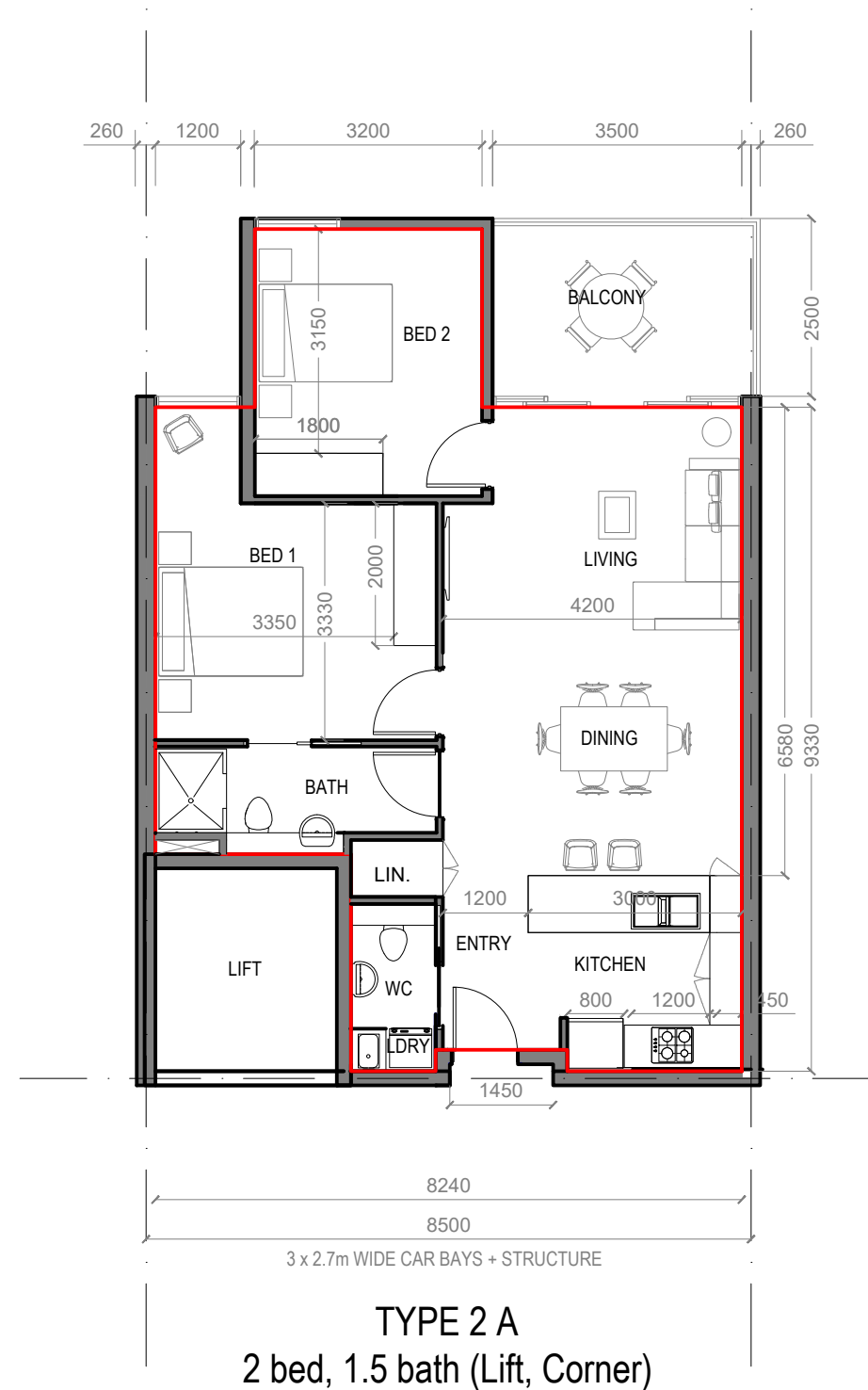
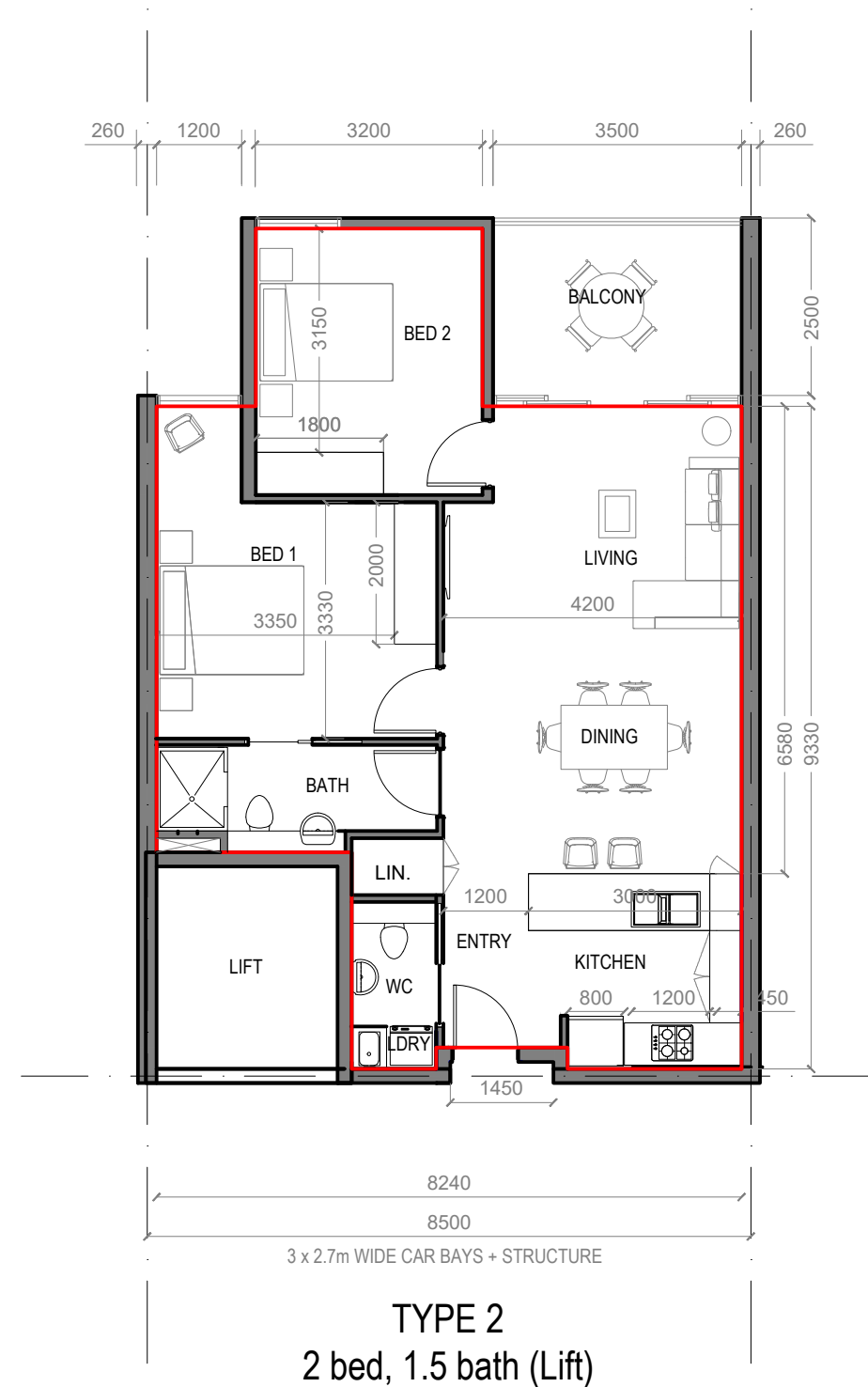
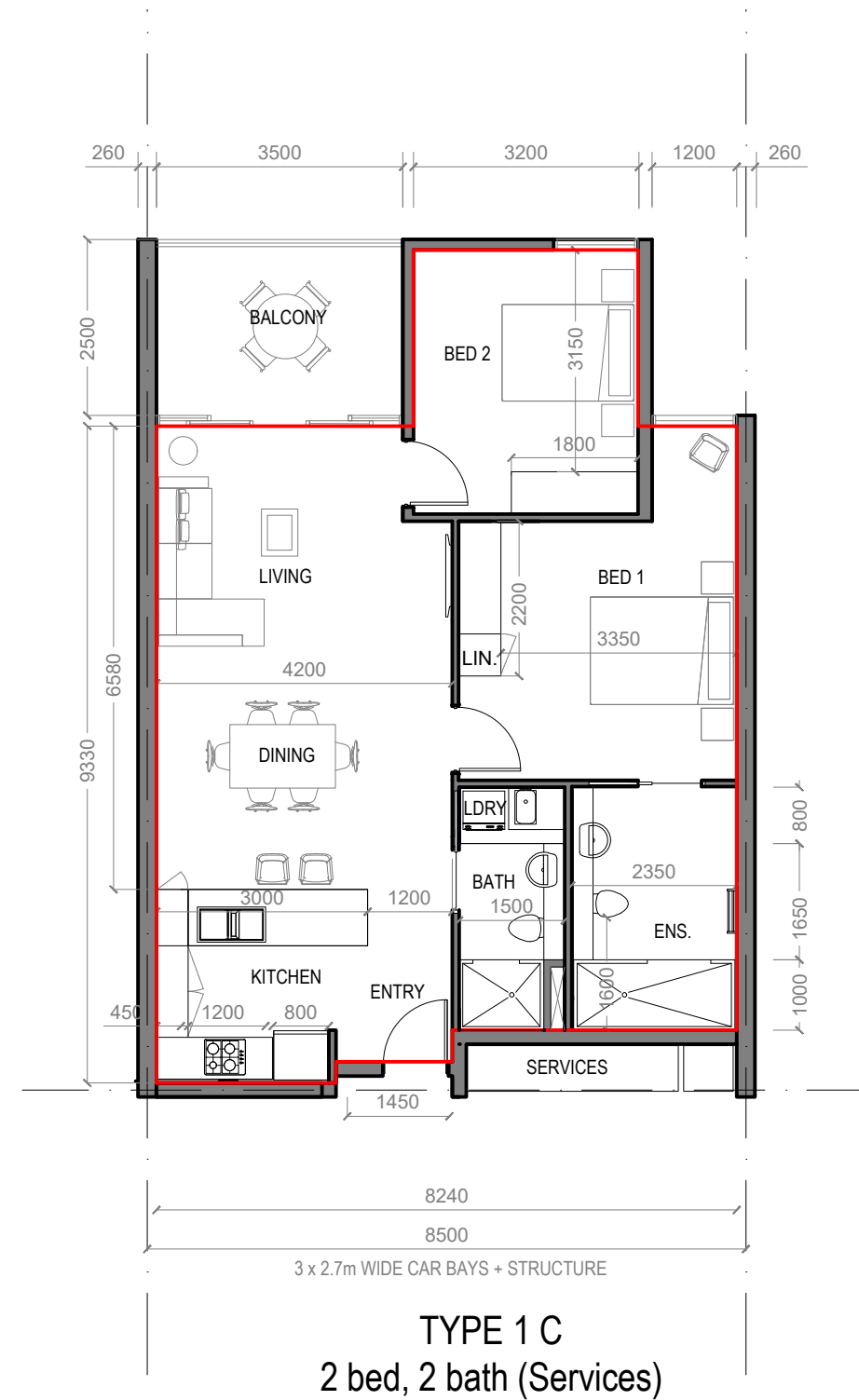
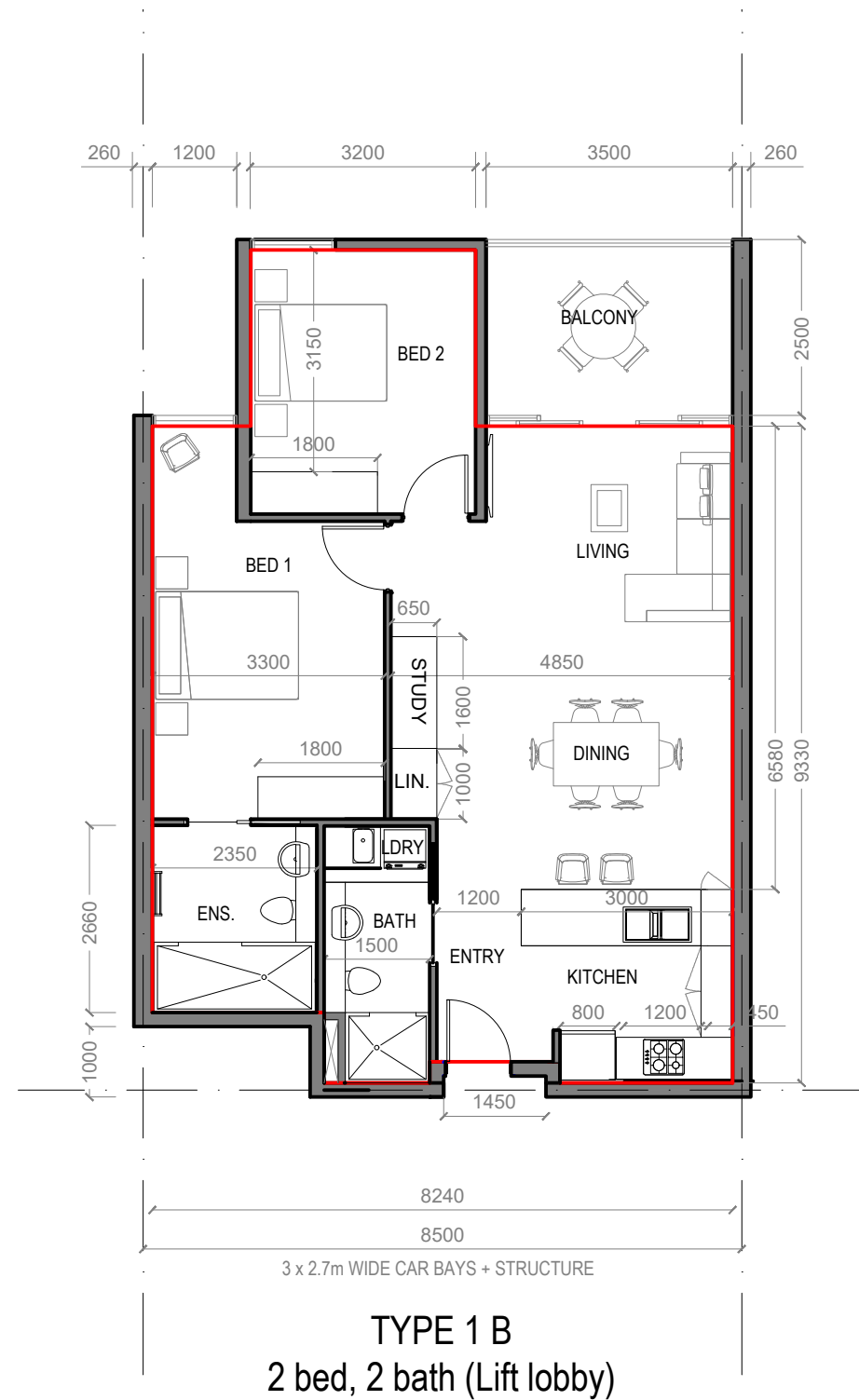
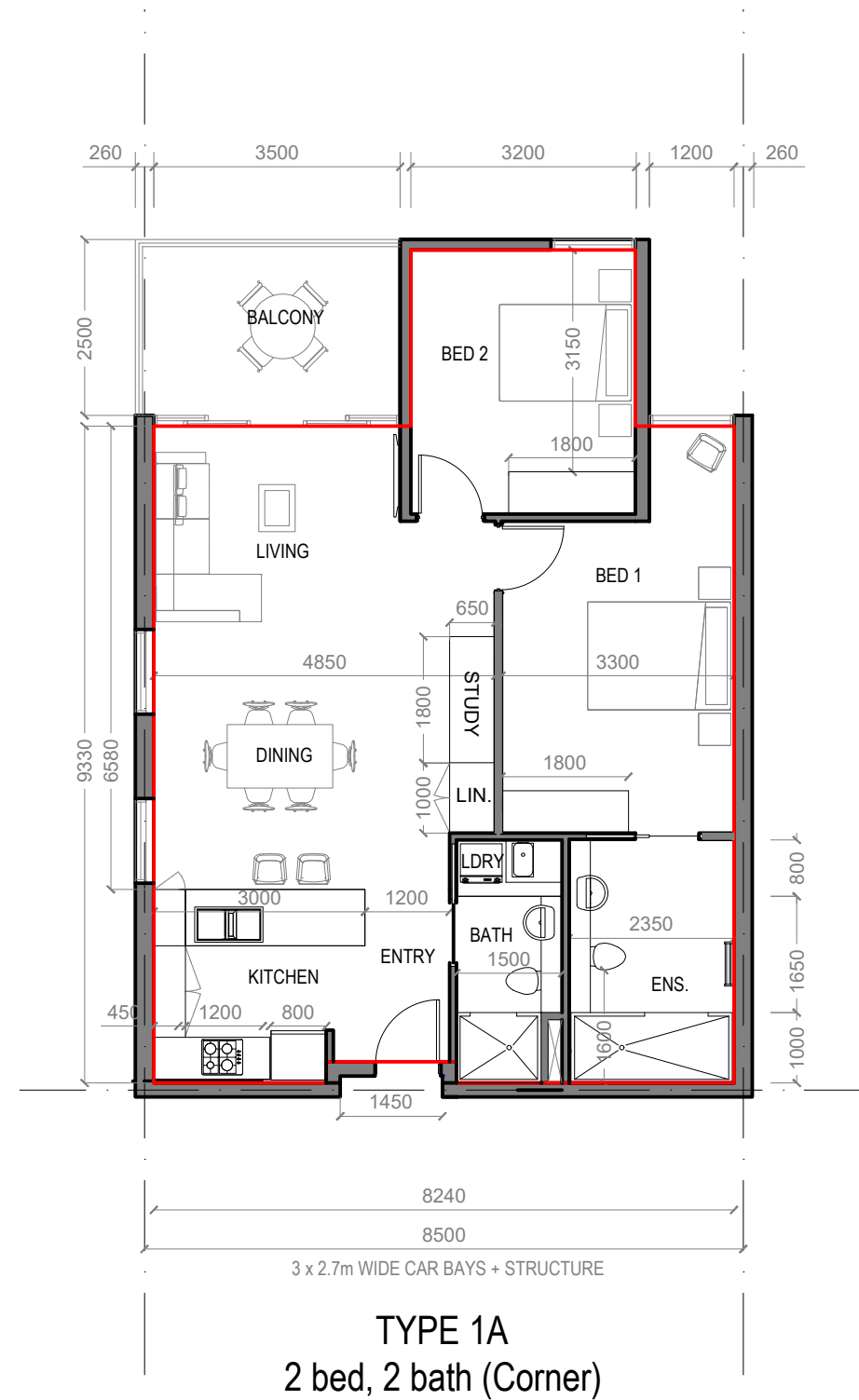
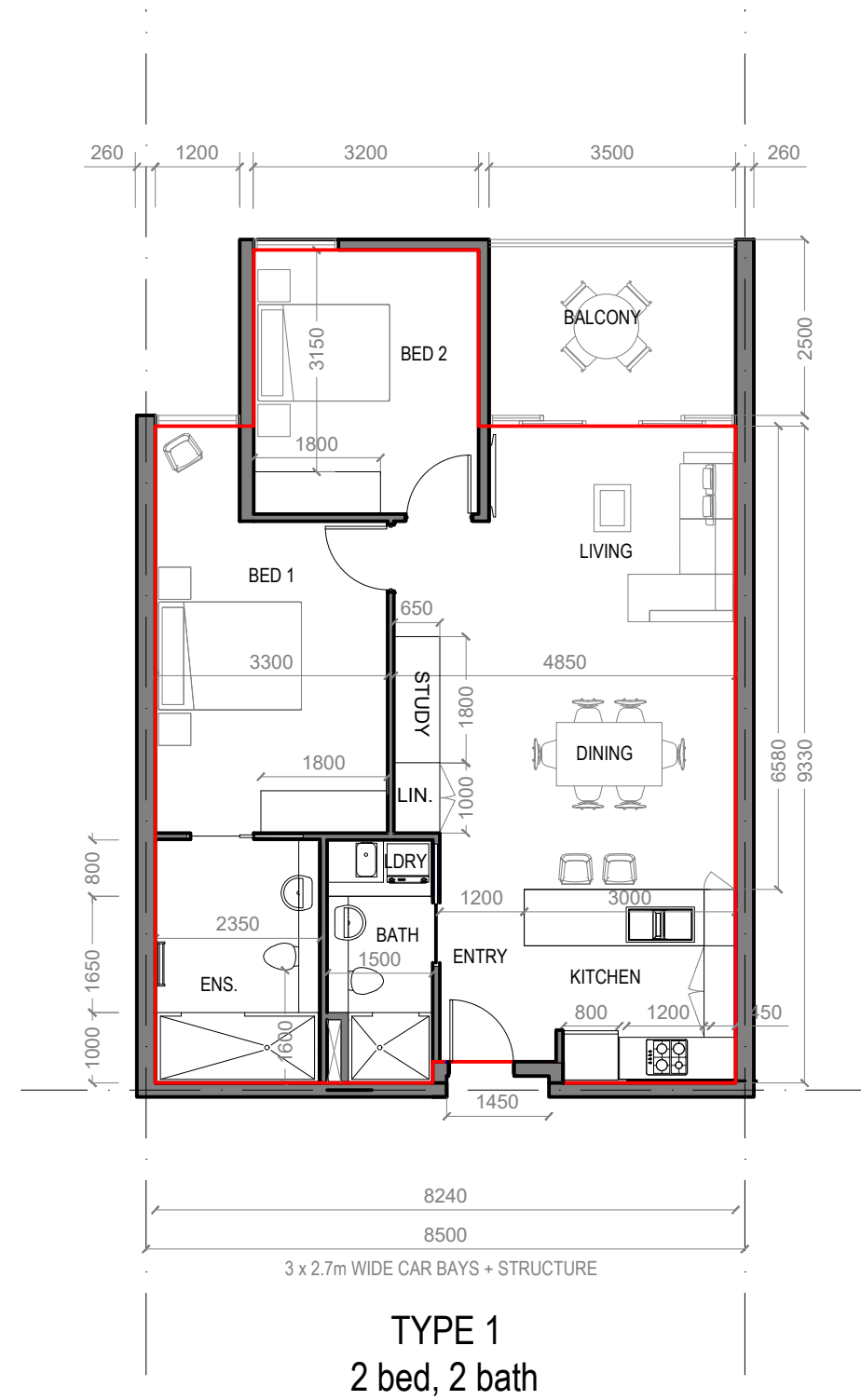
OPTIONAL
WINTER GARDEN
SLIDING WINDOWS

LOCATIONS
HIGHLIGHTED RED

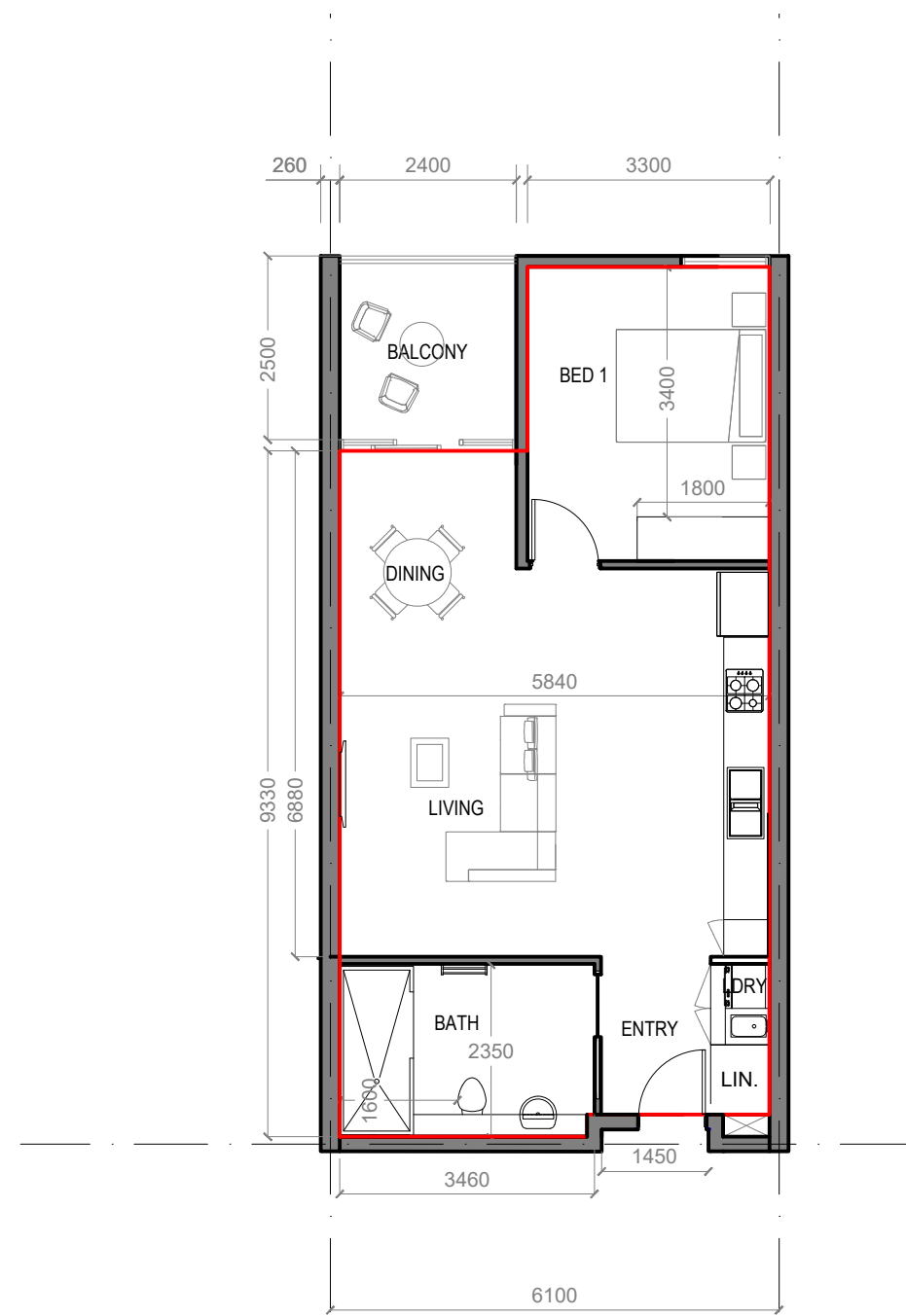




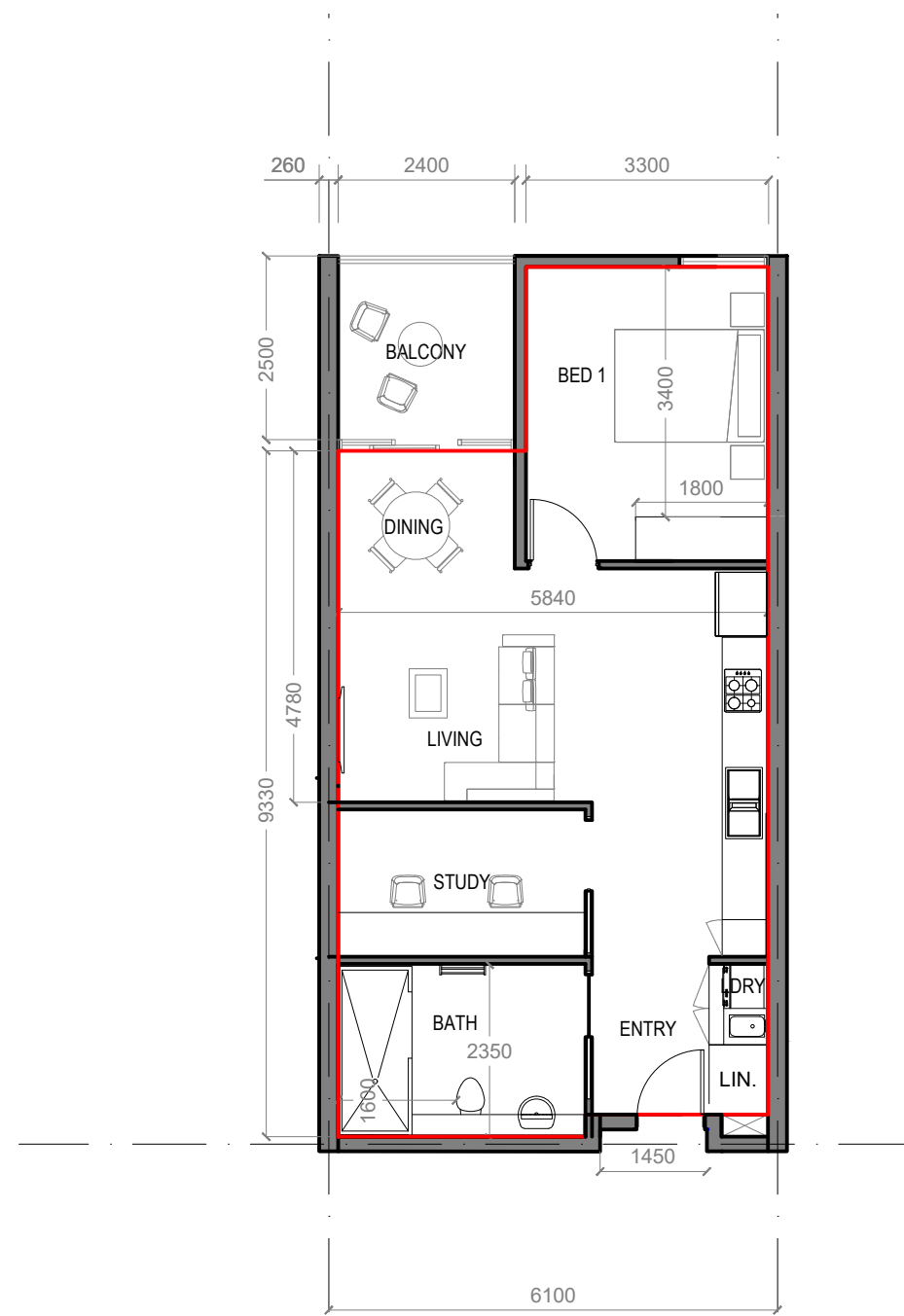
Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



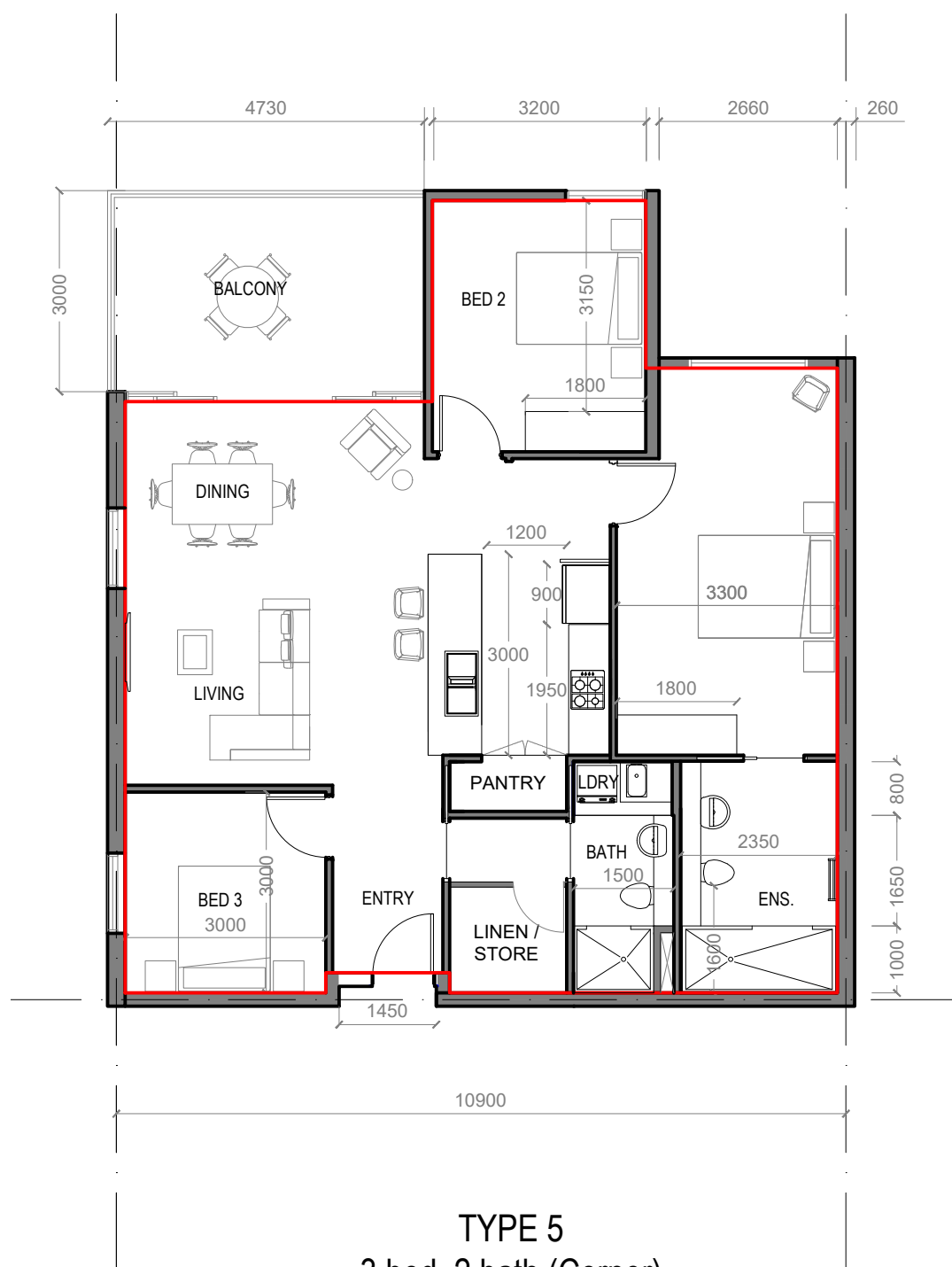
Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



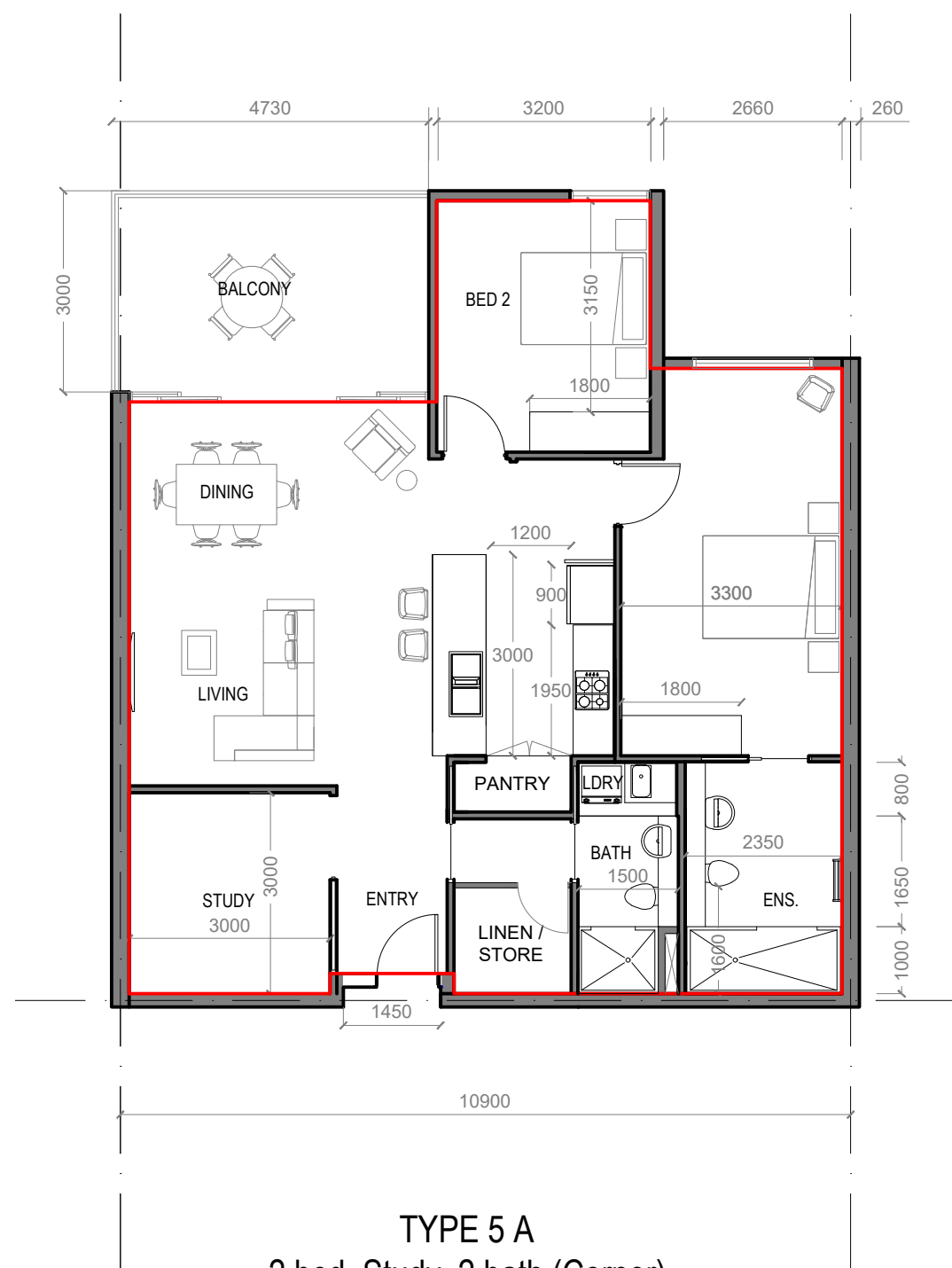
TYPE 4
1 bed, 1 bath



TYPE 4 A
1 bed, study, 1 bath



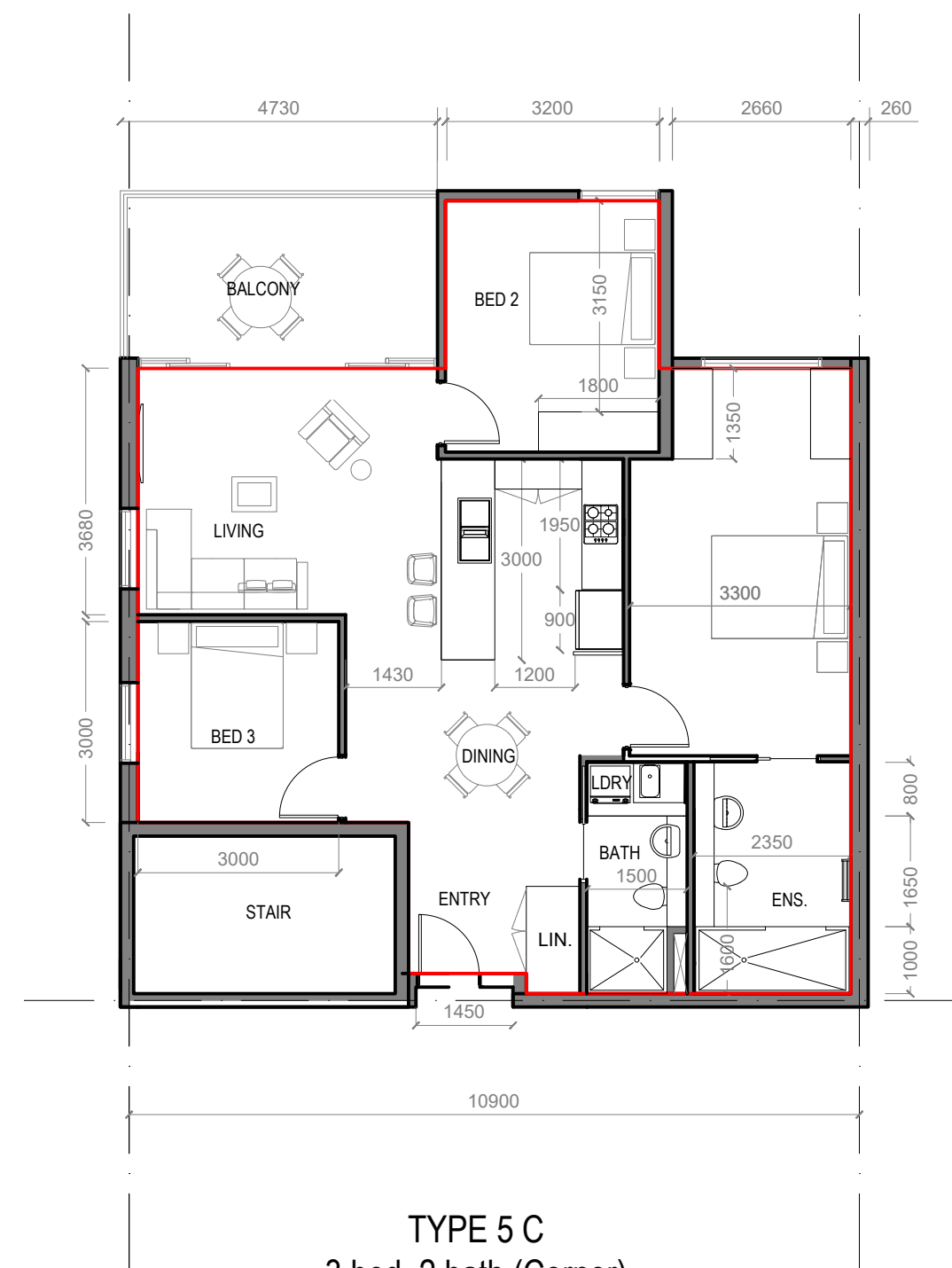
TYPE 5
3 bed, 2 bath (Corner)



TYPE 5 A
2 bed, Study, 2 bath (Corner)



TYPE 5 B
2 bed, 2 bath (Corner)



TYPE 5 C
3 bed, 2 bath (Corner)

**BROWN
FALCONER**

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Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

AVEO

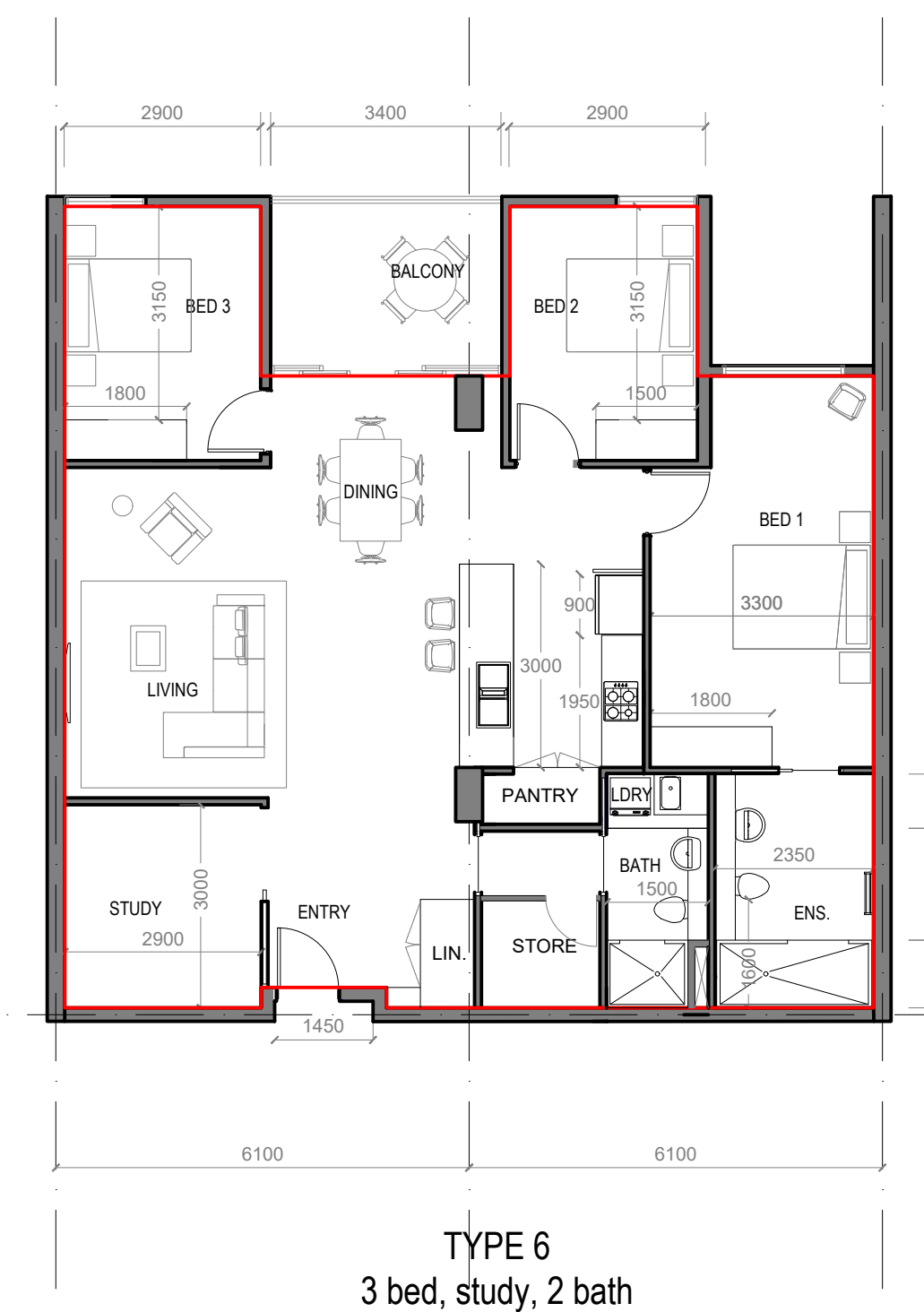
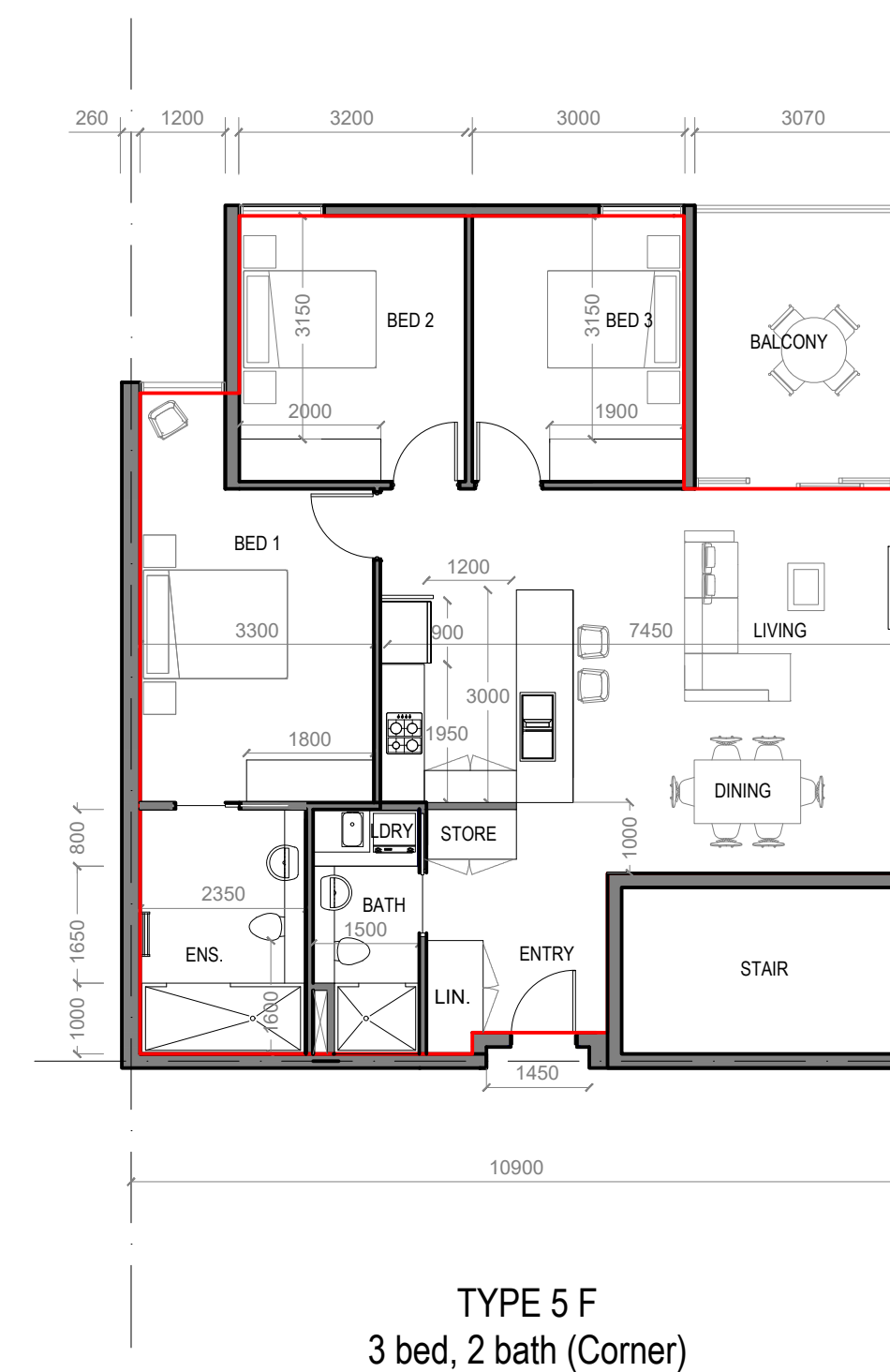
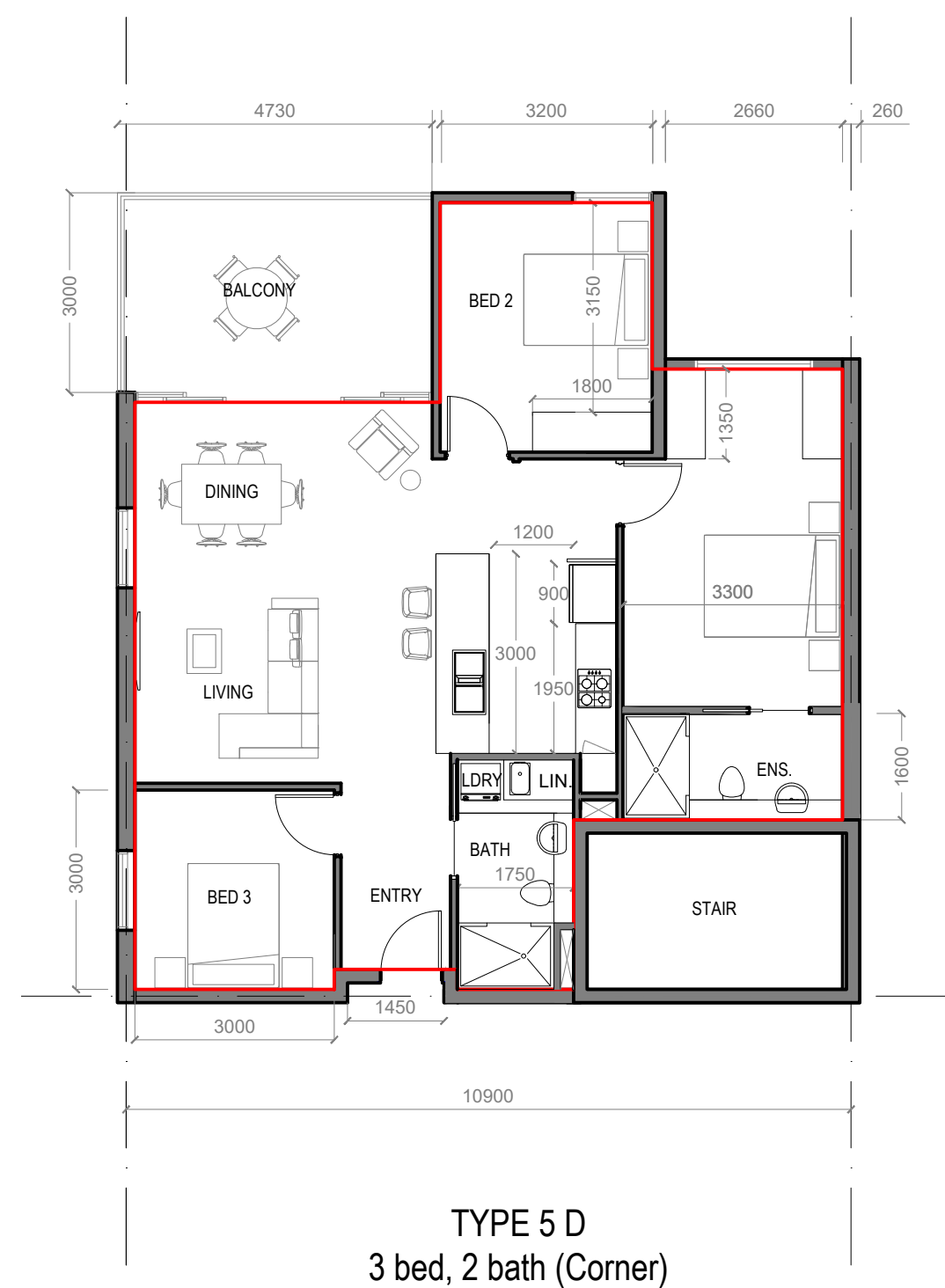
ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

APARTMENT TYPES PLAN - PAGE 2
OF 3

Scale
Drawn BF
Date 11/12/18
Job No. 2017045
Dwg No. 3144 DA151 Rev. 2 A1 SHEET



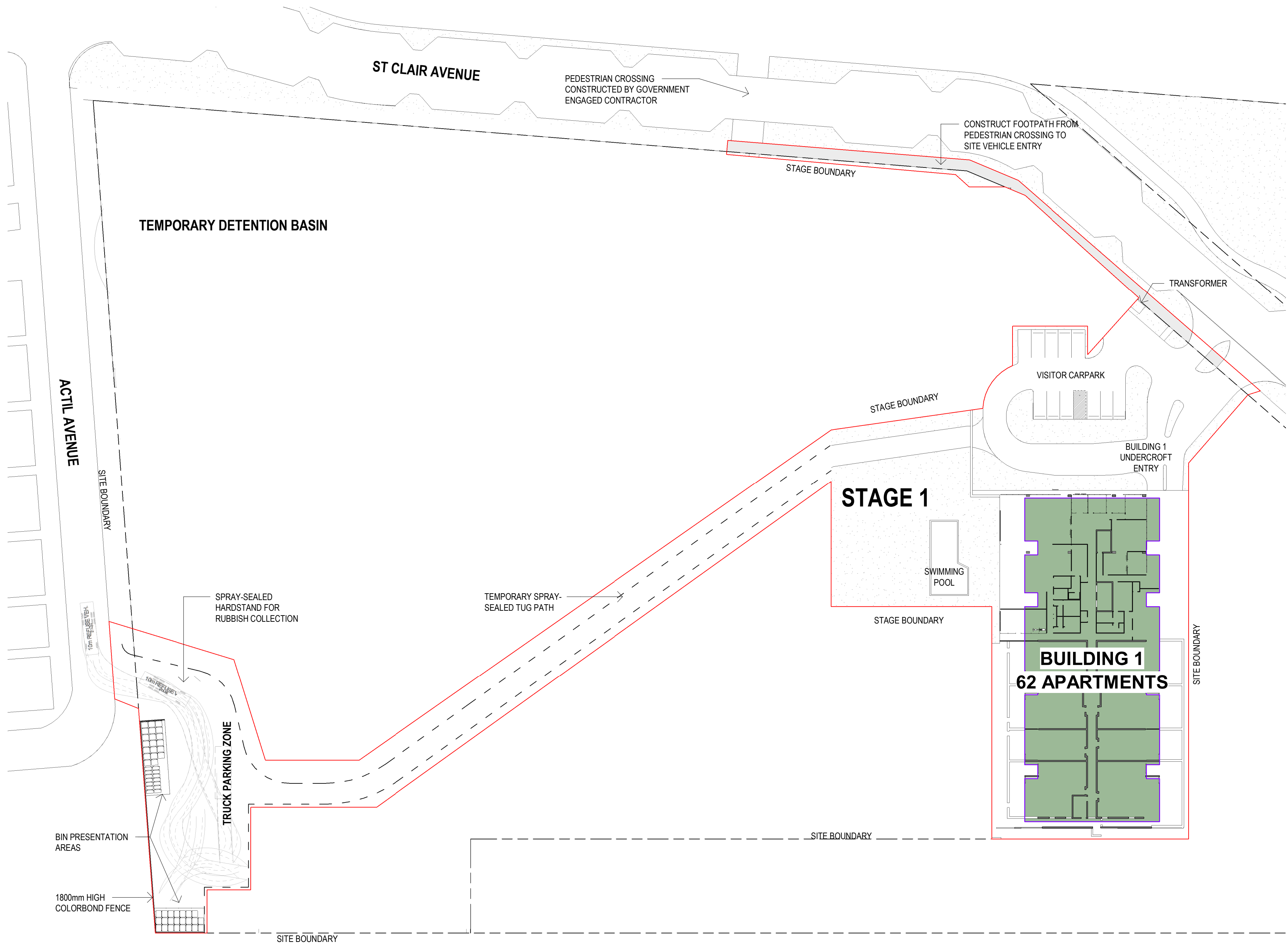
Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	30/11/18
2	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:54:59 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 1

1 : 500

**BROWN
FALCONER**

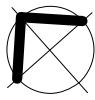
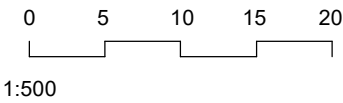
28 Chesser Street, Adelaide, South Australia 5000
Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 1

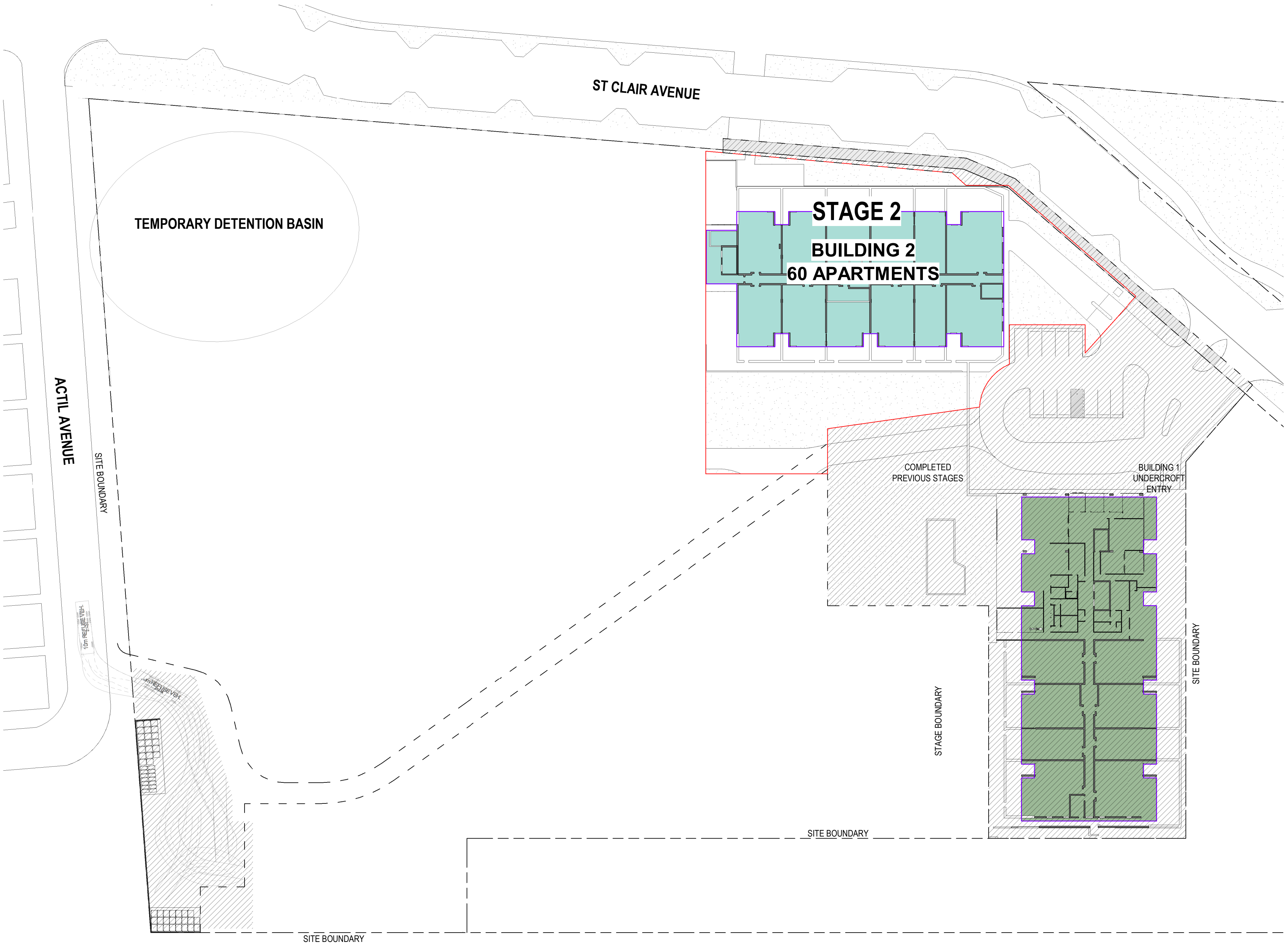
Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045
Dwg No. **3144 DA160** Rev: **4** A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:03 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 2

1 : 500

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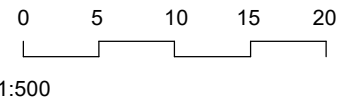
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 2

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

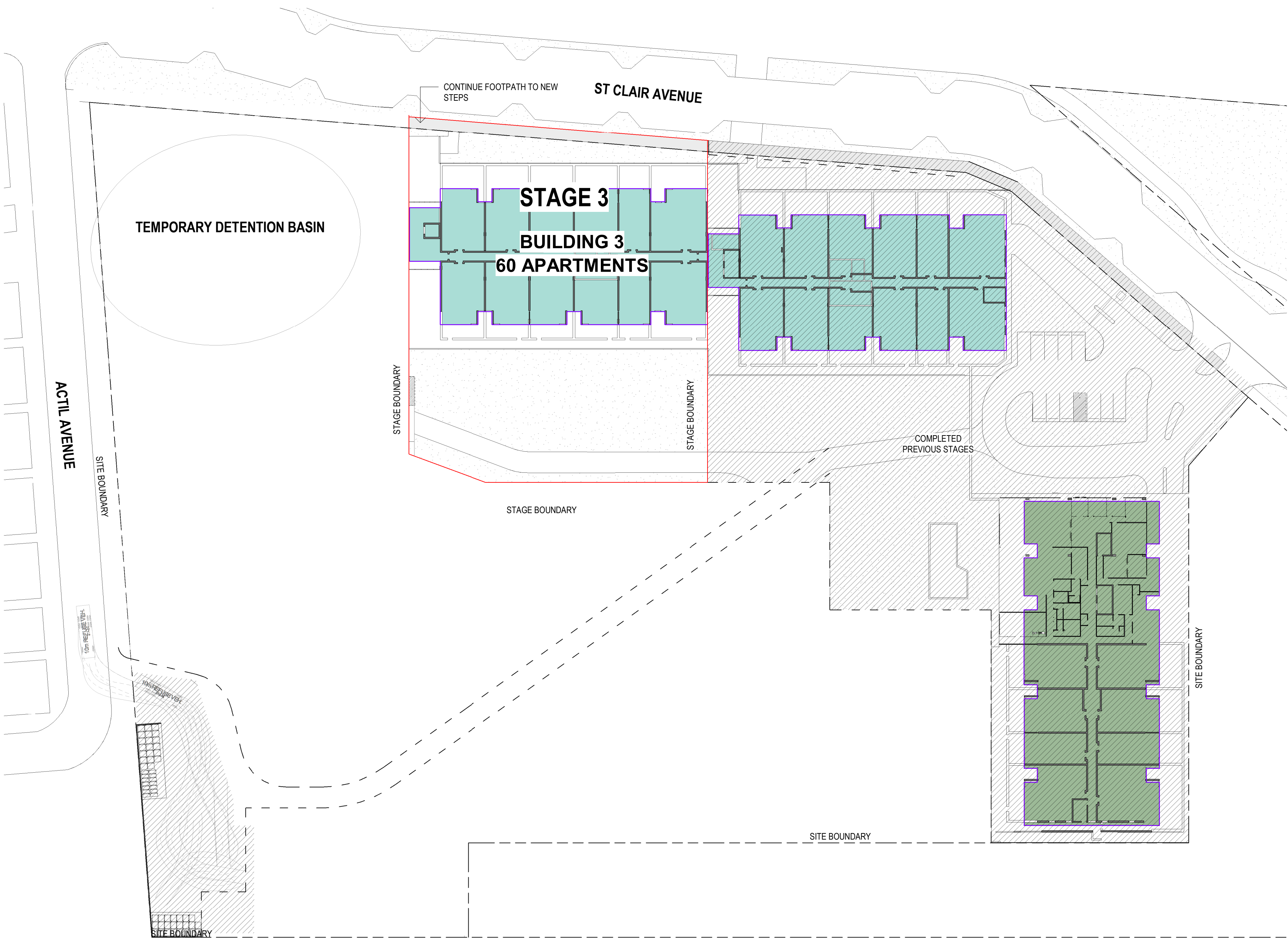
Dwg No. 3144 DA161 Rev: 4 A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:08 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 3
1 : 500

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FALCONER**
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ABN 65 007 846 586 brownfalconer.com.au

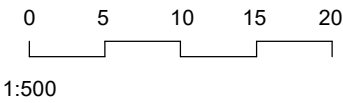
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 3

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

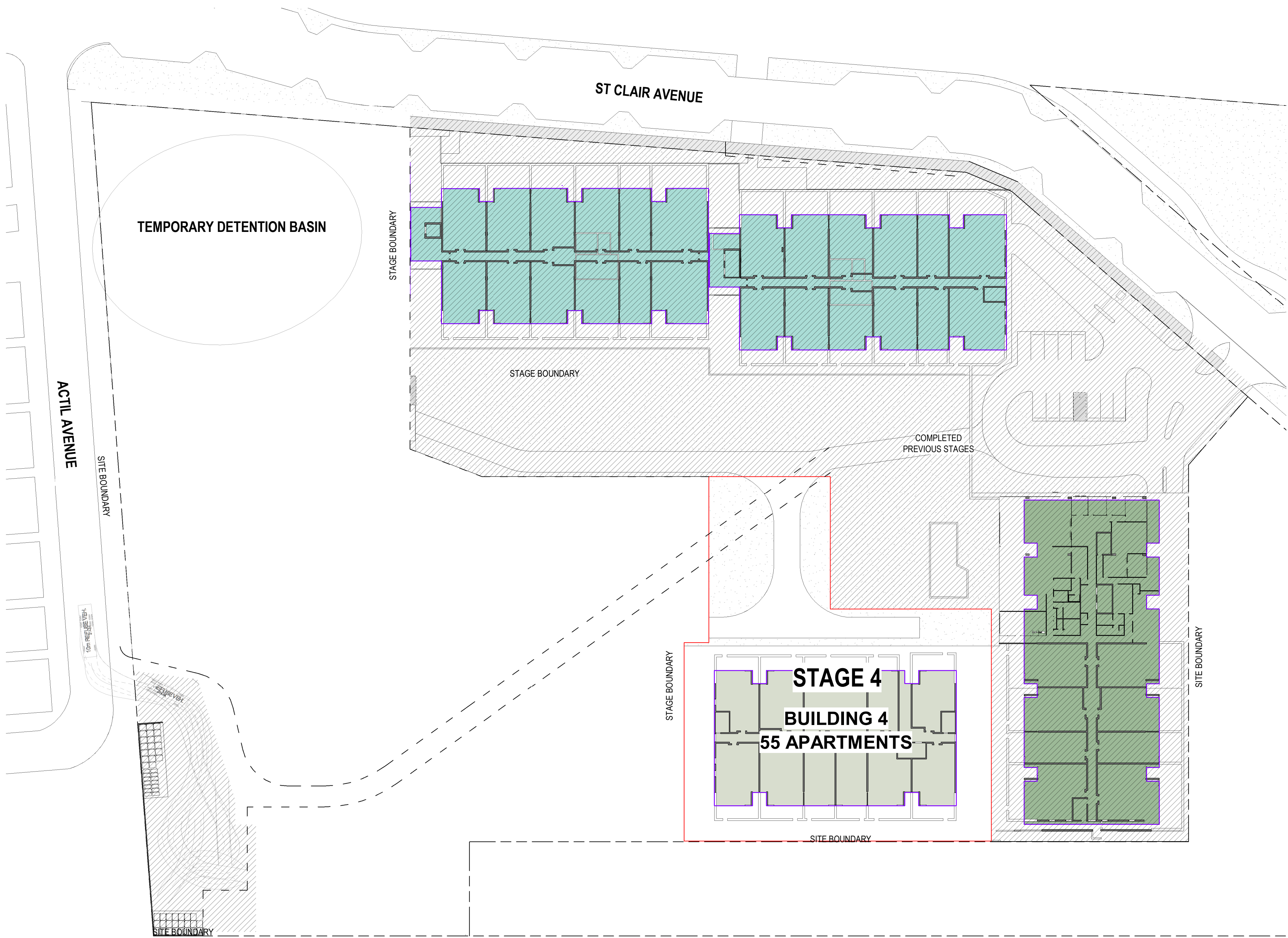
Dwg No. 3144 DA162 Rev: 4 A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:13 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 4

1 : 500

**BROWN
FALCONER**

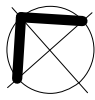
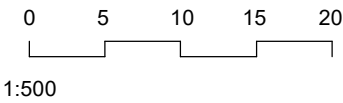
28 Chesser Street, Adelaide, South Australia 5000
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ABN 65 007 846 586 brownfalconer.com.au

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ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 4

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045
Dwg No. **3144 DA163** Rev: **4** A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:17 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 5

1:500

**BROWN
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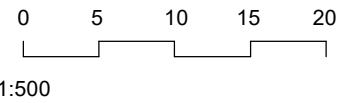
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 5

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. **3144 DA164** Rev: **4** A1 SHEET



Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

Dwg No. 3144 DA165 Rev: 4 A1 SHEET

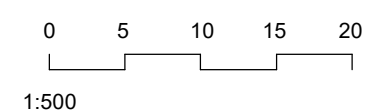
- TEMPORARY SPRAY-SEALED TUG PATH RE-DIRECTED

28 Chesser Street, Adelaide, South Australia 5000
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RETIREMENT COMMUNITY

Scale	1 : 500
Drawn	JS
Date	11/12/18
Job No.	2017045

Dwg No. 3144 DA165 Rev: 4 A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:27 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - GROUND FLOOR STAGE 7

1:500

**BROWN
FALCONER**

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Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

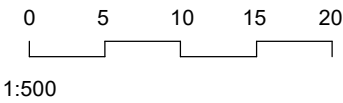
AVEO

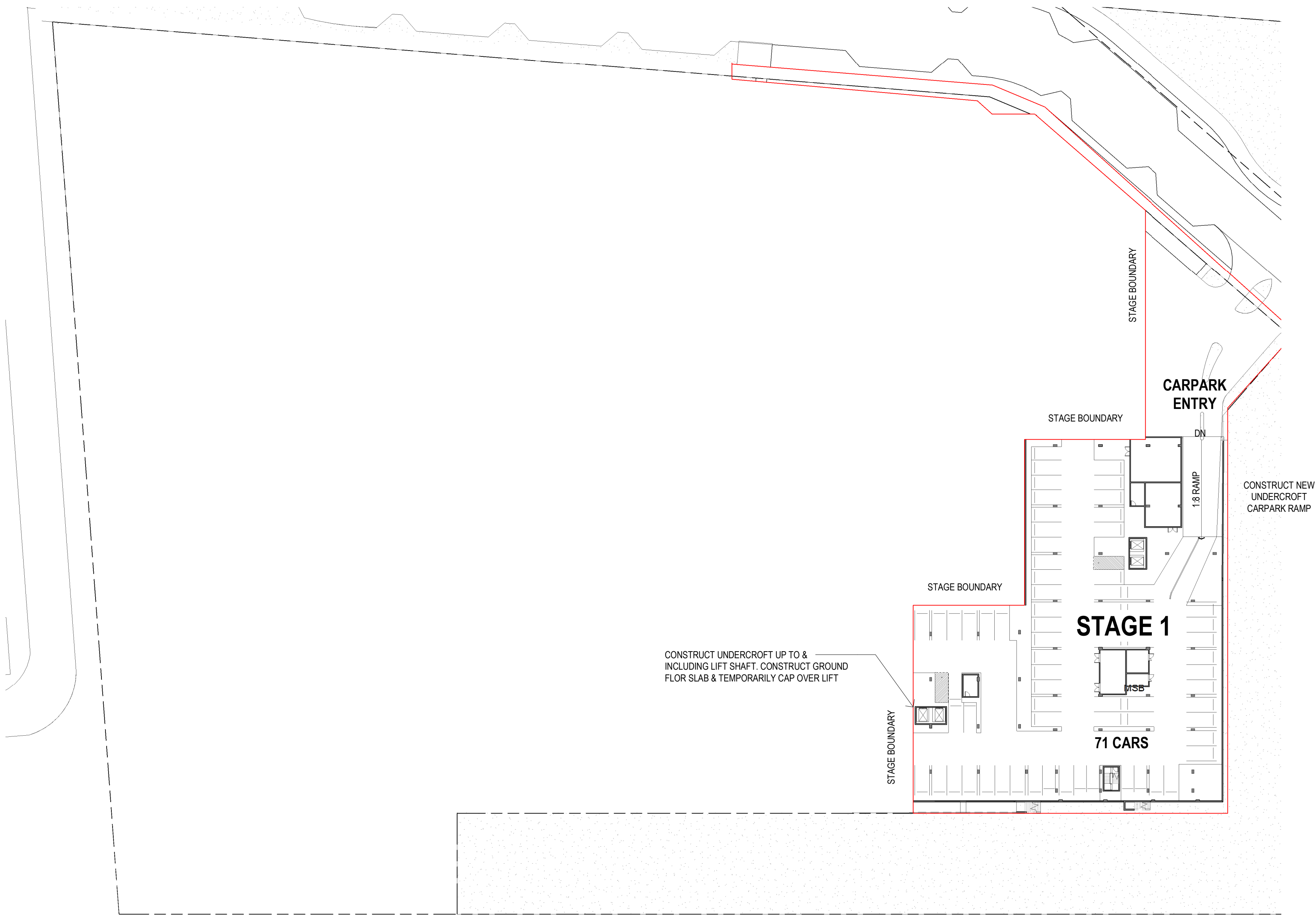
ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - GROUND FLOOR
STAGE 7

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

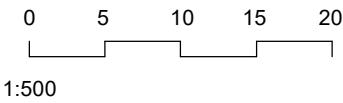
Dwg No. 3144 DA166 Rev: 4 A1 SHEET

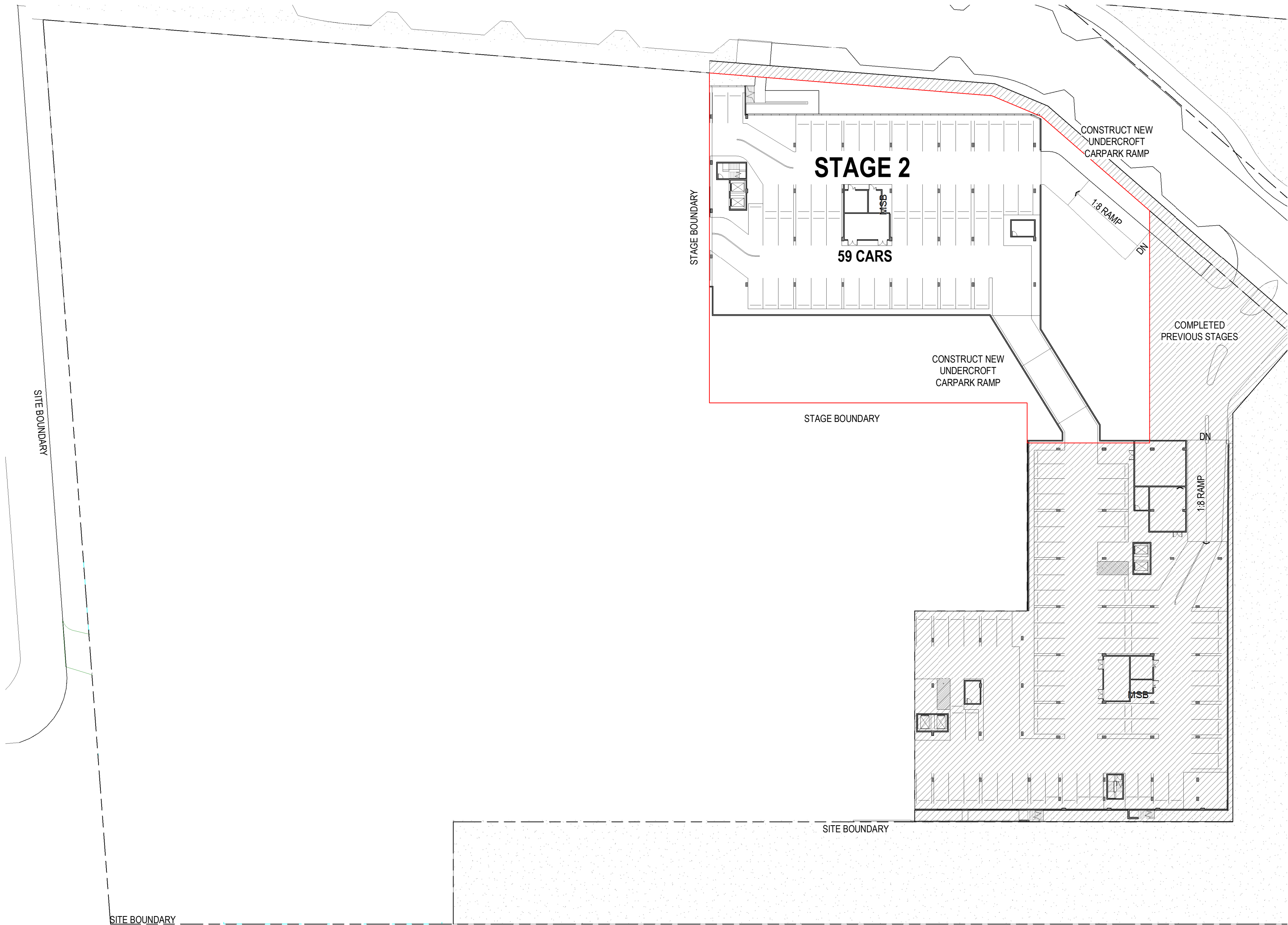




STAGING PLAN - UNDERCROFT STAGE 1

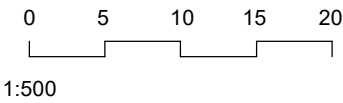
1 : 500





STAGING PLAN - UNDERCROFT STAGE 2

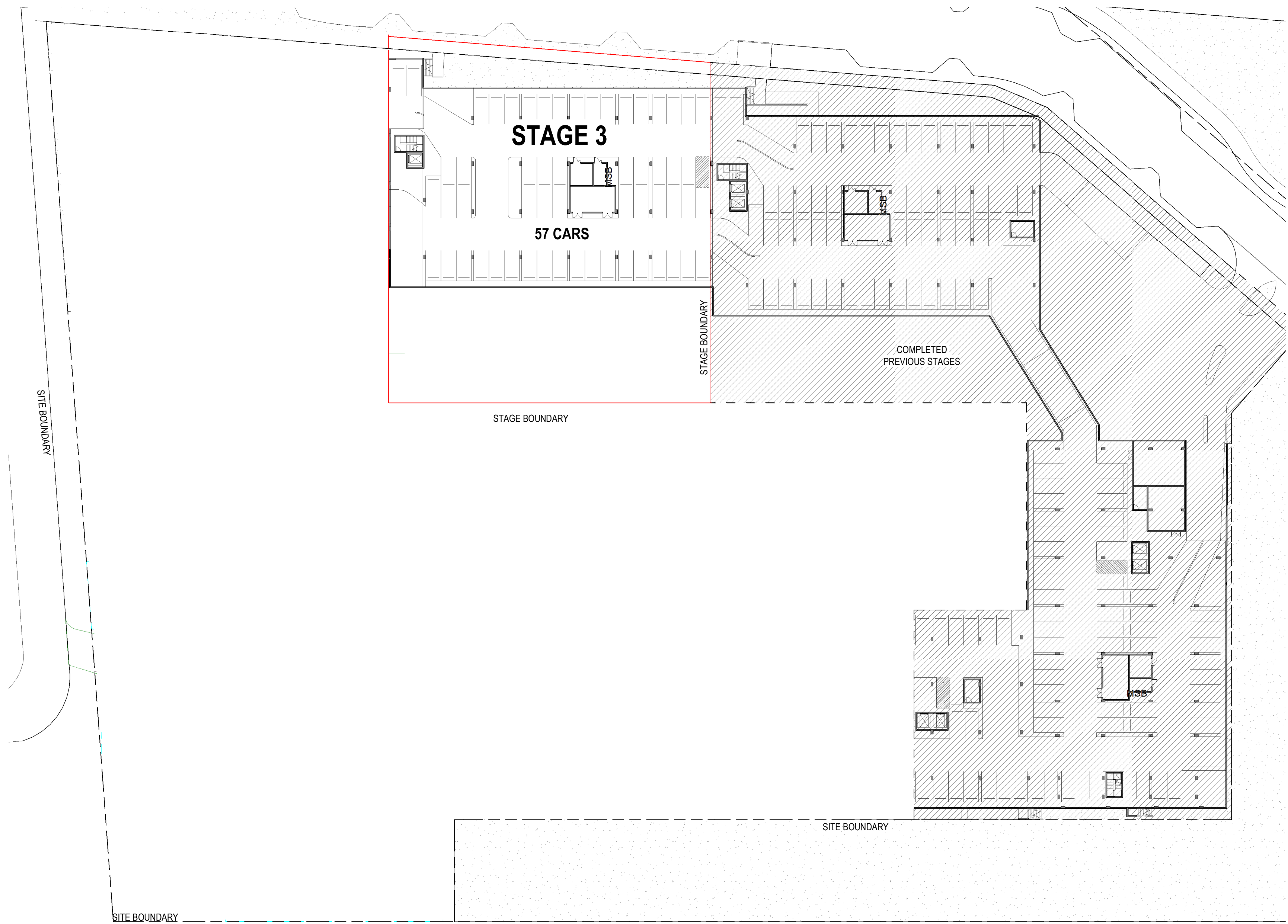
1 : 500



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:36 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - UNDERCROFT STAGE 3

1 : 500

BROWN
FALCONER

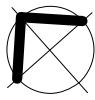
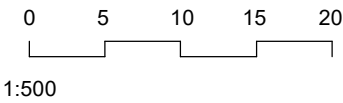
28 Chesser Street, Adelaide, South Australia 5000
Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

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RETIREMENT COMMUNITY

STAGING PLAN - UNDERCROFT
STAGE 3

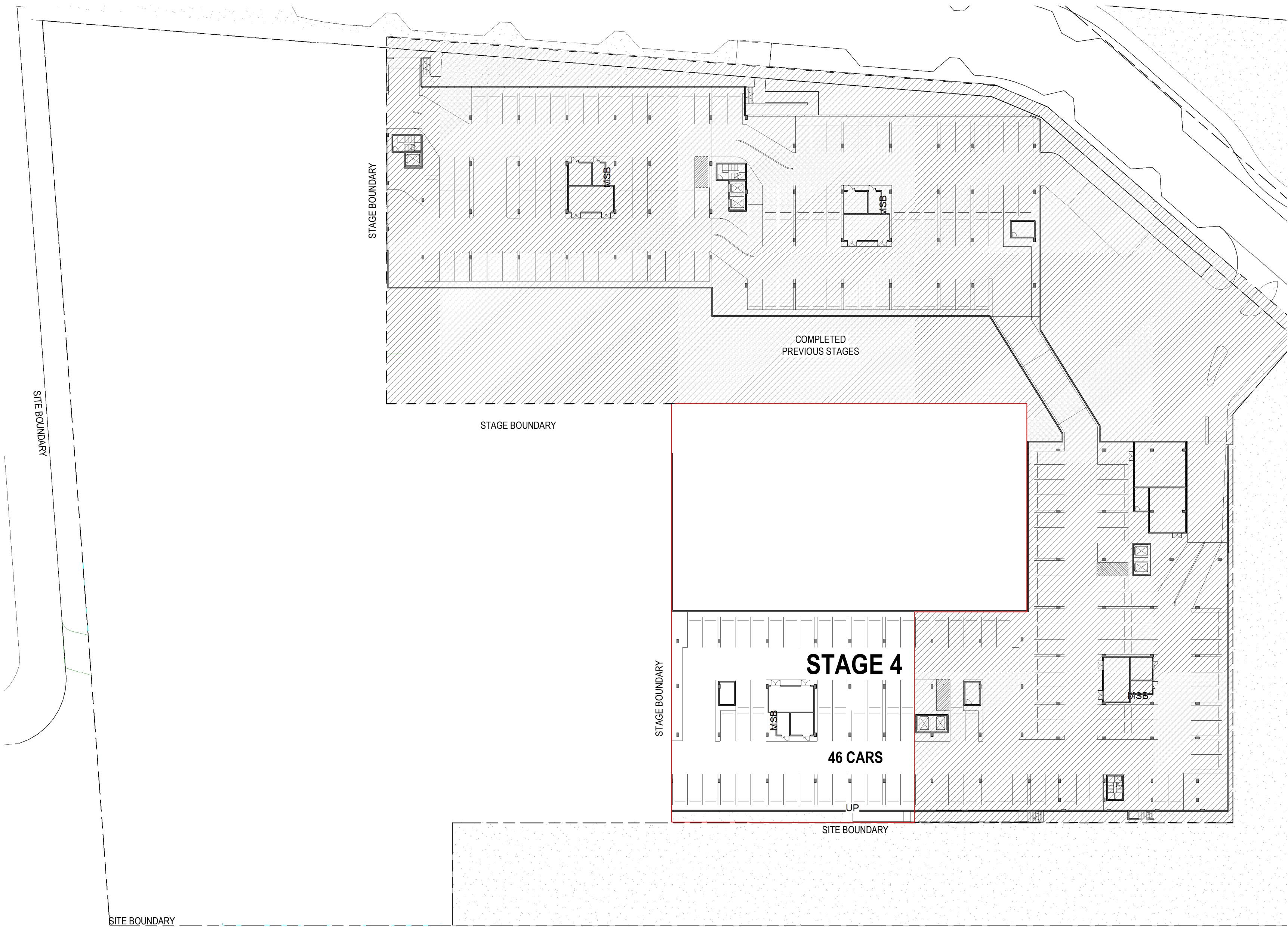
Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045
Dwg No. 3144 DA172 Rev: 4 A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:40 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - UNDERCROFT STAGE 4

1 : 500

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FALCONER**

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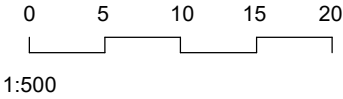
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - UNDERCROFT
STAGE 4

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. **3144 DA173** Rev: **4** A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:43 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - UNDERCROFT STAGE 5

1 : 500

**BROWN
FALCONER**

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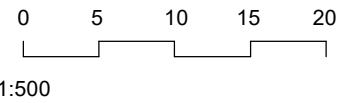
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - UNDERCROFT
STAGE 5

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

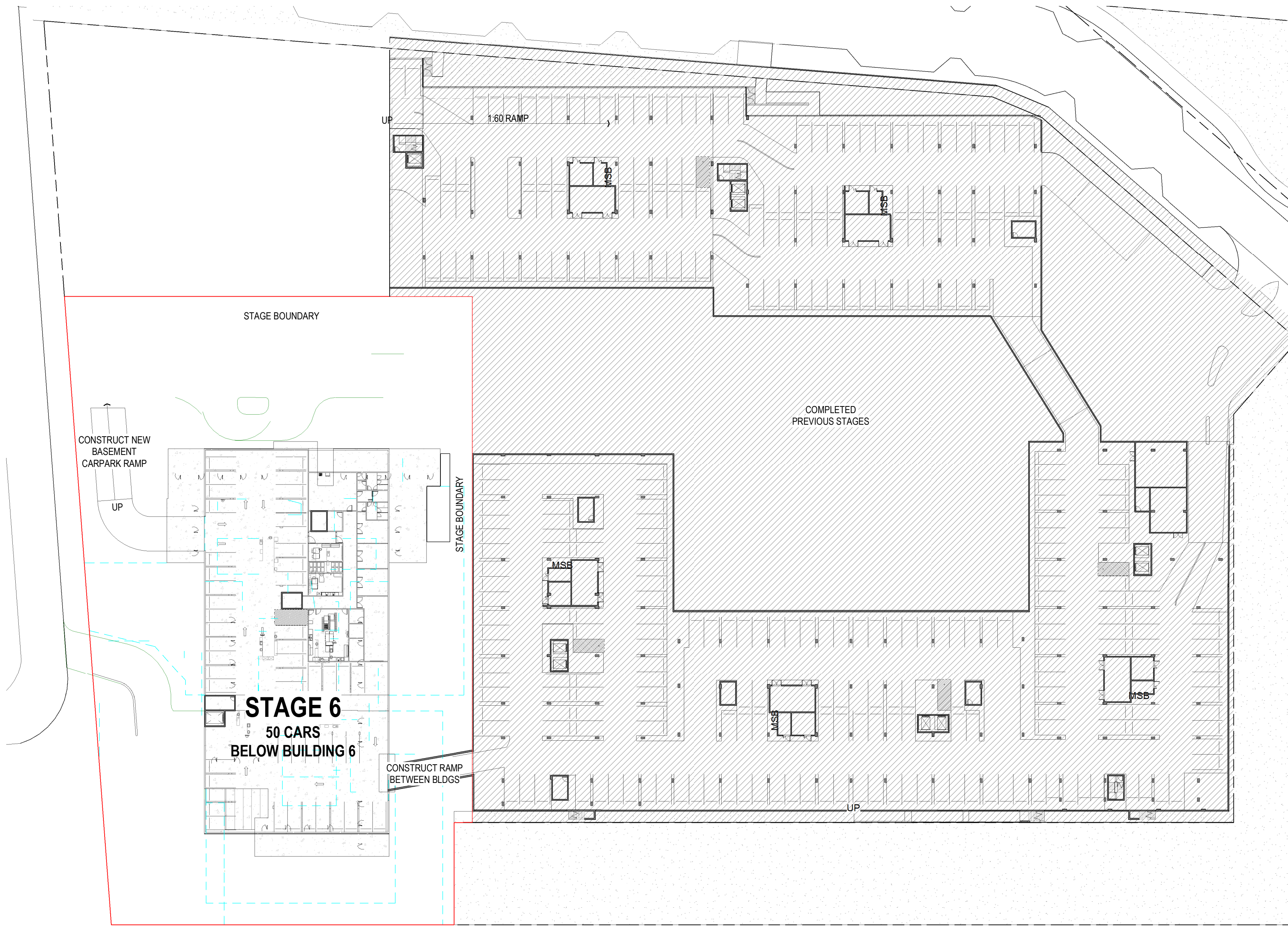
Dwg No. **3144 DA174** Rev: **4** A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:47 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - UNDERCROFT STAGE 6

1 : 500

**BROWN
FALCONER**

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Telephone : 08 8203 5800 Facsimile : 08 8223 2440
ABN 65 007 846 586 brownfalconer.com.au

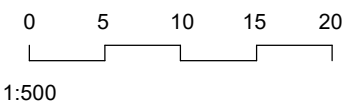
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - UNDERCROFT
STAGE 6

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. **3144 DA175** Rev: **4** A1 SHEET



DA ISSUE

ISSUED FOR DEVELOPMENT APPROVAL
12/12/2018 3:55:51 PM

Rev.	Amendment	Date
1	ISSUED FOR INFORMATION	28/09/18
2	ISSUED FOR INFORMATION	23/11/18
3	ISSUED FOR INFORMATION	30/11/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



STAGING PLAN - UNDERCROFT STAGE 7

1 : 500

**BROWN
FALCONER**

28 Chesser Street, Adelaide, South Australia 5000
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ABN 65 007 846 586 brownfalconer.com.au

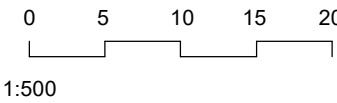
AVEO

ST CLAIR INTEGRATED
RETIREMENT COMMUNITY

STAGING PLAN - UNDERCROFT
STAGE 7

Scale 1 : 500
Drawn JS
Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA176 Rev: 4 A1 SHEET





ST CLAIR AVENUE ENTRY - BUILDING 1 + BUILDING 2



ENTRY - BUILDING 1



ST CLAIR AVENUE - BUILDING 1 + BUILDING 2 + BUILDING 3



ST CLAIR AVENUE + ACTIL AVENUE CORNER - BUILDING 7



ST CLAIR AVENUE + ACTIL AVENUE CORNER - BUILDING 7 + EXISTING CONTEXT



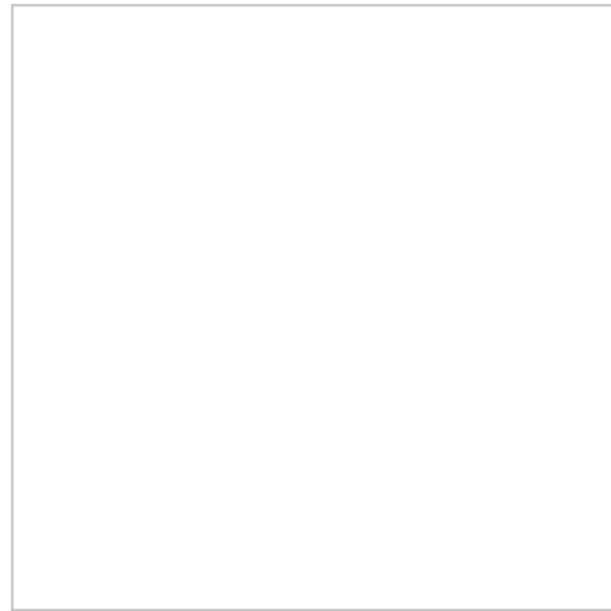
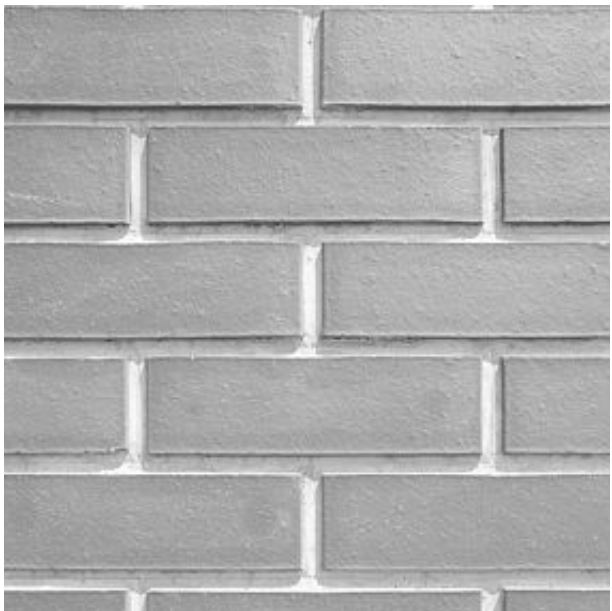
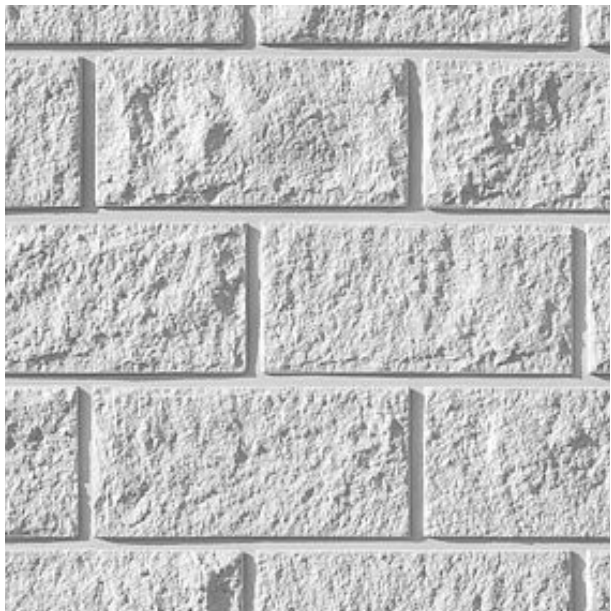
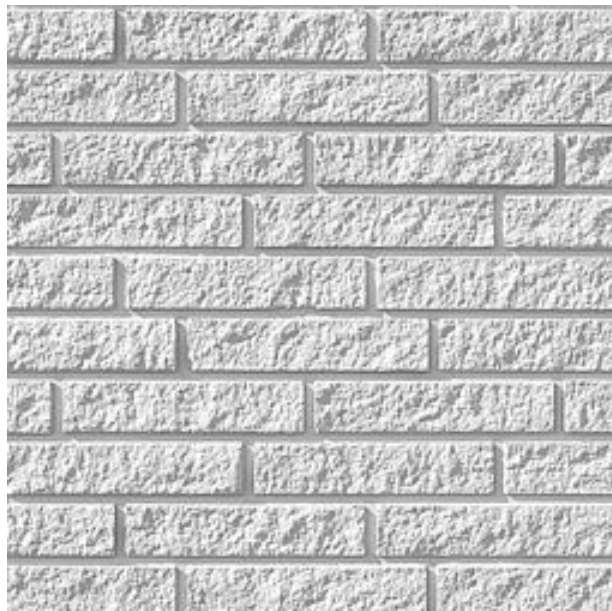
ST CLAIR AVENUE + ACTIL AVENUE CORNER - BUILDING 7 + EXISTING CONTEXT



① Brick snap faced precast concrete panels
Colour: Indicative range as pictured



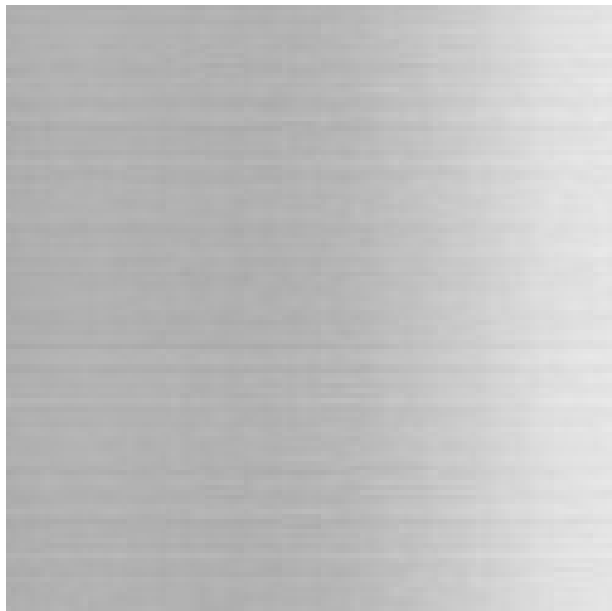
② Form liner patterned precast concrete panels
Colour: Concrete stain to match brick snap



③ Feature frame - precast concrete
Colour: White



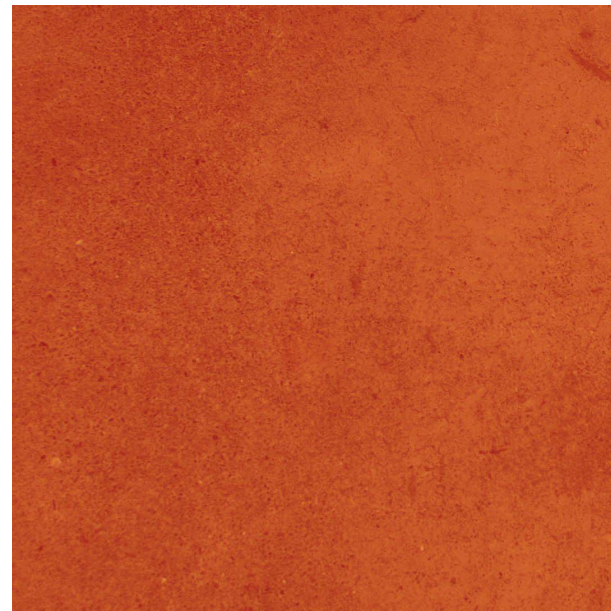
⑤ Precast concrete
Colour: Indicative range as pictured



④ Aluminium framed windows (openable) and sliding doors
Frame colour: Natural anodised / Charcoal anodised



⑥ Metal balustrade
Colour: Champagne tone anodised aluminium



⑧ Precast concrete garden wall / planter
Colour: Ochre



Louvre to undercroft carpark
Colour: Charcoal



SIGNAGE LOCATION PLAN

- ① TYPE 1: Entry feature signage to base of Porte Cochre
Refer to Signage package for details
- ② TYPE 2 EXAMPLE: Corner feature wall
Refer to Signage package for details
- ③ TYPE 3 EXAMPLE: Flag poles 5m total height at approx. 10m centres
Flag size 2m high x 0.75m wide
Refer to Signage package for details
- ④ TYPE 4 EXAMPLE: Illuminated 'AVEO' Signage
On walls of buildings (not roof). Refer to Signage package for details.
- ⑤ TYPE 5 EXAMPLE: Double sided pylon sign
Refer to Signage package for details
- ⑥ TYPE 6 EXAMPLE: Marketing banner signage
Refer to Signage package for details



STREETSCAPE ELEVATION - ST CLAIR AVENUE



SE ELEVATION : BUILDING 2



NW ELEVATION : BUILDING 7



SW ELEVATION : BUILDING 1

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Rev.	Amendment	Date
A	PRELIMINARY	02/10/18
1	PRELIMINARY	28/11/18
2	PRELIMINARY - REVISED BIN PRESENTATION AREA	29/11/18
3	PRELIMINARY - REVISED DA	05/12/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18

OVERALL BUILDING FOOTPRINT
AREA SCHEDULE

BUILDING - TOTAL	8957m ²
BEDS	144
BEDS to m ²	62.20m ²
OUTDOOR - TOTAL	1903m ²

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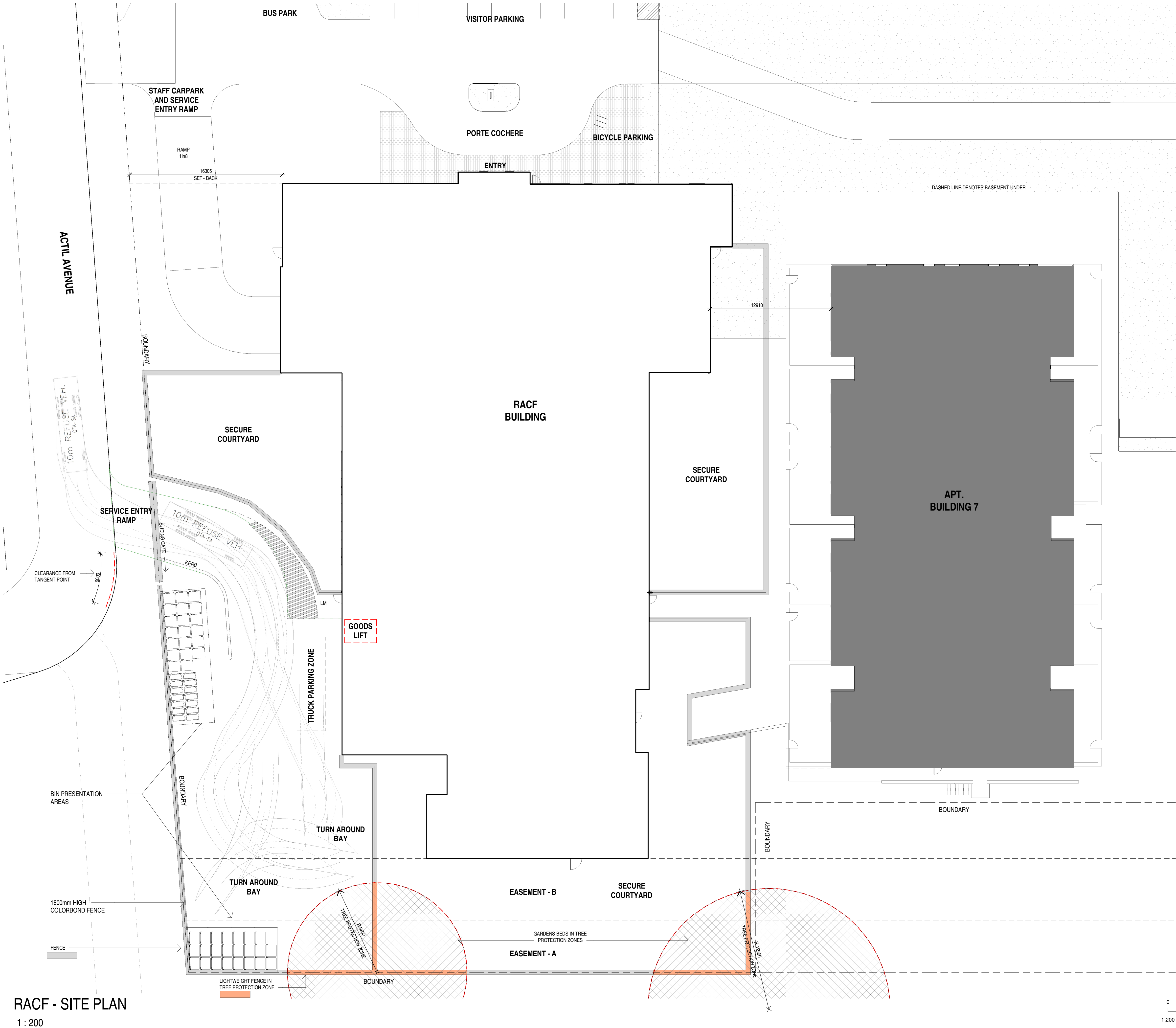
AVEO

AVEO, ST CLAIR

RACF SITE PLAN

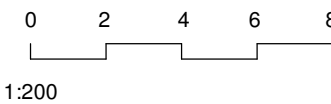
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Date 11/12/18
Job No. 2017045

Dwg No. 3144 DA200 Rev: 4 A1 SHEET



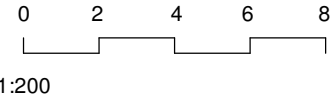
RACF - SITE PLAN

1 : 200



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AREA SCHEDULE		
CAR PARKS		50
TOTAL AREA		2173m²



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OVERALL BUILDING (G)	
FOOTPRINT AREA SCHEDULE	
GROUND FLOOR	2525m²
- TOTAL	
BEDS	36
BEDS to m²	70.1m²
OUTDOOR	1022m²

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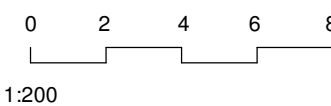
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RACF GROUND FLOOR PLAN

Scale 1 : 200
Drawn BB
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Job No. 2017045

Dwg No. 3144 DA202 Rev. 4 A1 SHEET



RACF GROUND FLOOR PLAN

1 : 200

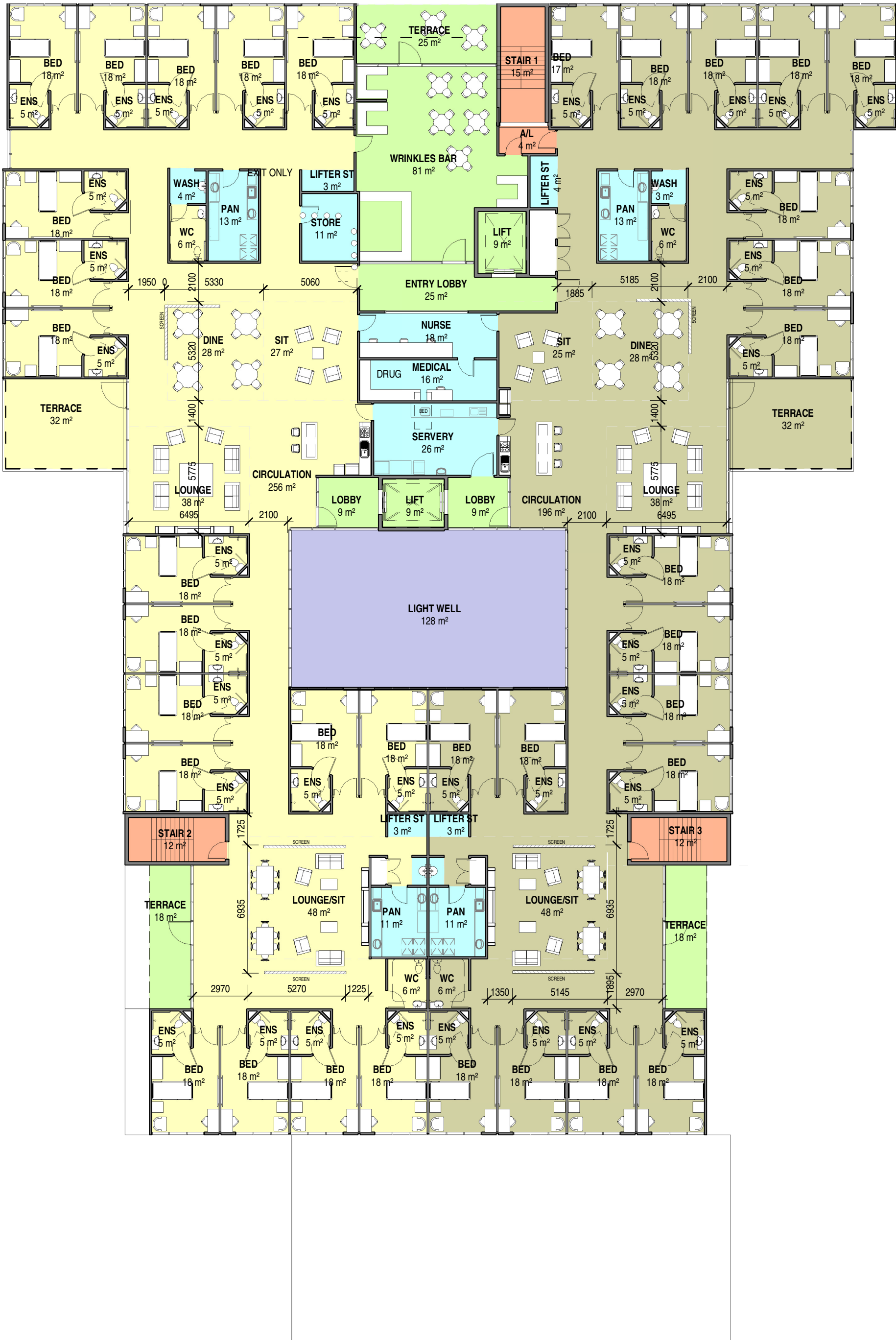
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4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



OVERALL BUILDING (L1)	
FOOTPRINT AREA SCHEDULE	
LEVEL 1	2058m²
- TOTAL	
BEDS	36
BEDS to m²	57.16m²
OUTDOOR	125m²

**LIGHT WELL NOT ACCOUNTED
FOR IN AREA TOTALS**

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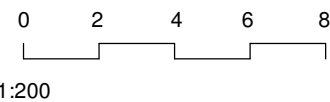
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RACF LEVEL 1 FLOOR PLAN

Scale 1 : 200
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Job No. 2017045

Dwg No. 3144 DA203 Rev: 4 A1 SHEET



LEVEL 1 FLOOR PLAN
1 : 200

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4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



OVERALL BUILDING (L2)	
FOOTPRINT AREA SCHEDULE	
LEVEL 2	2083m²
- TOTAL	
BEDS	36
BEDS to m²	57.86m²
OUTDOOR	100m²

LIGHT WELL NOT ACCOUNTED
FOR IN AREA TOTALS

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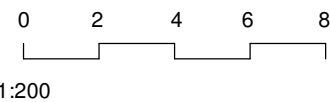
RACF LEVEL 2 FLOOR PLAN

LEVEL 2 FLOOR PLAN

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Scale 1 : 200
Drawn BB
Date 11/12/18
Job No. 2017045

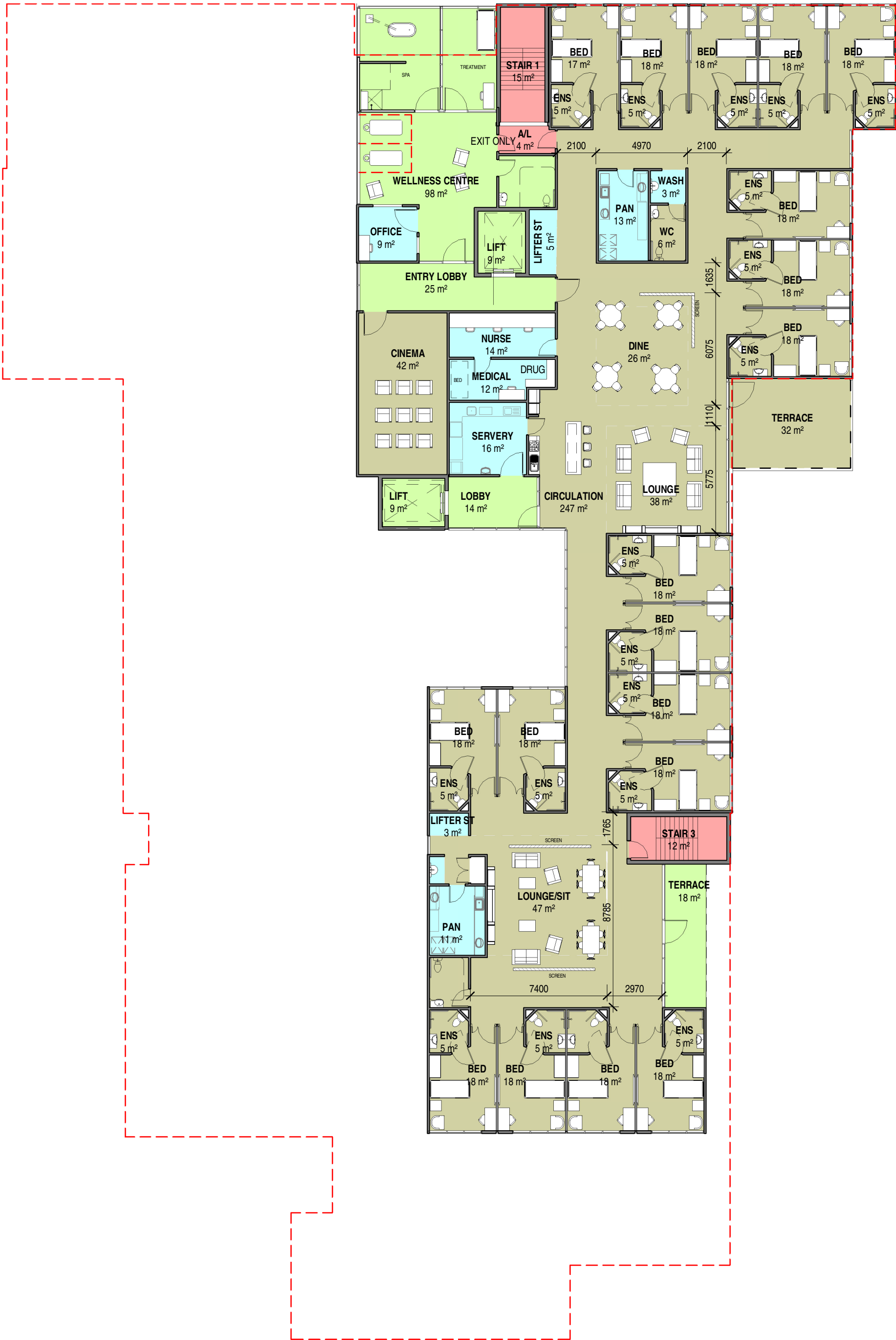
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A	PRELIMINARY	02/10/18
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2	PRELIMINARY	26/11/18
3	PRELIMINARY - REVISED DA	05/12/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



OVERALL BUILDING (L3)	
FOOTPRINT AREA SCHEDULE	
LEVEL 3	1158m ²
- TOTAL	
BEDS	18
BEDS to m ²	64.33m ²
OUTDOOR	50m ²

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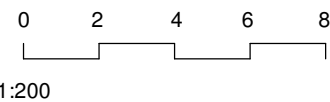
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RACF LEVEL 3 FLOOR PLAN

LEVEL 3 FLOOR PLAN

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Scale 1 : 200
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Date 11/12/18
Job No. 2017045

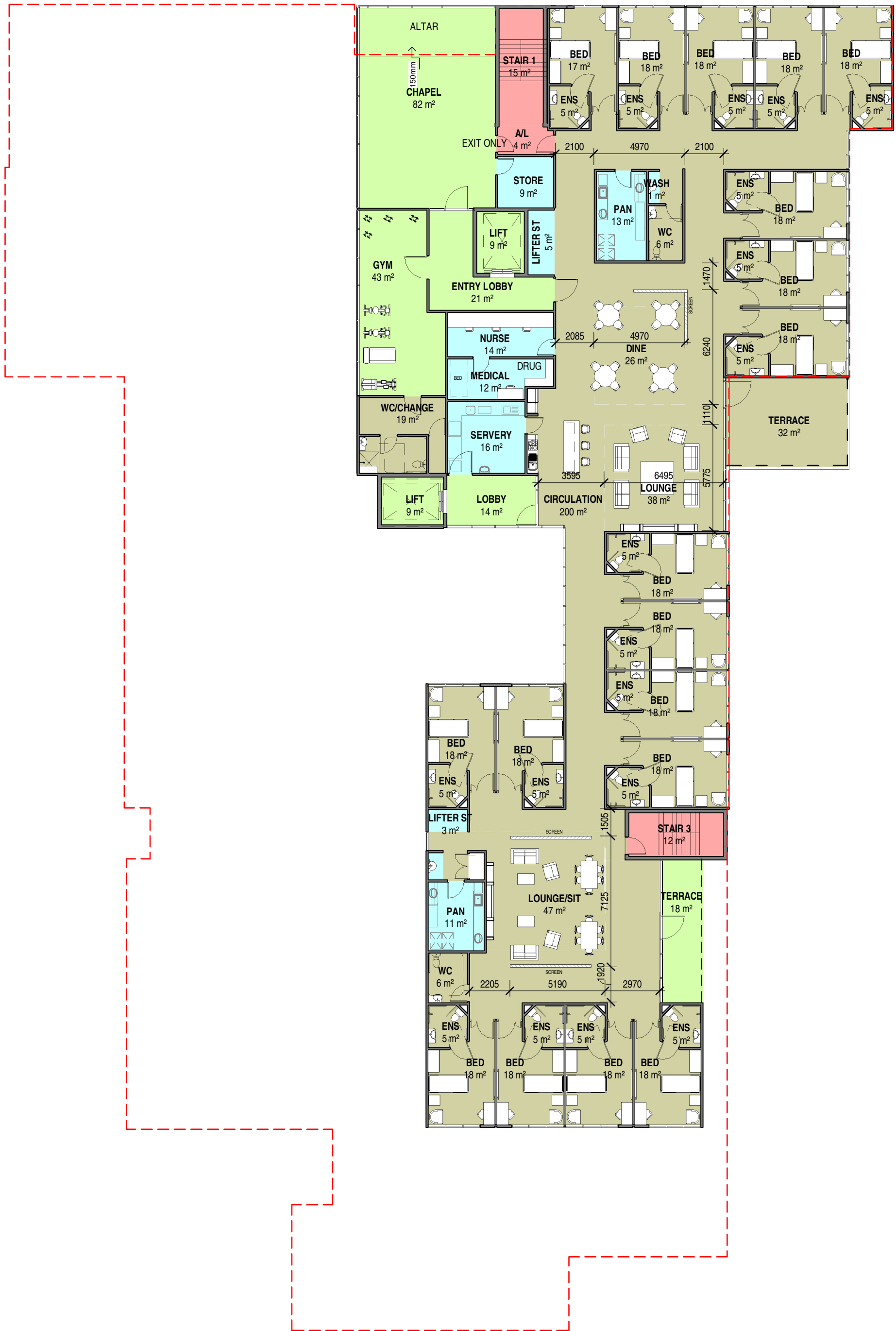
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A	PRELIMINARY	02/10/18
1	PRELIMINARY - REVISED PLANS	21/11/18
2	PRELIMINARY	26/11/18
3	PRELIMINARY - REVISED DA	05/12/18
4	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



OVERALL BUILDING (L4) FOOTPRINT AREA SCHEDULE	
LEVEL 4	1158m²
- TOTAL	
BEDS	18
BEDS to m²	64.33m²
OUTDOOR	50m²

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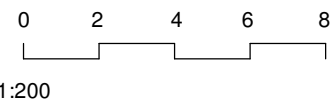
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RACF LEVEL 4 FLOOR PLAN

LEVEL 4 FLOOR PLAN
1 : 200



Scale	1 : 200
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Dwg No.	3144 DA206
Rev:	4
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1	ISSUED FOR PROVISIONAL DEVELOPMENT PLAN CONSENT	11/12/18



RACF NORTH EAST ELEVATION

1 : 200



RACF SOUTH WEST ELEVATION

1 : 200



RACF NORTH WEST ELEVATION

1 : 200



RACF SOUTH EAST ELEVATION

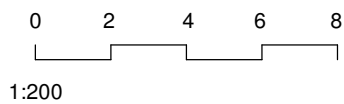
1 : 200

MATERIALS AND FINISHES PALETTE



Building 6 - Reference Elevation

- ① Brick snap faced precast concrete panels
Colour: Warm mid grey
- ② Form liner patterned precast concrete panels
Colour: Sand colour concrete stain
- ③ Feature frame - precast concrete
Colour: White
- ④ Aluminium framed windows (openable) and sliding doors
Frame colour: Natural anodised / Charcoal
- ⑤ Precast concrete
Finished: Sand colour concrete stain
- ⑥ Metal balustrade
Colour: Champagne tone anodised aluminium
- ⑦ Courtyard privacy screen
Colour: Champagne tone anodised aluminium
- ⑧ Precast concrete feature wall / garden wall / planter
Colour: Ochre
- ⑨ Blade entry feature
Colour: Ochre



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RACF ELEVATIONS

Scale 1 : 200

Drawn BB

Date 09/05/17

Job No. 2017045

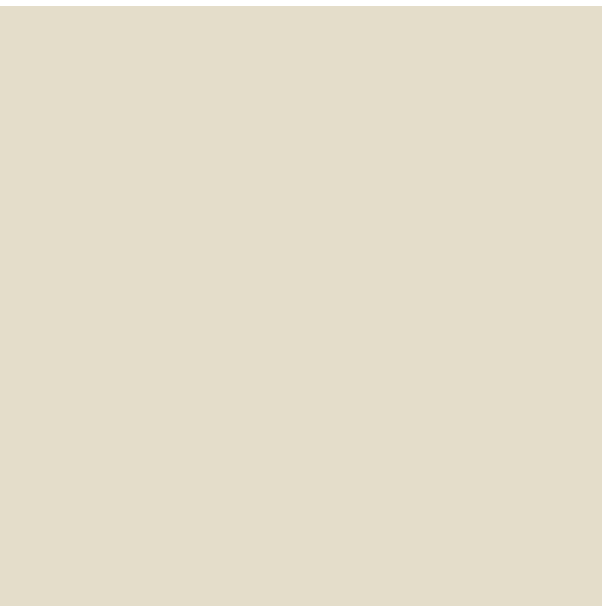
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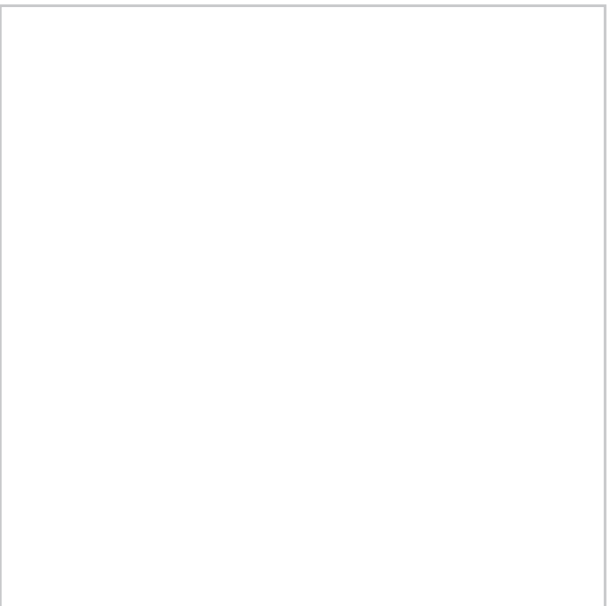
1 Brick snap faced precast concrete panels
Colour: Indicative range as pictured



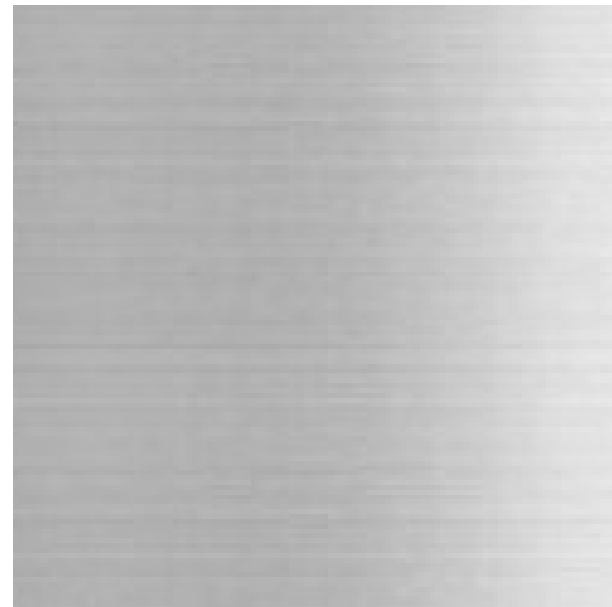
2 Form liner patterned precast concrete panels
Colour: Sand colour concrete stain



5 Precast concrete
Colour: Sand colour concrete stain



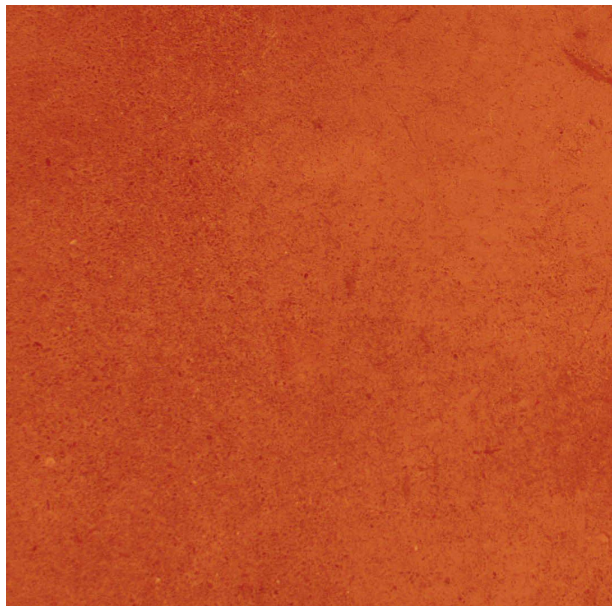
3 Feature frame - precast concrete
Colour: White



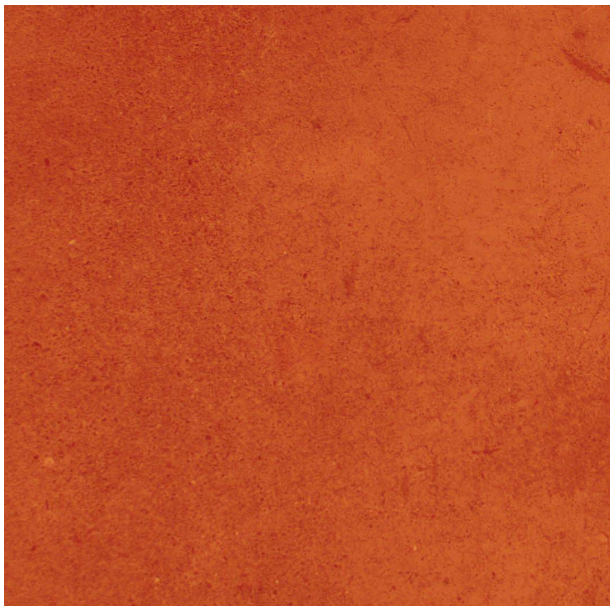
4 Aluminium framed windows (openable) and sliding doors
Frame colour: Natural anodised / Charcoal anodised



6 Metal balustrade
Colour: Champagne tone anodised aluminium
7 Courtyard privacy screen or Plant screen 1.8m high
Colour: Champagne tone anodised aluminium



8 Precast concrete feature wall / garden wall / planter
Colour: Ochre



8 Blade entry frame
Colour: Ochre

Aveo St Clair

Integrated Retirement Community

Design Approach

December 2018

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A place that takes care of you

We are all connected

A place with many opportunities to connect and feel part of something bigger; in harmony with the natural environment

Freedom to live the way you choose

Celebrate independence within a supported village environment; relaxed and secure

A vibrant community

Designed for people; supports an active, stimulating and social way of life; a dynamic and flexible place

Design Approach

An individual within a family within a community

Each apartment is home to the individual or individuals

The collection of apartments (individuals) make up the collage of the building (family)

The collection of buildings (families) generate the layered and rich composition of the community

This is achieved through subtle shifts in material tone and texture.

Responsive to views, privacy and solar orientation

Individual expression of apartments is strengthened as the facade responds to:

_Open up to views / Screen from less desirable views

_Provide privacy to courtyard orientation or apartments nearer to each other

_Screen apartment glazing where openings are exposed to large heat loads

Provide inviting spaces to connect

The spaces between buildings, where people circulate horizontally and vertically, are the places where residents will often cross paths

These 'collision zones' are opportunities to meet your neighbours and for impromptu conversations

Providing a desirable setting to extend these interactions will support the growth of a connected and sustaining community

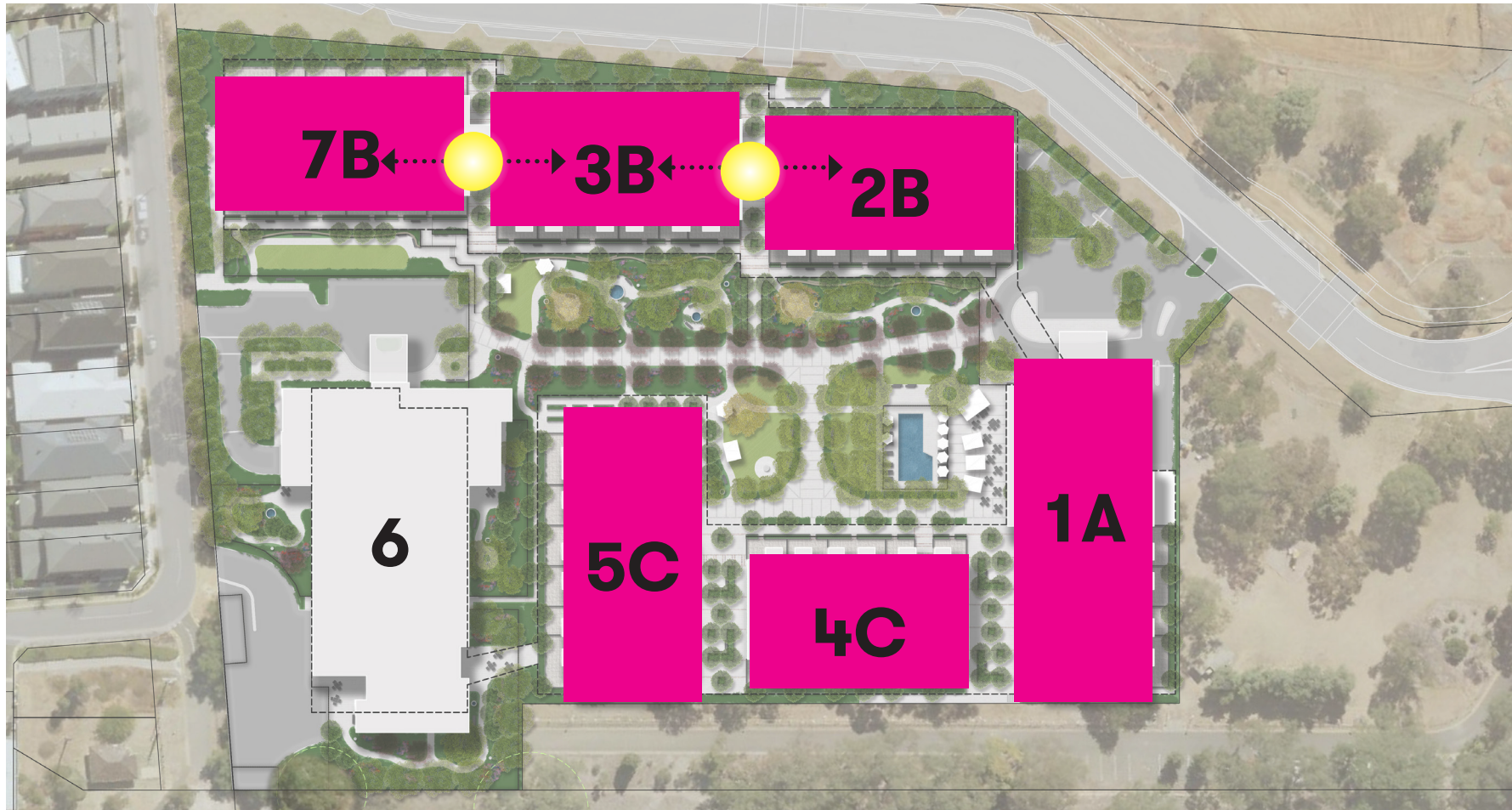
Each collision zones (links between buildings 2, 3 + 7) will be identifiable through unique ground surface material and landscaping

Design Approach A, B + C

Building 1 - Design Approach A responds to the ground level common and commercial program delivering a contemporary and sophisticated style and palette.

Building 2, 3 + 7 - Design Approach B responds to the premium views and favourable solar orientation with fine facade articulation and a warm and varying colour palette.

Building 4 + 5 - Design Approach C responds to the increased desire for privacy and less favourable solar orientation with more solid facade elements and a warm and varying colour palette.





AVEO ST CLAIR
INTEGRATED RETIREMENT
COMMUNITY
LANDSCAPE MASTER PLAN

Prepared for AVEO



GREENHILL



GREENHILL

Contact
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PO Box 134, Rundle Mall SA 5000

Reference	17-1574
Prepared by	Rhea Barnett
Reviewed by	AP
Revision	C
Revision Date	11.12.2018

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INTRODUCTION

Aveo St Clair is a new Integrated Retirement Community which will house approximately 341 apartments across 6 apartment buildings, and a Residential Aged Care Facility accommodating 144 beds. The landscape treatment proposed aims to enhance and connect the buildings with attractive spaces, with ease of movement and a variety of amenities for residents to enjoy.



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AVEO ST CLAIR

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MOVEMENT AND WAYFINDING

Pathways
Footpath connections will be accessible for all.
A main pedestrian walkway runs centrally through the development which also serves to accommodate access for fire trucks and other emergency vehicles.

Furniture
Seating with back and arms rests to be frequently spaced to allow rest and reflection throughout all landscape areas.

Wayfinding and Signage
Wayfinding will be included in key locations for ease of navigation throughout the development for both residents and visitors. Intent to limit physical signage will be explored by making characterised nodes using colour themes for planting and material selections.

Connection to Railway Station
Access to the railway station is proposed to be through pedestrian gates along the southern boundary.



LEGEND

Main vehicle entry

Vehicle ramp down to basement car park

Minor entry

Major pedestrian entry

Minor building entry

Ground floor emergency building entry

Gate

Private courtyard gate

Fire truck / ambulance vehicle access route

Pedestrian ramp with handrail



FENCING AND SCREENING

Fencing and screening solutions to areas throughout the development have been chosen to reflect the varying requirements of privacy, security and aesthetics. Anti-graffiti coatings will be used where required.

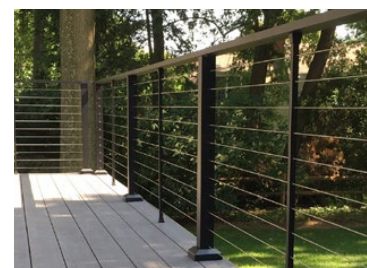
ENTRY

- 1.8m high open style fence
- - - - - 1.8m high sliding gate in open style fence

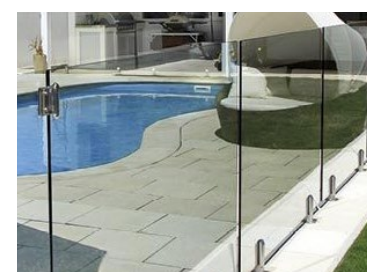


COURTYARDS AND CENTRAL GARDEN

- 1m high open style fence fixed to 1m high raised planters
- Gate located at courtyard entry
- 1m high handrail in open style fence
- 1.8m high anodised aluminium privacy screen in a champagne tone



- Pool fence
- Fence to be inline with AS1926.1 - Safety Barriers for Swimming pools



RACF

- 2.4m high colourbond solid fence in 'Woodland Grey'
- 1.8m high colourbond fence in 'Woodland Grey'
- - - - - 1.8m high sliding gate in colourbond 'Woodland Grey'
- Tree protection zone
- Lightweight solid fence in tree protection zones



LANDSCAPE MASTER PLAN ZONES

The landscape throughout the development will combine the characteristics of a structured garden with sweeping curves and edges to allow ease of movement and interest. Open spaces and planted areas will be designed to allow viewing from ground level and apartment balconies.

Key landscape zones have been identified for the development; these include:

1. St Clair Avenue Street Frontage

Landscape treatments to create a buffer from street interface and create amenity for adjacent apartments.

2. St Clair Street Frontage and Primary Entry

Feature planting to create a sense of arrival, and a main point of entry
Tree planting to create shade for car parking area
Seating zones for drop off/pick up

3. Actil Avenue South Frontage and Secondary Entry

Feature, low maintenance planting to create point of entry

4. Boundary Treatment

Screening and softening where possible to create buffer from railway corridor

5. Central Garden

Landscape treatment to create amenity and activity zones for the residents.
Emergency access and car parking

6. Enclosed Dementia Sensory Garden

Areas designated for people within Building 6. Gardens are enclosed for safety.

7. Private Residential Courtyards

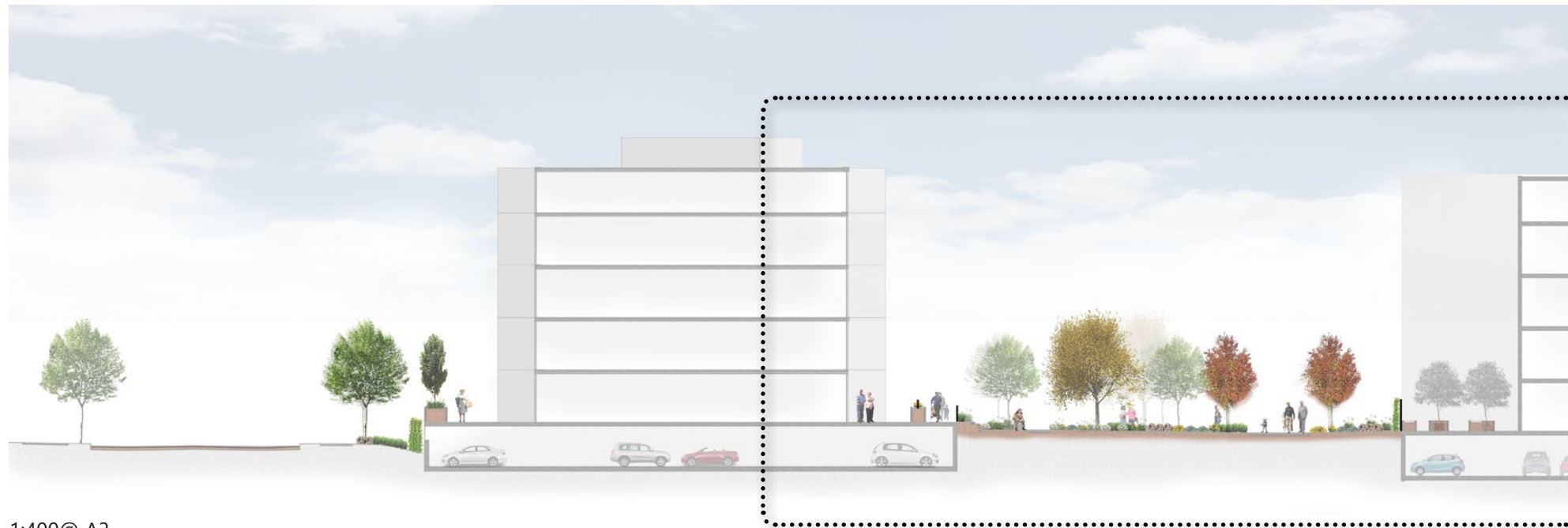
Private outdoor spaces for residents

E. Entry

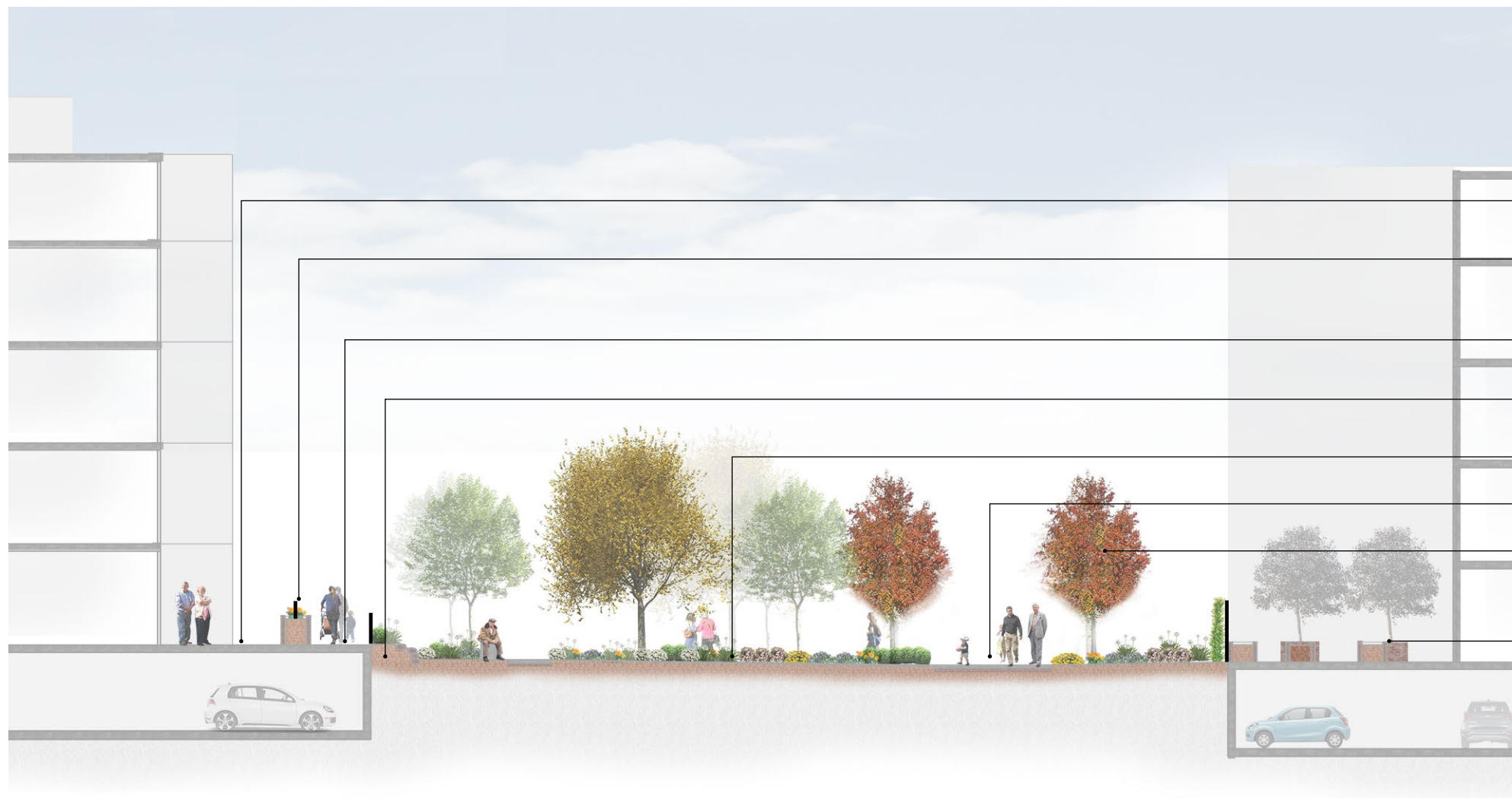
Main entry points to the development



INDICATIVE SECTION A



1:400@ A3



1:200@ A3

- Residential courtyards
- Raised planter box with central fencing/ screen to divide public and private space
- Public walkway with handrail along edge
- Raised garden bed with rock retaining edge
- Sensory garden
- Pedestrian walkway / emergency access
- Tree avenue. Trees to be planted offset to pathway and species selected to ensure firetruck access to pedestrian walkway
- Vegetable garden with screen



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1. ST CLAIR AVENUE STREET FRONTAGE

Key features will include:

- Combination of tree and shrub planting along streetscape to create a buffer between building and street edge and create amenity for adjacent apartments
- Selection of feature trees and shrubs to create impact and compliment the building forms
- Selection of trees and shrubs to be hardy, drought tolerant species
- Pedestrian access to buildings 2,3 and 7
- Incorporation of planter boxes, seating along building edge to create amenity and more intimate spaces for residents in buildings 2,3 and 7 in key locations
- Trees to be selected which allow views from courtyard apartments into playing fields
- Flag pole signage along St Clair Avenue





2. ST CLAIR AVENUE FRONTAGE, PRIMARY ENTRY

Key features will include:

- Combination of tree and shrub planting along streetscape to create a buffer between buildings and street edge, create shade and amenity
- Selection of feature trees and shrubs to create impact and a point of entry
- Selection of trees and shrubs to be hardy, drought tolerant species
- Pedestrian and vehicular access
- Main Aveo entry statement/signage
- Elements of wayfinding to direct residents and visitors
- Seating areas for residents drop off/pick up



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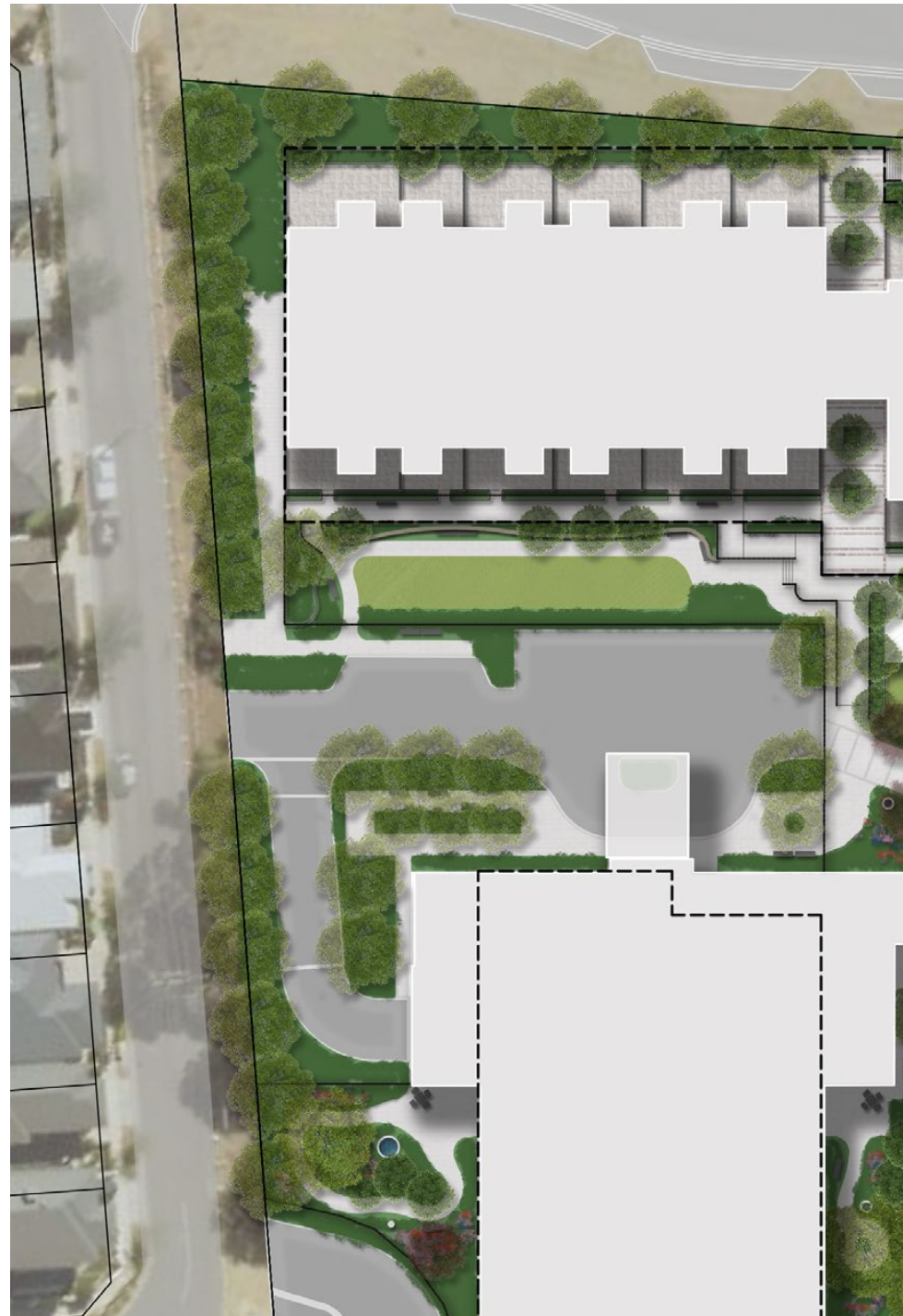
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3. ACTIL AVENUE SOUTH FRONTAGE, SECONDARY ENTRY

Key features will include:

- Combination of tree and shrub planting along streetscape to create a buffer between buildings/open space and street edge
- Selection of feature and trees and shrubs to create impact at the entry point and compliment the building forms
- Selection of trees and shrubs to be hardy, drought tolerant species
- Pedestrian and vehicular access
- Aveo entry statement/signage
- Elements of wayfinding to direct residents and visitors



4. BOUNDARY TREATMENT

Key features will include:

- Combination of tree and shrub planting to create a buffer between building and street edge and rail corridor where possible
- Small trees in raised planters
- Selection of small trees and shrubs to create impact and compliment the building forms
- Selection of small trees and shrubs to be hardy, drought tolerant species
- Pedestrian access to railway station



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5. CENTRAL GARDEN

- Feature garden spaces include:
- A. Grassed multi-function area
 - B. Sensory Garden
 - C. Pool and entertainment area
 - D. Family barbecue area
 - E. Vegetable garden





5A. GRASSED MULTI-FUNCTION AREA

- Key features will include:
- Open grassed area for petanque and bocce
 - Seating - Combination of fixed and loose seating to allow for flexibility of space
 - Planting along southern edge to screen from car park area



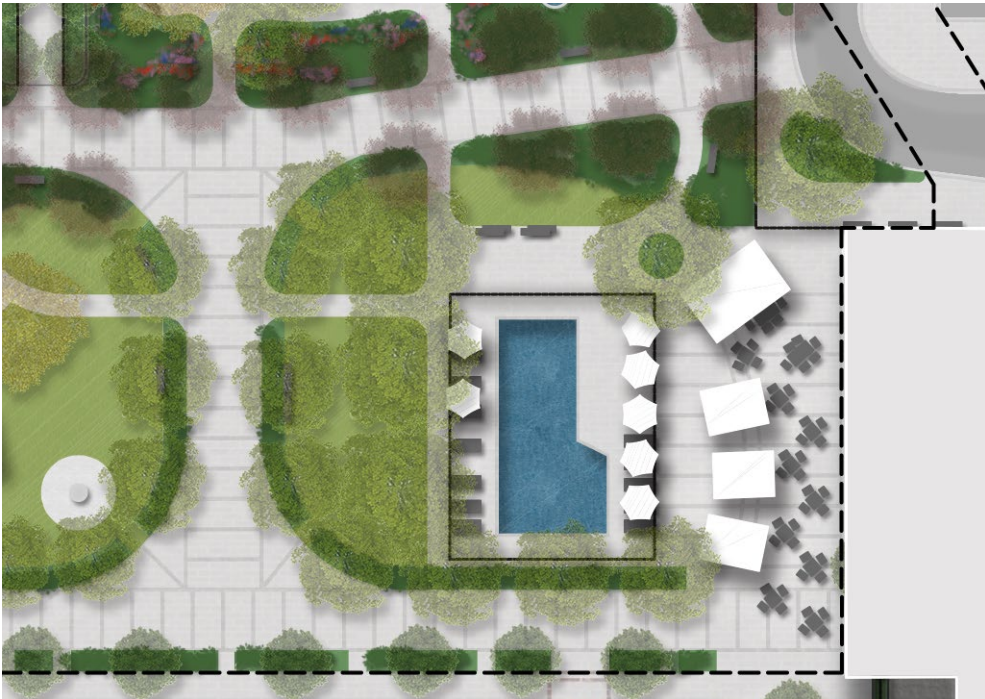


5B. SENSORY GARDEN

A feature space within the central zone which includes sensory plants is proposed. The sensory garden will benefit all residents, it has also been proven to assist with those suffering from memory loss by including plants which commonly have memories associated with them.

- Key features will include:
- Planting - a mixture of plants with sensory elements such as touch and smell, plants of different heights will be layered together for visual interest.
 - Raised garden beds - allows residence to interact plants at a more user friendly height.
 - Water feature - centrally located to create ambiance within the garden.
 - Arbor structure with creeping plants to create shade and a vertical feature element
 - Seating nooks will allow residents a more intimate and contemplative seating area - combination of fixed and loose seating to allow flexibility for residents
 - Pathways - looping curved pathways to allow residents to access all areas of the garden.



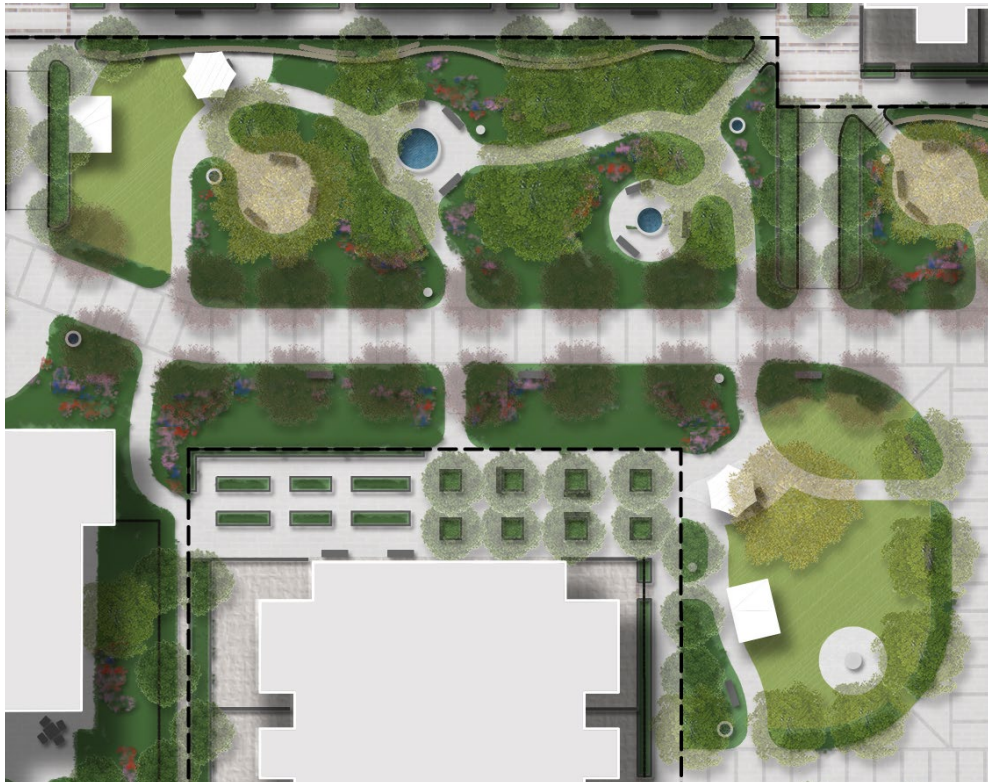


5C. POOL AND COMMUNITY AREA

A swimming pool is proposed to support healthy lifestyle and provide a node for social interaction. The pool area will have sufficient safety barriers and access as required by the Swimming Pools Safety Act.

- Key features of this area will include:
- Swimming pool with adjacent open area to allow ease of access and movement around pool, loose seating, potential umbrellas to create shade and amenity
 - Hard paved/concrete surfaces to allow ease of access
 - Tree planting to provide shade and amenity
 - Seating - combination of fixed and loose seating and tables to allow flexibility of space
 - Shelter structures - bespoke shelters with barbecues to compliment building forms and allow for a main outdoor gathering space for residents
 - Outdoor dining area adjacent building 1





5D. FAMILY BARBECUE AREAS

- Key features include:
- Bespoke small scale shelter with barbecue for family gatherings
 - Hard paved/concrete surfaces to allow ease of access
 - Tree planting to provide shade and amenity
 - Section of lawn to soften space
 - Combination of fixed and loose seating to allow for flexibility of space





5E. VEGETABLE GARDEN

A community vegetable garden will provide residents opportunity to grow their own food and produce. Community gardens are known to support social interactions, knowledge sharing and healthy lifestyles.

Key features will include:

- Raised garden beds to allow ease of access for residents
- Selection of herbs, vegetables and citrus trees
- Small seating area
- Storage box for tools

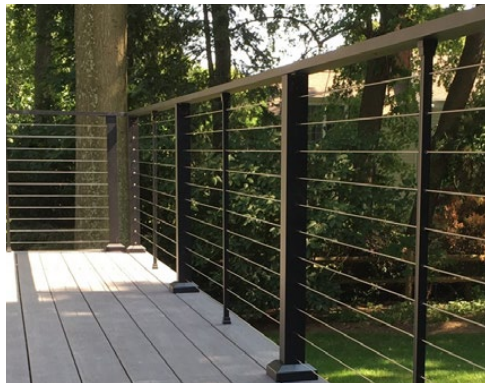
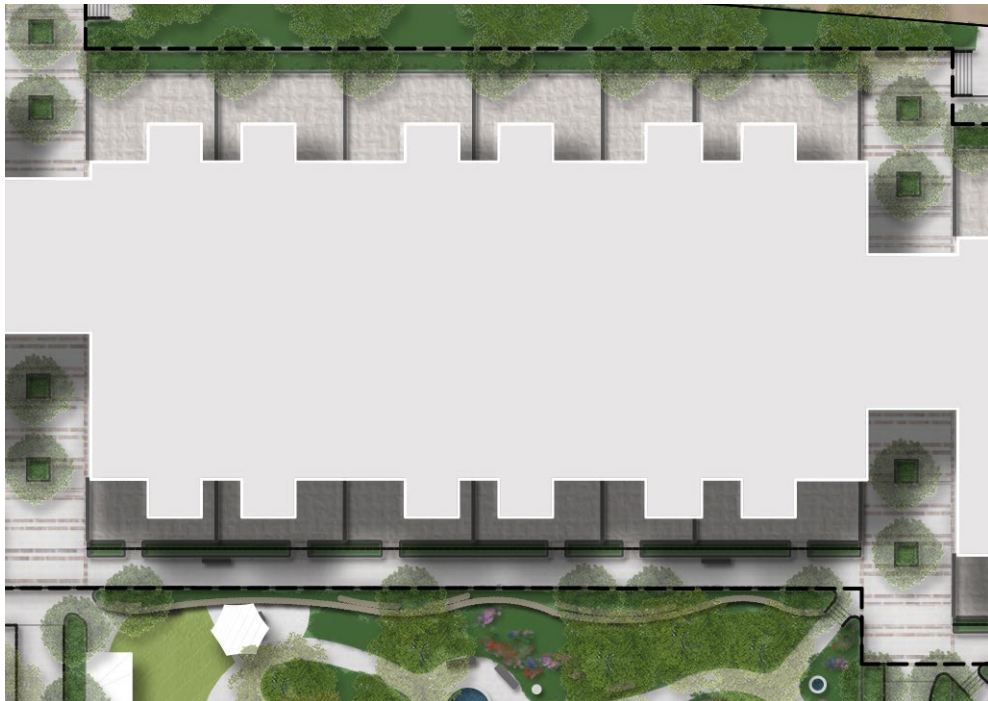




6. ENCLOSED DEMENTIA SENSORY GARDEN

Connectd to the RACF building three enclosed sensory garden spaces will provide a safe and familiar experience for patients with dementia. Key features will include:

- High fence to provide a fully enclosed garden space.
- Planting - a mixture of plants with sensory elements such as touch and smell, plants of different heights will be layered together for visual interest.
- Raised garden beds - allows residence to interact plants at a more user friendly height.
- Water feature - at key locatations to create ambiance within the garden.
- Arbor structure with creeping plants to create shade and a vertical feature element
- Seating nooks will allow residents a more intimate and contemplative seating area - combination of fixed and loose seating to allow flexibility for residents
- Pathways - looping curved pathways to allow residents to access all areas of the garden.



7. PRIVATE RESIDENTIAL COURTYARDS

This transition zone between the private residential and public walkway/emergency access include:

- Combination of low brick walls and planter boxes with fencing to create a defined boundary to the private courtyards
- Courtyards to the perimeter of the development are larger with raised planter beds along the perimeter. Small trees to be included in planter beds.
- Courtyards facing inwards to the central garden and other apartment buildings to include with raised planter beds and transparent fence/screens to give privacy to residents. Pedestrian entry with a gate to be included for each courtyard.
- Combination of fixed and loose seating to allow for flexibility of space



PROJECT
AVEO ST CLAIR

SCALE
NTS

DRAWING
17-1574-SK017

PROJECT
17-1574

REV.
C

DATE
11.12.18

PLANTING PALETTE

LARGE / MEDIUM TREES



Platanus Insularis
Common Name: Plane Tree
Mature size (h x w): 15 x 10m
Deciduous



Cupaniopsis anacardioides
'Tuckeroo'
Mature size (h x w): 7-10 x 6-7m
Evergreen



Eucalyptus sideroxylon
Mature size (h x w): 20 x 10m
Evergreen



Pyrus calleryana 'Winter Glow'
Common name: Ornamental Pear
Mature size (h x w): 10 x 5m
Deciduous

SMALL TREES



Hymenosporum flavum 'Native Frangipani'
Mature size (h x w): 8 x 3m
Evergreen



Magnolia grandifolia 'Teddy Bear'
Common name: Magnolia
Mature size (h x w): 4 x 3m
Evergreen



Prunus cerasifera nigra
Common Name: Flowering Plum
Mature size (h x w): 6 x 4m
Deciduous



Cercis canadensis 'Forest Pansy'
Mature size (h x w): 5 x 5m
Deciduous



Lagerstroemia indica 'Sioux'
Mature size (h x w): 4 x 3m
Evergreen



Lagerstroemia indica 'Natchez'
Mature size (h x w): 8 x 6m
Deciduous



Cupressus sempervirens
Common name: Pencil Pine
Mature size (h x w): 15 x 1m

GARDEN DESIGN

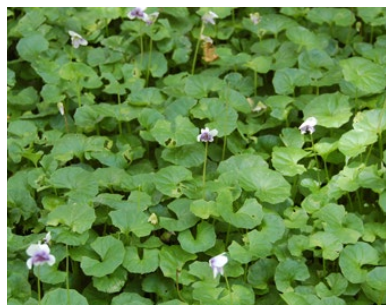


A formal Mediterranean garden will provide the overarching characteristic to the landscape spaces. A carefully considered plant palette will provide familiarity, colour and seasonal change for the residents aiming to evoke memories and appreciation for the landscape. As well as visual appearance, drought tolerance, feel and maintenance of the plants will be considered. Special consideration will be given to the maintenance of plantings, no sharp and thorny plants to touch will not be used near walkways, as will plants that drop leaves and berries to prevent slipping.



Turf areas included in social and community destinations of the central garden zone

X



PLANTING PALETTE

The planting palette will reflect they types of plants the residence would be likely to have in their own gardens. Plants will be well known and loved such as lavender, daisies and box hedges.

MATERIALS AND FURNITURE

PATHWAYS



Exposed aggregate concrete



Feature paving bands within concrete



Stairs with handrails



Ramps with handrails

STRUCTURES



Pergola or arbor structure



Pergola or arbor structure

FURNITURE



Timber seating with high back and arm rests.

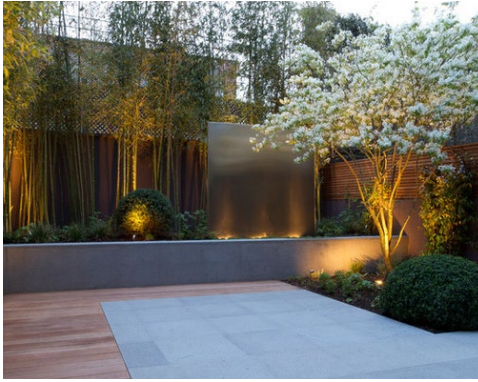


Loose seating and tables in entertaining spaces for flexibility

LIGHTING



Pathways lighting



Up lighting to highlight trees and sculptures within courtyards

GARDEN ELEMENTS



Sculptural elements



Raised planting beds



Bird bath



Water feature



Water feature

WAYFINDING SIGNAGE



TREE REPORT

Tree Survey: AVEO St Clair Integrated Retirement Community

Prepared for:

Rebecca Grundy
Development Manager
AVEO
Level 2
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Wayville SA 5034

10 December 2018

Prepared by:

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ABN 755 2046 6731

Tree Survey

AVEO St Clair Integrated Retirement Community

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Tree Survey

AVEO St Clair Integrated Retirement Community

Summary

Tree Environs carried out a survey of 32 trees at Lot 1000 Woodville Rd, St Clair on the 10th August 2018. 15 trees qualify as regulated trees and another 10 qualify as significant trees. 21 trees are locally indigenous *Eucalyptus camaldulensis*, all of which have been planted at the site. The remaining 11 surveyed trees are Australian natives or exotic ornamentals. The majority of trees are in average to good health. Four trees are in below average or poor health and have a short life expectancy (trees 20, 21, 24 and 39). The majority of trees have average to good structure. Two trees have a poor structure and pose a moderate risk to the future users of the site (trees 20 and 37). Two regulated trees (trees 21 and 24) and one significant tree (tree 20) are recommended to be removed based on tree condition. Trees 1-19 and 34-39 will be transferred to the City of Charles Sturt as public open space trees. Some of these trees should be managed to mitigate tree risk or health issues. None of these trees will be affected by the proposed development. Four non regulated trees (trees 22, 40, 41 and 42) will be adversely affected by the proposed development and require removal to facilitate the proposal. Planning consent is not required to remove these trees. Three regulated trees (trees 21, 23 and 24) and one significant tree (tree 20) will be adversely affected by the proposed development and require removal to facilitate the current proposal. Planning consent is required to remove these trees.



Tree Survey

AVEO St Clair Integrated Retirement Community

Introduction

I carried out a survey of 32 trees in and adjacent to Lot 1000 Woodville Rd, St Clair on the 10th August, 2018 following a request from Rebecca Grundy, Development Manager with the AVEO group.

I was requested to assess the following:

- Identify and assess all trees on the site (and immediately adjacent to the site) with a trunk circumference of near or over 2.0m.
- Describe the condition and life expectancy of the trees.
- Provide a tree retention value for each tree in the context of future development.
- Assess and comment on the impacts of the proposed development.

This tree report is in relation to the proposed development as outlined in the following selected drawings:

- *Existing Trees Plan* Drawing number 3144 DA048 Revision 1 prepared by Brown Falconer (dated 30/11/18).
- *RACF Site Plan* prepared by Brown Falconer (dated 25/09/18 – Revision A).
- *RACF Site Plan* Drawing number 3144 DA200 Revision 1 (extract showing close detail of bin presentation zone) prepared by Brown Falconer (dated 26/141/18).
- *RACF Ground Floor Plan* prepared by Brown Falconer (dated 25/09/18 – Revision A).
- *RACF Basement Floor Plan* prepared by Brown Falconer (dated 25/09/18 – Revision A).

Qualifications

I have based this report on my education, experience, ongoing training, site observations and the information provided to me. I have 20 years' experience in the field of arboriculture, both as a practicing (climbing) and consulting arborist. I have climbed and pruned in excess of 1,000 mature trees and assessed in excess of 10,000 trees. A summary of my qualifications includes:

- Bachelor of Science (Botany and Ecology) – University of Sydney (1994)
- Diploma of Horticulture (Arboriculture) (2005)
- Certified Arborist (#AU – 0007A) – International Society of Arboriculture (2003). I have maintained Continuing Professional Development with this certification.
- I am a registered consulting arborist with Arboriculture Australia. I have maintained Continuing Professional Development with this certification.
- Tree Risk Assessment Qualification (TRAQ) - International Society of Arboriculture (2013)
- Quantified Tree Risk Assessment (QTRA) – (2006) (#770).
- I have an Australian Arborist Industry Licence - Tier 1 (AL1153)

Tree Survey

AVEO St Clair Integrated Retirement Community

Scope of this survey

- The trees were surveyed within and adjacent to Lot 1000, with the approximate area indicated by the yellow box below.
- I have assessed all trees with a trunk circumference of ~1.90m or greater, to include regulated and near regulated trees for clarification. This also includes some exempt tree species^a.
- All tree assessments were carried out using a level 2 assessment from ground level^b.



Tree Survey

AVEO St Clair Integrated Retirement Community

Survey method

I carried out the tree survey on the 10th August 2018. I collected the following information on the subject trees.

Tree number

The tree number in the survey corresponds with the tree locations marked on the site plan supplied and attached at the end of this document.

Tree species

Tree names are given as botanical names and common names.

Trunk circumference

Trunk circumference is measured 1m above natural ground level and recorded as measured. The trunk circumference class is noted as follows:

- <2.00m – Not regulated
- 2.0m - 3.00m - Regulated Trees^c under the *Development Act 1993*
- 3.0m or greater - Significant Trees^d under the *Development Act 1993*
- Please note that some exemptions apply to certain tree species. This has been noted in the survey data table.

Diameter at Breast Height (DBH)

Diameter at Breast Height (DBH) is the diameter of the trunk measured at breast height. This measurement is taken at 1.40m above ground level. This is the nominal point measured to determine Tree Protection Zones using the Australian Standard^e method.

When calculating a DBH for a tree with multiple stems, the combined DBH do not accurately represent the root volume or area and the TPZ becomes exaggerated. Combining DBH in the following formula results in a revised total DBH that better represents the total stem cross sectional area as if it were 1 stem. From this a more proportional TPZ can then be calculated.

$$\text{Combined DBH} = \sqrt{A^2 + B^2 + C^2 \text{ etc.}}$$

(A, B and C etc. are the DBH of each individual stem)

Diameter at ground level

This value is used to calculate the structural root zone using the method outlined in the Australian Standard AS 4970 *Protection of trees on development sites*.

Tree Survey

AVEO St Clair Integrated Retirement Community

Tree height

Tree height is noted in the following classes:

- Small tree (<10m)
- Medium tree (10-20m)
- Large tree (20m plus)

Tree Attributes

I have assessed the attributes of the regulated and significant trees as outlined in the City of Charles Sturt *Development Plan* (consolidated 30th January 2018) as follows^f.

Regulated Trees Objective 2

Development in balance with preserving regulated trees that demonstrate one or more of the following attributes:

- (a) significantly contributes to the character or visual amenity of the locality
- (b) indigenous to the locality
- (c) a rare or endangered species
- (d) an important habitat for native fauna.

Significant Trees Principle of Development Control 1

Development should preserve the following attributes where a significant tree demonstrates at least one of the following attributes:

- (a) makes an important contribution to the character or amenity of the local area; or
- (b) is indigenous to the local area and its species is listed under the National Parks and Wildlife Act 1972 as a rare or endangered native species
- (c) represents an important habitat for native fauna
- (d) is part of a wildlife corridor or a remnant area of native vegetation
- (e) is important to the maintenance of biodiversity in the local environment
- (f) forms a notable visual element to the landscape of the local area.

Tree Survey

AVEO St Clair Integrated Retirement Community

Tree health

Tree health is determined by assessing such factors as foliage colour and density, annual extension growth, the amount and location of deadwood, the presence and severity of dieback, the presence of pests and diseases in the crown, the rate of wound closure and wood production in the trunk/main branches. The following list outlines the range of health and vitality classes used.

- **Good**- Actively growing. Minor pest activity, minor deadwood.
- **Average**- Moderate growth rate, moderate number of pests and diseases, moderate number of dead branches, presence of epicormic shoots, minor crown dieback and other signs of stress. Trees in this category have the capacity to respond to improved growing conditions or other treatments.
- **Below average** - Reduced growth rate, significant pest or diseases issues present or evidence of past activity present, foliage may be thinning, terminal dieback may be present, and an excessive number of dead branches may be present within the crown.
- **Poor**- Poor growth rate, poor foliage colour, distribution and density, moderate to high levels of pest infestation, severe dieback, excessive epicormic shoots present and other signs of severe stress. Trees in this category are unlikely to have the capacity to respond to improved growing conditions or other treatments.
- **Dead** – No live parts remaining.

Tree structure

Tree structure is recorded using the following classes.

- **Good structure** – The tree has stable form. Branch attachments are free of defects. Some minor structural defects or concerns may be present. Maintenance pruning or other treatments are capable of improving tree structure with minimal input and without adversely impacting tree health or appearance.
- **Average structure** – For a tree to qualify in this category it will have one or more of the following structural issues; co-dominant^g stems with minor bark inclusions^h, minor bark inclusions may also be present in the main branch attachments or secondary branch attachments, the trunk may be leaning, the tree may have a history of poor quality pruning, minor trunk wounds and/or decay may be present, over-extended and end-weighted stems or limbs, or poorly tapered limbs, a history of small branch failures or rubbing limbs may be present. Maintenance pruning or other treatments may be capable of improving tree structure with moderate input, however there may be adverse impacts on tree health and/or appearance.
- **Poor structure** – For a tree to qualify as having poor structure it will have one or more of the following significant structural issues: Poor form, including co-dominant stems with a major bark inclusion, major bark inclusions present in main branch attachments, a severely leaning trunk, severely over-extended and end-weighted stems or limbs, poorly tapered limbs, a poor pruning history (Lopping), major trunk wounds, open cavities and areas of decay, a history of significant branch failure, damage to the root crown or an unstable root system. Pruning or other treatments are unlikely to improve tree structure without major adverse impacts to tree health and/or appearance. Removal may be required.

Tree Survey

AVEO St Clair Integrated Retirement Community

Risk

My assessment of tree risk has been based on a visual assessment of the tree (VTA), the location of the tree in relation to its proposed future surroundings as an aged care residential site, and my experience, education and ongoing training as an arborist. I am trained, qualified and experienced in the use of various tree risk assessment methodsⁱ. I have considered tree risk on the basis the site will be developed into a higher use residential area than is currently the case.

This risk assessment considers the individual components of risk (risk = likelihood x consequence). This risk assessment determines the risk posed by any tree at the site to persons/property over the following 12 month period.

The following factors have been considered when determining the likelihood of failure and impact;

- The suitability of the species to the local soil and climatic conditions.
- Current tree health.
- The presence of defects in the tree.
- Any history of branch failure in the tree, including size and frequency.
- Any evidence of pruning and the quality of the pruning to manage the crown of the tree.
- Any evidence of root damage.
- Tree age and life expectancy.
- Loading and forces on any defects.
- Likelihood of stem or branch failure
- Fall characteristics from the tree.
- Nature of target area. I have assumed the site is likely to be developed into a high density residential area with a higher number of buildings, structures, pedestrians, vehicles etc. beneath and in the vicinity of these trees.

The following factors have been considered when determining the consequences of failure and impact;

- Part size
- Fall characteristics
- Level of personal harm
- Level of property damage

The overall risk rating has been noted in the tree survey data.

Individual tree risk levels may differ, depending on the nature and location of targets, specific site usage patterns, tree management factors, impacts on any tree from development activities and a range of other possible factors.

Tree Survey

AVEO St Clair Integrated Retirement Community

Life expectancy

Life expectancy is considered to be the remaining *useful* life expectancy of the tree in an urban environment. It considers a range of factors, including tree species, tree age, tree condition, tree structure and the presence of defects, the growing environment, past pruning practices and tree risk.

Please note that the *actual* life expectancy of a tree may be longer, in that a tree may remain alive, but have poor form or be in poor condition that it has limited usefulness/life expectancy in the urban landscape.

Life expectancy is categorised as follows:

- <10 years
- 10-20 years
- 20-50 years
- 50-100 years

Management recommendations

Following the assessment of each tree, tree maintenance guidelines are given. These maintenance guidelines consider the site is developed into a higher density residential area.

Crown maintenance pruning^j may be recommended for trees in good health and with good structure to improve tree aesthetics and to reduce any risks that may be present in the tree.

Trees with an average structure may require more extensive pruning to improve tree safety and aesthetics which may include reduction pruning^k, crown lifting^l, remedial pruning^m or other such specified pruning.

Those trees that cannot have their risks reduced to an acceptable level through pruning may be recommended for removal. Similarly, trees in below average or poor health with a short life expectancy may be recommended for removal.

Tree Survey

AVEO St Clair Integrated Retirement Community

Retention value

The retention value of the surveyed trees is noted as follows;

- High
- Medium
- Low

For a tree to qualify as having **high retention value** it meets all the following criteria.

- It qualifies as a regulated or significant tree at the time of the survey, and
- It is in average to good health, and
- It has an average to good structure and
- It has one or more attributes worthy of preservation as outlined in the City of Charles Sturt *Development Plan*.
- Please note that some of these trees may need some maintenance to reduce risk and provide suitable clearances.

For a tree to qualify as having **medium retention value** it meets the following criteria.

- It is a non-regulated tree or an exempt tree species (at the time of the survey)
- It is in average to good health, and
- It has an average to good structure and
- The tree has potential to provide a range of benefits at the site for more than a decade.

For a tree to qualify as having **low retention value** it meets the following criteria.

- It is in below average or poor health (has a short life expectancy), or
- It has poor structure (represents a material or unacceptable risk to public or private safety), or
- The tree has no attributes worthy of preservation as outlined in the City of Charles Sturt *Development Plan*

Regulated and significant trees in any of these categories are protected by the *Development Act 1993*. Development approval is required before such trees can be removed.

Tree Protection Zones

A Tree Protection Zoneⁿ (TPZ) is required to protect the root system, growing environment and the above ground parts of trees from the potentially adverse effects of development activities.

The TPZ is calculated by multiplying the trunk diameter (DBH) x 12, as per AS 4970 – 2009 *Protection of trees on development sites*. The TPZ is given as a radial distance from the centre of the trunk and is also converted to a TPZ area.

Structural root zone

The Structural Root Zone (SRZ) is the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold a tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed as a radius in metres. This zone considers the tree's structural stability only, not the root zone required for the tree's vigour and long-term viability, which will usually be a much larger area. There are

Tree Survey

AVEO St Clair Integrated Retirement Community

many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the following formula. Root investigations may provide more information on the extent of these roots. From AS 4970-2009 *Protection of Trees on Development Sites*.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64$$

(D= trunk diameter in metres when measured above the root buttress)

Impacts from proposed development

An assessment of the impacts from the proposed development activities has been made for each tree. This considers the level of encroachment into each tree protection zone from the proposed earthworks, building footprints and sealed surfaces into the tree protection zone of each tree in line with Australian Standard AS 4970 *Protection of trees on development sites*.

I have referred to the selected relevant drawings prepared by Brown Falconer as outlined in the introduction of this report.

Tree Survey

AVEO St Clair Integrated Retirement Community

Observations

Tree data

The data collected on the trees is compiled in a table attached at the end of the report.

Tree numbers

A total of 32 trees were surveyed. Each tree has a numbered tag attached for clarification.

Tree species

The surveyed trees consist of a mixture of tree species including;

Locally indigenous	Australian native	Exotic
<i>Eucalyptus camaldulensis</i> (x21)	<i>Corymbia maculata</i> (x2)	<i>Cupressus macrocarpa</i> (x1)
	<i>Eucalyptus cladocalyx</i> (x1)	<i>Lagunaria patersonia</i> (x1)
	<i>Eucalyptus leucoxylon</i> (x1)	<i>Pinus halepensis</i> (x1)
	<i>Eucalyptus spathulata</i> (x1)	<i>Schinus areira</i> (x2)
	<i>Ficus macrophylla</i> (x1)	

All trees are considered to be planted trees. It is not likely that any of the surveyed trees are remnant pre-European trees.

Trunk circumference

A breakdown of the trunk circumference on site is as follows;

- There are 3 trees with a trunk circumference below 2m which do not qualify as regulated trees (trees 18, 22, 42).
- There are 15 trees with a trunk circumference between 2 and 3m and qualify as regulated trees under the *Development Act 1993*. These have been marked orange in the survey data for clarification (trees 1, 4, 6, 7, 9, 14, 17, 21, 23, 24, 34, 35, 37, 38, 39)
- There are 10 trees with a trunk circumference of 3m or greater and qualify as significant trees under the *Development Act 1993*. These have been marked yellow in the survey data for clarification (trees 2, 3, 5, 8, 10, 12, 13, 16, 19, 20)
- There are 4 trees with a trunk circumference of greater than 2m, but are exempt from the regulations (trees 11, 36, 40, 41). These have been marked grey in the survey data for clarification. These trees are exempt under the *Development Regulations 2008* as follows:

6A—Regulated and significant trees

(5) Subregulations (1) and (2) do not apply—

(b) to a tree within 1 of the following species of trees:
Cupressus macrocarpa (Monterey Cypress)

Schedule 3—Acts and activities which are not development

17—Removal of trees in certain cases

Tree Survey

AVEO St Clair Integrated Retirement Community

(1) A tree-damaging activity in relation to a regulated tree (including a tree that also constitutes a significant tree) if—

(a) the tree is within 1 of the following species of trees:

Lagunaria patersonia (Norfolk Island Hibiscus)

Schinus areira (Peppercorn Tree)

Tree height

A breakdown of the tree height on site is as follows;

- 3 small trees below 10m
- 29 medium trees between 10-20m
- No large trees greater than 20m tall

Tree health

The majority of trees on site are in average to good health. A breakdown of tree health is as follows;

- 9 trees are in good health
- 19 trees are in average health
- 3 trees are in below average health (tree 20, 21 and 24)
- 1 tree is in poor health (tree 39)

Tree structure

The majority of trees on site have an average to good structure. A breakdown of tree structure is as follows;

- 12 trees have a good structure
- 18 trees have an average structure
- 2 trees have poor structure with notable defects (trees 20, 37)

Risk

Tree risk was categorised as follows:

- 30 trees currently present a low risk.
- 2 trees present a moderate risk (20, 37)
- No trees pose a high risk at present.

Life expectancy

The life expectancy of trees on site is categorised as follows:

- <10 years – 4 trees (20, 21, 24, 39)
- 10-20 years – 4 trees (3, 11, 35, 37)
- 20-50 years – 24 trees

Tree Survey

AVEO St Clair Integrated Retirement Community

Retention value

- There are 20 trees that have a high retention value.
- There are 7 trees that have a medium retention value.
- There are 5 trees that have a low retention value
 - Trees 20, 21, 24, 37, 39

Tree Survey

AVEO St Clair Integrated Retirement Community

Appraisal

General overview of tree population

A total of 32 larger trees were surveyed within the defined area.

21 trees are locally indigenous (planted) River Red gums, 6 trees are Australian natives and another 5 are exotic trees. These trees collectively provide a wide range of benefits in the local area^o.

Of these trees, 15 are regulated and another 10 are significant. The remaining 7 trees are not regulated or are exempt tree species.

The majority of these trees are proposed to be retained in the public reserve and will provide valuable amenity in the local area and important screening between the development and the railway line and station. The pruning of some trees is recommended to maintain acceptable levels of risk for users of the public bike path/pedestrian path



Tree Survey

AVEO St Clair Integrated Retirement Community

Similarly, the group of trees in the open space adjacent to Woodville Rd (current playground area) also provide a wide range of benefits in the locality. These trees are proposed to be retained within a public reserve.



Some trees will require some management to maintain acceptable levels of risk. Tree 37 has an irregular form with a previous large stem failure and over extended branches (below left). This tree will require the target zone be managed or the tree itself is managed if it is to be retained in a public reserve. Tree 39 is in poor condition with a short life expectancy (below right).



Tree Survey

AVEO St Clair Integrated Retirement Community

Tree health

28 trees are in average to good health and are not considered to have a short life expectancy. There are four trees that are in below average or poor health with a short life expectancy. This includes trees 20, 21, 24 and 39.



Tree 20 (*Ficus macrophylla*)

Tree 20 has been in slow decline for several years. Large sections of dieback were previously removed and the site has been improved with mulches. The decline in tree health continues.

Tree Survey

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Tree 21 (regulated) – A *Corymbia maculata* with thinning and chlorotic foliage.
This tree is located in a raised mound and may have poor root architecture.

Tree Survey

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Tree 24 (regulated) – A *Eucalyptus spathulata* with thinning foliage.
It is located in a raised mound.

Tree Survey

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Tree structure and risk

30 trees were observed to have average to good structure. Two trees have a poor structure and pose a moderate risk to the future users of the site (trees 20 and 37).

Tree 20 is a declining *Ficus macrophylla*. It has increasing levels of sunburn and delaminating bark on the western side of the trunk and main branches. Root death is occurring on the western side. In addition, large cracks are developing within the exposed, decaying wood on the western side as a result of the weight of the live tree parts on the SE side. Whole tree stability is gradually reducing. The long term future of this tree is limited. Tree 20 is recommended to be removed.



Tree Survey

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Tree 37 is outside the development site, however, is within the public reserve to be transferred to the City of Charles Sturt. To manage tree form and mitigate risk, either the tree is managed or the target is managed (or a combination of both).

The following trees have been recommended to be removed from within the development site based on tree condition. Planning consent is required to remove regulated and significant trees.

Non regulated trees	Regulated trees	Significant Trees
	21, 24	20

Tree Survey

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Development impacts

Some trees are within or adjacent to the proposed development activities. An assessment of the impacts from the proposal has been made. These impacts as presented in the tree survey data table, and discussed below.

This impact assessment considers the level of encroachment from the site earthworks (fill to create the building podium), building footprints and sealed surfaces into the tree protection zone of each tree in line with Australian Standard AS 4970 *Protection of trees on development sites*⁹.

I have referred to the selected relevant drawings prepared by Brown Falconer as outlined in the introduction of this report.

Service yard

A service yard is proposed in the western corner of the site where various service vehicles access the site from Actil Avenue (South) for various deliveries and services. Some vehicles are larger and require a larger turning circle and height clearances. The service yard requires a hard concrete surface for the larger vehicles.

- **Tree 1** – Regulated River red gum. The tree is to be retained in a landscaped garden bed area with all hard surfaces for the service yard and secure courtyard outside the tree protection zone. A lightweight fence around the secure courtyard area consisting of posts in concrete pads passes through the tree protection zone, requiring minor isolated hand excavations. There is not likely to be any impact on this tree.
- **Tree 2** – Significant River red gum. The tree is to be retained in a landscaped garden bed area with all hard surfaces for the secure courtyard outside the tree protection zone. A lightweight fence around the secure courtyard area consisting of posts in concrete pads passes through the tree protection zone, requiring minor isolated hand excavations. There is not likely to be any impact on this tree.
- **Trees 40 and 41** – Non-regulated Peppercorn trees (exempt tree species). These trees are required to be removed to facilitate driveway access for large vehicles to the service yard. Planning consent is not required to remove these non-regulated trees.
- **Tree 42** – Non-regulated Spotted gum. This tree is likely to be adversely affected by the combined impacts of site fill, the service yard and building footprint (RACF). This tree is required to be removed to facilitate the proposed works. Planning consent is not required to remove this non-regulated tree.

Tree Survey

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Building footprints

The proposed development has several buildings across the site. Various trees will be adversely affected by the construction of such buildings, associated earthworks and hard surfaces. This includes the following trees.

- **Tree 20** – Significant Moreton Bay fig. This tree is in the area where building 5 is proposed, with ~50% encroachment into the tree protection zone from both the raising of the land to create the building podium, and from the building footprint itself. This tree is currently in below average health, a poor structure, poses a moderate risk and has a limited future at the site. These works will adversely affect the tree. Tree removal is required to facilitate the proposal, subject to planning consent.
- **Tree 21** - Regulated Spotted gum. This tree is in the area where building 6 is proposed, with ~100% encroachment into the TPZ from the raising of the land to create the building podium and ~40% encroachment into the tree protection zone from building 6 itself. This tree is currently in below average health, and has a limited future at the site. These works will adversely affect the tree. Tree removal is required to facilitate the proposal, subject to planning consent.
- **Tree 22** – Non-regulated Sugar gum. This tree is in the area where building 6 is proposed, with >30% encroachment into the tree protection zone from the raising of the land to create the building podium and from building 6 itself. These works will adversely affect the tree. Tree removal is required to facilitate the proposal. Development approval is not required.
- **Tree 23** – Regulated Aleppo pine. This tree is in the area where the RACF building is proposed, with ~100% encroachment into the tree protection zone from the raising of the land to create the building podium, and ~25% encroachment into the tree protection zone from the building footprint itself. In addition, the basement level tunnel linking the RACF building to building 7 passes through the TPZ. These works will adversely affect the tree. Tree removal is required to facilitate the proposal, subject to planning consent.
- **Tree 24** – Regulated Swamp mallet. Building footprint encroaches not TPZ by 33m² (17%). Additional earthworks to remove raised mound will further encroach into TPZ. Major impact on tree. Tree removal is required to facilitate the proposal, subject to planning consent.

The following trees have been recommended to be removed from within the development site to facilitate the current proposal, subject to planning consent where they are regulated or significant trees.

Non regulated trees	Regulated trees	Significant Trees
22, 40, 41, 42	21, 23, 24	20

Unaffected trees

A section of land along Glenys Nunn Drive and the playground area adjacent to Woodville Road is to be retained as open space. Trees 3 to 19 and 34 to 39 are located within this open space.

Tree 2 is located on Council land and overhangs the western boundary of the site.

The proposed development does not encroach into the tree protection zone of any of these trees.

Tree Survey

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Tree protection zones

To protect those trees to be retained on or adjacent to the development site from the possible adverse impacts of development activities, a tree protection zone (TPZ) and structural root zone (SRZ) are required. The TPZ radius and area, and SRZ radius for each tree has been calculated and presented in the survey data. They are also plotted onto various site plans.

Where trees are to be retained on or adjacent to the site, adequate space with suitable landscaping must be provided to them so they can remain an asset to the local area. This has been the case for trees 1 and 2 where they have been incorporated into a landscaped area.

Trees can tolerate some encroachment into their TPZ area from development activities and other changes to their growing environment. The level of encroachment from the current proposal has been determined and presented in the tree survey data table and discussed on previous pages. Several trees are required to be removed to facilitate the current proposal, subject the planning consent where they are regulated and significant trees.

The development of the site will need to consider the protection requirements of the trees to be retained on or adjacent to the site in accordance with Australian Standard AS 4970 – *Protection of trees on development sites*. The following guidelines tree protection measures are required to protect such trees.

Protective fencing

Protective fencing must be erected around the trees to be retained on site (and adjacent to the site where the TPZ extends into the development site) prior to any development activities commencing. This fencing is to protect the tree trunk, branches, surrounding soils and tree roots. Ideally the TPZ fence should be set up at the full TPZ radius (where possible). Once erected, protective fencing must not be removed or altered without approval by the project arborist. The fencing should be secured to restrict access. Appropriate signage must be placed on the TPZ fencing.

TPZ fencing may be reduced in the vicinity of development activities in consultation with the project arborist, to allow easy movement of workers on site. Suitable ground protection measures will be required in these circumstances.

Demolition and site clearing activities

The demolition of existing structures, surfaces and vegetation will require heavy machinery to move about on the site. If they work within the TPZ area of any tree, they can potentially compact the soil and damage tree roots, trunks and branches. The tree protection zone for trees to be retained on and adjacent to the site must be established prior to demolition and site work activities commencing. Any demolition activities must proceed with caution when in the vicinity of trees, and may require arborist supervision for sensitive works in close proximity to any tree.

Tree Survey

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Site preparation/earthworks

The preparation of the site requires a range of earthwork activities such as mound removal, levelling, grade changing and trenching for footings and underground services. These activities usually require heavy machinery to move about on the site and can potentially cause harm to the trees, surrounding soils and its root system.

All site preparation activities and earthworks must be designed and planned to stay outside of the TPZs of those trees being retained on or adjacent to the site. If these activities are to occur within any TPZ, the works must be carried out with extreme caution under the supervision of the project arborist using tree sensitive strategies.

Underground services

Several underground services will be required to service any development at the site. These should be routed outside of all TPZ areas. If underground services must pass through any TPZ, they must utilise underground boring methods, hydro excavation or manually excavated trenches where tree roots are left intact and undamaged.

Construction activities

Construction activities are wide and varied. These activities may include but are not limited to; laying of building foundations, building the frames of the structures, brickwork or other walling materials, scaffolding, roofing, interior fitting etc.

These activities require a range of different contractors accessing the site, receiving and storing materials, generating waste and spoil etc. If these activities occur unchecked within any tree protection zone, the cumulative effects of these activities may cause harm to the tree, surrounding soils and its root system.

The trees must be well protected with fencing and other suitable ground protection during all phases of the construction process. Areas for parking, storage, waste disposal, mixing and wash out areas must be clearly defined, outside all tree protection zones.

Paving

Paving works often require excavation works, soil compaction and the installation of impervious surfaces. These can all have an adverse impact on the soil and the trees root system which can adversely affect tree health.

Impermeable paving should be located outside tree protection zones. If paving works are required within any TPZ, it must be kept to a minimum, must utilize a no dig method, use permeable sub base preparations and permeable paving materials.

Tree Survey

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Landscaping

There are a range of landscaping activities that may cause harm to the soil and roots of the tree. These include but are not limited to; grade changes up or down, soil compaction from heavy machinery and stockpiling of materials, damage to tree trunks and branches from machinery, soil contamination from improper chemical use, root cutting from trenching activities for underground services (power and irrigation) and retaining walls, root damage from soil cultivation and planting and from paving activities. This can have an adverse impact on the long term health of a tree.

Landscape works must consider the needs of the trees, placing existing trees in large, undisturbed landscaped garden areas. All surrounding landscape activities must avoid root disturbance, grade changes, surface sealing, soil compaction, trenching and any other damaging activities.

Fencing

Fencing works on the boundaries of the property within any TPZ must not use continuous trenching, as would be the case for a masonry wall, concrete plinth or other similar fence construction. It is recommended that boundary fencing at the site use lightweight panel fencing on a post and rail support system with concrete pads to support the posts.

Tree Survey

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Conclusions

- Tree Environs carried out a survey of 32 trees at Lot 1000 Woodville Rd, St Clair on the 10th August 2018.
- 15 trees qualify as regulated trees and another 10 qualify as significant trees.
- 21 trees are locally indigenous *Eucalyptus camaldulensis*, all of which have been planted at the site. The remaining 11 surveyed trees are Australian natives or exotic ornamentals.
- The majority of trees are in average to good health. Four trees are in below average or poor health and have a short life expectancy (trees 20, 21, 24 and 39).
- The majority of trees have average to good structure. Two trees have a poor structure and pose a moderate risk to the future users of the site (trees 20 and 37).
- Two regulated trees (trees 21 and 24) and one significant tree (tree 20) are recommended to be removed based on tree condition.
- Trees 1-19 and 34-39 will be transferred to the City of Charles Sturt as public open space trees. Some of these trees should be managed to mitigate tree risk or health issues. None of these trees will be affected by the proposed development.
- Four non regulated trees (trees 22, 40, 41 and 42) will be adversely affected by the proposed development and require removal to facilitate the proposal. Planning consent is not required to remove these trees.
- Three regulated trees (trees 21, 23 and 24) and one significant tree (tree 20) will be adversely affected by the proposed development and require removal to facilitate the current proposal. Planning consent is required to remove these trees.

Tree Survey

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Recommendations

A summary of the tree management recommendations is set out below:

	Not regulated	Regulated	Significant
Remove based on tree condition		21, 24	20
Remove to facilitate the development proposal	22, 40, 41, 42	21, 23, 24	20

1. I recommend significant tree 20 be removed. This removal should occur under the principles of development control of the City of Charles Sturt *Development Plan* (consolidated 30th January 2018) as follows;

Significant Trees PDC 3

Significant trees should be preserved, and tree-damaging activity should not be undertaken, unless:

- (a) in the case of tree removal:
 - (i) the tree is diseased and its life expectancy is short.
 - (ii) the tree represents an unacceptable risk to public or private safety.

As this tree qualifies as a significant tree, an application must be made to the relevant planning authority to have it removed.

2. I recommend regulated trees 21 and 24 be removed. These removals should occur under the principles of development control of the City of Charles Sturt *Development Plan* (consolidated 30th January 2018) as follows;

Regulated Trees PDC 2

A regulated tree should not be removed or damaged other than where it can be demonstrated that one or more of the following apply:

- (a) the tree is diseased and its life expectancy is short

As these trees qualify as regulated trees, an application must be made to the relevant planning authority to have them removed.

3. Non regulated trees 22, 40, 41 and 42 can be removed to facilitate the current proposal without development approval.
4. Regulated trees 21, 23 and 24 are required to be removed to facilitate the current proposal. The removal of these trees could occur under the City of Charles Sturt *Development Plan* (consolidated 30th January 2018) as follows:

Regulated Trees PDC 2

A regulated tree should not be removed or damaged other than where it can be demonstrated that one or more of the following apply:

- (d) development that is reasonable and expected would not otherwise be possible

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5. Significant tree 20 is required to be removed to facilitate the current proposal. The removal of this tree could occur under the City of Charles Sturt *Development Plan* (consolidated 30th January 2018) as follows:

Significant Trees PDC 3

Significant trees should be preserved, and tree-damaging activity should not be undertaken, unless:

- (a) in the case of tree removal:
 - (vi) it is demonstrated that all reasonable alternative development options and design solutions have been considered to prevent substantial tree-damaging activity occurring.
6. Regulated and significant trees that are retained on or adjacent to the site should be protected with a tree protection zone radius and area as indicated in the survey data.
 7. A range of tree protection measures must be implemented during the construction phase, in accordance with Australian Standard AS 4970 *Protection of trees on development sites*.

As many of these trees qualify as regulated or significant trees, an application must be made to the relevant planning authority to approve any development in relation to them (including tree removal). The relevant planning authority may take an alternative point of view and may refuse consent. Development activities cannot occur until appropriate planning approvals have been granted.

Tree Survey

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If you have any further queries regarding the information contained in this report please feel free to contact me.



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Endnotes

^a Development Regulations 2008

6A—Regulated and significant trees

- (5) Subregulations (1) and (2) do not apply—
- (b) to a tree within 1 of the following species of trees:
- Acer negundo* (Box Elder)
 - Acer saccharinum* (Silver Maple)
 - Ailanthus altissima* (Tree of heaven)
 - Alnus acuminata* subsp. *Glabrata* (Evergreen Alder)
 - Celtis australis* (European Nettle Tree)
 - Celtis sinensis* (Chinese Nettle Tree)
 - Cinnamomum camphora* (Camphor Laurel)
 - Cupressus macrocarpa* (Monterey Cypress)
 - Ficus* spp. (Figs), other than *Ficus macrophylla* (Morton bay fig) located more than 15 metres from a dwelling
 - Fraxinus angustifolia* (Narrow leaved Ash)
 - Fraxinus angustifolia* ssp. *Oxycarpa* (desert ash)
 - Pinus Radiata* (Radiata Pine / Monterey Pine)
 - Platanus x acerifolia* (London Plane)
 - Populus alba* (White poplar)
 - Populus nigra* var. *italica* (Lombardy Poplar)
 - Robinia pseudoacacia* (Black Locust)
 - Salix babylonica* (Weeping Willow)
 - Salix chilensis* 'Fastigiata' (Chilean Willow, Evergreen Willow, Pencil Willow)
 - Salix fragilis* (Crack Willow)
 - Salix X rubens* (White Crack Willow, Basket Willow)
 - Salix X sepulcralis* var. *chrysocoma* (Golden Weeping Willow)
 - Schinus areira* (Peppercorn Tree);

^b Tree and risk assessments can be conducted at different levels and may employ various methods and tools. The level of assessment applied should be appropriate for the circumstances.

Level 1 - Limited visual assessment.

- A visual assessment from a specified perspective, near specified targets.
- The aim is to identify obvious defects or specified conditions.
- Typically identifies trees with imminent or probable likelihood of failure.
- This is the fastest and least thorough form of assessment intended for larger populations of trees.
- This can be carried out as a walkover, drive-by or fly-over inspection.

Level 2 - Standard assessment.

- A level 2 assessment is a detailed ground based visual tree inspection of a tree and its surroundings.
- The use of simple tools (mallet, binoculars, probes, spades), may be required.
- In some instances only limited information may be gained on specific internal, below ground or upper crown factors.
- For the majority of tree assessments the standard assessment provides adequate information to guide tree management.

Level 3 - Advanced assessment.

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- A level 3 assessment is performed to provide detailed information about specific tree parts, defects, targets or site conditions.
- This assessment is usually conducted after a standard assessment has undertaken if additional information is required and with the approval of the client.
- Specialised equipment is often required for advanced assessment.
- The assessments are generally more time intensive and expensive.
- Advanced assessment techniques may include; aerial inspection, detailed target analysis, detailed site evaluation, decay testing, health evaluation, root inspection, tree stability monitoring and load testing.

NOTE: If tree condition cannot be adequately assessed at the specified level a higher level of assessment may be required.

^cRegulated tree means— (as defined in Section 4 Interpretation (1) of the Development (Regulated Trees) Amendment Act 2009)

- (a) a tree, or a tree within a class of trees, declared to be regulated by the regulations (whether or not the tree also constitutes a significant tree under the regulations); or
- (b) a tree declared to be a significant tree, or a tree within a stand of trees declared to be significant trees, by a Development Plan (whether or not the tree is also declared to be a regulated tree, or also falls within a class of trees declared to be regulated trees, by the regulations);

Section 6A—Regulated and significant trees (as defined in the *Development (Regulated Trees) Variation Regulations 2011*)

- (1) Subject to this regulation, the following are declared to constitute classes of regulated trees for the purposes of paragraph (a) of the definition of **regulated tree** in section 4(1) of the Act, namely trees within the designated area under subregulation (3) that have a trunk with a circumference of 2 metres or more or, in the case of trees with multiple trunks, that have trunks with a total circumference of 2 metres or more and an average circumference of 625 millimetres or more, measured at a point 1 metre above natural ground level.

^d Significant tree means (as defined in Section 4 Interpretation (1) of the Development (Regulated Trees) Amendment Act 2009)

- (a) a tree declared to be a significant tree, or a tree within a stand of trees declared to be significant trees, by a Development Plan (whether or not the tree is also declared to be a regulated tree, or also falls within a class of trees declared to be regulated trees, by the regulations); or
- (b) a tree declared to be a regulated tree by the regulations, or a tree within a class of trees declared to be regulated trees by the regulations that, by virtue of the application of prescribed criteria, is to be taken to be a significant tree for the purposes of this Act;

6A—Regulated and significant trees (as defined in the *Development (Regulated Trees) Variation Regulations 2011*)

- (1) Subject to this regulation, the following are declared to constitute classes of regulated trees for the purposes of paragraph (a) of the definition of **regulated tree** in section 4(1) of the Act, namely trees within the designated area under subregulation (3) that have a trunk with a circumference of 2 metres or more or, in the case of trees with multiple trunks, that have trunks with a total circumference of 2 metres or more and an average circumference of 625 millimetres or more, measured at a point 1 metre above natural ground level.
- (2) Subject to this regulation—
- (a) a prescribed criterion for the purposes of paragraph (b) of the definition of **significant tree** in section 4(1) of the Act is that a regulated tree under subregulation (1) has a trunk with a circumference of 3 metres or more or, in the case of a tree with multiple trunks, has trunks with a total circumference of 3 metres or more and an average circumference of 625 millimetres or more, measured at a point 1 metre above natural ground level; and
- (b) regulated trees under subregulation (1) that are within the prescribed criterion under paragraph (a) are to be taken to be significant trees for the purposes of the Act.

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^e The Australian Standard: AS 4970 – 2009, *Protection of trees on development sites* provides guidelines to protecting trees in and around development.

^f The opinion of landscape contribution may need to be verified by a qualified landscape architect.

^g Co-dominant stems are stems or trunks of about the same size originating from the same position by division of the main stem. When the stem bark ridge turns upwards the union is strong and when the ridge turns inwards the union is potentially weak.

^h Included Bark Crotches are potential structural weaknesses that occur in trees between the main stem and a branch or between leaders of equal size (co dominant stems). Bark between the stems turns downwards and prevents the interlocking of wood fibres rather than upwards to form a branch bark ridge as occurs in structurally sound crotches. This defect is under genetic control and may be repeated throughout the tree or occur in only one crotch. The position of an included bark crotch in a tree plays an important part in the trees structural stability. Low included bark crotches may be more serious than those higher in a tree. Depending upon the severity of the defect, tree age and species involved, it may be possible to prune or cable trees with bark inclusions in order to reduce the risk of failure. Bark inclusions that do not display signs of structural instability and or are in sheltered locations, are unlikely to be a safety issue and may not warrant Arboricultural intervention.

ⁱ The International Society of Arboriculture Tree Risk Assessment Qualification (TRAQ) is a risk assessment method for determining the risk of harm from tree or branch failure. This method assesses three components of tree risk; Likelihood of Failure. Likelihood of Impact and Consequences of Failure. A qualitative descriptor is applied to each of these components of risk. These descriptors are applied to a set of matrices to determine an overall risk of harm. I am a qualified user of the TRAQ method. More information about this method can be found in the *Best Management Practices – Tree Risk Assessment* (Companion Publication to American Standard ANSI A300 Part 9: - *Tree Shrub and other woody plant management – Standard Practices (Tree risk assessment a. Tree structure assessment)*) published by The International Society of Arboriculture 2011 **AND** *Tree Risk Assessment Manual* International Society of Arboriculture, Champaign, Illinois, USA 2013.

Quantified Tree Risk Assessment (QTRA) is a target driven method providing a framework for determining the risk of harm from tree or branch failure. This method assesses three components of tree risk; Target Value, Probability of Failure and Impact Potential. A numerical range is applied to each of these components of risk. The value or probability of each component is multiplied to determine a risk of harm. I am a trained and licensed user of this system For further information on this methodology refer to www.qtra.co.uk

^j 7.2 Crown maintenance

7.2.1 General

Crown maintenance is pruning according to the growth habit of the tree. It includes dead wooding, crown thinning, selective pruning and formative pruning.

It does not reduce the volume of the crown and retains the structure and size of the tree.

From Australian Standard AS4373 – 2007 'Pruning of Amenity Trees'

^k For reduction pruning the ends of branches are removed to internal lateral branches or stems. The extent of crown or limb reduction shall be specified at the time of assessment. The lateral branch to which the final cut is made should be at least one third of the diameter of the branch being reduced at the point of the final cut. This may be difficult to achieve in remedial pruning and line clearance work. Reduction pruning is not lopping or topping. **Australian Standard: AS 4373 – 2007.** 'Pruning of amenity trees'

^l Crown lifting is the removal of the lower branches. Clearances shall be specified. The maximum diameter and location of the branches to be removed should be specified. **The Australian Standard: AS 4373 – 2007.** 'Pruning of amenity trees'

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^m This type of pruning shall only be carried out on trees which have lost their natural form and structure through storm damage, mechanical damage, vandalism, lopping, dieback or disease. This method is usually only used when all other approaches have failed and replacing the tree is difficult. The purpose of this pruning is to prolong the useful life expectancy of such trees and to reduce their hazard potential.

This type of pruning removes damaged, diseased or lopped branches back to undamaged or healthy tissue. The final cut may not necessarily be at the branch collar. The aim is to induce the production of epicormic shoots from which a new crown is intended to be established. To achieve this, regrowth should be managed by reduction pruning or crown thinning.

This type of pruning should be done in several stages in an attempt to induce stable and successful regrowth. Consideration should be given to removing dangerous trees. Remedial pruning may create hazards from weak branch attachment. Trees should be carefully monitored.

AS 4373-2007 *Pruning of Amenity Trees* section 7.3.5.

ⁿ Tree Protection Zones are areas designated by Arborists for the preservation trees on development sites. TPZs preserve tree root systems and the immediate soil environs as well as protecting the above ground parts of the tree from inadvertent crown or trunk damage. The zone within the TPZ must be monitored and managed by a qualified Arborist to avoid the many potentially adverse consequences of uncontrolled development. Management of the crown and improvements to the growing conditions within this zone should occur for several reasons, including compensation for root loss, to reduce plant stress, improve tree form and safety, to improve the growing conditions generally and to extend tree longevity.

^o Trees and shrubs are proven to provide a range of social, environmental, economic and psychological benefits that improve the pleasantness of a local area that positively affect human wellbeing. The amenity value of trees include gaseous and particulate pollution mitigation, amelioration of climatic extremes (shading, cooling and wind speed reduction), mitigation of heat islands, attenuation of noise pollution, store and sequester carbon (reducing greenhouse gasses), improve air quality, improve water quality, stormwater mitigation and erosion control, visual screening of undesirable views, aesthetically enhance local areas, aesthetically enhance urban structures, improve property values, reduce urban glare, improve human health, wellbeing and relaxation, reduce stress and anxiety, reduce crime and improve healing rates of patients. In addition, locally indigenous plants provide further benefits including; provide important habitat for local fauna, maintain biodiversity in the local environment, provide wildlife corridor links with areas of native and indigenous vegetation.

^p It may be possible to encroach into or make variations to the standard Tree Protection Zone (TPZ). Encroachment includes excavation, compacted fill and machine trenching. **Minor encroachment** - If the encroachment is less than 10% of the TPZ area and is outside the Structural Root Zone (SRZ), detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. Variations must be made by the project arborist considering relevant factors listed on section 3.3.4 of the standard. **Major encroachment** - If the proposed encroachment is greater than 10% of the TPZ area or inside the SRZ, the project arborist must demonstrate that the tree would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors including: location and distribution of roots, the potential number and size of root loss, tree species and tolerance to root disturbance, age, vigour and size of tree, lean and stability of the tree, soil characteristics, volume, topography and drainage, the presence of existing or past structures or obstacles and design factors. From Australian Standard AS 4970 – 2009 *Protection of trees on development sites*, section 3.3.

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Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
1	<i>Eucalyptus camaldulensis</i> River red gum	2.59. regulated	800	0.87	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average, moderate number of small dead branches	Good	Low	20-50	none,	High	9.60	290	3.1	Tree retained within landscaped garden bed to full extent of TPZ. Lightweight post and pad fence around secure courtyard within TPZ. Service yard driveway surface outside TPZ. No impact on tree health.
2	<i>Eucalyptus camaldulensis</i> River red gum	3.46. significant	1080	1.19	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average, dead branches - minor,	Good branch failures - limited, low branches, pruned under powerlines	Low	20-50	remove dead branches over 40mm dia., lift lower crown if required, tidy up previous powerline pruning, reduce branch leverage to W over bike path through reduction pruning by 10-15%	High	12.96	528	3.6	Tree retained within landscaped garden bed to full extent of TPZ. Lightweight post and pad fence around secure courtyard within TPZ. No impact on tree health.

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AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
3	<i>Eucalyptus camaldulensis</i> River red gum	3.44. significant	1090	1.14	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Good	Average crown form - irregular, over-extended branch to north, several large branch failures,	Low	10-20	reduce branch leverage to north through reduction pruning by 10-30%,	High	13.08	537	3.5	none
4	<i>Eucalyptus camaldulensis</i> River red gum	2.96 regulated (2 stems)	670	0.89	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Good	Average multi-stemmed, crown form - irregular, trunk wound - minor, good woundwood response	Low	20-50	none,	High	8.04	203	3.2	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expectancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
5	<i>Eucalyptus camaldulensis</i> River red gum	3.03 significant (2 stems)	680	0.76	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average,	Average co-dominant stems, crown form - irregular,	Low	20-50	none,	High	8.16	209	2.9	none
6	<i>Eucalyptus camaldulensis</i> River red gum	2.47. regulated	760	0.88	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average, borer activity minor	Good bird chewing damage to top side of primary branch at ~7m to west	Low	20-50	reduce primary branch at ~7m to west with bird chewing through reduction pruning by 15-25%	High	9.12	261	3.1	none
7	<i>Eucalyptus camaldulensis</i> River red gum	2.34. regulated	740	0.79	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average,	Average crown form - irregular, trunk wounds minor, good woundwood response, over-extended branches in upper crown to SW.	Low	20-50	none,	High	8.88	248	3.0	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expectancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
8	<i>Eucalyptus camaldulensis</i> River red gum	3.51. significant	970	1.04	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average,	Average crown form - irregular, large stem at ~8m to W previously removed	Low	20-50	none,	High	11.64	426	3.4	none
9	<i>Eucalyptus camaldulensis</i> River red gum	2.97. regulated	830	0.95	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Good	Average co-dominant stems, bark inclusions main stems - minor, open irregular crown, broken hanging branch in upper crown to north	Low	20-50	Remove broken hanging branch at ~8m to north	High	9.96	312	3.2	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expectancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
10	<i>Eucalyptus camaldulensis</i> River red gum	3.12. significant	990	1.06	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average, minor dieback	Average bark inclusion with cavity at ~4m, good woundwood support, adequate support wood.	Low	20-50	Reduce branches in upper crown to west through reduction pruning by 10-20% to reduce load on bark inclusion, control bees if required.	High	11.88	443	3.4	none
11	<i>Cupressus macrocarpa</i> Monterey cypress	2.16. exempt species	650	0.65	medium (10-20m)		Average	Average crown form - irregular,	Low	10-20	none,	Medium	7.80	191	2.8	none
12	<i>Eucalyptus camaldulensis</i> River red gum	3.40. significant	1080	1.15	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average, foliage density average, borer activity moderate	Good	Low	20-50	none,	High	12.96	528	3.5	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
13	<i>Eucalyptus camaldulensis</i> River red gum	4.60. significant	1470	1.54	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average,	Average crown form - irregular, over-extended branches to N and NW	Low	20-50	Reduce over-extended branches in lower crown to N and NW through reduction pruning by 10-20%	High	15.00	707	4.0	none
14	<i>Eucalyptus camaldulensis</i> River red gum	2.08 regulated	640	0.7	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average,	Average crown form - irregular, bias to S,	Low	20-50	none,	High	7.68	185	2.8	none
16	<i>Eucalyptus camaldulensis</i> River red gum	3.45. significant	1100	1.11	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average, epicormic shoots - minor	Good Over extended branches to SW over bike track	Low	20-50	Reduce over-extended branches to SW over bike track through reduction pruning by 10-25%	High	13.20	547	3.5	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
17	<i>Eucalyptus camaldulensis</i> River red gum	2.50. regulated	780	0.82	medium (10-20m)	(i) character/visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average, borer activity - moderate,	Average bias to S, leaning trunk - minor, previous upper stem failure to South, irregular crown	Low	20-50	none,	High	9.36	275	3.0	none
18	<i>Eucalyptus camaldulensis</i> River red gum	1.89	590	0.65	medium (10-20m)		Average foliage density - average,	Good	Low	20-50	none,	Medium	7.08	157	2.8	none
19	<i>Eucalyptus camaldulensis</i> River red gum	3.70. significant	1130	1.35	medium (10-20m)	(a) character/amenity (c) habitat value (e) biodiversity value (f) notable visual element	Average foliage density - average,	Average crown form - narrow upright, bark inclusions main stems - minor, old branch failures at ~6m to W and ~8m in centre	Low	20-50	none,	High	13.56	578	3.8	none

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
20	<i>Ficus macrophylla</i> Moreton Bay fig	5.72. significant	1820	1.82	medium (10-20m)	(a) character/amenity	Below average some foliage with burnt tips, major dieback on NW side, dead vascular tissue on ~30% of trunk, dead vascular tissue on western and upper sides of branches, foliage predominantly epicormic shoots, short life expectancy,	Poor broad spreading, bias to SE, Dead and decaying trunk wood on NW side of main trunk with structural cracks developing, increasing instability as root decay occurs on NW side and high level of leverage on SE side.	Moderate	<10	Remove tree	Low	15.00	707	4.3	Overall site to be raised by ~1200mm to create base podium for buildings (>50 of TPZ) Works within SRZ. Building 5 encroaches into TPZ by ~354m² (50%). Works within SRZ. Major impact on tree. Remove tree to facilitate current proposal subject to planning consent.

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
21	<i>Corymbia maculata</i> Spotted gum	2.70. regulated	820	0.92	medium (10-20m)	(a) character/ amenity	Below average foliage density - average, foliage chlorotic, located in raised mound. Short life expectancy.	Average single trunk, crown form - irregular, several previous branch failures, two due to bark inclusions	Low	<10	Remove tree	Low	9.84	304	3.2	Overall site to be raised by ~1200mm to create base podium for buildings (~100 of TPZ) Works within SRZ. Building 6 encroaches into TPZ by ~117m² (40%). Works within SRZ. Major impact on tree. Remove tree to facilitate current proposal subject to planning consent.

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
22	<i>Eucalyptus cladocalyx</i> Sugar gum	1.91	620	0.67	small (<10m)		Good	Average crown form - irregular, previously lopped,	Low	20-50	Remove tree to facilitate development.	Medium	7.44	174	2.8	Building 6 encroaches into TPZ by ~30%. Works within SRZ. Major impact on tree. Remove tree to facilitate current proposal. Development consent not required.

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
23	<i>Pinus halepensis</i> Aleppo pine	2.98. regulated	950	0.99	medium (10-20m)	(a) character/ amenity	Good	Good low branches,	Low	20-50	Remove tree to facilitate development, subject to planning consent	High	11.40	408	3.3	Overall site to be raised by ~1200mm to create base podium for buildings (100% of TPZ) Works within SRZ. Basment level tunnel between RACF and Building 7 within TPZ. RACF building encroaches into TPZ by ~25%. Major impact on tree. Remove tree to facilitate current proposal subject to planning consent.

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
24	<i>Eucalyptus spathulata</i> Swamp mallet	2.05. regulated	660	0.73	small (<10m)	none	Below average foliage density - average, dead branches - moderate, short life expectancy	Average, irregular, sparse crown	Low	<10	Remove	Low	7.92	197	2.9	building footprint within TPZ by 33m² (17%). Earthworks to remove raised mound will encroach further into TPZ. Major impact on tree.
34	<i>Eucalyptus camaldulensis</i> River red gum	2.14. regulated	680	0.8	medium (10-20m)	(i) character/ visual amenity (ii) indigenous (iv) important habitat	Average foliage density - average, borer activity - moderate,	Good	Low	20-50	none,	High	8.16	209	3.0	none all proposed works outside TPZ
35	<i>Eucalyptus camaldulensis</i> River red gum	2.37. regulated	720	0.9	medium (10-20m)	(i) character/ visual amenity (ii) indigenous (iv) important habitat	Good	Average crown form - narrow upright, bark inclusion branches - future branch failures possible	Low	10-20	none,	High	8.64	235	3.2	none all proposed works outside TPZ
36	<i>Lagunaria patersonia</i> Norfolk Island hibiscus	2.10. exempt species	580	0.72	medium (10-20m)		Good	Good	Low	20-50	none,	Medium	6.96	152	2.9	none all proposed works outside TPZ

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expectancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
37	<i>Eucalyptus leucoxylon</i> SA blue gum	2.40. regulated	720	0.85	medium (10-20m)	(i) character/ visual amenity	Average epicormics - moderate, borer activity moderate	Poor crown form - irregular, previous failure of central stem, over-extended branches, lower trunk wound - moderate	Moderate	10-20	Manage target zone to reduce risk or prune tree to reduce leverage of branches through reduction pruning and remove larger dead branches	Low	8.64	235	3.1	none all proposed works outside TPZ
38	<i>Eucalyptus camaldulensis</i> River red gum	2.90. regulated	880	1.01	medium (10-20m)	(i) character/ visual amenity (ii) indigenous (iv) important habitat	Good	Good	Low	20-50	none,	High	10.56	350	3.3	none all proposed works outside TPZ
39	<i>Eucalyptus camaldulensis</i> River red gum	2.74. regulated	850	0.93	medium (10-20m)	(i) character/ visual amenity (ii) indigenous (iv) important habitat	Poor dieback - major, short life expectancy	Average crown form - narrow upright, dead branches - large,	Low	<10	remove tree, consider habitat pruning.	Low	10.20	327	3.2	none all proposed works outside TPZ
40	<i>Schinus areira</i> Peppercorn tree	2.73. exempt species	860	0.86	medium (10-20m)		Average foliage density - average,	Good low branches,	Low	20-50	remove tree to facilitate service yard entry.	Medium	10.32	335	3.1	

Tree Survey
AVEO St Clair Integrated Retirement Community

Tree #	Species	Circumf. @ 1m (m)	DBH @ 1.4m (mm)	Dia. @ GL (m)	Height (m)	Attributes	Health	Structure	Risk	Life expect. ancy	Management recs	Retention Value	TPZ radius (m)	TPZ area (m²)	SRZ radius (m)	Impacts from development
41	<i>Schinus areira</i> Peppercorn tree	2.52 exempt species	530	0.64	small (<10m)		Average foliage density - average,	Average Regularly pruned under powerlines, limited future at site	Low	20-50	remove tree to facilitate service yard entry.	Medium	6.36	127	2.7	
42	<i>Corymbia maculata</i> Spotted gum	1.99	600	0.75	medium (10-20m)		Good	Good	Low	20-50	Remove tree to facilitate development.	Medium	7.20	163	2.9	Overall area to be raised by ~1200mm to create base podium for RACF building (100% of TPZ) Works within SRZ. RACF building encroaches into TPZ by ~27m² (16.6%) Service yard encroaches ~136m² (83.4%) Major impact on tree.





Aveo St Clair Integrated Community St Clair Avenue, St Clair Transport Impact Assessment

Client //	Aveo Group Limited
Office //	SA
Reference //	S130750
Date //	11/12/2018

Aveo St Clair Integrated Community

St Clair Avenue, St Clair

Transport Impact Assessment

Issue: A 11/12/2018

Client: Aveo Group Limited

Reference: S130750

GTA Consultants Office: SA

Quality Record


Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	11/12/2018	Final	Timothy Jones	David Kwong	David Kwong	

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1. Introduction

1.1 Background

A development application is currently being sought by Aveo for a proposed Integrated Community Development on land located on the corner of St Clair Avenue, Actil Avenue South and Woodville Road in St Clair. The proposed development incorporates 341 Independent Living Units across 6 buildings, a 144 bed RACF and associated on-site car parking.

GTA Consultants was commissioned by the Aveo Group Limited to undertake a transport impact assessment of the proposed development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- i existing traffic and parking conditions surrounding the site
- ii parking demand likely to be generated by the proposed development
- iii suitability of the proposed parking in terms of supply (quantum) and layout
- iv traffic generation characteristics of the proposed development
- v proposed access arrangements for the site
- vi transport impact of the development proposal on the surrounding road network.

1.3 References

In preparing this report, reference has been made to the following:

- o City of Charles Sturt Development Plan, consolidated 30 January 2018
- o Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- o Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- o Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- o plans for the proposed development prepared by Brown Falconer
- o various technical data as referenced in this report
- o other documents as nominated.

2. Existing Conditions

2.1 Subject Site

The subject site is located on the corner of St Clair Avenue, Actil Avenue South and Woodville Road in St Clair. The site of approximately 37,400m² has frontages of 127m to Actil Avenue South, 316m to St Clair Avenue and 75m to Woodville Road.

The site is located within a District Centre zone and is currently partially occupied by an existing oval and children's playground.

The surrounding properties are primarily residential land uses, with the exceptions of the St Clair Recreational Centre, Woodville High School and Woodville Football Club.

The location of the subject site and the surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and its Environs



(PhotoMap courtesy of NearMap Pty Ltd)

2.2 Road Network

2.2.1 Adjoining Roads

Woodville Road

Woodville Road is a two-way road aligned in an approximate north-east/south-west direction. In the vicinity of the subject site, it is configured with a 15.1-metre-wide carriageway with two travel lanes in each direction, set within a 21.5 metre wide road reserve (approx.).

Based on data available from Location SA, Woodville Road is estimated to carry approximately 21,400 vehicles per day in the vicinity of the subject site.

St Clair Avenue

St Clair Avenue is a two-way road aligned in an approximate east/west direction. It is configured with a 9.2-metre-wide carriageway with one travel lane in each direction, set within a 21.2 metre wide road reserve (approx.). Indented angled parking is provided along St Clair Avenue located on both sides of the carriageway. An extension to St Clair Avenue is currently under construction to provide direct connection to Woodville Road.

Actil Avenue South

Actil Avenue South is a two-way road aligned in an approximate north-east/south-west direction. It is configured with a 7.6-metre-wide carriageway, set within a 15 metre wide road reserve (approx.). On-street parallel parking is permitted along the length of Actil Avenue South. Actil Avenue South provides a pedestrian/cyclist connection to the existing Outer Harbour Greenway.

Local Roads

Other local roads within the vicinity of the site include Cameo Street and Swans Place.

2.2.2 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- St Clair Avenue/Cameo Street, unsignalised T intersection (All Turning Movements)
- St Clair Avenue/Actil Avenue South, unsignalised 4-way intersection (All Turning Movements)
- St Clair Avenue/Woodville Road (currently under construction), unsignalised T-intersection (Left In/Left Out).

2.2.3 Crash Data

Crash data on the most recent five-year period available (2012-2016) has been sourced from DPTI. Figure 2.2 shows that no incidents have been recorded along Actil Avenue South or St Clair Avenue adjacent the subject site.

Figure 2.2: Crash Data (2012 – 2016)



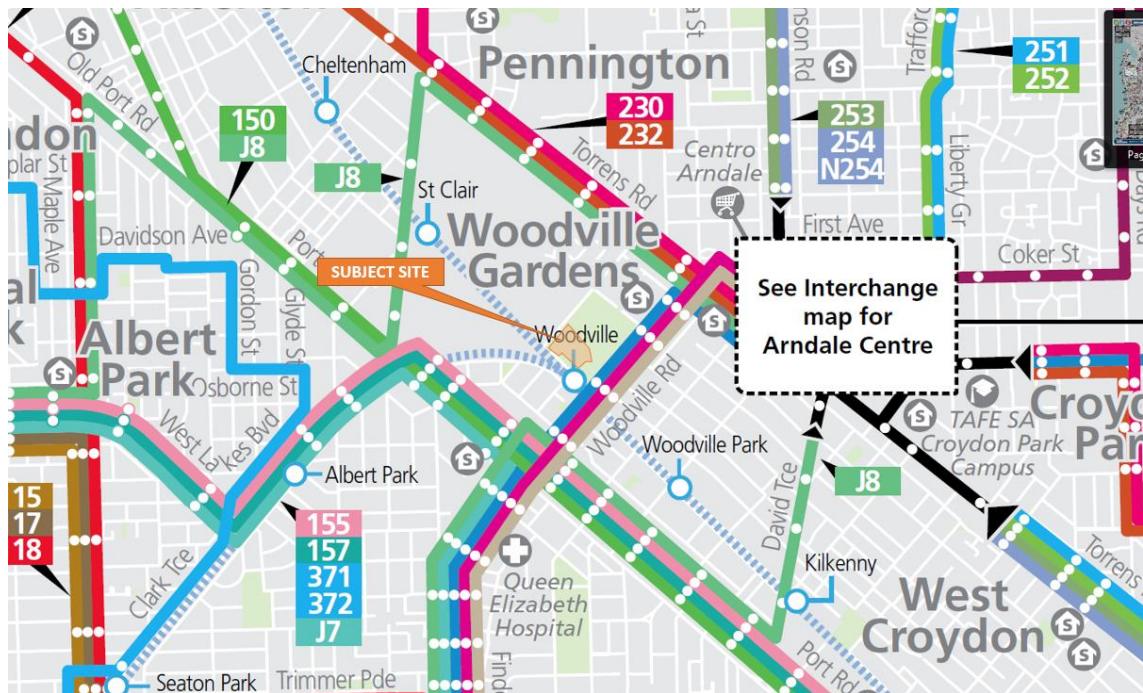
2.3 Sustainable Transport Infrastructure

2.3.1 Public Transport

Figure 2.3 shows the subject site in relation to existing public transport routes within its vicinity. The subject site is located approximately 150m from the nearest bus stop, providing connection to key services such as Arndale Shopping Centre, Glenelg Interchange and Marion Centre Interchange.

In addition to road based public transport, Woodville Railway station on the Grange and Outer Harbour line is located immediately adjacent the site to the south. As the train station is serviced by two separate rail services, the station has a scheduled frequency of 15 minutes or less between 7.30am and 6.30pm Monday to Friday and a scheduled frequency of 30 minutes or less at night, Saturday, Sunday and public holidays.

Figure 2.3: Public Transport Map

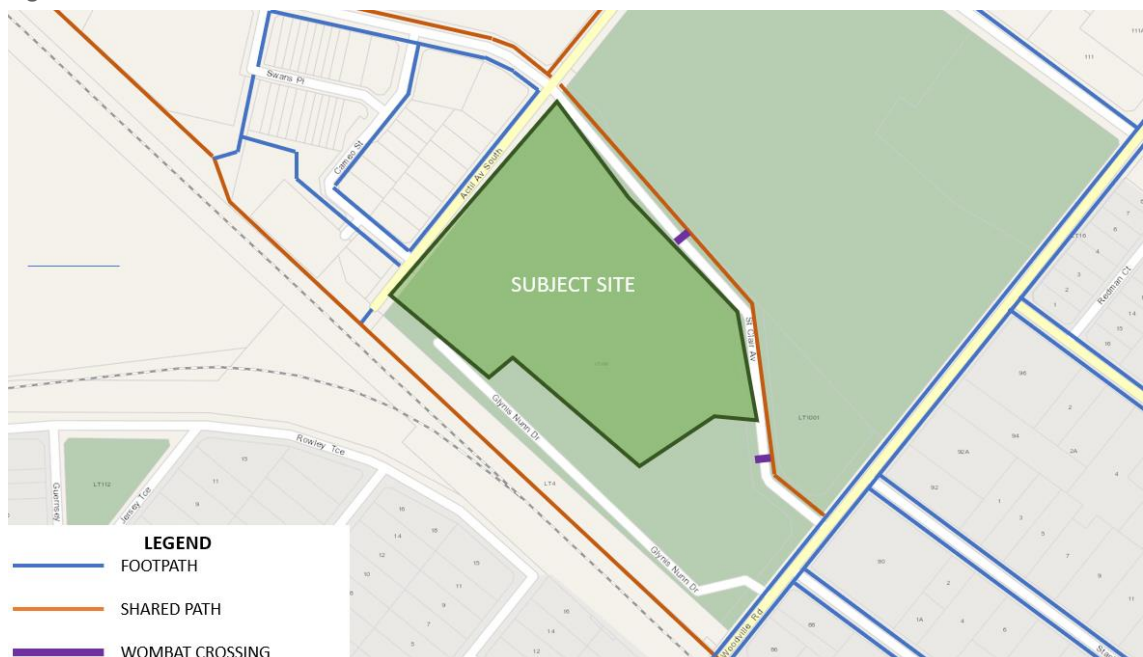


2.3.2 Pedestrian Infrastructure

Pedestrian paths are located on either side of St Clair Avenue and Woodville Road, and are located on the western side of Actil Avenue South. The Outer Harbour Greenway is an existing sealed pedestrian and cycling shared path adjacent the site travelling along the Outer Harbour Railway Line connecting to the CBD.

The surrounding pedestrian infrastructure (including currently under construction on St Clair Avenue) is outlined in Figure 2.4.

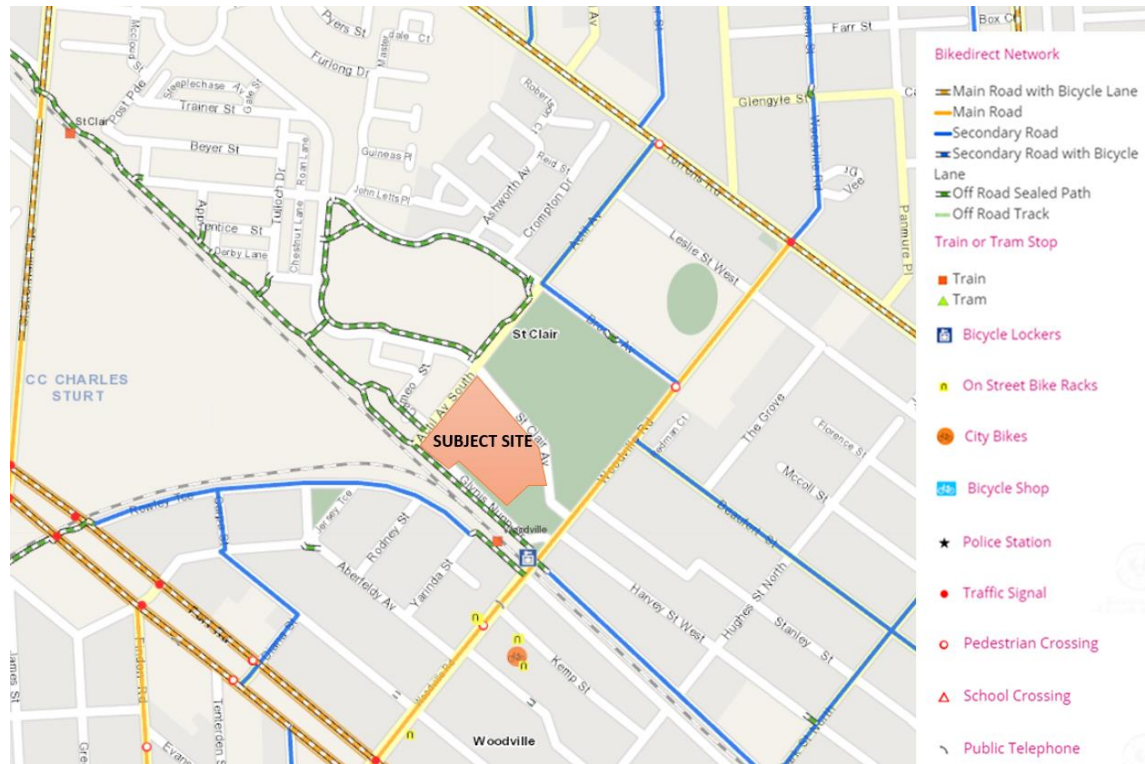
Figure 2.4: Pedestrian infrastructure



2.3.3 Cycle Infrastructure

The cycling infrastructure in the vicinity of the subject site is shown in Figure 2.5.

Figure 2.5: Cycling Infrastructure



(Reproduced from CycleInstead Website)

3. Development Proposal

3.1 Land Uses

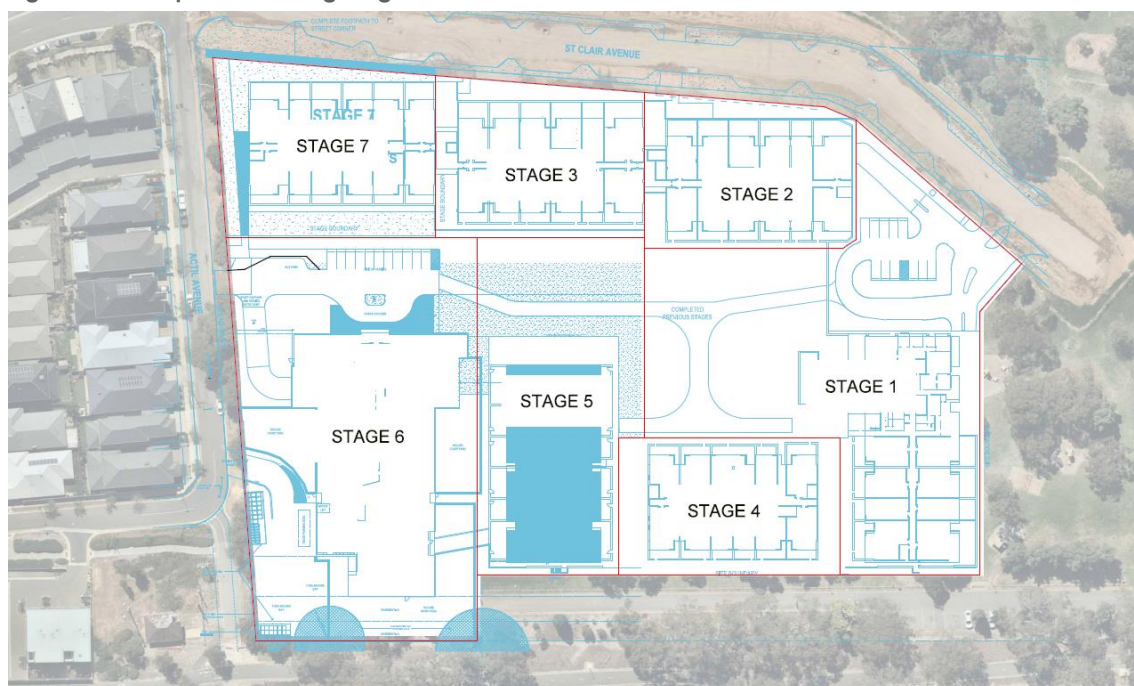
The proposal includes the construction of an aged care facility comprising of 341 independent living units across 6 buildings, a 144 bed RACF and associated at-grade and basement car parking. Building 1 is proposed to also include an ancillary Aveo administration office and ancillary community centre facilities.

The Aveo office will operate in conjunction with the Aveo St Clair Integrated Community Development. The community centre facilities are to be only used by residents of the proposed development and their families and friends (visitors to the site).

3.1.1 Staging

The proposed development is to be staged across 7 Stages, with the different stages illustrated in Figure 3.1.

Figure 3.1: Proposed Building Stages



A breakdown of the uses associated with the relevant stages are outlined in Table 3.1.

Table 3.1: Staging Land Use Summary

Stage	No. of Apartments/ILUs	No. of Supported Accommodation Beds	Size of Office (sq.m)
Stage 1	62	-	61
Stage 2	60	-	-
Stage 3	60	-	-
Stage 4	55	-	-
Stage 5	60	-	-
Stage 6	-	144	-

Stage	No. of Apartments/ILUs	No. of Supported Accommodation Beds	Size of Office (sq.m)
Stage 7	44	-	-
TOTAL	341 Apartments/ILUs	144 Beds	61 sq.m

3.2 Car Parking

The proposal provides a total of 416 car parking spaces, including 355 car parking spaces (345 basement spaces, 10 at-grade spaces) for the Independent Living Units and 61 (50 basement spaces, 11 at-grade spaces) car parking spaces associated with the RACF.

3.2.1 Staging

The basement and at-grade on-site parking is also to be staged across 7 Stages, with staging of the basement and at-grade car parking is illustrated in Figure 3.2 and Figure 3.3 respectively.

Figure 3.2: Basement Car Park Staging

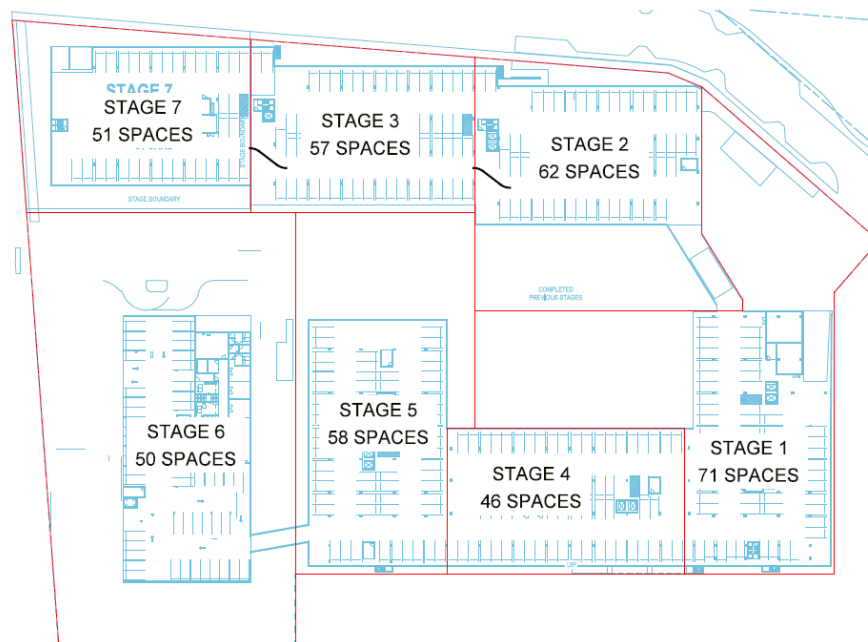
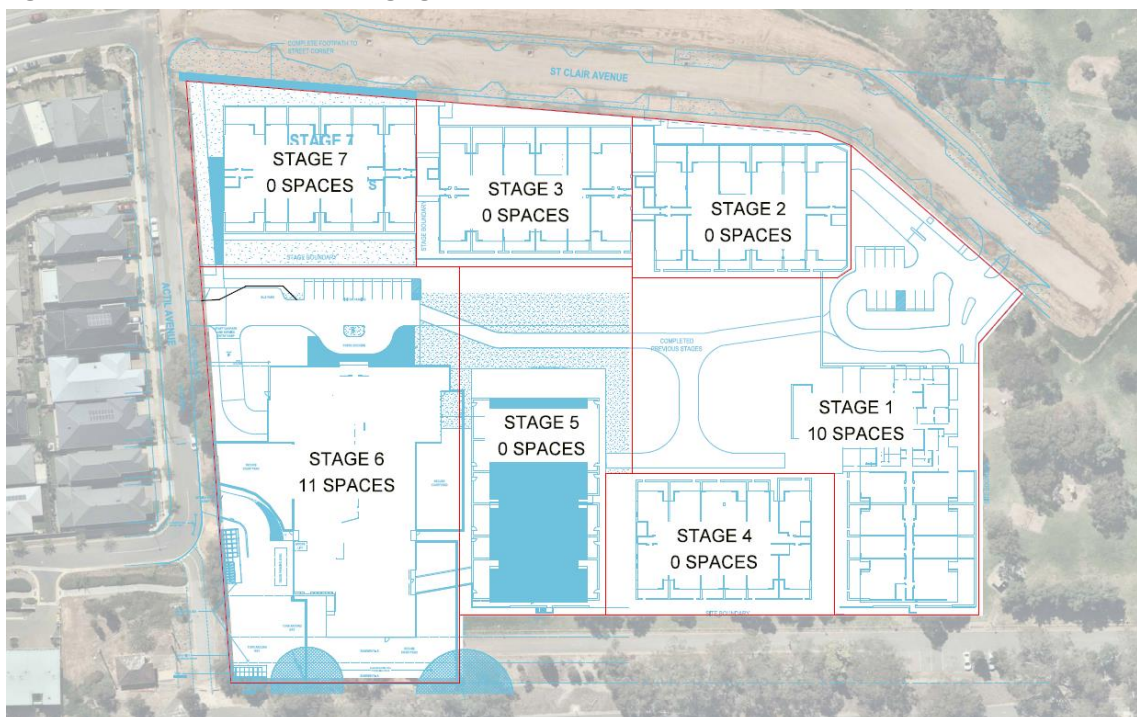


Figure 3.3: At-Grade Car Park Staging



A breakdown of the number of car parking spaces associated with the relevant stages are outlined in Table 3.2.

Table 3.2: Staging Car Parking Summary

Stage	No of Parking Spaces Underground	No of Parking Spaces At-Grade	Total No of Parking Spaces
Retirement Village Parking			
Stage 1	71	10	81
Stage 2	59	-	59
Stage 3	57	-	57
Stage 4	46	-	46
Stage 5	61	-	61
Stage 7	51	-	51
RACF Parking			
Stage 6	50	11	61

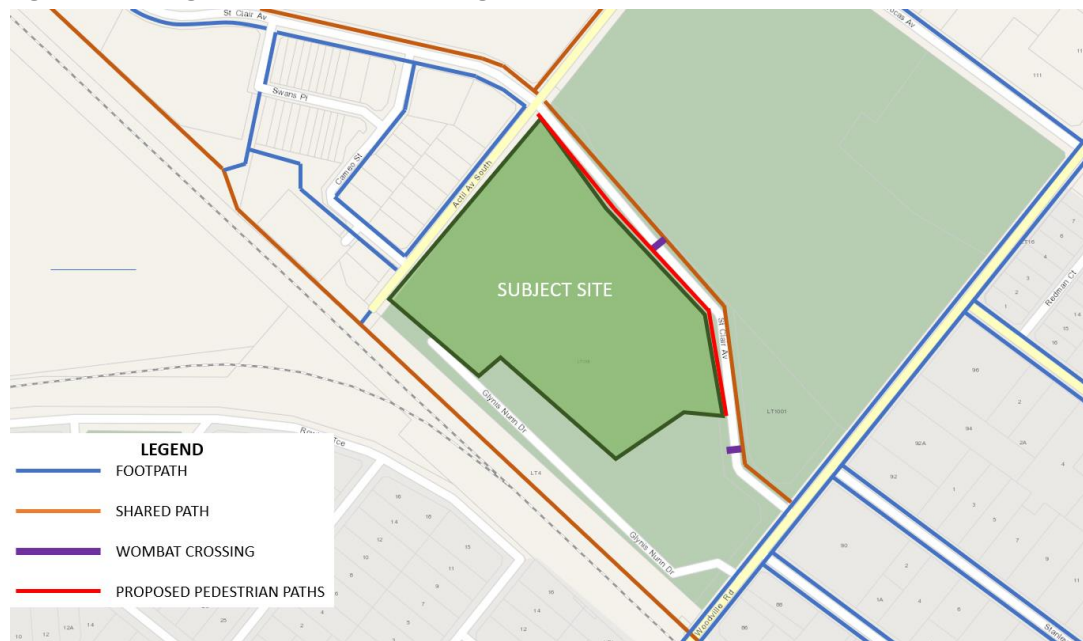
3.3 Vehicle Access

Light vehicle access is to be provided via St Clair Avenue and Actil Avenue South. Loading vehicle access is to occur via a separate access on Actil Avenue South.

3.4 Pedestrian Facilities

As part of the proposal, the proposed development provides footpaths along St Clair Avenue, providing connection to the surrounding infrastructure, as shown in Figure 3.4.

Figure 3.4: Integration with the Surrounding Pedestrian Infrastructure



3.5 Loading/Refuse Collection Areas

Loading is anticipated to be undertaken by vehicles up to a 10m Refuse Vehicle in length.

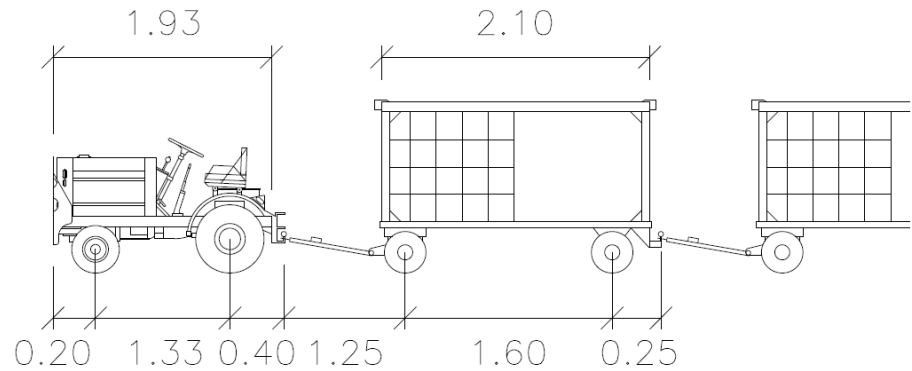
During all stages of the development, loading and refuse collection is to occur in the south-western corner of the site via Actil Avenue South.

3.6 Internal Waste Collection

Waste collection is to be undertaken by vehicles up to a 10.0m Refuse Vehicle, in the south western loading area. Waste bins are to be collected within the basement by a small tug vehicle and bin trailers from the respective buildings and transport them to/from the collection point. The anticipated size of the tug and bin trailers are shown in Figure 3.5. When the vehicle is required to undertake a u-turn within the parking aisle, the tug will not be towing any bin trailers. The ability for the tug vehicle (without any bin trailers) to undertake a u-turn within a general parking aisle is outlined in Figure 3.6.

To minimise the interactions between the tug and vehicles within the basement car parking area, the tug vehicle will collect and transport the waste bins outside of peak periods associated with the undercroft parking area. It is understood that the tugs will have an operational speed in the order of 6-8km/h when loaded. Therefore, it is anticipated that the internal waste collection will take under 45 minutes to transport the bins to the collection area for the whole of site.

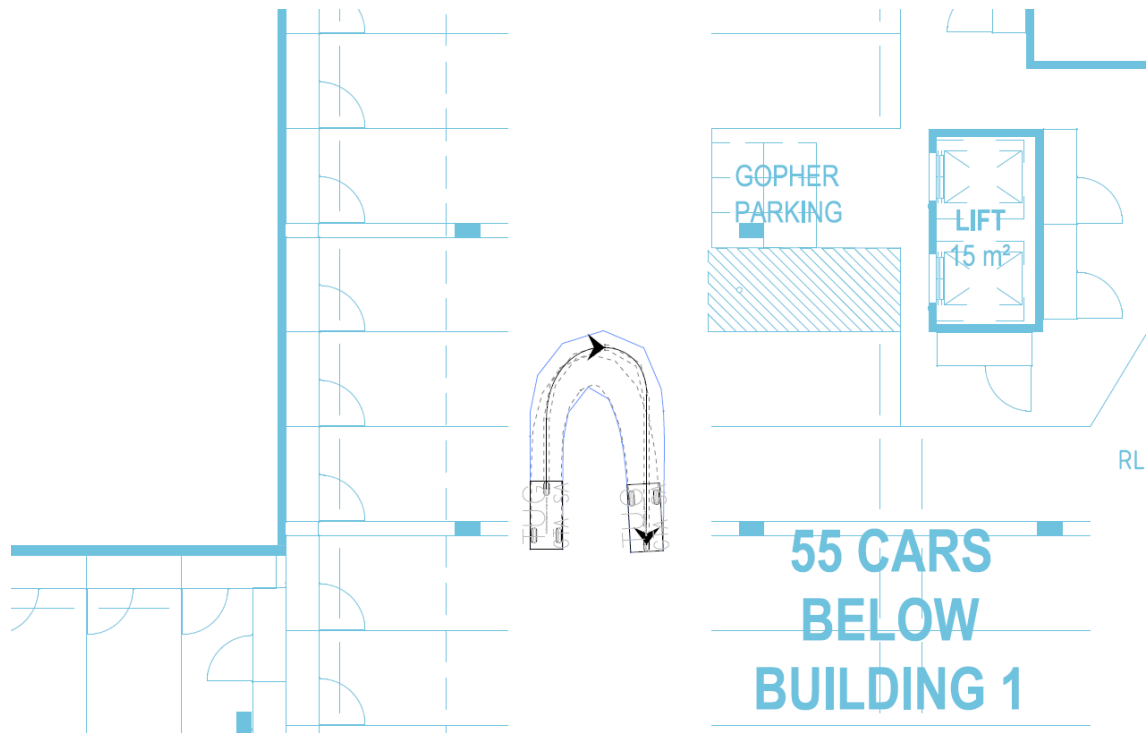
Figure 3.5: Tug Vehicle and Bin Trailer Dimensions



TUG AND TRAILERS

	meters		
Tractor Width	: 0.93	Lock to Lock Time	: 6.0
Cart Width	: 1.25	Steering Angle	: 62.8
Tractor Rear Track	: 0.86	Articulating Angle	: 70.0
Trailer Track	: 1.25		

Figure 3.6: Tug Vehicle U-Turn



4. Car Parking

4.1 Development Plan Car Parking Requirements

The proposed development is located within a District Centre zone within the Woodville Policy Area 5, located within 400 metres of the Woodville railway station. The Woodville railway station is serviced by the Grange and Outer Harbor rail services, providing a high frequency rail service (refer to Section 2.3.1) as per the Development Plan requirements, meeting the condition for a 'Designated Area'.

The proposed development is proposed to incorporate community centre facilities such as meeting halls and function rooms. It is understood that these facilities will be utilised by residents of the integrated community, and their families and friends (visitors). Therefore, the community centre facilities are considered to be ancillary to the development.

Car parking rates that are applicable to the proposed development are as follows:

Land Use	Parking Rate	Source
Residential development	0.75 car parking spaces per dwelling	Woodville Policy Area 5, Precinct Specific Provisions 47, pg 144
Supported accommodation	1 space for every 3 beds.	Table ChSt/2
Non-residential development excluding tourist accommodation (Office)	Minimum - 3 spaces per 100 square metres of gross leasable floor area	Table ChSt/2A

Based on the above rates, the Development Plan car parking requirements are set out in Table 4.1.

Table 4.1: Development Plant Parking Assessment

Use	Size	Empirical Parking Rate	Empirical Car Parking Requirement
Stage 1			
Residential Flat Building	62 units	0.75 spaces per unit	47
Office	61 sq.m	3 spaces per 100 sq.m	2
Stage 1 Total			49
Stage 2			
Residential Flat Building	60 units	0.75 spaces per unit	45
Stage 2 Total			45
Stage 3			
Residential Flat Building	60 units	0.75 spaces per unit	45
Stage 3 Total			45
Stage 4			
Residential Flat Building	55 units	0.75 spaces per unit	41
Stage 4 Total			41
Stage 5			
Residential Flat Building	60 units	0.75 spaces per unit	45
Stage 5 Total			45
Stage 6			
RACF	144 beds	1 space per 3 beds	48

Use	Size	Empirical Parking Rate	Empirical Car Parking Requirement
Stage 6 Total			48
<i>Stage 7</i>			
Residential Flat Building	44 units	0.75 spaces per unit	33
Stage 7 Total			33
Overall Retirement Village Total			258
Overall RACF Total			48
Overall Site Requirement			306

Based on the above, the parking assessment anticipates that the development proposal has a Development Plan parking requirement of 306 parking spaces, incorporating 258 spaces for the retirement village and 48 spaces for the RACF.

4.2 Empirical Assessment

By comparison, parking rates have been sourced for the parking rates for Independent Living Units from the Roads and Maritime Services of New South Wales (formerly RTA) in the "Guide to Traffic Generating Developments" published in 2002 (henceforth referred to as the RTA Guide). The applicable rates for the independent living units for visitors are as follows;

Units *2 spaces per 3 units (residents)*
plus 1 space per 5 units (visitors).

Based on the above rates, the empirical parking assessment is outlined in Table 4.2.

Table 4.2: Empirical Car Parking Assessment

Use	Size	Empirical Parking Rate	Parking Rate Source	Empirical Car Parking Requirement
Stage 1				
Independent Living Units	62 units	Resident - 2 spaces per 3 units	RTA Guide	41
		Visitor - 1 space per 5 units		12
Office	61 sq.m	3 spaces per 100 sq.m	Development Plan	2
Stage 1 Total				55
Stage 2				
Independent Living Units	60 units	Resident - 2 spaces per 3 units	RTA Guide	40
		Visitor - 1 space per 5 units		12
Stage 2 Total				52
Stage 3				
Independent Living Units	60 units	Resident - 2 spaces per 3 units	RTA Guide	40
		Visitor - 1 space per 5 units		12
Stage 3 Total				52
Stage 4				
Independent Living Units	55 units	Resident - 2 spaces per 3 units	RTA Guide	37
		Visitor - 1 space per 5 units		11
Stage 4 Total				48
Stage 5				
Independent Living Units	60 units	Resident - 2 spaces per 3 units	RTA Guide	40
		Visitor - 1 space per 5 units		12

Use	Size	Empirical Parking Rate	Parking Rate Source	Empirical Car Parking Requirement
Stage 5 Total				52
Stage 6				
RACF	144 Beds	1 space per 3 beds	Development Plan	48
Stage 6 Total				48
Stage 7				
Independent Living Units	44 units	Resident - 2 spaces per 3 units	RTA Guide	29
		Visitor - 1 space per 5 units		9
Stage 7 Total				38
Overall Retirement Village Total				297
Overall RACF Total				48
Overall Site Requirement				345

Based on the above, the empirical assessment anticipates that the development proposal has an empirical parking requirement of 345 parking spaces, incorporating 297 spaces for the retirement village and 48 spaces for the RACF.

4.3 Adequacy of Parking Supply

4.3.1 Parking Space Supply

Based on the staging of the development, and the parking provision following the completion of each of the stages is outline in Table 4.3.

Table 4.3: Parking Surplus Following Stage Completion

Completed Stage	Parking Spaces Provided Following Stage Completion	Development Plan Assessment	Empirical Assessment	Parking Space Surplus	
				Development Plan	Empirical Assessment
Retirement Village Parking					
Stage 1	81	49	55	32	26
Stage 2	140	94	107	46	33
Stage 3	197	139	159	58	38
Stage 4	243	180	207	63	36
Stage 5	304	225	259	79	45
Stage 7	355	258	297	97	58
RACF Parking					
Stage 6	61	48	48	13	13

Based upon the above table, it is clear that the proposed on-site car parking provision of 416 parking spaces will be more than capable of accommodating the peak parking demands likely to be generated by the development based on both the Development Plan assessment (306 parking spaces) and empirical assessment (345 parking spaces). It is also noted that following the completion of each of the stages, the proposed development readily satisfies the parking assessment requirements.

4.3.2 Accessible Parking Spaces

The National Construction Code 2016 Volume 1 Table D3.5 outlines the number of accessible car parking spaces required for new developments. Based on the intended land uses the buildings are considered to be the following class:

<i>Independent Living Units</i>	<i>Class 2 - accommodation for the aged, children or people with disabilities</i>
<i>RACF</i>	<i>Class 9c – an aged care building</i>

Based on the above building classes, the following accessible car parking rates apply to the proposed development.

<i>Class 2 (Accommodation for aged, disabled or children)</i>	<i>1 space for every 100 parking spaces or part thereof.</i>
<i>Class 5, 7, 8 or 9c</i>	<i>1 space for every 100 parking spaces or part thereof.</i>

The accessible parking spaces required across the various stages of the development are outlined in Table 4.4

Table 4.4: Staging Accessible Parking Space Requirement

Completed Stage	Parking Spaces Provided Following Stage Completion	Accessible Parking Space Rate	Accessible Parking Spaces Required (Accumulative)	Proposed Accessible Parking Spaces (Accumulative)
Retirement Village Parking				
Stage 1	81	1 space for every 100 parking spaces	1	2
Stage 2	140		2	2
Stage 3	197		2	3
Stage 4	243		3	4
Stage 5	304		4	5
Stage 7	355		4	5
Retirement Village Total			4	5
RACF Parking				
Stage 6	61	1 space for every 100 parking spaces	1	1
RACF Total			1	1

Based on the table above, the proposed Independent Living Units require a total of 4 accessible parking spaces and the RACF requires 1 accessible spaces. The overall provision of 6 accessible parking spaces will meet the above National Construction Code accessible parking space requirement for each stage of the proposed development.

4.4 Car Parking Layout

The parking layout has been generally designed in accordance with Australian Standard/New Zealand Standard for Off Street Car parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009).

Some key design features are as follows:

- Parking spaces shall be a minimum 2.6m wide and 5.4m in length set within a minimum 5.8m wide parking aisle, meeting the requirements for a User Class 3 facility.
- Accessible parking space and associated shared space shall be a minimum 2.4m wide and 5.4m in length set within a minimum 5.8m wide parking aisle. The accessible space located within Building 4 does not provide 300mm clearance to the staircase wall

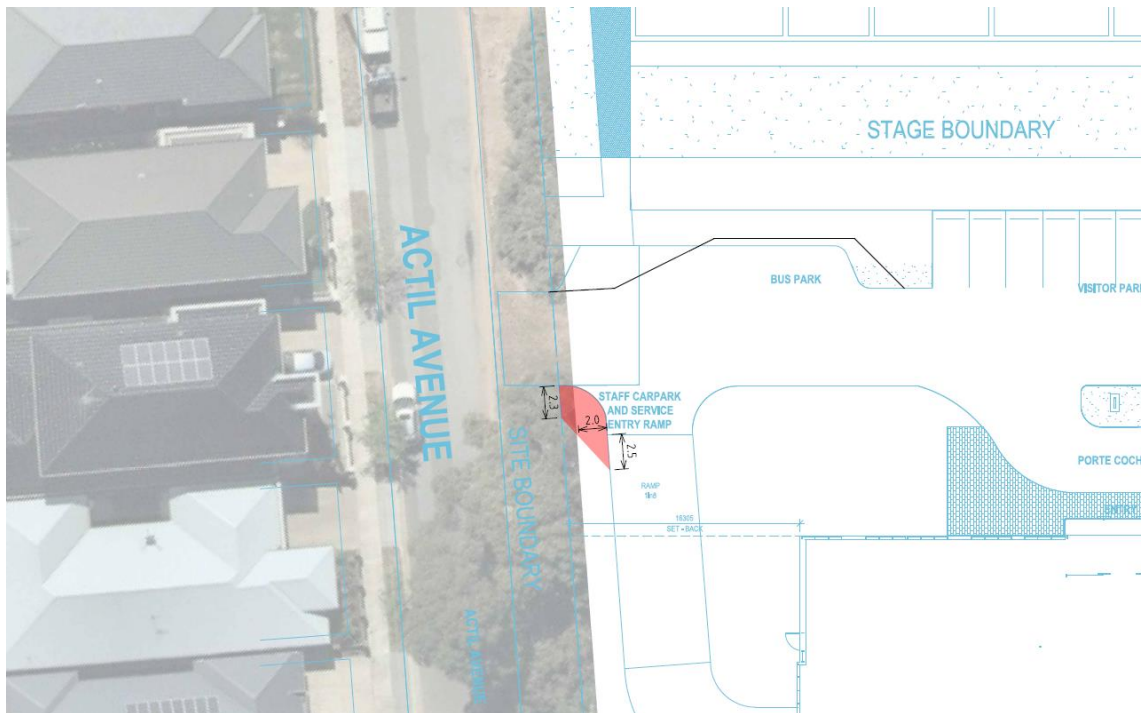
adjacent the parking space. It is recommended that the space and shared area be moved by 300mm to provide clearance to the stair case. **This can be reviewed within Detailed Design.**

- One parking space within the basement of Building 4 is located adjacent a stairwell. It is recommended that the parking space be changed to a small car space to provide 300mm clearance to the stairwell. **This can be reviewed within Detailed Design.**
- Small car parking spaces shall be a minimum 2.3m wide and 5.0m in length set within a minimum 5.8m wide parking aisle.
- Where parking is located on one side of an aisle only and the other side is confined by a wall, the parking aisle shall be a minimum 6.1m wide.
- Where circulation aisles (no parking) are located with vertical obstructions greater than 150mm high (i.e. walls or columns) are located on one or both sides of the aisle, the circulation aisle shall provide a minimum 5.5m wide travel lane plus 300mm clearance to each vertical obstruction.
- The proposed basement car parking area shall provide a minimum 2.2m head height clearance, with a minimum 2.5m head height clearance above accessible parking spaces and associated shared space.
- Maximum gradients within the car park adjacent the car parking spaces shall be a maximum of 1:20 or 1:40 adjacent accessible spaces.
- To allow for adequate pedestrian and vehicular sightlines, it is recommended that the areas outlined in Figure 4.1 and Figure 4.2 are to remain free of sightline obstructions.

Figure 4.1: St Clair Avenue Sightline Area

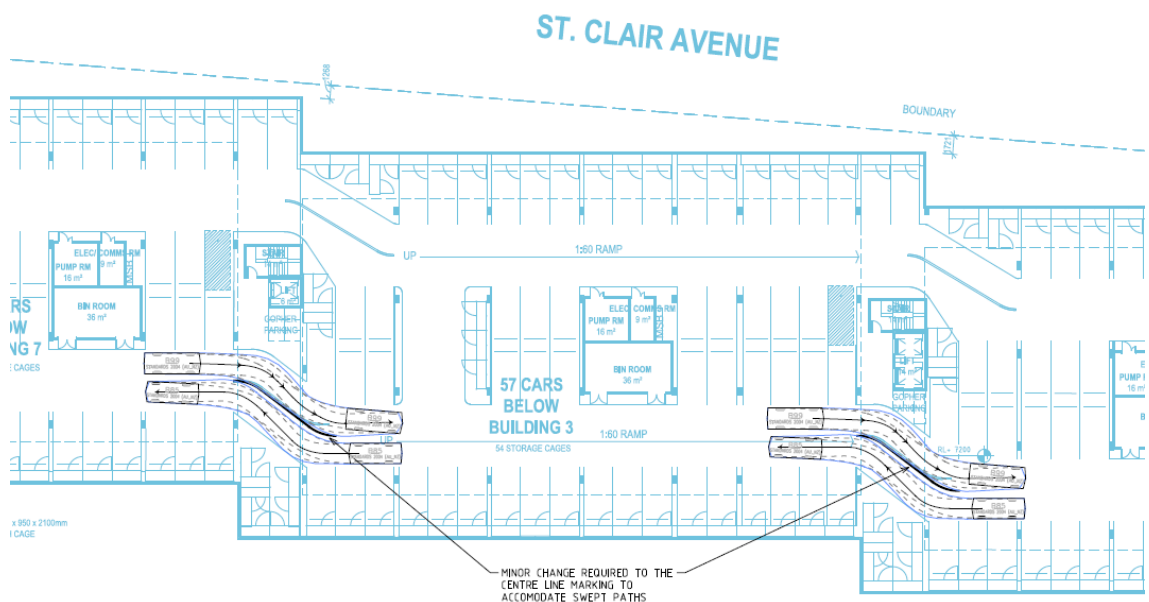


Figure 4.2: RACF Sightline Area



- Centre line marking within Building 2, 3 and 7 does not allow for simultaneous movements without the vehicle crossing the centreline. It is recommended that the line marking be adjusted to remain clear of the swept paths, as shown in Figure 4.3. **This can be reviewed within detailed design.**

Figure 4.3: Line Marking Alterations



- One metre blind aisle extensions shall be provided where required across the various stages of the development.
- Turn around provisions shall be provided where required across the various stages of the development.

GTA Consultants have not assessed the ramp gradients for the entry and exit ramps associated with the basement car parking. Ramp gradients are assessed as part of Greenhills Australia's reporting.

5. Sustainable Transport Infrastructure

5.1 Bicycle End of Trip Facilities

The City of Charles Sturt Development Plan outlines a bicycle parking rate of 3 parking spaces per 50 employees. It is understood that the proposed RACF anticipates in the order of 52 employees on site at any one time and the proposed Retirement Village will have in the order of 8 employees (grounds keepers, Aveo offices etc) on site at any one time. This results in a bicycle parking requirement of 3 bicycle parking spaces for the RACF and 1 bicycle parking space for the Retirement Village.

The RACF provides a total of 3 bicycle parking spaces at grade and the Retirement Village provides 1 bicycle parking rail, meeting the Development Plan requirement.

5.2 Walking and Cycling Network

Pedestrian footpaths are present on existing road network surrounding the subject site. The proposed development provides connections to the exiting walking and cycling network.

5.3 Public Transport

The site is accessible by public transport as discussed in Section 2.3.1.

6. Loading Facilities

6.1 Development Plan Requirements

Principle of Development Control (PDC) 14 of the Transportation and Access section of the Development Plan states the following:

Development should provide for the on-site loading, unloading and turning of all traffic likely to be generated.

6.2 Proposed Delivery/Loading/Waste Collection Arrangements

6.2.1 Loading/Deliveries

It is understood that the proposed RACF will have a range of deliveries per day for the various delivery and waste collection requirements of the site. Information provided to GTA based on a similar Aveo RACF in Durack, QLD has a delivery schedule as follows:

- Food/kitchen deliveries 4 deliveries per day
- Linen collection and delivery 2 deliveries per week
- 'Other' deliveries (courier, other supplies) 5 deliveries per day
- Waste collection 1 collection per day

Based on the above, it is anticipated that the site will experience a similar delivery schedule, resulting in between 10 and 15 delivery/collection vehicles per day. It is anticipated that the majority of the delivery vehicles will be via light vehicle, with the largest anticipated delivery vehicle being an 8.8m MRV. Refuse collection is anticipated to occur by vehicles up to 10.0m in length.

It is also anticipated that delivery vehicles associated with the Independent Living Units be primarily via light vehicles.

6.2.2 Refuse Collection

Stages 1 to 5

Refuse collection during Stages 1 to 5 will occur to the south-western corner of the site within an at-grade hardstand area. The largest commercial vehicle to access the loading/waste area is anticipated to be a refuse vehicle up to 10m in length. The refuse vehicle will enter the site in a forward direction via Actil Avenue South, position the vehicle in close proximity to the refuse collection area, and then exit to Actil Avenue South in a forward direction.

A swept path assessment of the refuse collection area for a 10m Refuse Vehicle entering the site to undertake refuse collection and vehicle egress is outlined in Figure 6.1 and Figure 6.2 respectively.

Figure 6.1: Stages 1 to 5 - 10m Refuse Vehicle Ingress

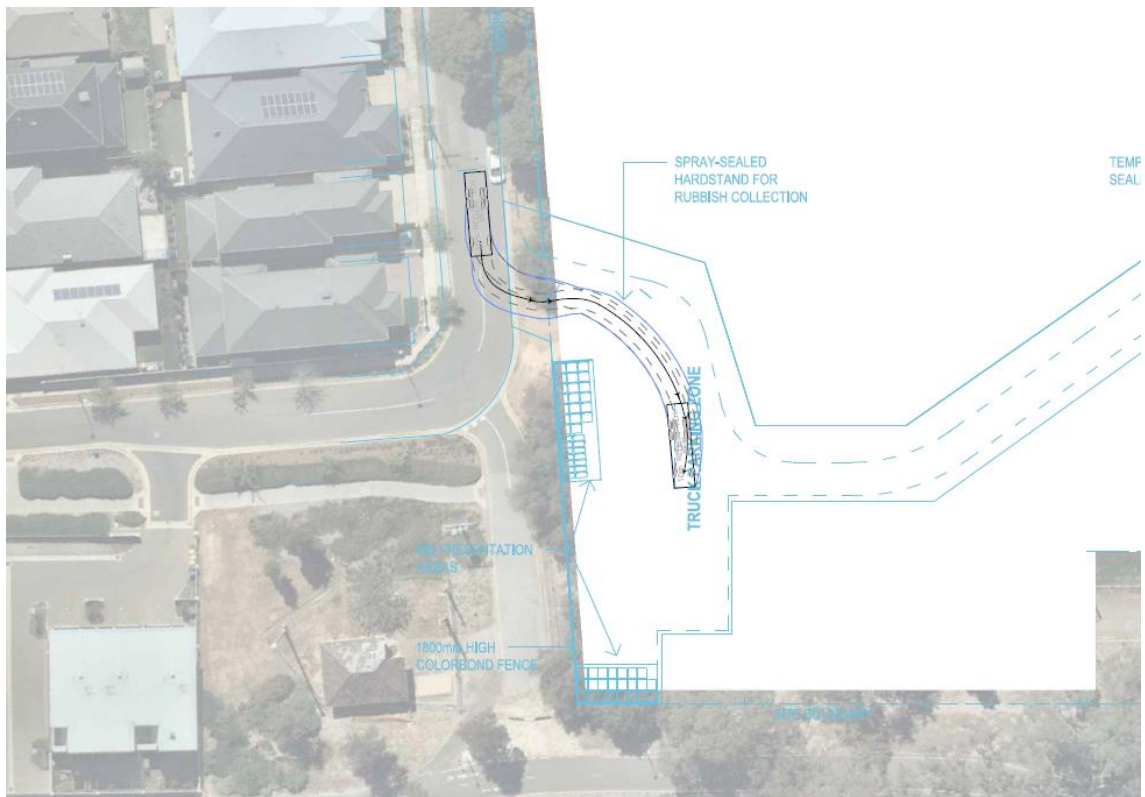
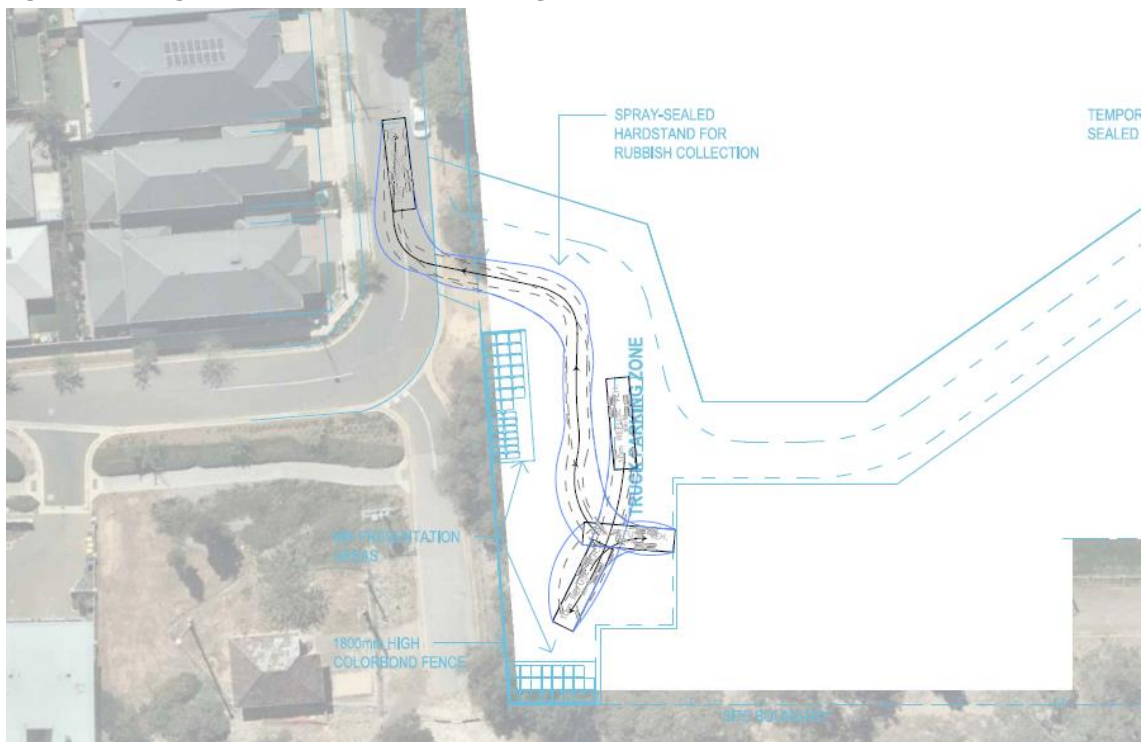


Figure 6.2: Stages 1 to 5 - 10m Refuse Vehicle Egress



It is understood that the refuse bins located from each of the respective buildings will be collected by a small tug vehicle, transported to the designated refuse collection area.

Following Completion of Stage 6

Loading/refuse collection will occur to the south-western corner of the RACF building. Refuse and loading vehicles will enter the site in a forward direction via Actil Avenue, undertake loading/refuse collection, and then exit to Actil Avenue in a forward direction. It is understood that the refuse bins located from each of the respective buildings will be collected by a small tug vehicle, transported to the goods lift to be moved to the bin presentation area.

A swept path assessment of the site for a 10m Refuse Vehicle entering exiting the site to undertake refuse collection and vehicle egress is outlined in Figure 6.3 and Figure 6.4 respectively.

Figure 6.3: Following Completion of Stage 6 - 10m Refuse Vehicle Ingress

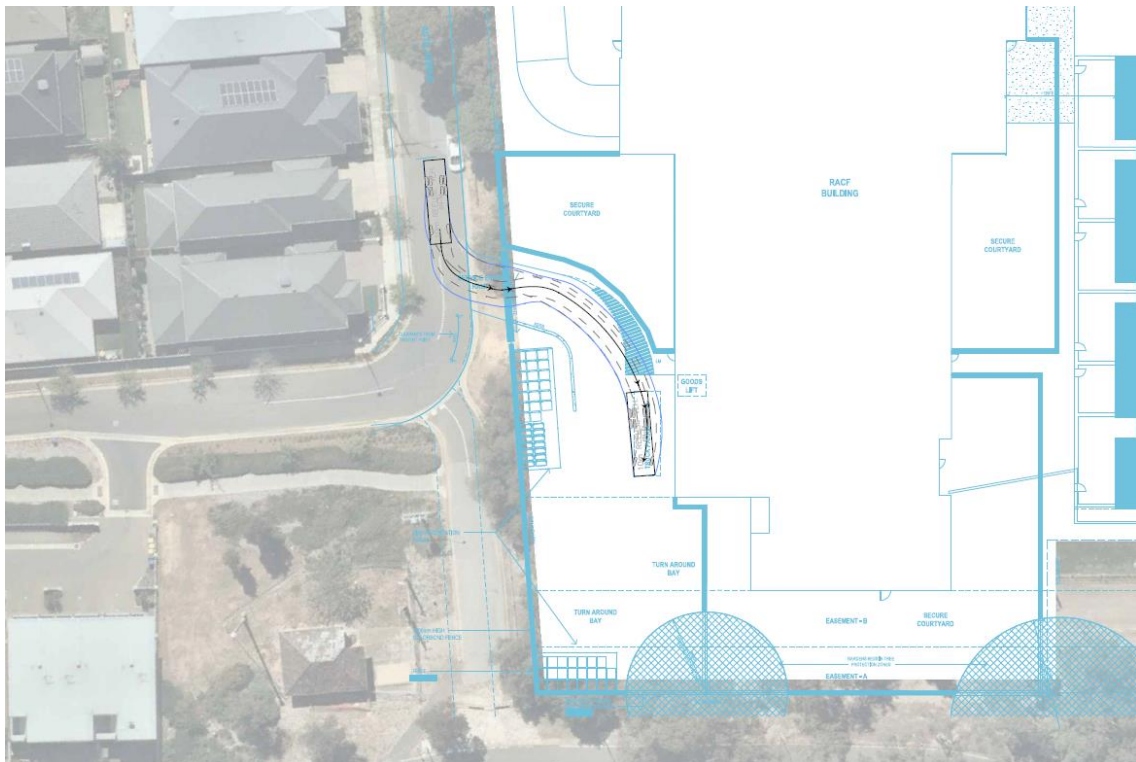
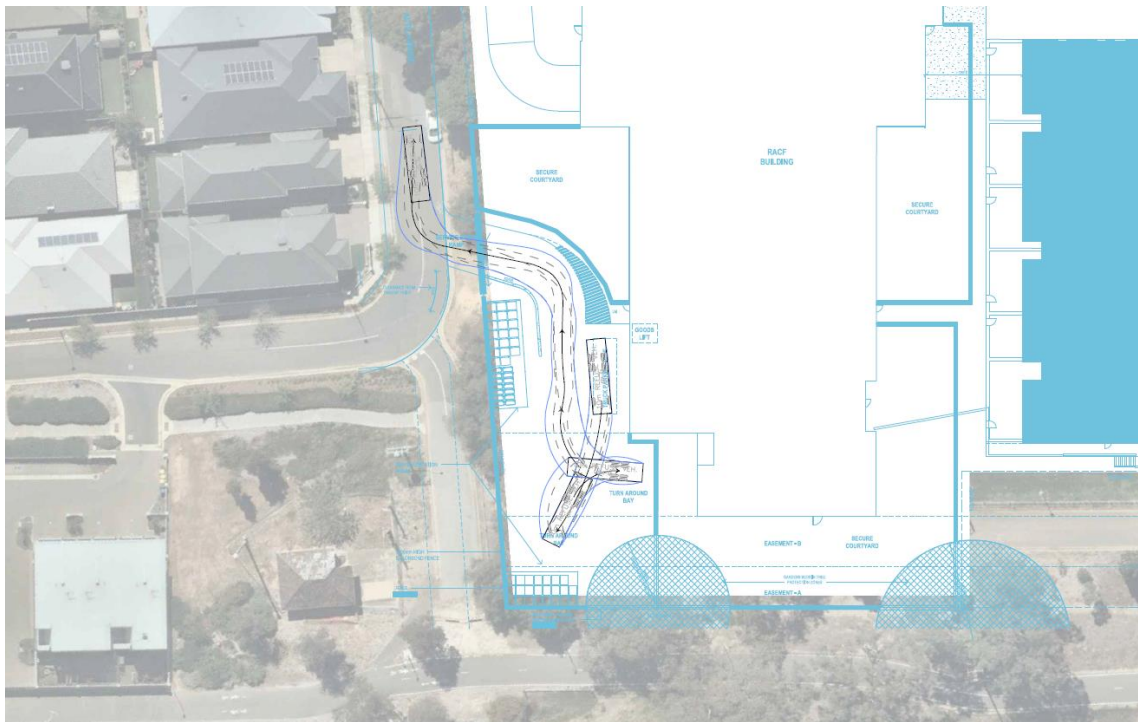


Figure 6.4: Following Completion of Stage 6 - 10.0m Refuse Vehicle Egress

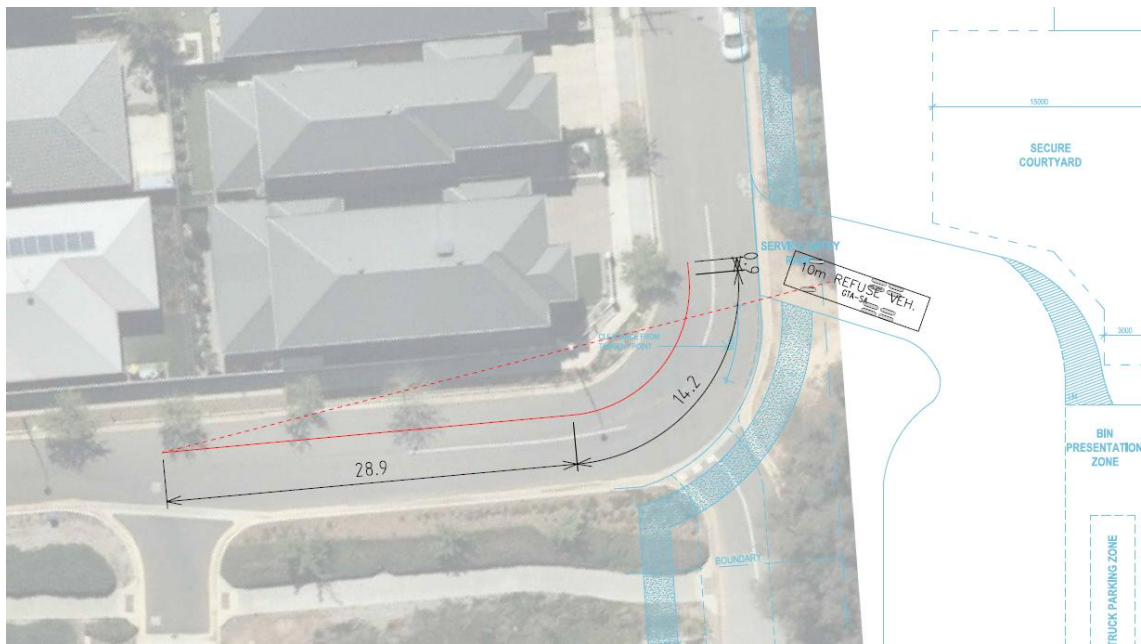


6.3 Loading Sightlines

The proposed loading access is located 6.0m away from the tangent point of the intersection of Cameo Street, Actil Avenue South and the council owned lane. In the vicinity of the access, Cameo Street contains two 90-degree angle bends with a small acceleration opportunity between them. The small acceleration opportunity and the tight radius bend directly adjacent the access is expected to reduce vehicles speed to approximately 25km/h. A 25km/h design speed requires a Safe Intersection Sight Distance (SISD) of 42m. It is noted that the section of Cameo Street services a small number of dwellings. It is anticipated that most of the dwellings along the northern section of Cameo Street utilise St Clair Avenue and utilise the section adjacent the loading access.

Given the angle of the proposed access and the alignment of Cameo Street, it is anticipated that vehicles will be positioned a minimum of 5.0m back from the kerb to provide greater sight lines. As illustrated in Figure 6.5, sightlines measured 5.0m from the kerb provides approximately 44m of sight distance. It is noted that if vehicles are positioned further back from the kerb will have greater sightlines.

Figure 6.5: Loading Access Sightlines to the West



6.4 Internal Waste Collection

Waste from each building is to be sorted within waste rooms within the basement car parking areas. Waste is to be transported from these rooms to the rear loading area by small tug vehicles with bin trailers. The vehicle will traverse through the basement car park to the waste rooms, collecting the waste bins, and move them to the designated collection point.

6.4.1 Stages 1 to 5

Refuse collection for Stages 1 to 5 of the proposed development is proposed to occur within the south-western corner of the site. The small tug vehicle will transport the bins from the building bin rooms to the refuse collection point within the at-grade car parking area. The at-grade path of the tug waste vehicle will be the same for Stages 1 to 4, with a slightly different path during Stage 5.

The ability for the anticipated small tug and bin trailers to collect the waste from the basement storage to the top of the Building 1 Ramp Stage 1, 2, 3, 4 and 5 of the development is outlined in Figure 6.6 to Figure 6.10. The ability to transport the waste bins to/from the Building 1 ramp to at-grade waste collection area is outlined in Figure 6.11 to Figure 6.14.

It is noted that during Stages 1, 2 and 3, the small tug vehicle will be required to disconnect from the bin trailers, turn the vehicle and bin trailers around individually and reattach to complete the collection.

Figure 6.6: Stage 1 Basement Collection

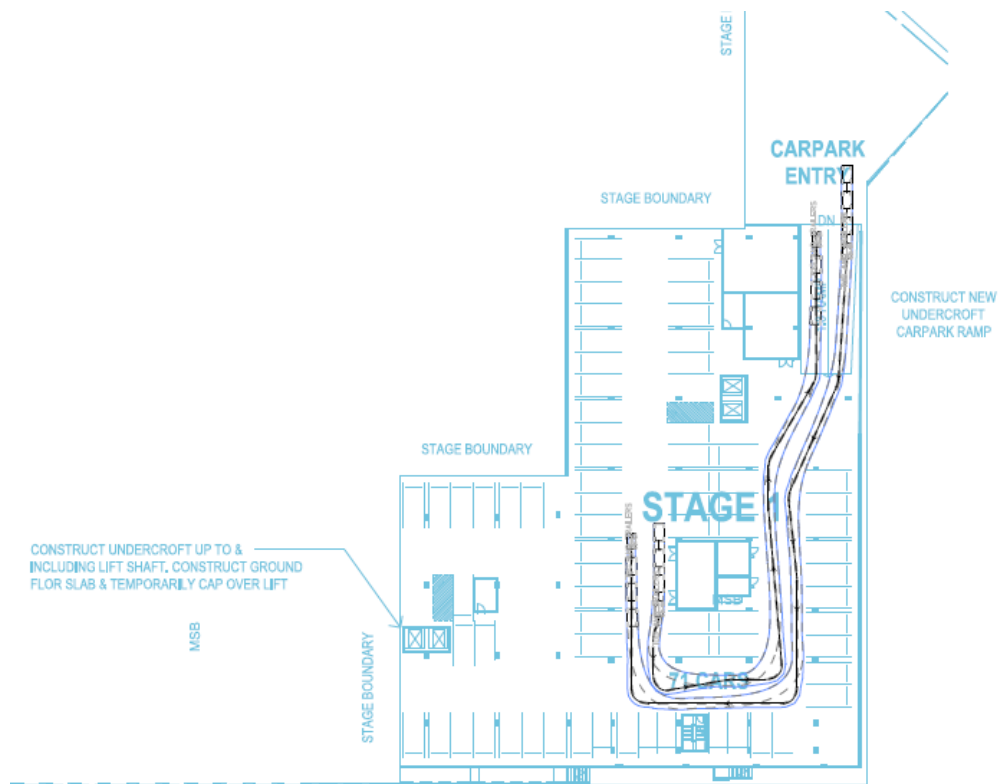


Figure 6.7: Stage 2 Collection

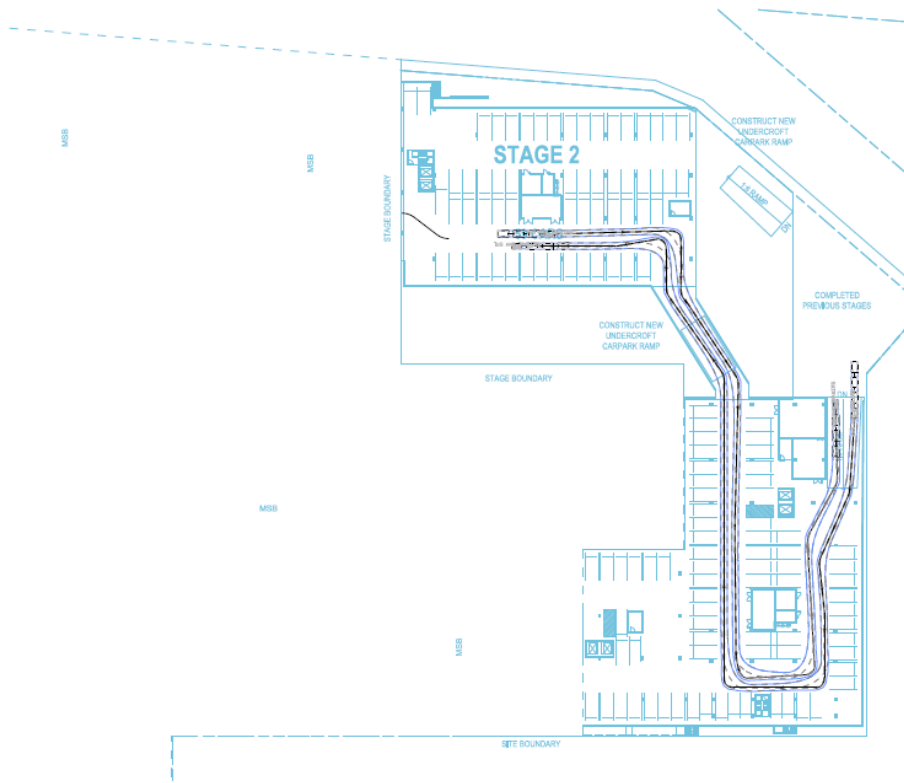


Figure 6.8: Stage 3 Collection

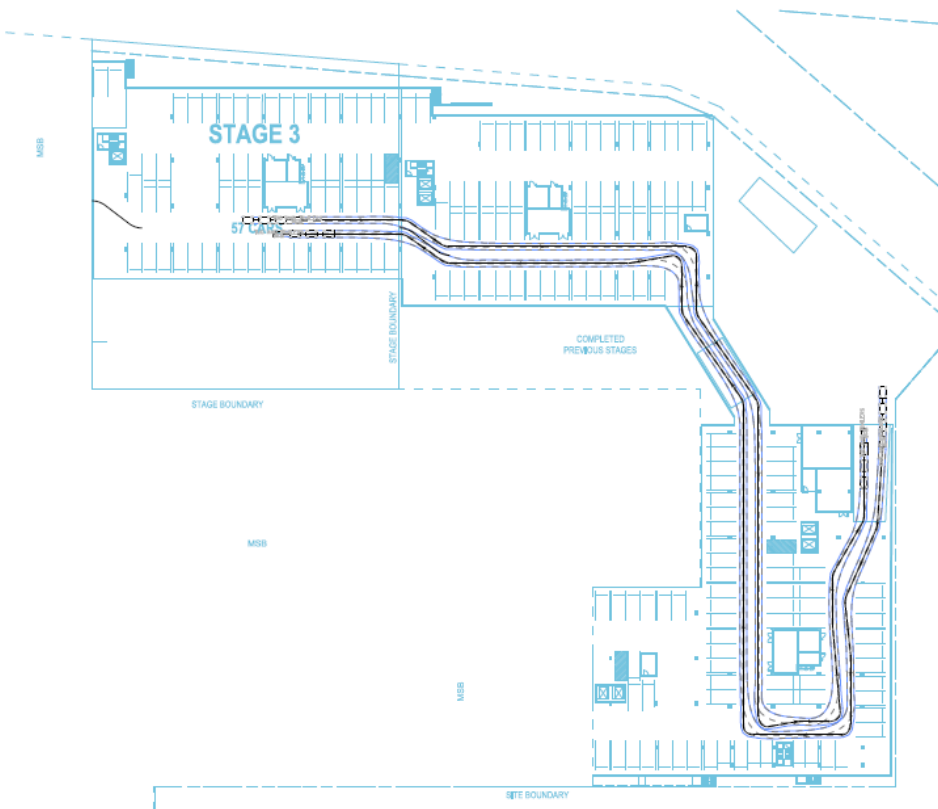


Figure 6.9: Stage 4 Collection

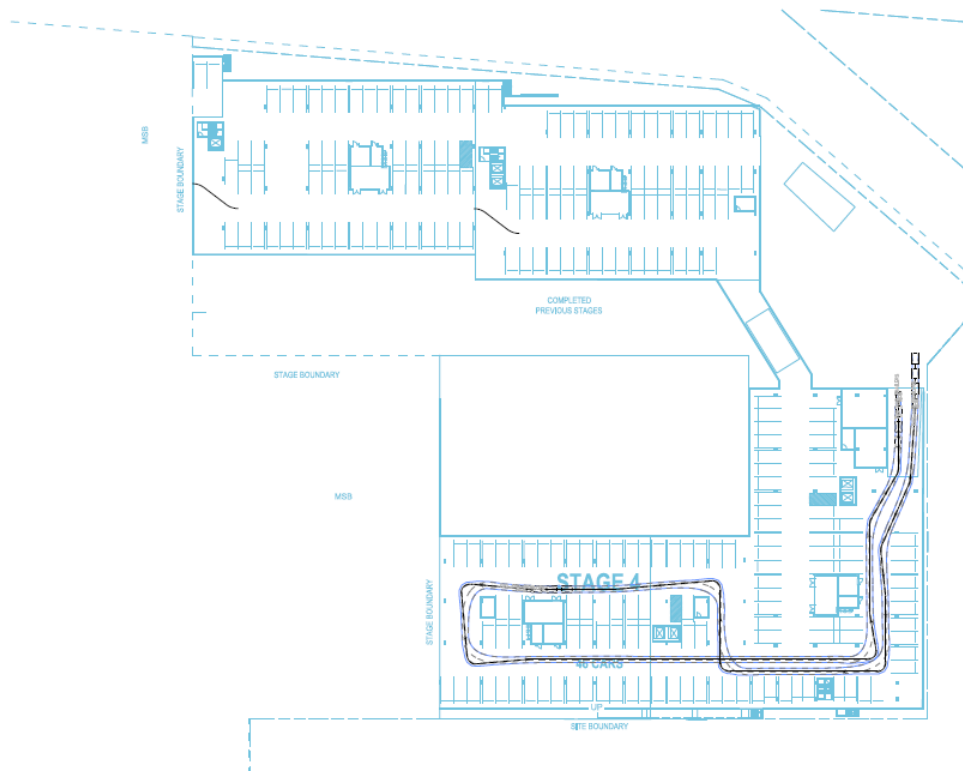


Figure 6.10: Stage 5 Collection



Figure 6.11: Transport to At-Grade Collection Area – Stage 1

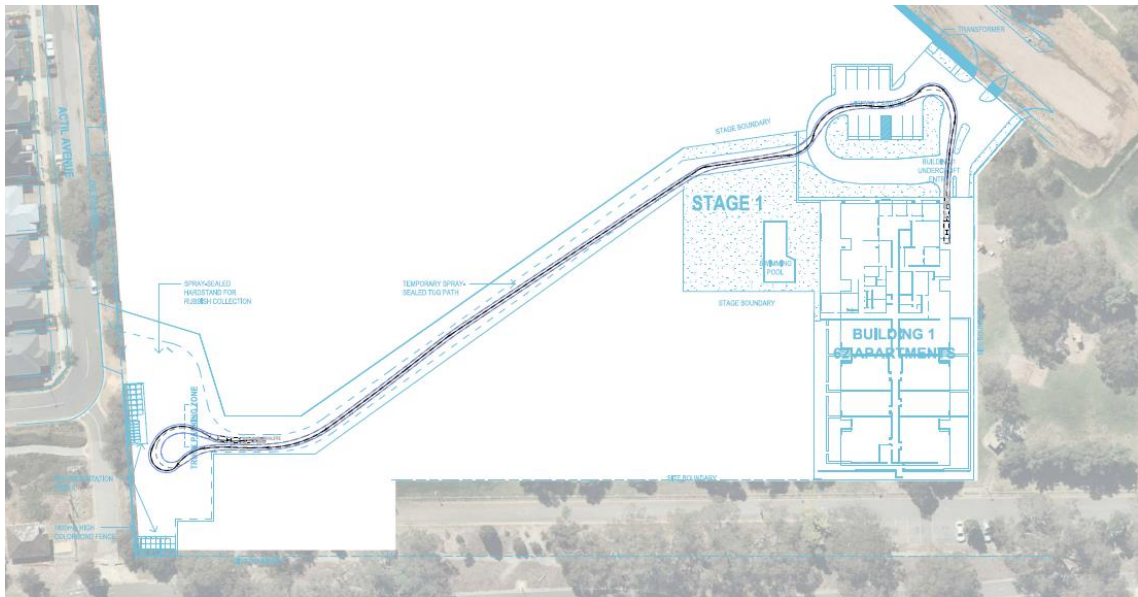


Figure 6.12: Transport from At-Grade Collection Area – Stage 1

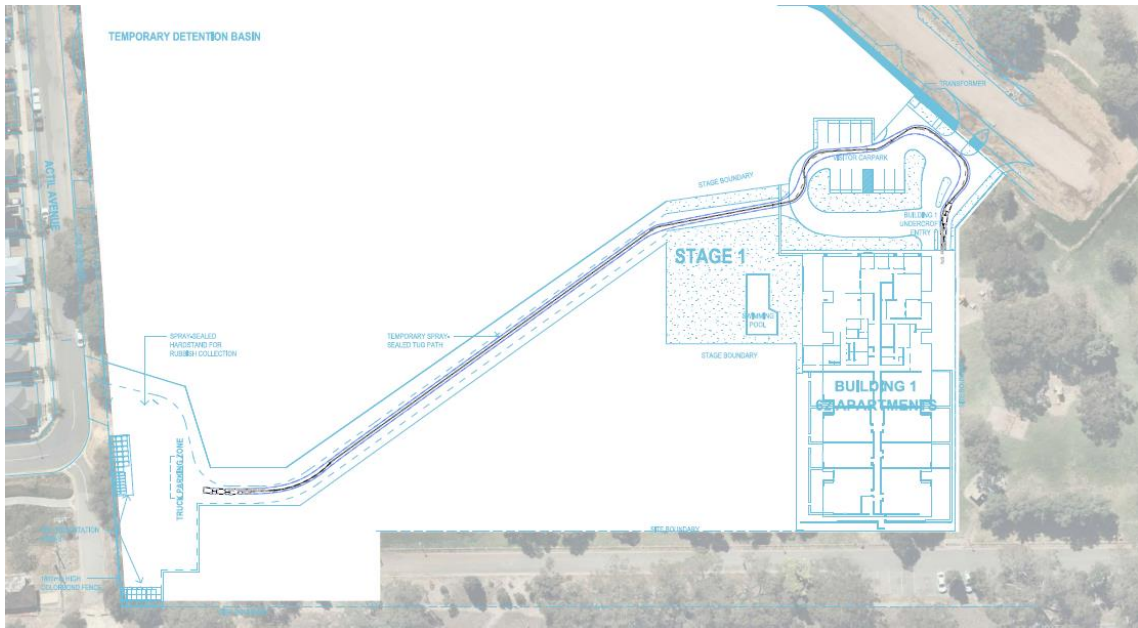


Figure 6.13: Transport to At-Grade Collection Area – Stage 5

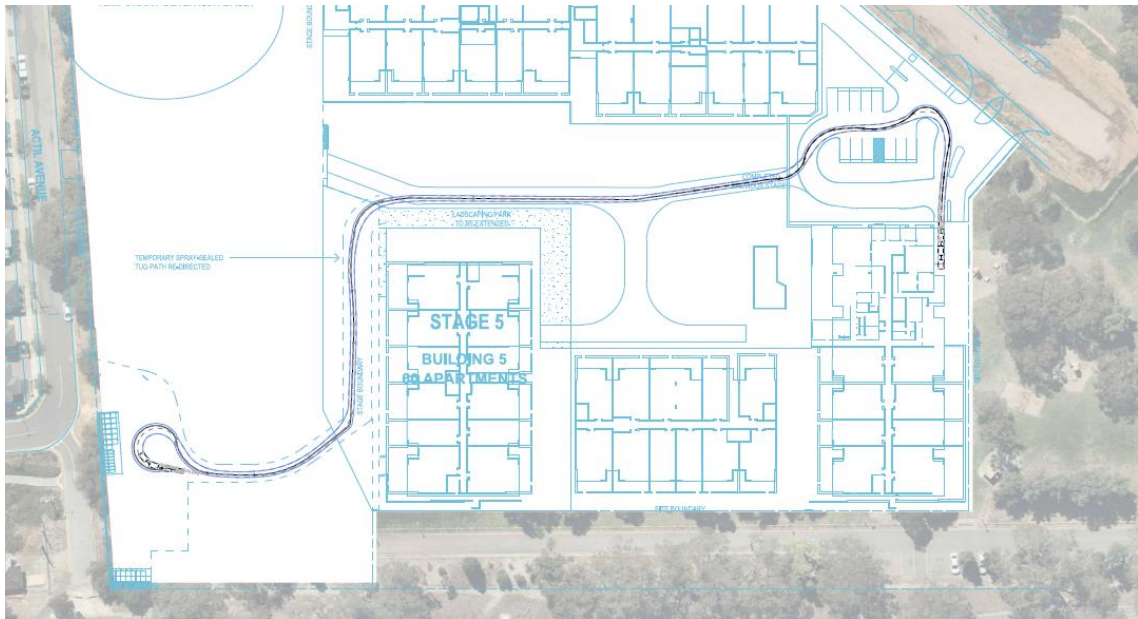
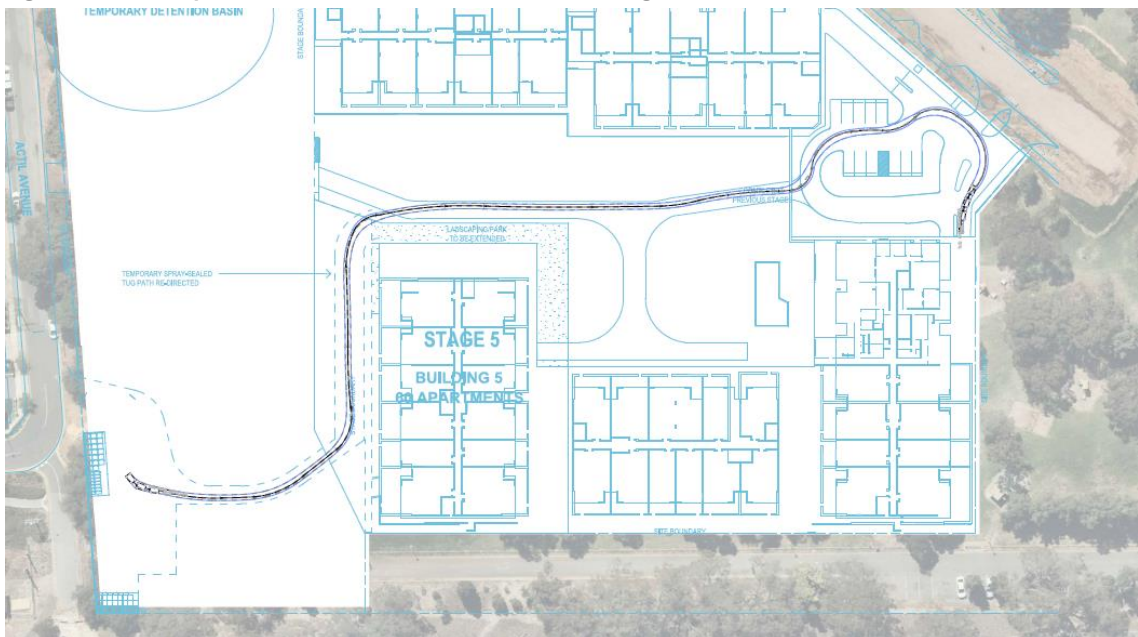


Figure 6.14: Transport from At-Grade Collection Area – Stage 5



6.4.2 Following Completion of Stage 6

Refuse collection for the whole of site following the completion of Stage 6 is proposed to occur at the south-western corner of the site within the RACF loading area. The small tug vehicle will transport the bins from the building bin rooms to the basement of the RACF, where a goods lift will move the bins from the basement area to the refuse collection point within the south-western loading area.

The ability for the anticipated small tug and bin trailers to collect the waste from the basement storage to the goods lift within the RACF basement is outlined in Figure 6.15 to Figure 6.22.

Figure 6.15: RACF Basement Entry

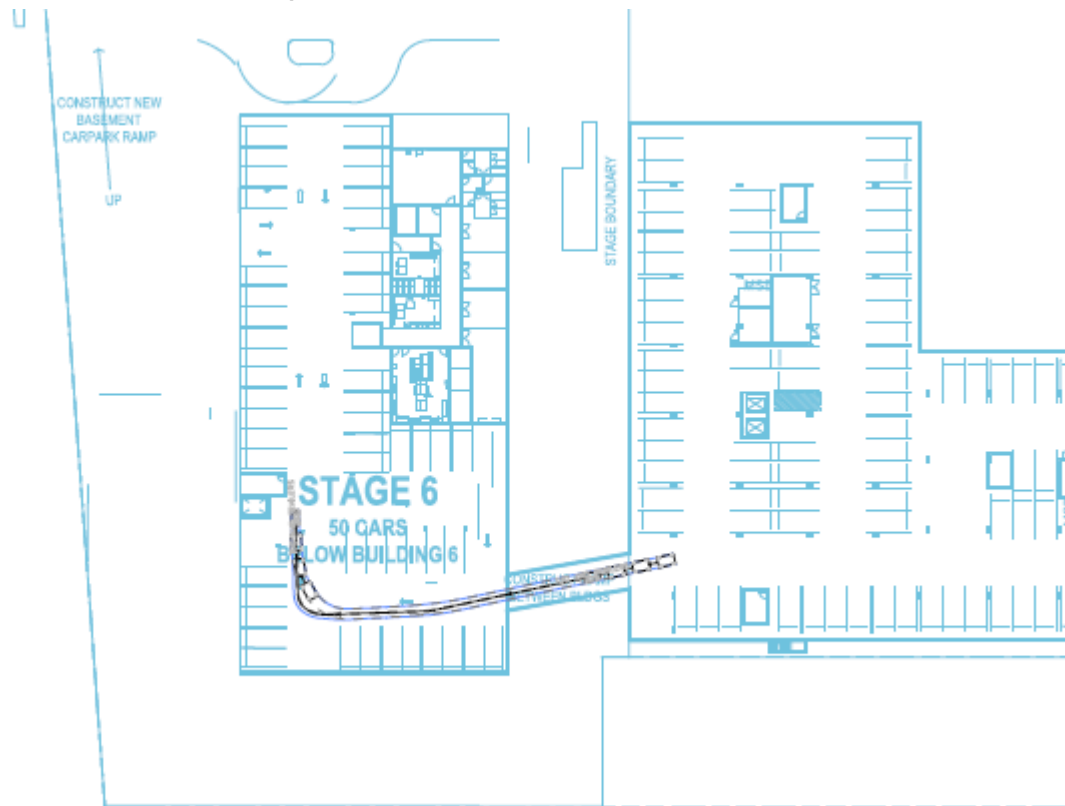


Figure 6.16: RACF Basement Exit

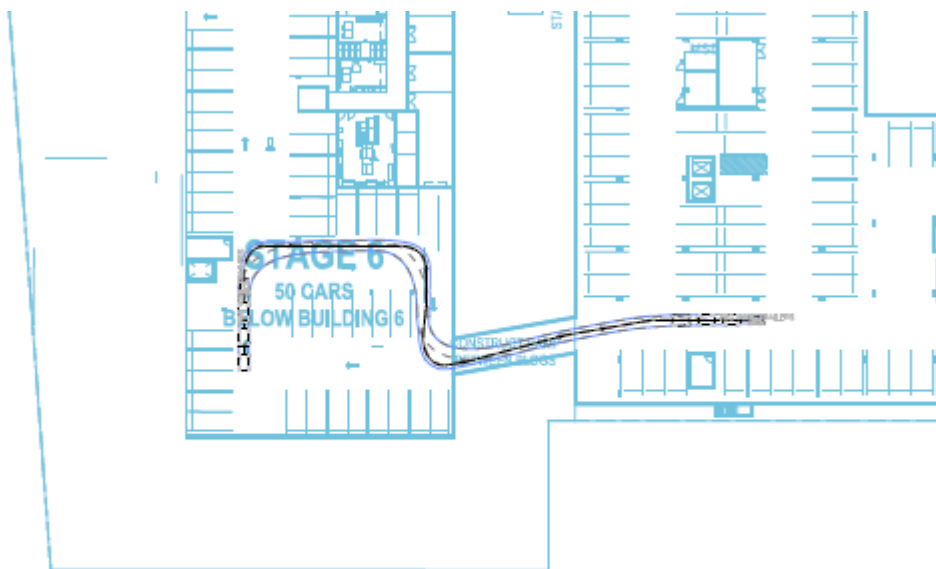


Figure 6.17: Stage 6 - Building 1 Collection

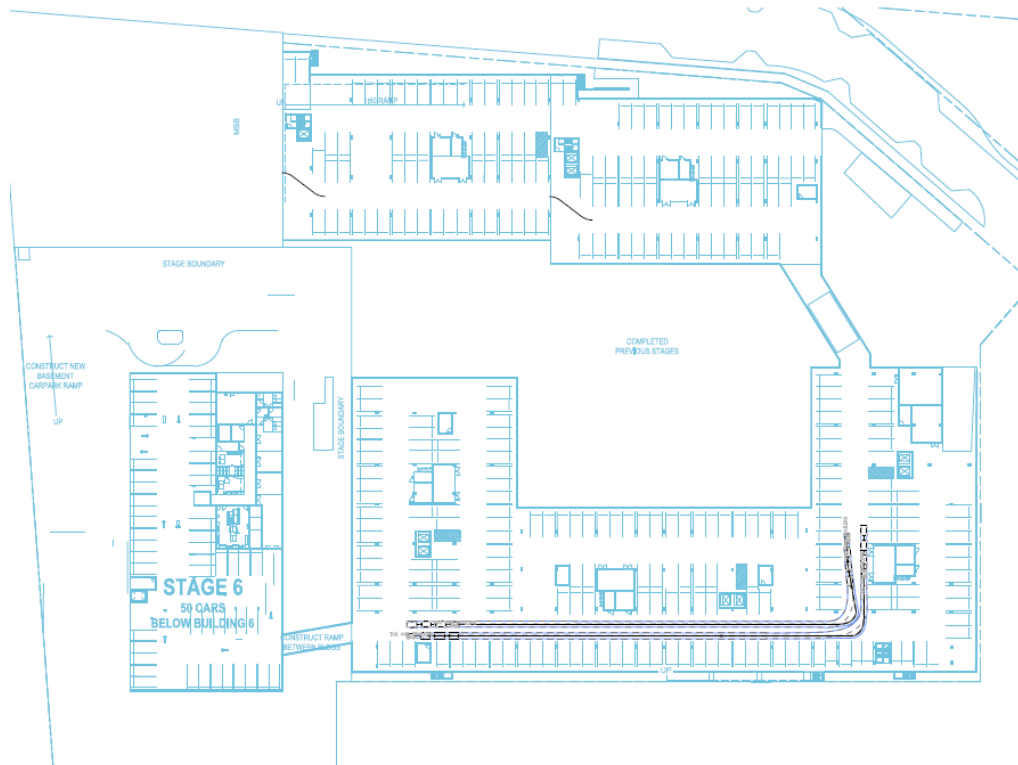


Figure 6.18: Stage 6 - Building 2 Collection

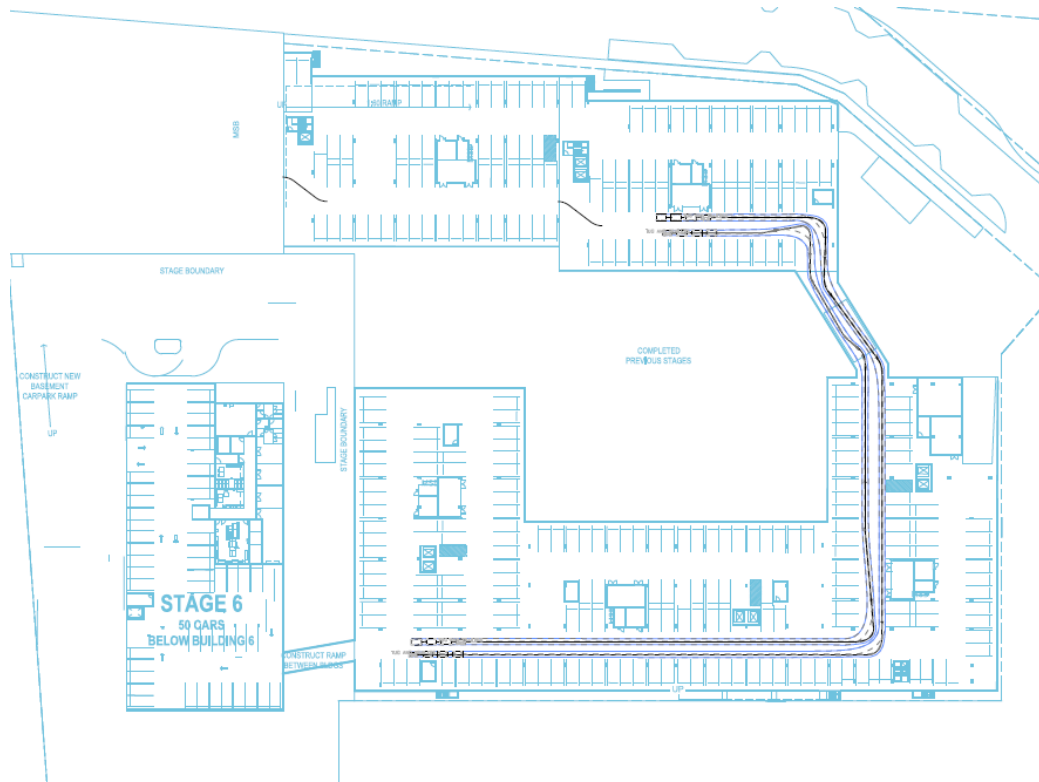


Figure 6.19: Stage 6 - Building 3 Collection

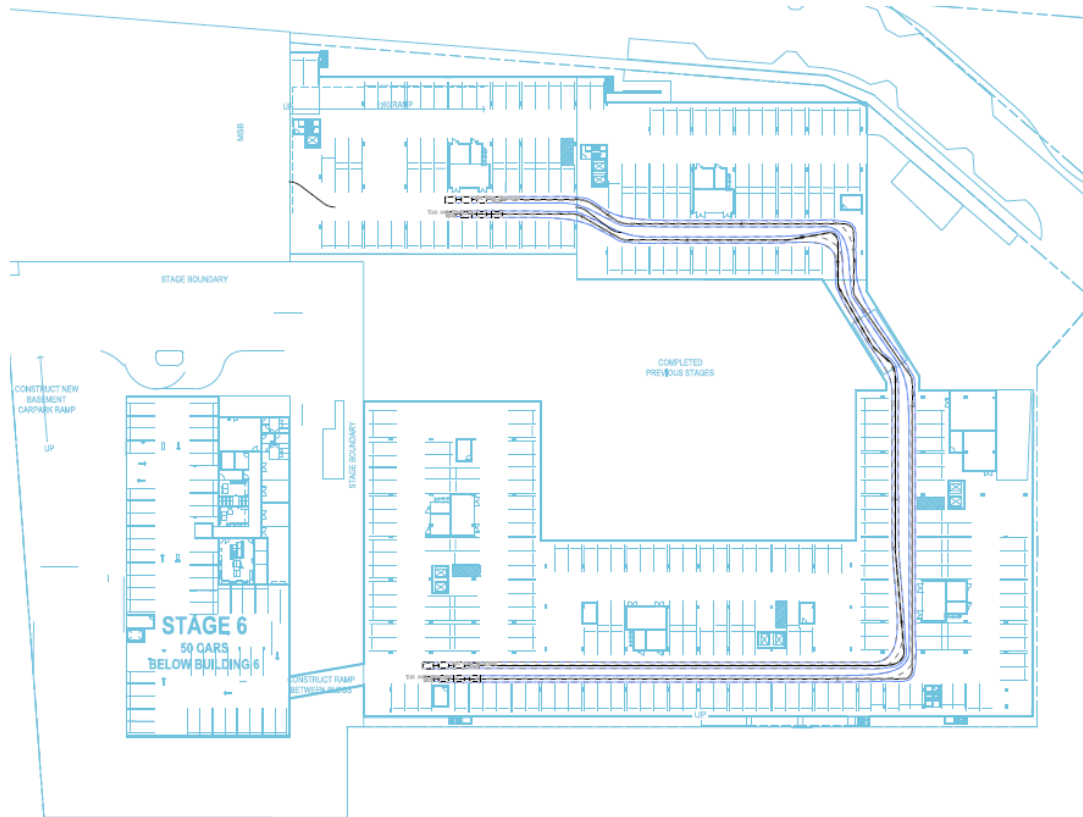


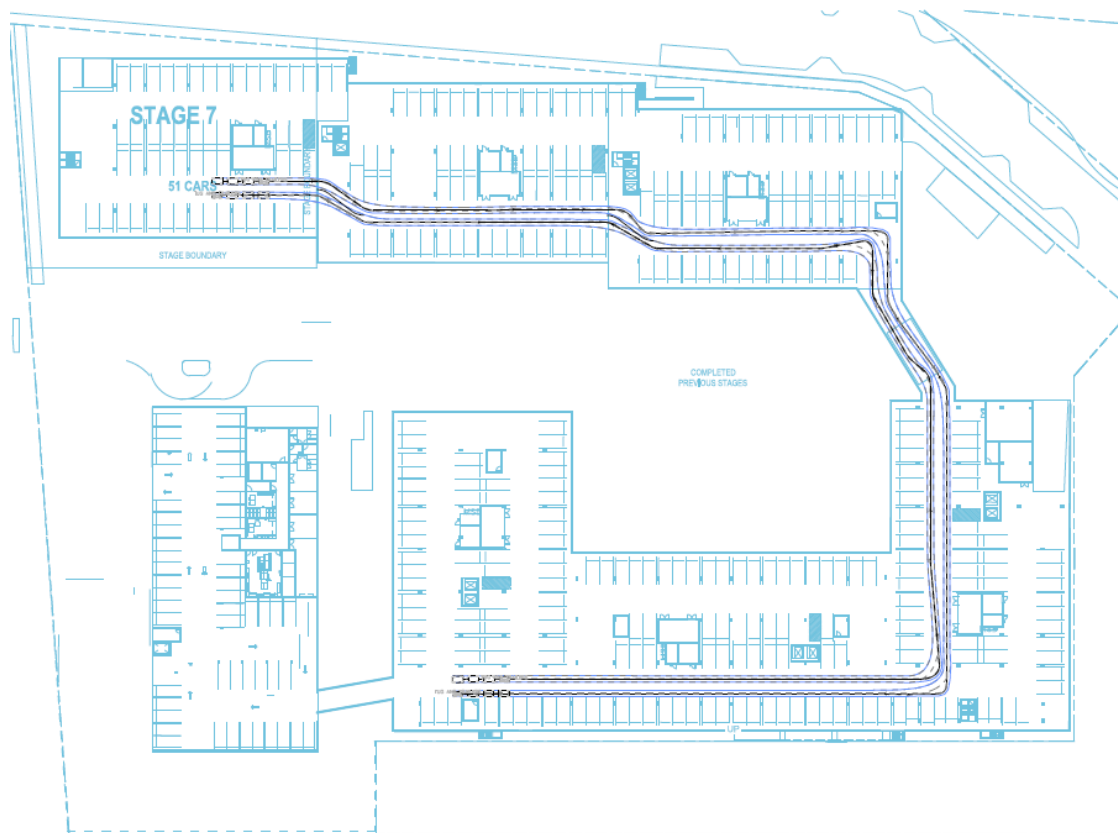
Figure 6.20: Stage 6 - Building 4 Collection



Figure 6.21: Stage 6 - Building 5 Collection



Figure 6.22: Stage 7 Collection



6.5 Mini Bus Arrangements

With the nature of the development, minibuses may enter the site to collect residents from the Port Cocheres located at the RACF and adjacent Building 1. It is expected that the largest vehicle to collect residents is up to a 7.0m long 22 seat minibuses.

Figure 6.23 and Figure 6.24 outline the ability for a 7.0m mini bus utilising the Port Cochere at the RACF and adjacent Building 1 respectively. It is recommended that the bus parking space be relocated further into the site to maintain separation to the access as shown in Figure 6.23.

Figure 6.23: 7.0m Mini Bus RACF Porte Cochere Access

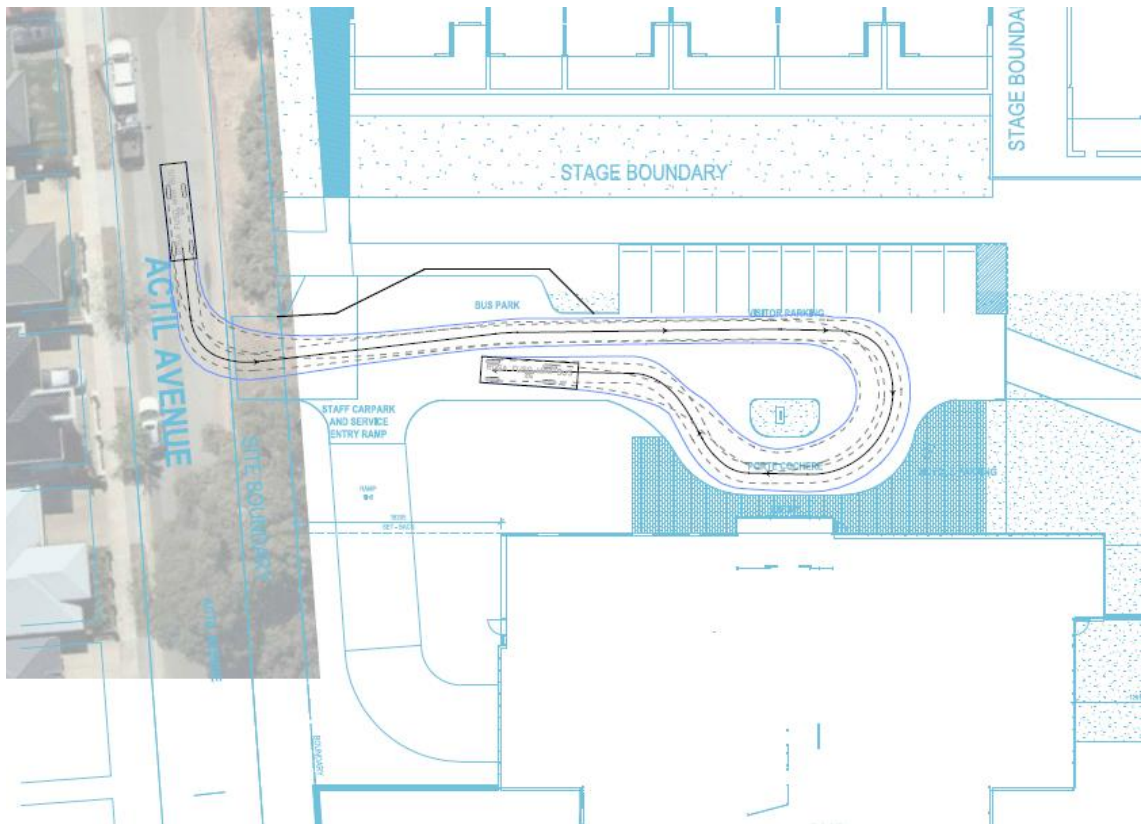
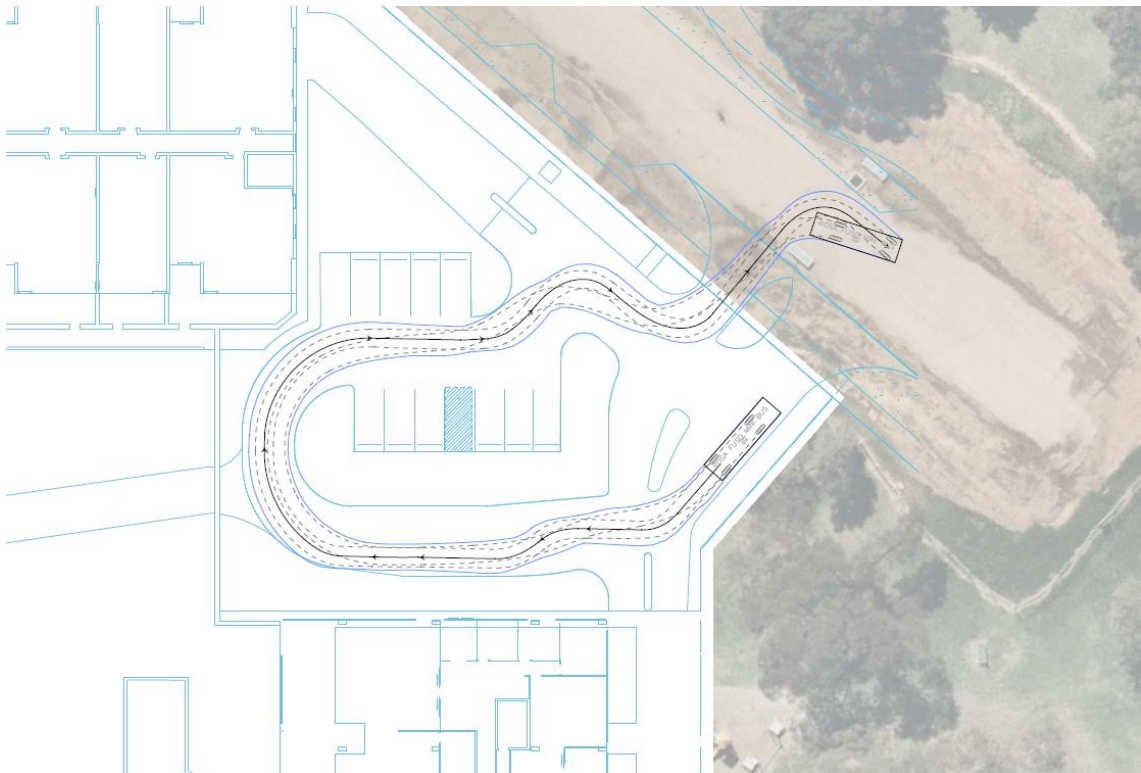


Figure 6.24: 7.0m Mini Bus Building 1 Porte Cochere Access



6.6 Ambulance/ Emergency Services

In the event that an Ambulance is required to access the subject site, the vehicle will access the Port Cocheres located at the RACF and Building 1. The head height clearance under the Port Cocheres is 4.5m, which meets the Australian Standards head height clearance requirements for Commercial Vehicles. A swept path assessment of a Bariatric ambulance access the Port Cocheres is demonstrated in Figure 6.25 and Figure 6.26.

Figure 6.25: 7.3m Bariatric Ambulance Building 1 Porte Cochere Access

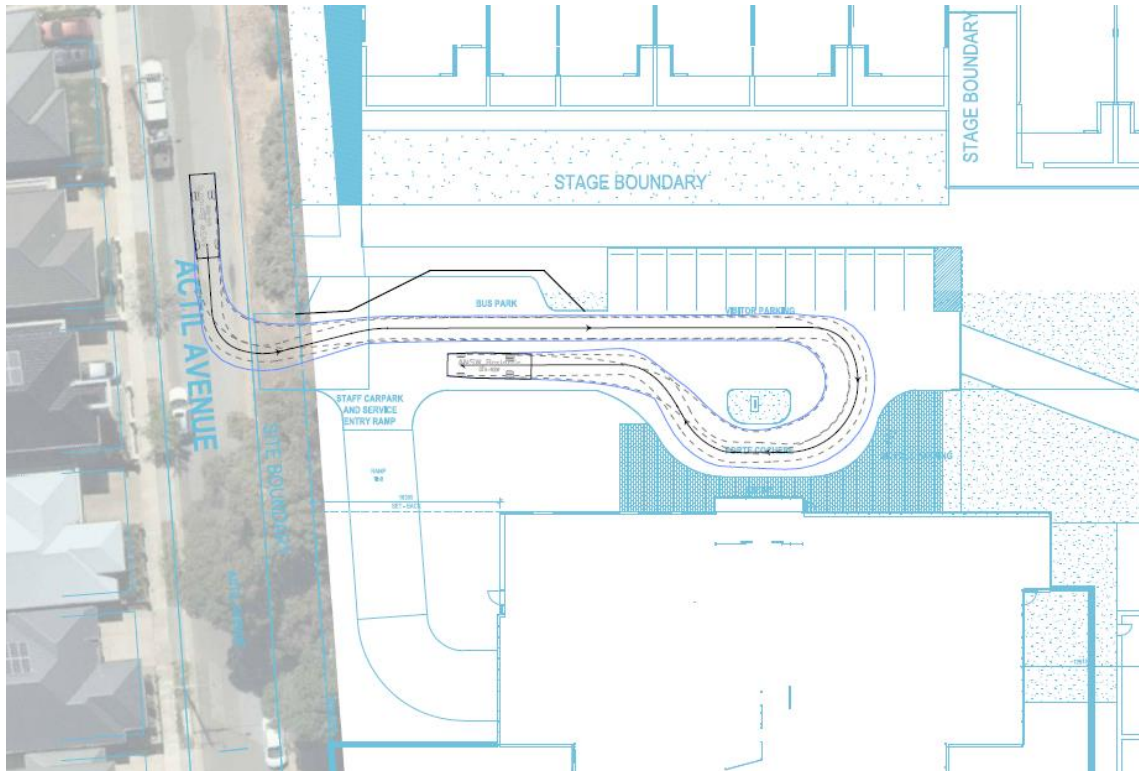
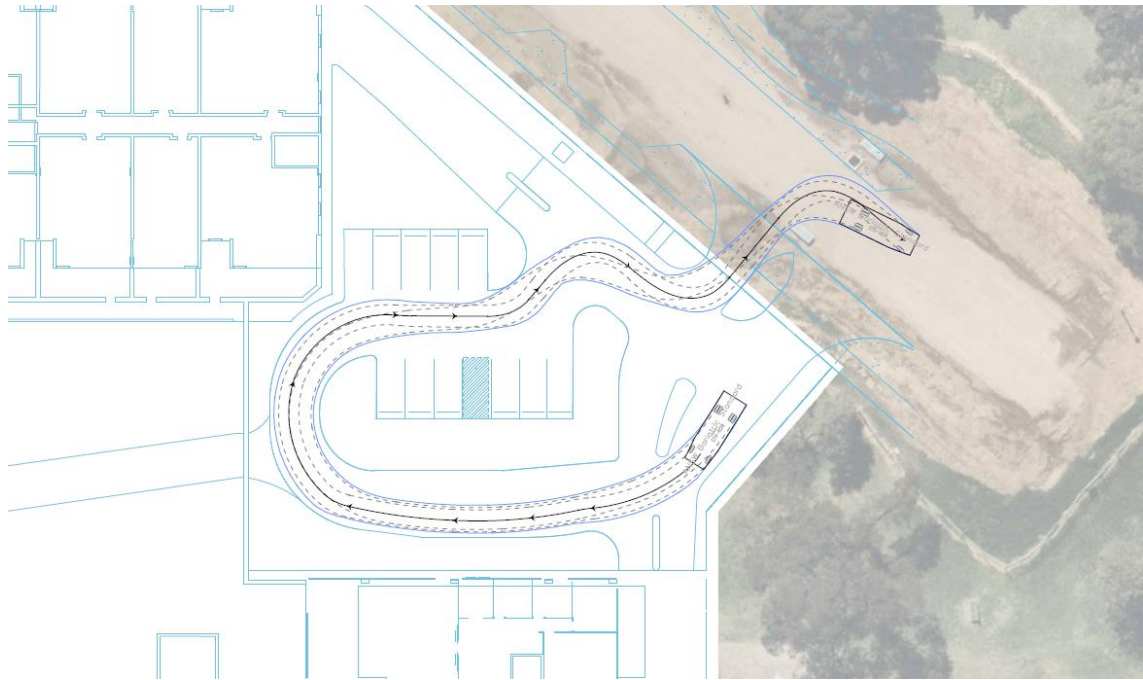


Figure 6.26: 7.3m Bariatric Ambulance Building 1 Porte Cochere Access



GTA Consultants have not assessed larger emergency vehicles such as those utilised by the MFS. It is understood that assessment of these vehicles have been undertaken as part of Greenhills Australia assessment.

7. Traffic Impact Assessment

7.1 Traffic Generation

The proposed development is proposed to incorporate community centre facilities such as meeting halls and function rooms. It is understood that these facilities will be utilised by residents of the integrated community, and not open to the general public. Therefore, the community centre facilities are considered to be ancillary to the development.

7.1.1 Design Rates

Traffic generation rates have been sourced from the Roads and Maritime Services of New South Wales (formerly RTA) in the "Technical Direction 04a Guide to Traffic Generating Developments – Updated Traffic Surveys" published in 2013 and the GTA Generation Database. The Technical Direction outlines a peak hour generation rate for Housing of Seniors of 0.4 trips per dwelling. However, the peak hour of this use does not generally coincide with the network peak hour. Therefore, to determine the network peak generation, the peak hour site generation has been assumed to be 10% of the daily generation.

The applicable rates to the proposed development are as follows;

Housing for Seniors (Technical Direction)	Network Peak Hour	0.21 trips per dwelling
	Daily Trips	2.1 trips per dwelling
Office (Technical Direction)	AM Peak Hour	1.6 trips per 100 sq.m
	PM Peak Hour	1.2 trips per 100 sq.m
	Daily Trips	11 trips per 100 sq.m
Supported Accommodation (GTA Database)	AM Peak Hour	0.24 trips per bed
	PM Peak Hour	0.31 trips per bed
	Daily Trips	1.97 trips per bed

Based on the above rates, the estimates of peak hour and daily traffic volumes resulting from the proposal are set out in Table 7.1, Table 7.2 and Table 7.3.

Table 7.1: AM Peak Hour Traffic Generation Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	0.21 trips per dwelling	72
Office	61 sq.m	1.6 trips per 100 sq.m	1
Supported Accommodation	144 Beds	0.24 trips per bed	35
AM Peak Hour Total			108

Table 7.2: PM Peak Hour Traffic Generation Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	0.21 trips per dwelling	72
Office	61 sq.m	1.2 trips per 100 sq.m	1
Supported Accommodation	144 Beds	0.31 trips per bed	45
PM Peak Hour Total			118

Table 7.3: Daily Traffic Generation Estimates

Use	Size	Design Generation Rates	Traffic Generation Estimate
Housing for Seniors/ Independent Living Units	341 Units	2.1 trips per dwelling	716
Office	61 sq.m	11 trips per 100 sq.m	7
Supported Accommodation	144 Beds	1.97 trips per bed	284
Daily Total			1007

The above tables indicate the proposed development could be expected to generate approximately 108 and 118 vehicle movements during the AM and PM peak hour and 1,007 vehicle movements on a typical weekday.

7.1.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- i configuration of the arterial road network in the immediate vicinity of the site
- ii existing operation of intersections providing access between the local and arterial road network
- iii distribution of households in the vicinity of the site
- iv surrounding retail centres in relation to the site
- v likely distribution of employee's residences in relation to the site
- vi configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

Road Network Distributions

- St Clair Avenue 15%
- Woodville Road 85%.

Site Access Distributions

- St Clair Avenue 70%
- Actil Avenue South 30%.

The above distributions are illustrated in Figure 7.1

Figure 7.1: Vehicle Trip Distributions



In addition, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) has been assumed to 50:50 for the AM Peak Hour, PM Peak Hour and Daily Period.

Based on the above, Figure 7.2, Figure 7.3 and Figure 7.4 have been prepared to show the estimated increase in turning movements in the vicinity of the subject property following full site development.

Figure 7.2: AM Peak Hour Site Generated Traffic Volumes



Figure 7.3: PM Peak Hour Site Generated Traffic Volumes



Figure 7.4: Daily Site Generated Traffic Volumes



7.2 Traffic Impact

Given the high proportion of traffic anticipated to access the site via Woodville Road and the left in, left out of the Woodville Road/St Clair Avenue intersection, the additional traffic generated by the proposed development is not expected to compromise the safety or function of the surrounding road network.

By comparison, if the subject site were to be developed as residential nature, a larger portion of the site could have been developed to provide a higher dwelling yield rate. It is also noted that traffic generation rates outlined within the RTA Guide and Technical Direction for high density residential developments typically have a higher traffic generation than that of Independent Living Units. Therefore, the proposed development will have a lower traffic impact to St Clair Avenue and Actil Avenue South than a higher density residential development.

8. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- i The proposed development generates a Development Plan parking requirement of 306 car parking spaces including 258 spaces for the retirement village and 48 spaces for the RACF.
- ii The proposed development generates an empirical parking requirement of 345 car parking spaces including 297 spaces for the retirement village and 48 spaces for the RACF.
- iii The proposed supply of 416 spaces (355 associated with the Independent Living Units, 61 associated with the RACF) is considered to be appropriate as it exceeds both the Development Plan and empirical parking assessment.
- iv The proposed parking layout is to be constructed in accordance with the dimensional requirements as set out in Australian/New Zealand Standards for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009). **Recommendations to change the parking layout can be reviewed during the detailed design phase.**
- v The proposed provision of 3 bicycle parking spaces associated with the RACF and 1 bicycle parking space associated with the retirement village is considered to be appropriate as it meets the Development Plan requirement.
- vi Waste bins are to be collected by a small tug vehicle and bin trailers from each of the building storage rooms and transported to the loading area for collection by the larger waste vehicle.
- vii Loading and refuse collection is anticipated to occur outside of peak periods, with a loading/collection vehicle up to 10m in length.
- viii The site is expected to generate up to 108, 118 and 1,007 vehicle movements in the AM peak hour, PM peak hour and daily period respectively.
- ix Given the high proportion of traffic anticipated to access the site via Woodville Road and the left in, left out of the Woodville Road/St Clair Avenue intersection, the proposed development is not expected to compromise the safety or function of the surrounding road network.

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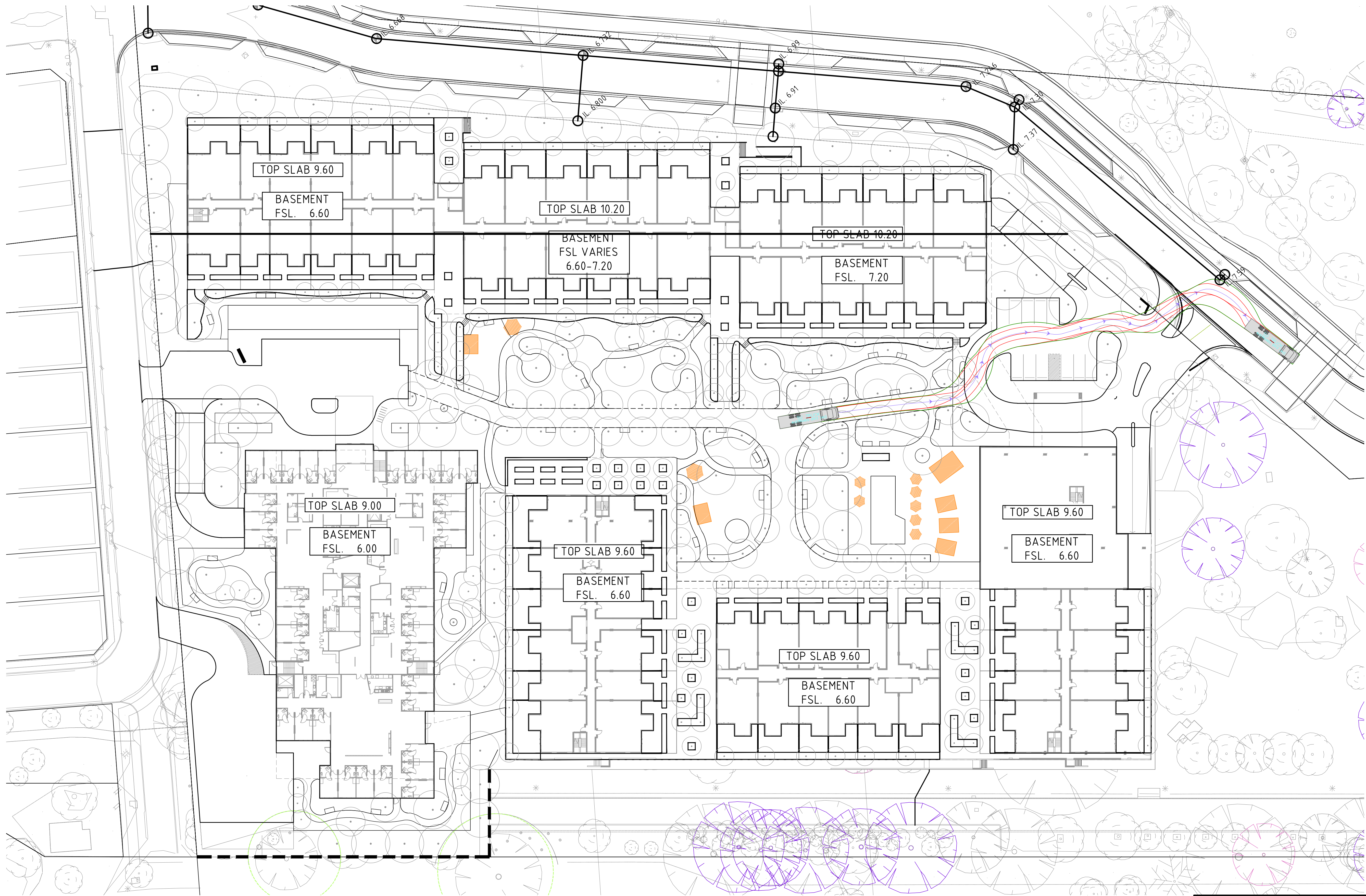
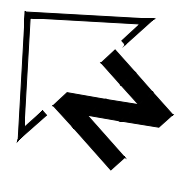
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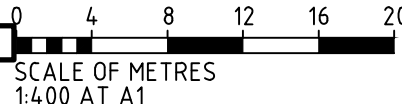
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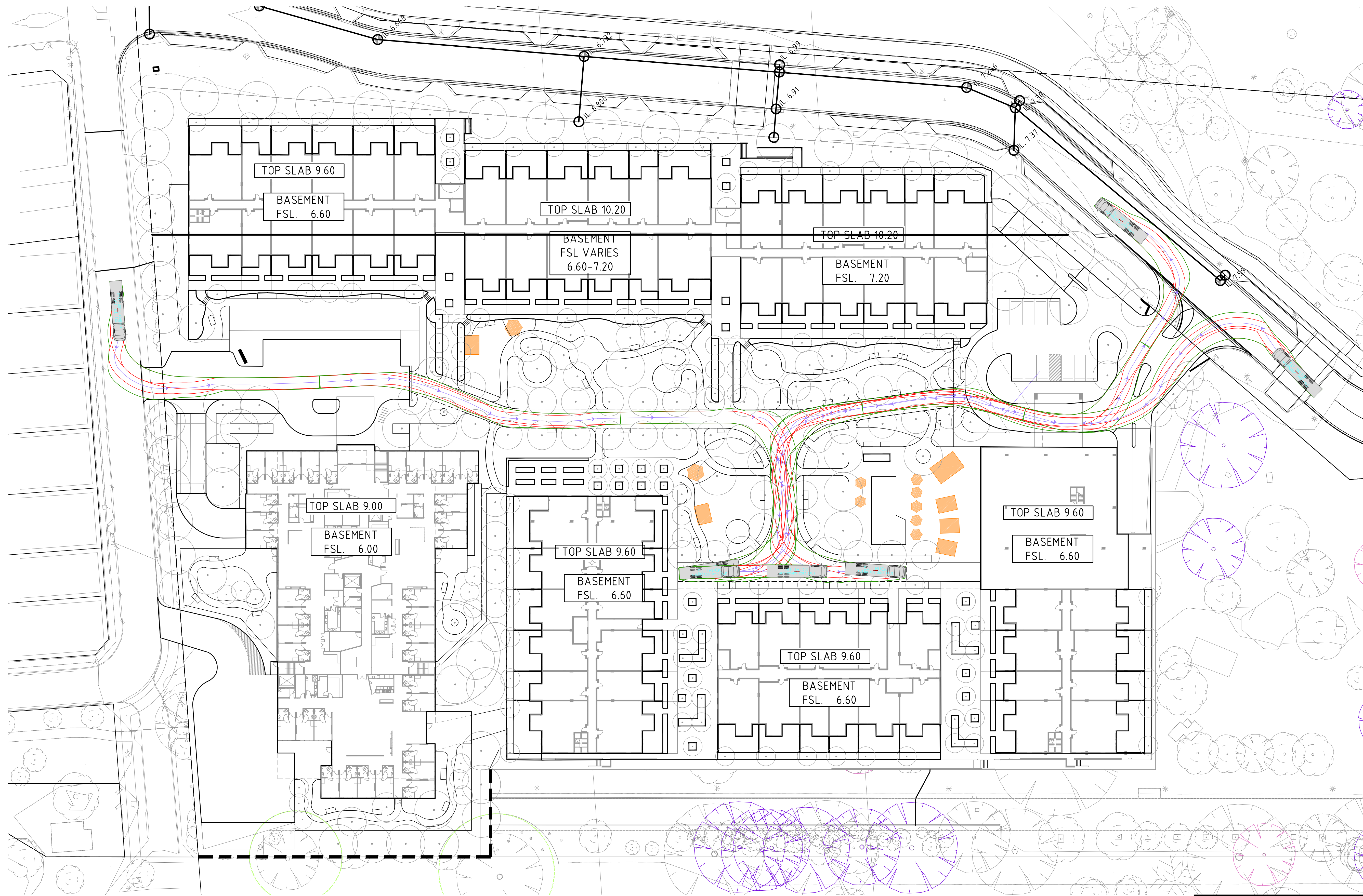
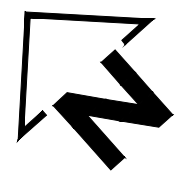


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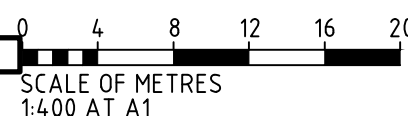


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Aveo—Lot 1000 Woodville Road St Clair

Planning Stage Acoustic Assessment

A17459RP1 Revision C

Tuesday, 11 December 18

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Report revision	Date	Comments
0	27 September 2018	DRAFT FOR INFORMATION
A	29 November 2018	Draft for client comment
B	7 December 2018	For submission
C	11 December 2018	Section 4.2 clarification

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Building envelope	means those parts of a building's fabric that separate an internal <i>habitable room</i> from the exterior of the building. Reference to <i>building envelope</i> includes parts of a <i>building envelope</i> —From SA 78B.
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency or modulating characteristic of the noise that is determined in accordance with the Guidelines for the use of the Environment Protection (Noise) Policy (Noise EPP) to be fundamental to the nature and impact of the noise.
Continuous noise level	A-weighted noise level of a continuous steady sound that, for the period over which the measurement is taken using fast time weighting, has the same mean square sound pressure as the noise level which varies over time when measured in relation to a noise source and noise-affected premises in accordance with the Noise EPP
Day	Between 7 am and 10 pm as defined in the Noise EPP
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
dB(A)	Units of the A-weighted sound level.
Facade sound reduction	means the reduction in external to internal sound level provided by the <i>building envelope</i> —From SA 78B.
Floor area	means, in relation to a room, the area of the room measured within the finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting—From SA 78B.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
Indicative noise level	Indicative noise level determined under clause 5 of the Noise EPP.
L ₉₀	Noise level exceeded for 90 % of the measurement time. The L ₉₀ level is commonly referred to as the background noise level.
L _{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L _{max}	The maximum instantaneous noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise EPP
Noise source	Premises or a place at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
Quiet locality	A locality is a quiet locality if the Development Plan provisions that make land use rules for the locality principally promote land uses that all fall within either or both of the following land use categories: (a) Residential; (b) Rural Living;

R_w	Weighted Sound Reduction Index—means a measure of the sound attenuation performance of a building element, measured in controlled conditions in a laboratory— <i>From SA 78B.</i>
R_w+C_{tr}	means a weighted sound reduction index with spectrum adaptation placing greater emphasis on low frequency performance— <i>From SA 78B.</i>
Separation distance	means the shortest distance (to the nearest metre), from an existing or future <i>designated sound source</i> to the nearest exposed point of the <i>building envelope</i> bounding a <i>habitable room</i> — <i>From SA 78B.</i>
Sound Exposure Category (SEC)	means the degree to which a <i>habitable room</i> within a building is likely to be affected by external sound received by the <i>building envelope</i> — <i>From SA 78B.</i>

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1 Introduction

This report details the external noise intrusion and environmental noise emission assessment for the proposed Aveo retirement community development at Lot 1000 Woodville Road, St Clair.

The acoustic requirements of the project are based on:

- Charles Sturt Council Development Plan (consolidated 13 September 2018)
- Minister's Specification SA 78B *Construction Requirements for the Control of External Sound*.

The main acoustic issues addressed in this report are facade construction requirements to control traffic and transport noise, and noise emissions from traffic generated by and mechanical plant and equipment associated with the development. Advice is also provided in relation to noise mitigation from the operation of the adjacent St Clair Recreation Centre.

2 Project description

The proposed development is located at Lot 1000 Woodville Road, St Clair. The site is surrounded by various noise sources and noise sensitive receivers. A summary of the site surrounds are as follows:

- North – St Clair Recreation Centre and Woodville High School beyond
- South – Woodville Railway Station and residential receivers beyond
- East – Proposed public open space, Woodville Road and residential receivers beyond
- West – Residential receivers on Actil Avenue South and beyond.

The location of the site and its surrounds are shown in Figure 1.



Figure 1 Site map in context

The proposed development is for an integrated retirement community, incorporating a Residential Aged Care Facility (RACF), independent living apartments with under croft car parking, communal open space and an ancillary community centre. The nearest noise sensitive receivers are located to the west on Actil Avenue South.

3 Noise criteria

3.1 Development plan

The site of the proposed development is located within the City of Charles Sturt Council Area and should have regard to the Charles Sturt Council Development Plan (the Plan).

3.1.1 Land zoning

The proposed development is located within the District Centre Zone, Precinct 21 Railway Station of the Woodville Policy Area 5, as defined by the Plan. The nearest noise sensitive receivers are located within the adjacent Residential Zone located to the west on Actil Avenue South. The land uses principally promoted in the District Centre Zone are residential and commercial (such as community centres, consulting rooms, offices, places of worship, shops, etc.).

3.1.2 Interface between land uses

The council-wide Principles of Development Control (PDCs) relating to noise emission between zones promoting different land use. These are as follows:

Objectives:

- 1 Development located and designed to minimise adverse impact and conflict between land uses.
- 2 Protect community health and amenity from adverse impacts of development.
- 3 Protect desired land uses from the encroachment of incompatible development.

Principles of Development Control

- 1 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:...
 - (a) ...
 - (b) noise
 - (c) ...
- 2 Development should be sited and designed to minimise negative impacts on existing and potential future land uses desired in the locality.
- 4 Residential development adjacent to non-residential zones and land uses should be located, designed and/or sited to protect residents from potential adverse impacts from non-residential activities.
- 5 Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses desired for the zone should be designed to minimise negative impacts.
- 6 Non-residential development on land abutting a residential zone should be designed to minimise noise impacts to achieve adequate levels of compatibility between existing and proposed uses.

Noise Generating Activities

- 8 Development that emits noise (other than music noise) should include noise attenuation measures that achieve the relevant Environment Protection (Noise) Policy criteria when assessed at the nearest existing noise sensitive premises.
- 9 Development with the potential to emit significant noise (e.g. industry) should incorporate noise attenuation measures that prevent noise from causing unreasonable interference with the amenity of noise sensitive premises.
- 10 Outdoor areas (such as beer gardens or dining areas) associated with licensed premises should be designed or sited to minimise adverse noise impacts on adjacent existing or future noise sensitive development.
- 11 Development proposing music should include noise attenuation measures that achieve the following desired noise levels:

Noise level assessment location	Desired noise level
Adjacent existing noise sensitive development property boundary	Less than 8 dB above the level of background noise ($L_{90,15min}$) in any octave band of the sound spectrum. and Less than 5 dB(A) above the level of background noise ($LA_{90,15min}$) for the overall (sum of all octave bands) A-weighted level.
Adjacent land property boundary	Less than 65dB(Lin) at 63Hz and 70dB(Lin) in all other octave bands of the sound spectrum or less than 8 dB above the level of background noise ($L_{90,15min}$) in any octave band of the sound spectrum and 5 dB(A) overall (sum of all octave bands) A-weighted level.

Environmental noise emissions at the planning stage are assessed in accordance with the *Environment Protection (Noise) Policy 2007* (Noise EPP).

3.2 Noise and air emission overlay

The proposed development is located within a noise and air emission designated area where the land zoning promotes mixed-use development. The following outlines the relevant objectives for the project.

OBJECTIVES

Objective 1: Protect community health and amenity from adverse impacts of noise and air emissions.

PRINCIPLES OF DEVELOPMENT CONTROL 1 Noise and air quality sensitive development located adjacent to high noise and/or air pollution sources should:

(a) shield sensitive uses and areas through one or more of the following measures:

(i) placing buildings containing less sensitive uses between the emission source and sensitive land uses and areas

(ii) within individual buildings, place rooms more sensitive to air quality and noise impacts (e.g. bedrooms) further away from the emission source

(iii) erecting noise attenuation barriers provided the requirements for safety, urban design and access can be met

(b) use building design elements such as varying building heights, widths, articulation, setbacks and shapes to increase wind turbulence and the dispersion of air pollutants provided wind impacts on pedestrian amenity are acceptable

(c) locate ground level private open space, communal open space and outdoor play areas within educational establishments (including childcare centres) away from the emission source.

Application of SA 78B will demonstrate compliance with the PDCs relating to the Noise and Air Emissions overlay.

3.3 Environmental noise policy

Environmental noise emissions from the proposed development will have to comply with the *Environment Protection (Noise) Policy 2007* (Noise EPP) and this is the most relevant guideline to address the requirements of the Development Plan.

The noise goals in the Noise EPP are based on the zoning of the development and the closest noise affected premises in the relevant development plan. The land uses primarily promoted by the zones are used to determine the environmental noise criteria with the indicative noise factors shown in Table 1.

Table 1 Excerpt from Noise EPP—Table 2(subclause(1)(b))

Land use category	Indicative noise factor dB(A)	
	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Rural living	47	40
Residential	52	45
Rural industry	57	50
Light industry	57	50
Commercial	62	55
General industry	65	55
Special industry	70	60

As stated above, the development is located in the District Centre Zone (Woodville Policy Area 5), for which a mix of residential and commercial land uses are primarily promoted and the most affected noise sensitive receivers located in an adjacent Residential Zone.

In accordance with Part 5 of the Noise EPP, the relevant criteria for this development will be an average of the relevant indicative noise factors less 5 dB(A). The application of Part 5 results in the following environmental noise criteria:

- 52 dB(A) during the day, 7 am to 10 pm
- 45 dB(A) at night, 10 pm to 7 am.

These criteria apply to noise associated with vehicles movements within the site, and external mechanical plant.

Penalties can also be applied to a noise source for a variety of characteristics, such as impulsivity, low frequency content, modulation or tonality. For a characteristic penalty to be applied to a noise source it must be fundamental to the impact of the noise and dominate the overall noise impact. A 5 dB penalty has been applied to vehicle noise in this assessment to account for the modulating character of vehicle noise.

4 Noise emission assessment

4.1 Mechanical services noise

Detailed specifications in relation to proposed mechanical services are not yet available. It is likely that rooftop plant will be required for all buildings on the site.

The mechanical plant that is selected for the development shall be designed to achieve, at the nearest potentially affected receiver, the indicative noise level requirements of:

- 52 dB(A) from 7 am to 10 pm; and
- 45 dB(A) from 10 pm to 7 am.

Conceptual noise mitigation for mechanical services plant items associated with developments of this type include:

- Screening of rooftop external plant using solid barriers or acoustic louvres.
- Selection of lower noise plant and equipment.
- Appropriate construction of a rooftop plant room to reduce noise emissions to neighbouring land uses.

4.2 Vehicle noise

The proposed development includes provision of approximately 452 resident and staff car parking spaces undercroft the building structures as well as ground level visitor parking. Primary car parking access is provided by egress at two locations: Woodville Road/St Clair Avenue and Actil Avenue South. Service and rubbish collection vehicle egress is proposed via a second entry/exit on Actil Avenue South adjacent to the RACF.

For the purposes of this assessment, vehicle noise has been assessed to noise sensitive receivers on Actil Avenue South. egress locations have been addressed due to proximity with noise sensitive receivers located within the adjacent Residential Zone.

4.2.1 Passenger vehicles

This vehicle noise assessment addresses the potential noise impact from passenger vehicles entering and exiting the Aveo site from Actil Avenue South. Resonate have assessed car park noise emissions based on traffic volumes provided in the draft Transport Impact Assessment (A-Dr3), prepared by GTA Consultants, dated 30 November 2018.

The traffic impact assessment identifies the following hourly peak site generated vehicle movement at the Aveo entrance/exit driveway at Actil Avenue South:

- 34 vehicle movements in and out in peak AM hour (assumed 17 in a worst-case 15-minute period)
- 36 vehicle movements in and out in peak PM period (assumed 18 in a worst-case 15-minute period)

Based on the worst-case 15-minute traffic movements above and minimum offset distance of approximately 17 metres to the nearest noise sensitive receiver, noise levels are predicted to comply with the daytime and night-time noise criteria at all neighbouring residences (including a 5 dB penalty for modulation).

4.2.2 Service vehicles

Rubbish collection services are to be conducted in accordance with Division 3, Clause 28 of the SA Noise EPP.

Subclause (1)(a) permits rubbish collection on a subject site during the following time periods, provided reasonable and practicable measures, as outlined in Subclause (1)(3), are taken to minimise noise:

- 9 am and 7 pm on a Sunday or other public holiday
- 7 am and 7 pm on any other day.

If service vehicle access is required to occur outside these times, noise levels must comply with a criterion of L_{Amax} 60 dB, or the existing ambient noise level (whichever is higher) at nearby noise-affected premises.

5 Noise intrusion assessment

The proposed development is surrounded by various noise sources. The primary noise source of concern is the rail transport corridor at the southern border of the site. Noise from this source has been assessed under Minister's Specification SA 78B (the Specification) under requirements of the Air and Noise Emission Overlay designation within the Plan.

In addition, the South Australian Planning Policy Library *Technical Information Sheet 8—Noise and Air Emissions—Overlay 3* provides guidance on the application of the Specification where mixed land use developments are proposed adjacent to designated sound sources. In this case, the application of a mixed land use designation does apply and has been addressed in the assessment below.

5.1 Minister's Specification SA 78B

5.1.1 Development near rail transport corridor

Part C Table 8 of the Specification defines the relevant Sound Exposure Category (SEC) for developments near a rail transport corridor for prescribed separation distances (see Table 2). The southern-facing facade of the RACF is the closest proposed building envelope to the rail line. The minimum separation distance from an assessment point three metres inside the boundary of the railway corridor to the building envelope is approximately 33 metres.

The SECs for the development are shown in Table 2.

Table 2 SA 78B Sound exposure category – Rail (Table 8)

Sound exposure category	Separation from <i>Tram line</i> (metres)	Separation from <i>Train line</i> (metres)
1	> 10 < 20	> 25 < 50
2	< 10 ⁽¹⁾	> 10 < 25
3	N/A	< 10 ⁽¹⁾
4	N/A	N/A
5	N/A	N/A

(1) This Specification does not consider ground-borne vibration from road or rail sources. Buildings closer than 10 m to a road or 20 m to a rail line may be exposed to perceptible ground vibration. Advice should be sought from a professional acoustic engineer for such buildings.

A review of Table 2 reveals a maximum SEC 1 for the facades on the southern side of the development with direct line of site to the railway line.

5.1.2 Mixed land use areas

As the project boundary resides within an Air and Noise Emissions Designated Area, is adjacent to a designated sound source and promotes mixed land use development, Part C3.4 of the Specification requires that:

All buildings in a *mixed land use area* must have a minimum *sound exposure category* (SEC) of 1 at the building facade in the *building envelope*.

5.1.3 Sound insulation ratings

The appropriate sound insulation ratings relevant to the development are provided in Table 3.

Table 3 Minimum airborne sound attenuation ratings for habitable rooms

SEC	Building element	Location	Acoustic rating
1	External walls	All habitable rooms	$R_W + C_{tr} \geq 45$
	Windows & external glass doors	Refer to Table 4.	

The appropriate sound insulation ratings for closed windows and external glass doors to habitable rooms are provided in Table 4.

Table 4 Minimum airborne sound attenuation for closed windows and external glass door to habitable rooms

Room	Area of window and external glass doors as a percentage of the floor area of the room	Designated sound exposure category 1
		R_W rating
Bedroom and attached non-habitable rooms	Not more than 20%	25
	More than 20% but not more than 40%	28
	More than 40% but not more than 60%	31
	More than 60% but not more than 80%	34
	More than 80%	37
Habitable rooms (other than bedrooms and enclosed kitchens) and attached non-habitable rooms	Not more than 20%	22
	More than 20% but not more than 40%	25
	More than 40% but not more than 60%	28
	More than 60% but not more than 80%	31
	More than 80%	34

(1) Windows and external glass doors are outside of the Deemed-to-Satisfy Provisions and must comply with the Specification Part B5.

5.2 Construction requirements

5.2.1 Deemed-to-satisfy

The constructions provided below detail the deemed-to-satisfy provisions and requirements of the Specification. The constructions are based on the highest SEC applicable to the building facades of the development.

External walls

External wall constructions to achieve the minimum $R_W + C_{tr} \geq 45$ airborne noise requirements for SEC 1 are provided in Table 5.

Table 5 External wall construction requirements

Sound insulation requirement	Deemed-to-satisfy construction
$R_W + C_{tr} \geq 45$	<ul style="list-style-type: none"> one row of 90 mm studs at 600 mm centres, and resilient steel channels fixed to the outside of the studs; and 9.5 mm hardboard or 9 mm fibre cement sheeting or 11 mm fibre cement weatherboards fixed to the outside of the channels; and 75 mm thick glass or mineral wool insulation with a density of 11 kg/m³ or 75 mm thick polyester insulation with a density of 14 kg/m³, positioned between the studs; and two layers of 16 mm fire-protective grade plasterboard fixed to the inside face of the studs. <p>OR</p> <ul style="list-style-type: none"> one row of 90 mm studs at 600 mm centres, and resilient steel channels fixed to the outside of the studs; and one layer of 19 mm board cladding fixed to the outside of the channels and 6 mm fibre cement sheets fixed to the inside of the channels; and 75 mm thick glass or mineral wool insulation with a density of 11 kg/m³ or 75 mm thick polyester insulation with a density of 14 kg/m³, positioned between the studs; two layers of 16 mm fire-protective grade plasterboard fixed to the inside face of the studs.

External windows and glass doors

The sound insulation requirements for external windows and glass doors have been calculated based on the requirements of the Specification (see Table 4) and architectural drawings depicting floor plans and external elevations. The resultant glazing requirements per apartment type are presented in Table 6.

Table 6 Glazing requirements

Apartment type	Room type	Area of glazing as a percentage of the floor area, %	Required external window and glass door $R_W + C_{tr}$ rating
1	Bed 1	18	25
	Bed 2	24	28
	Living/Dining/Kitchen	21	25
1A	Bed 1	18	25
	Bed 2	24	28
	Living/Dining/Kitchen	35	25
1B	Bed 1	19	25
	Bed 2	24	28
	Living/Dining/Kitchen	21	25
1C	Bed 1	18	25
	Bed 2	25	28
	Living/Dining/Kitchen	23	25

Apartment type	Room type	Area of glazing as a percentage of the floor area, %	Required external window and glass door $R_w + C_{tr}$ rating
2	Bed 1	20	25
	Bed 2	24	28
	Living/Dining/Kitchen	23	25
2A	Bed 1	20	25
	Bed 2	25	28
	Living/Dining/Kitchen	23	25
3	Bed 1	17	25
	Bed 2	25	28
	Living/Dining/Kitchen	22	25
3A	Bed 1	21	28
	Bed 2	25	28
	Living/Dining/Kitchen	33	25
4	Bed 1	23	28
	Living/Dining/Kitchen	15	22
4A	Bed 1	22	28
	Living/Dining/Kitchen	15	22
5	Bed 1	24	28
	Bed 2	25	28
	Bed 3	32	28
	Living/Dining/Kitchen	32	25
5A	Bed 1	24	28
	Bed 2	25	28
	Living/Dining/Kitchen	21	25
5B	Bed 1	24	28
	Bed 2	25	28
	Living/Dining/Kitchen	26	25
5C	Bed 1	24	28
	Bed 2	25	28
	Bed 3	32	28
	Living/Dining/Kitchen	31	25
5D	Bed 1	28	28
	Bed 2	24	28
	Bed 3	32	28

Apartment type	Room type	Area of glazing as a percentage of the floor area, %	Required external window and glass door $R_w + C_{tr}$ rating
	Living/Dining/Kitchen	28	25
5E	Bed 1	18	25
	Bed 2	25	28
	Bed 3	27	28
	Living/Dining/Kitchen	19	25
5F	Bed 1	18	25
	Bed 2	25	28
	Bed 3	26	28
	Living/Dining/Kitchen	23	25
6	Bed 1	25	28
	Bed 2	29	28
	Bed 3	27	28
	Living/Dining/Kitchen	12	22
RACF	Bedrooms	32	28
	Lounge/Sit	22	25
	Lounge/Sit/Dine	28	25

Acceptable forms of construction are outlined in Table 7 and Table 8, to be read in conjunction with Table 4 and Table 6.

Table 7 Acceptable forms of window construction

$R_w + C_{tr}$ rating	Window construction
22	3 mm thick monolithic or laminated glass with sliding or double hung type opening
25	3 mm thick monolithic or laminated glass with awning type opening
28	6 mm thick monolithic or laminated glass with sliding or double hung type opening

Windows are to have a seal to restrict air infiltration around each edge of an opening. Seals may be foam or rubber compressible strip, fibrous seal with a vinyl interleaf or the like.

Table 8 Acceptable forms of external glass door construction

$R_w + C_{tr}$ rating	External glass door construction
22	3 mm thick monolithic glass sliding door
25	4 mm thick monolithic glass sliding door

Glass in external doors must be set and sealed in an airtight non-hardening sealant or a soft elastomer gasket or glazing tape. Alternatively, the door manufacturer can verify that the door will achieve the required $R_w + C_{tr}$ rating.

Seals

All openable windows and doors are to have the following or acoustically equivalent seals:

- sliding doors are to have:
 - Schlegel Q-Lon T-Slot seals on the lock and mullion
 - Schlegel Fin-Seal on the rails
- windows awning style with rubber compression seals around the perimeter such as Schlegel Q-Lon T-Slot seals, or sliding with seals as indicated for the sliding doors
- hinged doors are to have:
 - high quality rubber contact seals for the head and the jambs acoustically equivalent to Kilargo IS1212/1515 or Raven RP120/150
 - dropdown seal at the bottom acoustically equivalent to Kilargo IS8090si or Raven RP38.

Ventilation

At this stage, detailed ventilation design has not yet been developed. Any proposed mechanical ventilation should not reduce the acoustic performance of the external facade and will therefore be in accordance with requirements of the Specification.

5.3 St Clair Recreation Centre

The St Clair Recreation Centre (SCRC), located to the north-east of the project site, has been identified as a potential source of external noise intrusion for the development. Whilst the SCRC falls outside the scope of the Specification, it is considered best-practice to include design requirements in order to protect the amenity of habitable spaces that may experience direct exposure to noise ingress.

5.3.1 Internal noise level criteria

Adopting the Performance Requirements set out in the Specification, the internal sound level criteria are summarised in Table 9.

Table 9 Internal sound criteria

Type of room	Internal sound criteria	Applicable time period
	Maximum allowable level for individual rooms	
Bedroom	$L_{eq, 15min}$ 35 dB(A)	Night (10 pm to 7 am)
Other habitable room other than a bedroom	$L_{eq, 15min}$ 40 dB(A)	Day (7 am to 10 pm)

Resonate has conducted modelling of noise emission from the SCRC. It is noted the SCRC is operational until 11 pm each day of the week. Predicted noise levels for the operation of the SCRC are approximately 57 dB(A) at the nearest affected facade of Building 2 of the development.

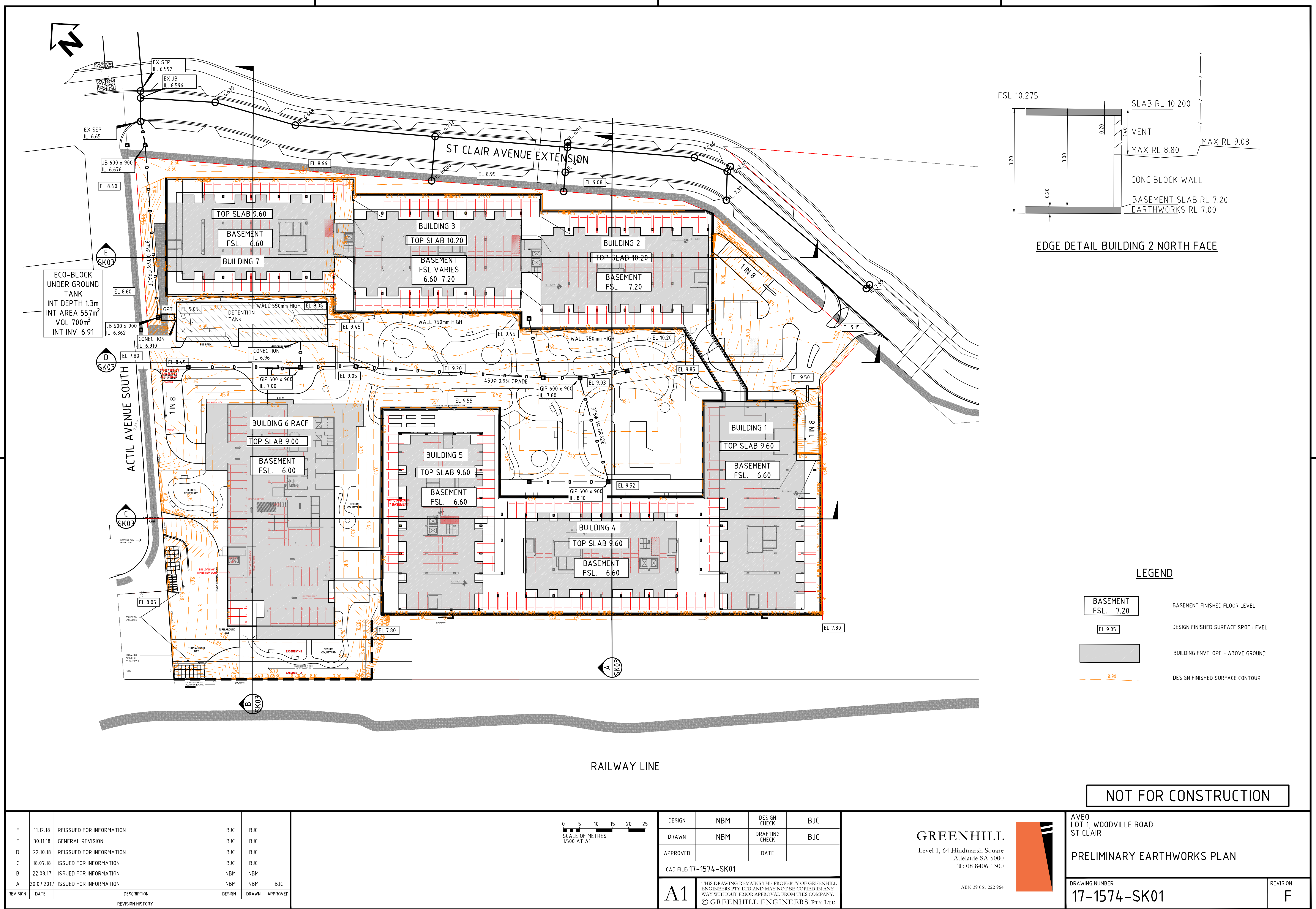
As established in Section 5.1.2, a minimum SEC 1 applies for habitable spaces in all buildings located within the Noise and Air Emissions Designated Area. The application of the construction requirements provided in Section 5.2 should achieve the internal noise level criteria for those buildings facing the SCRC.

6 Conclusion

An environmental noise emission and external noise assessment has been conducted for the proposed Aveo retirement community site at Lot 1000 Woodville Road, St Clair. The assessment has had regard to the relevant noise requirements of the Charles Sturt Council Development Plan and the Minister's Specification SA 78B *Construction Requirements for the Control of External Sound*.

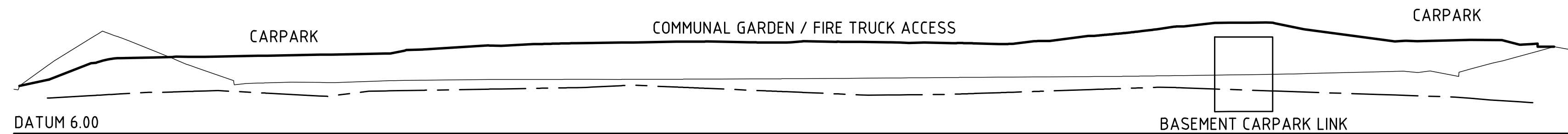
This assessment has demonstrated the following:

- The Charles Sturt Council Development Plan has specific noise requirements relating to noise emission and ingress
- Conceptual facade constructions for the management of noise from the nearby railway line on the site in accordance with the Minister's Specification SA 78B
- As the land zoning promotes mixed-use development and is located adjacent to a designated sound source, a minimum Sound Exposure Category 1 applies to all buildings within the Noise and Air Emissions Overlay Designated Area.

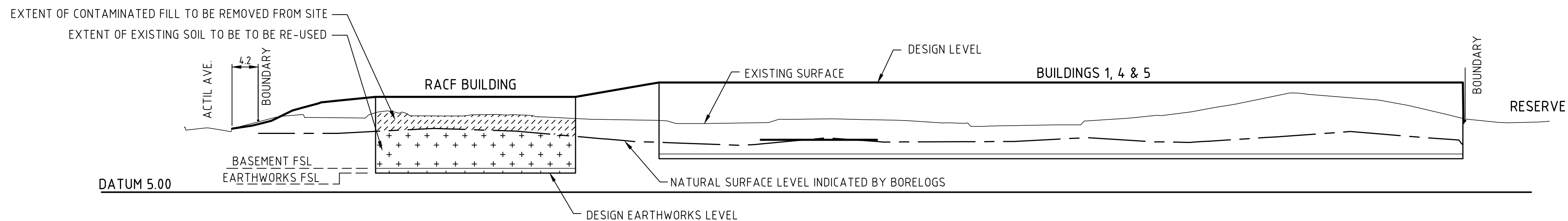




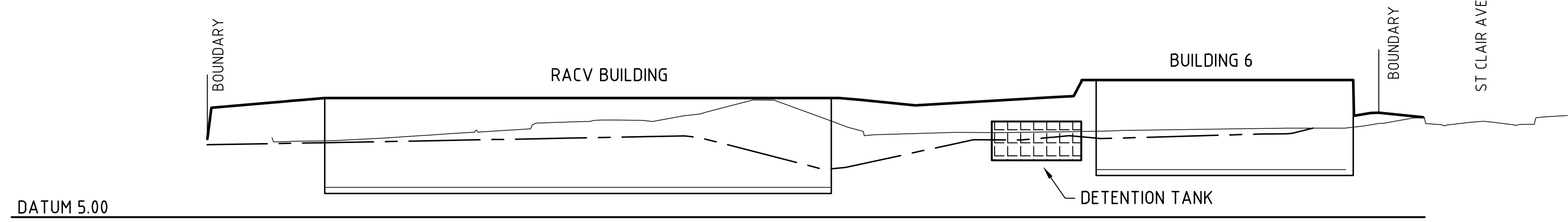
SECTION E
SK01



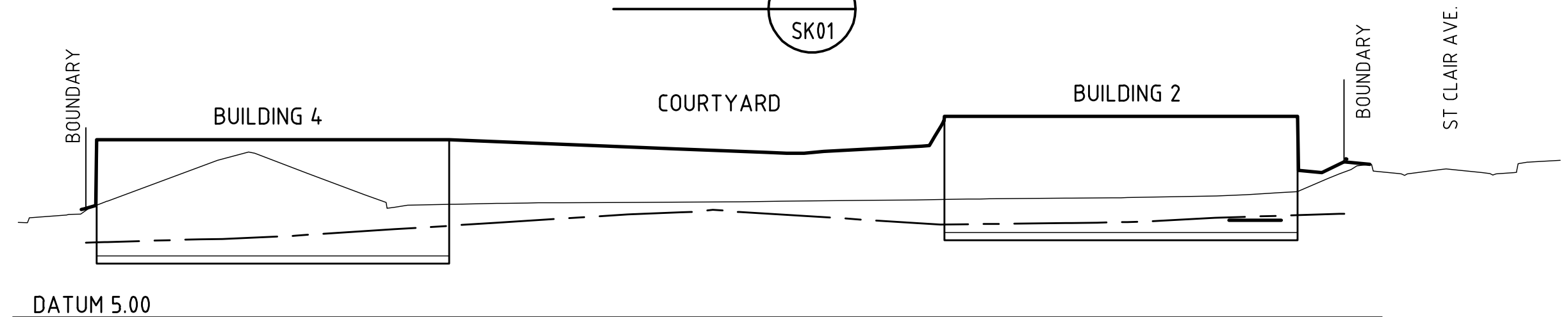
SECTION D
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SECTION C
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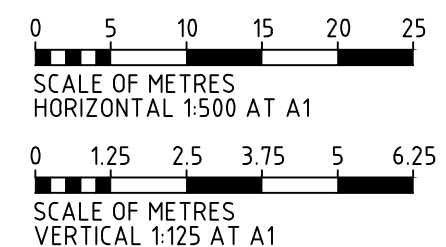
SECTION B
SK01



SECTION A
SK01

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REVISION	DATE	DESCRIPTION	DESIGN	DRAWN	APPROVED
D	11.12.18	SECTION ADDED	BJC	BJC	
C	30.11.18	SECTIONS REVISED	BJC	BJC	
B	22.10.18	SECTIONS REVISED	BJC	BJC	
A	18.07.18	ISSUED FOR INFORMATION	BJC	BJC	



DESIGN	ABS	DESIGN CHECK	ABS
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AVEO LOT 1, WOODVILLE ROAD ST CLAIR	
PRELIMINARY EARTHWORKS PLAN EARTHWORKS SECTIONS	
DRAWING NUMBER 17-1574-SK03	REVISION D



AVEO ST CLAIR INTEGRATED RETIREMENT COMMUNITY

STORMWATER MANAGEMENT PLAN

Prepared for

Aveo Group

10 December 2018

Project Number: 17.1574

Revision D



STORMWATER MANAGEMENT PLAN

Prepared for

Aveo Group

Ref 16777

Date 10 December 2018

Prepared by Kathryn M^cAllister

Reviewed by Tyson Radetti/Dean Mathews

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	2 October 2018	Issued for Information	Kathryn M ^c Allister Civil Engineer	
B	30 November 2018	Issued for Information	Kathryn M ^c Allister Civil Engineer	
C	5 December 2018	Revised Number of apartments	Kathryn M ^c Allister Civil Engineer	
D	10 December 2018	Revised Section 2 and Section 8	Kathryn M ^c Allister Civil Engineer	

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Appendix B – Pre-Development DRAINS

Appendix C – Post Development DRAINS

Appendix D – GRAF ecobloc Information

Appendix E – SPEL Storm Chamber Information

Appendix F –MUSIC Modelling



1. Introduction

GREENHILL has been engaged by Aveo Group to develop a Stormwater Management Plan for the Development Approval of Aveo St Clair Integrated Retirement Community. The development will yield approximately 341 independent living units in the form of 6 apartment buildings, with an additional building proposed to be a Residential Aged Care Facility, accommodating 144 beds. A concept plan for this site is located in Appendix A. This parcel of land is within the City of Charles Sturt Local Government area.

The site is approximately 2.8 hectares and is located approximately 10 kilometres northwest of the Adelaide CBD, adjacent the St Clair Recreation Centre and the recently constructed St Clair Avenue extension. This site was previously a sporting oval, consisting of existing earth mounds, club rooms and a carpark.

The site is bordered by:

- The St Clair Recreation Centre and numerous ovals to the north and east;
- Residential properties along Actil Avenue South to the north west;
- Woodville Road to the South east; and
- The Outer Harbour Rail Corridor to the south west.

Given the existing mounds onsite there is varying grades across this site; however, the site generally grades to the northern corner of the site. Site levels vary between approximately 9.2 m and 7.9m AHD.

An aerial image of the proposed redevelopment site is shown below.



Figure 1: Development Site

This report details the proposed stormwater management plan for the development.



2. Existing Infrastructure

As part of the St Clair Avenue Extension, an underground stormwater pit and pipe network was installed that connects into the existing system in Actil Avenue South. Connections were installed as part of the extension to allow for this development.

The existing stormwater network in Actil Avenue consists of a 600 mm diameter reinforced concrete pipe.

The existing stormwater system in Actil Avenue South continues north to Torrens Road. This stormwater ultimately discharges to the existing large wetland and detention basin system built as part of the recent St Clair Development north west of the site. The wetlands and detention basin system has been designed and constructed to account for the large catchment area, which incorporates this proposed development site.

3. Authority requirements

During a Pre-Lodgement Panel Meeting, held on 27 August 2018, it was confirmed that the development site is to ensure that the peak runoff from the 100-year ARI storm event is to be limited to the peak runoff from the 100-year ARI storm event in the pre-development scenario. This is in accordance with the Charles Sturt Council Development Plan General Section (Natural Resources) PDC 8B, which states that:

- Water discharged from a development site should not exceed the rate of discharge from the site as it existed in pre-development conditions; and
- Development should include stormwater management systems to protect it from damage during a minimum of a 1 in 100 year average return interval flood.

In addition, it is noted that City of Charles Sturt has previously advised that following is required for this site:

- Stormwater quality is to be managed through pollution control devices to remove gross pollutants, grease, oil and chemical pollutants;
- Detention storage is to be provided for the development site only, and does not need to cater for runoff from St Clair Avenue or external flows.

A Local Government Search was provided on the property as part of the original Expression of Interest supporting information provided by Renewal SA for this site. This document listed Conditions required by the Development Assessment Commission (DAC), with item 3 (2016) and item 14 (2017) being in relation to the Stormwater Management. This states that *“Any net increase in peak stormwater discharge from the site (post-development to pre-development) for the design storm event (major) shall be managed and/or disposed of onsite via an engineered drainage system (detention, retention, and/or combination of both and/or other engineered means).*



The Stormwater Management Plan must achieve the following:

For Individual Allotments:

- (i) For the minor storm event stormwater discharge from allotments must be restricted to pre-development Q5 flows.*

For Land Division:

- (i) For minor storm events an underground stormwater drainage system must be designed to cater for pre-development Q5 flows for each contributing catchment;*
- (ii) For storms greater than the minor storm event, flow paths shall be clearly defined using roadways giving consideration to public safety and protection to properties;*
- (iii) This must be achieved by restricting the flow using engineered detention and retention systems located in Public Road Reserves for ease of access and maintenance;*
- (iv) Where overland flow paths stormwater drainage system are in open space areas, then prior to the development of the Stormwater Management Plan, consent must be obtained from the Council and additional open space may be required; and*
- (v) Define how the quality of the stormwater discharge will be managed with pollution prevention devices that effectively remove solids and liquid pollutants.*

Once the Storm Water Management Plan has been approved by the Council, the Developer must prepare engineering Design Plans, calculations and supporting information as required in Land Division Consent Condition 'Public Infrastructure and Utility Services'."

The Aveo development has proposed a stormwater system to meet with the CCS Development Plan and the Conditions outlined in the Local Government Search, listed above.

4. Drainage Model

The stormwater drainage modelling was undertaken using the DRAINS software, developed by Watercom. DRAINS is an integrated hydrology and hydraulic model that undertakes design analysis calculations to simulate the operation of the urban stormwater drainage system.

The ILSAX type hydrology model in DRAINS has been selected for use in the assessment of the existing stormwater infrastructure and the proposed infrastructure for the development. The ILSAX model uses the time-area method and Horton infiltration procedures to calculate flow hydrographs from sub-catchments. Sub-catchments are combined and the flows routed through the pipe and/or channel system in a time step process. DRAINS calculates a hydraulic grade line through the drainage system at each time step along with establishing flow rates and water surface levels. DRAINS can model stormwater flows in pipe and channel systems, as well as over land flows that may occur in roadways or other locations.

The DRAINS model was prepared using rainfall information for the St Clair area.

The following ILSAX parameters have been selected and considered appropriate for this site:



Impervious area depression storage:	1
Supplementary area depression storage:	1
Pervious area depression storage:	5
Antecedent Moisture Condition:	2.5

The rainfall data in the original models is based on that recommended by Australian Rainfall and Runoff, Volume 1 and Volume 2, 1987. The design storms used for analysis of the stormwater network are the 15, 20, 25, 45 minute and 1, 1.5, 2, 3, 4.5, 6, 9 and 12 hour storms.

5. Pre-development Assessment

A pre-development analysis of the development site was undertaken using DRAINS.

The DRAINS model reports that during the 100-years ARI event the peak runoff from the site is 225 L/s, which occurs during a 25-minute duration storm event.

Further DRAINS details for the pre-development scenario are located in Appendix B.

6. Proposed Infrastructure

A system of pits and underground pipes is proposed to convey stormwater internally to a detention tank located within the site. The grade of the site and the design floor levels of the buildings enable the internal drainage to be directed to the tank location, prior to discharging into the existing downstream system.

Preliminary detention sizing has been undertaken based on limiting the minor 5-year ARI postdevelopment flows in the underground system to the predevelopment 5-years ARI, with the combined underground pipe network and the overland flow from the site during the 100-years ARI limited to the predevelopment 100-year ARI.

It is proposed that the detention be in the form of an underground detention tank system located within the north western portion of the site. This detention system will then connect into the existing downstream infrastructure, on the corner of Actil Avenue South and St Clair Avenue.

Details of the proposed detention are as per below:

Depth	1.3 m
Volume	700 m ³
Outlet size	225 mm outlet pipe

The DRAINS details of the post-development scenario, including detention are located in Appendix C.



It is noted that during early construction stages, a temporary detention basin will be created to restrict flows from the site, as required. As the development progresses, this temporary basin will be converted to the proposed underground tank.

During detailed design phase, further investigations will be undertaken into the form of detention tank to be used for this site, and confirmation of the Detention size and inlet/outlet structure details. Early investigations indicate that the use of a high early discharge system may further reduce the volume of storage required for this site.

Alternative detention storage forms have been investigated, such as proprietary products by manufactures such as SPEL and GRAF. General information on two of these products has been included in Appendix D and Appendix E.

7. Water Quality

Stormwater water quality treatment measures to treat stormwater prior to discharge from the site are proposed for this development in the form of a Gross Pollutant Trap (GPT). The aim of the GPT is to meet the EPA water quality policy targets. The current EPA water quality targets are:

- 90% reduction in litter/gross pollutants;
- 45% reduction in average annual total nitrogen;
- 60% reduction in average annual phosphorous;
- and
- 80% reduction in average annual suspended solids.

Preliminary water quality modelling has been undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling software. Preliminary modelling suggests that implementation of an Ecosol GPT 4300 or similar product will provide suitable treatment for this site to meet the current EPA requirements. However, it is noted that due to the proximity of the downstream St Clair Wetlands it is likely that treatment of this site can occur offsite without the use of a GPT.

Results are as per the table below, with further information located in Appendix F.

Table 1: Water Quality Targets and Results

Pollutant	EPA Reduction Target	MUSIC Reduction Results
Gross Pollutants	90%	98%
Total Nitrogen	45%	60%
Total Phosphorus	60%	61%
Total Suspended Solids	80%	80%



8. Summary

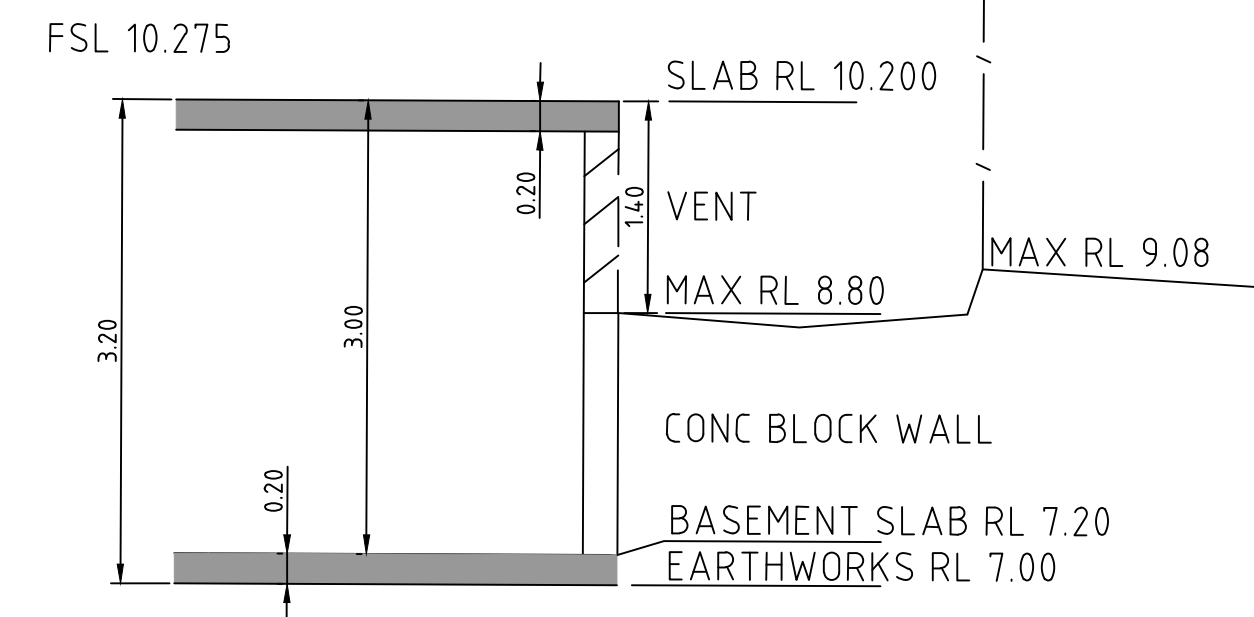
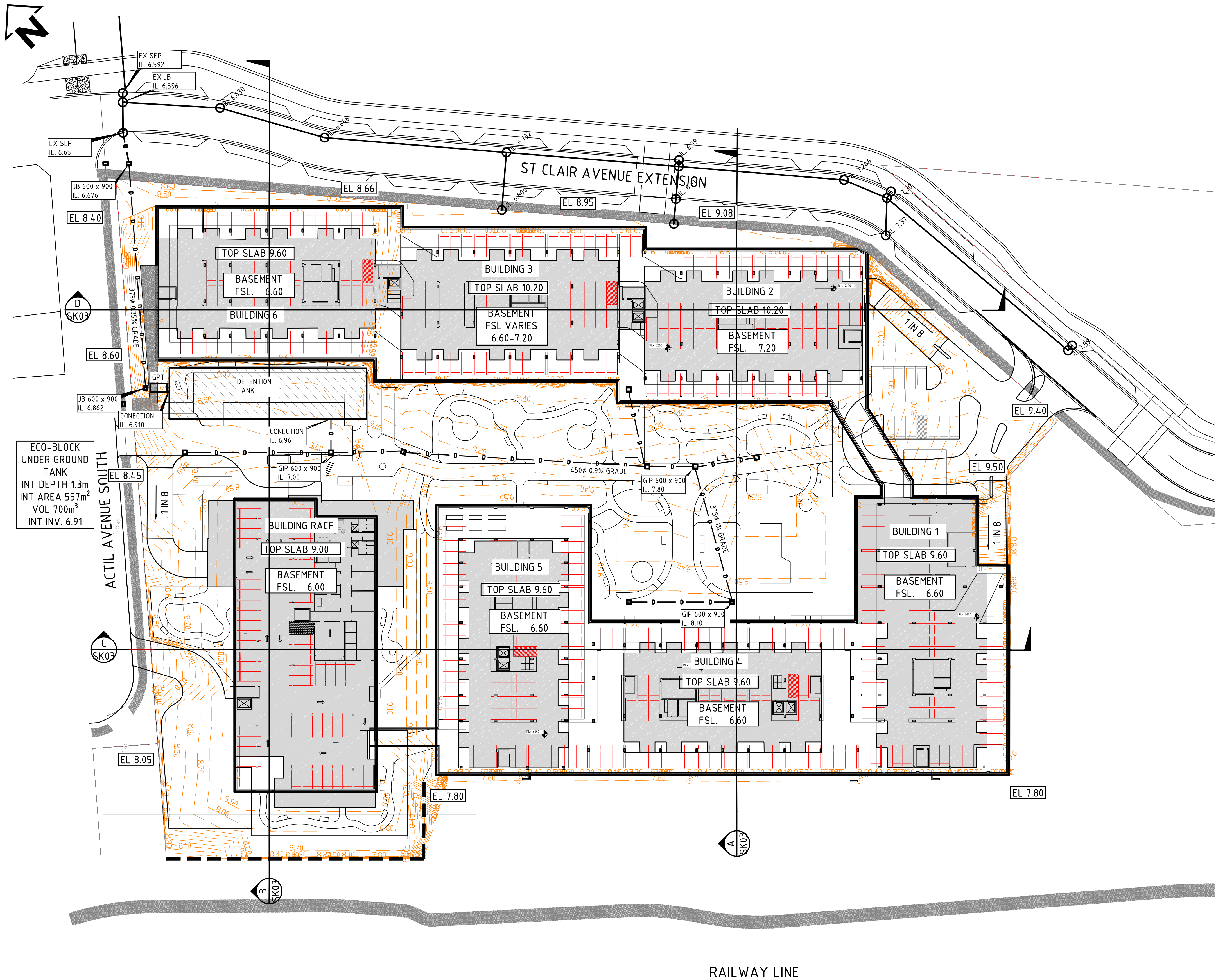
An assessment of the stormwater management required for the development has been undertaken.

Detention has been proposed for the development to restrict the flows from the development to the pre-development flows. The modelling suggests that a detention storage volume of 700m³ is required to restrict the flows to that of the pre-development flow.

The existing St Clair Development, directly downstream of this site, has been designed with a large wetland and detention basin system, so that there should be no risk of downstream flooding.

It is expected that stormwater from the site can be treated by the downstream St Clair Wetlands, and that onsite treatment will not be required. However, if onsite treatment is required, it is proposed that the stormwater will be treated with the use of a GPT prior to discharging to the existing system in St Clair Avenue/Actil Avenue, to meet the EPA water quality objectives.

Appendix A – Development Concept Plan

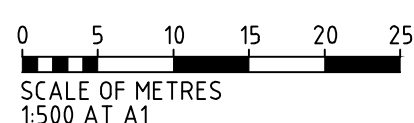


EDGE DETAIL BUILDING 2 NORTH FACE

RAILWAY LINE

NOT FOR CONSTRUCTION

E	30.11.18	GENERAL REVISION	BJC	BJC	
D	22.10.18	REISSUED FOR INFORMATION	BJC	BJC	
C	18.07.18	ISSUED FOR INFORMATION	BJC	BJC	
B	22.08.17	ISSUED FOR INFORMATION	NBM	NBM	
A	20.07.2017	ISSUED FOR INFORMATION	NBM	NBM	BJC
REVISION	DATE	DESCRIPTION	DESIGN	DRAWN	APPROVED



DESIGN	NBM	DESIGN CHECK	BJC
DRAWN	NBM	DRAFTING CHECK	BJC
APPROVED		DATE	
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ABN 39 061 222 964

AVEO LOT 1, WOODVILLE ROAD ST CLAIR	
PRELIMINARY EARTHWORKS PLAN	
DRAWING NUMBER 17-1574-SK01	REVISION E

Appendix B – Pre-Development DRAINS

Pre-Development Inputs

2018.11.13 Post to 5-year pre dev.drn - DRAINS

File Edit Project View Draw Run Help



C 100-yr Predev
100-yr Predev

C 5-yr Predev
5-yr Predev

Press F1 for help.

Project Number: 17-1574
Project Name: Lot 1 Woodville Road, St Clair
Client: Aveo Group
DRAINS: Pre-Development Inputs

PIT / NODE DETAILS																						
Name	Type	Family	Version 13 Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is						
5-yr Predev	Node						8.75		0		812.56	-307.12		1	No							
100-yr Predev	Node						8.75		0		901.389	-139.583		1525	No							
DETENTION BASIN DETAILS																						
Name	Elev	Volume	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id							
SUB-CATCHMENT DETAILS																						
Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C 5-yr Predev	5-yr Pr	2.8		10	90	0	6	40	0										0			1
C 100-yr Predev	100-yr	2.8		10	90	0	6	40	0										0			1
PIPE DETAILS																						
Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)			
DETAILS of SERVICES CROSSING PIPES																						
Pipe	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	etc etc												
CHANNEL DETAILS																						
Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed									
PIPE COVER DETAILS																						
Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)																		

This model has no pipes with non-return valves

Pre-Development Results

2018.11.13 Post to 5-year pre dev.drn - DRAINS

File Edit Project View Draw Run Help



Worst case major storm

0.225

0.052

Results of Standard Hydraulic Analysis for major storms

Project Number: 17-1574

Project Name: Lot 1 Woodville Road, St Clair

Client: Aveo Group

DRAINS: Pre-Development 100-Years ARI Results

DRAINS results prepared from Version 2018.09

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
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SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C 5-yr Predev	0.052		0.052	0	6	40	0 AR&R 100 year, 15 minutes storm, average 112 mm/h, Zone 6
C 100-yr Predev	0.225		0.108	0.138	6	40	0 AR&R 100 year, 25 minutes storm, average 83.0 mm/h, Zone 6

Outflow Volumes for Total Catchment (0.56 impervious + 5.04 pervious = 5.60 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 100 year, 15 minutes storm, average 112 mm/h, Zone 6	1568	245.30 (15.6%)	106.12 (67.7%)	139.18 (9.9%)
AR&R 100 year, 20 minutes storm, average 95.0 mm/h, Zone 6	1773.33	315.19 (17.8%)	121.15 (68.3%)	194.05 (12.2%)
AR&R 100 year, 25 minutes storm, average 83.0 mm/h, Zone 6	1936.67	364.37 (18.8%)	133.12 (68.7%)	231.24 (13.3%)
AR&R 100 year, 45 minutes storm, average 57.0 mm/h, Zone 6	2394.05	487.73 (20.4%)	167.02 (69.8%)	320.71 (14.9%)
AR&R 100 year, 1 hour storm, average 47.3 mm/h, Zone 6	2648.8	560.69 (21.2%)	185.64 (70.1%)	375.05 (15.7%)
AR&R 100 year, 1.5 hours storm, average 35.7 mm/h, Zone 6	2998.71	644.26 (21.5%)	212.24 (70.8%)	432.03 (16.0%)
AR&R 100 year, 2 hours storm, average 29.2 mm/h, Zone 6	3270.45	685.67 (21.0%)	232.96 (71.2%)	452.71 (15.4%)
AR&R 100 year, 3 hours storm, average 21.8 mm/h, Zone 6	3677.25	753.49 (20.5%)	263.21 (71.6%)	490.28 (14.8%)
AR&R 100 year, 4.5 hours storm, average 16.3 mm/h, Zone 6	4123.82	810.44 (19.7%)	298.17 (72.3%)	512.27 (13.8%)
AR&R 100 year, 6 hours storm, average 13.3 mm/h, Zone 6	4486.47	904.19 (20.2%)	326.19 (72.7%)	578.00 (14.3%)
AR&R 100 year, 9 hours storm, average 9.9 mm/h, Zone 6	5024.54	889.49 (17.7%)	368.86 (73.4%)	520.63 (11.5%)
AR&R 100 year, 12 hours storm, average 8.1 mm/h, Zone 6	5451.29	926.93 (17.0%)	402.96 (73.9%)	523.97 (10.7%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
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CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
------	--------	--------	----------------	--------------------	---------------------

CONTINUITY CHECK for AR&R 100 year, 25 minutes storm, average 83.0 mm/h, Zone 6

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
5-yr Predev	39.09	39.09	0	0
100-yr Predev	325.28	325.28	0	0

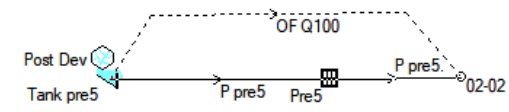
Run Log for 2018.11.13 Post to 5 run at 10:39:02 on 26/11/2018

Appendix C – Post Development DRAINS

Post Development Inputs

2018.11.13 Post to 5-year pre dev.drn - DRAINS

File Edit Project View Draw Run Help



Finished 0 of 12 storms. Running 12 storms. Overall 15% complete. Press ESC to terminate run. ■■■

Project Number: 17-1574
Project Name: Lot 1 Woodville Road, St Clair
Client: Aveo Group
DRAINS: Post Development Inputs

PIT / NODE DETAILS

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is	
Pre5	OnGrade	JB	JB		1.5		8.65		0	0	1334.028	-450.694	No	1534	1 x Ku	No	New
	2-Feb Node						8.027		0		1464.167	-449.167		1429		No	

DETENTION BASIN DETAILS

Name	Elev	Volume	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id
Tank pre5		6.91	0	Culvert		1.5				1117.824	-451.736	No			1410
		7.2	5												
		8.2	750												

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area (%)	Grass Area (%)	Supp Area (%)	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope (%)	Supp Slope (%)	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope (%)	Gutter FlowFactor	Rainfall Multiplier
Post Dev	Tank pre5	2.8		60	30	10	6	16	2										0			1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)
P pre5	Tank pre5	Pre5		15	6.91	6.835	0.5 PVC		225	242	0.03	NewFixed		1 Tank pre5	0				
P pre5.	Pre5	2-Feb		66	6.835	6.65	0.28 PVC		225	242	0.03	NewFixed		1 Pre5	0				

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	etc
										etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed
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OVERFLOW ROUTE DETAILS

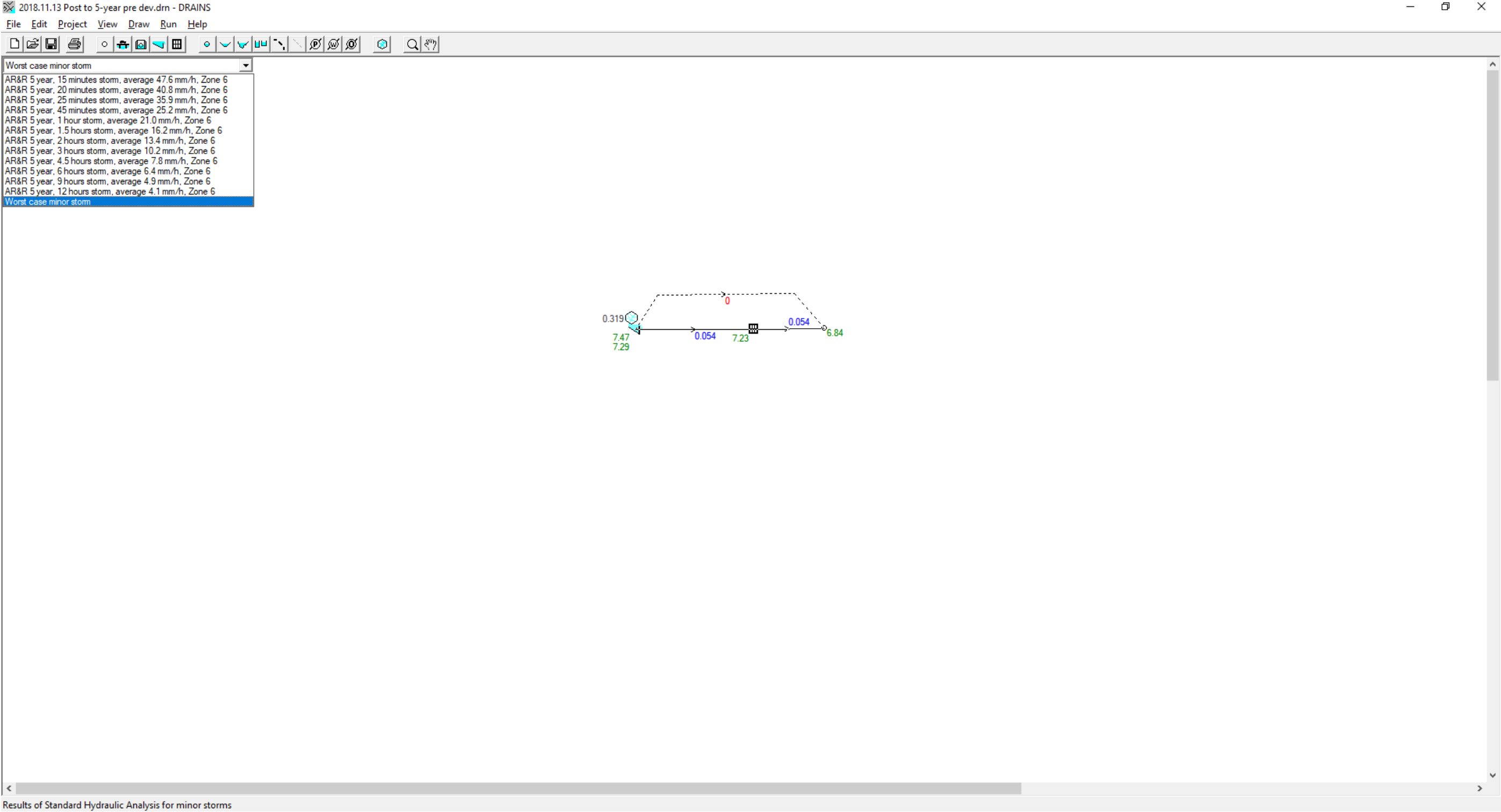
Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id			
OF Q100	Tank pre5	2-Feb		0.1	8	2	1.45 Dummy		0.5	0.5	0.4	0.3	0	1416		1

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)
P pre5	PVC	242	0.45	0.04 Unsafe
P pre5.	PVC	242	0.45	1.13

This model has no pipes with non-return valves

Post Development 5-Years ARI Results



Results of Standard Hydraulic Analysis for minor storms

Project Number: 17-1574
Project Name: Lot 1 Woodville Road, St Clair
Client: Aveo Group
DRAINS: Post Development 5-Years ARI Results

DRAINS results prepared from Version 2018.09

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pre5		7.23		0		1.42	None
	2-Feb	6.84		0			

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Post Dev		0.319	0.311	0.008	6	16	2 AR&R 5 year, 25 minutes storm, average 35.9 mm/h, Zone 6

Outflow Volumes for Total Catchment (1.96 impervious + 0.84 pervious = 2.80 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 5 year, 15 minutes storm, average 47.6 mm/h, Zone 6	333.2	183.12 (55.0%)	183.12 (78.5%)	0.00 (0.0%)
AR&R 5 year, 20 minutes storm, average 40.8 mm/h, Zone 6	380.82	213.07 (55.9%)	211.69 (79.4%)	1.37 (1.2%)
AR&R 5 year, 25 minutes storm, average 35.9 mm/h, Zone 6	418.88	236.17 (56.4%)	234.53 (80.0%)	1.64 (1.3%)
AR&R 5 year, 45 minutes storm, average 25.2 mm/h, Zone 6	529.2	300.72 (56.8%)	300.72 (81.2%)	0.00 (0.0%)
AR&R 5 year, 1 hour storm, average 21.0 mm/h, Zone 6	588	336.00 (57.1%)	336.00 (81.6%)	0.00 (0.0%)
AR&R 5 year, 1.5 hours storm, average 16.2 mm/h, Zone 6	679.02	394.48 (58.1%)	390.61 (82.2%)	3.87 (1.9%)
AR&R 5 year, 2 hours storm, average 13.4 mm/h, Zone 6	750.35	433.41 (57.8%)	433.41 (82.5%)	0.00 (0.0%)
AR&R 5 year, 3 hours storm, average 10.2 mm/h, Zone 6	856.8	497.28 (58.0%)	497.28 (82.9%)	0.00 (0.0%)
AR&R 5 year, 4.5 hours storm, average 7.8 mm/h, Zone 6	984.06	573.63 (58.3%)	573.63 (83.3%)	0.00 (0.0%)
AR&R 5 year, 6 hours storm, average 6.4 mm/h, Zone 6	1083.6	633.36 (58.4%)	633.36 (83.5%)	0.00 (0.0%)
AR&R 5 year, 9 hours storm, average 4.9 mm/h, Zone 6	1242.36	729.67 (58.7%)	728.62 (83.8%)	1.06 (0.3%)
AR&R 5 year, 12 hours storm, average 4.1 mm/h, Zone 6	1370.88	805.73 (58.8%)	805.73 (84.0%)	0.00 (0.0%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P pre5	0.054		1.17	7.292	7.226 AR&R 5 year, 1.5 hours storm, average 16.2 mm/h, Zone 6
P pre5.	0.054		1.39	7.122	6.84 AR&R 5 year, 1.5 hours storm, average 16.2 mm/h, Zone 6

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF Q100		0	0	0	0	0	0	0

DETENTION BASIN DETAILS

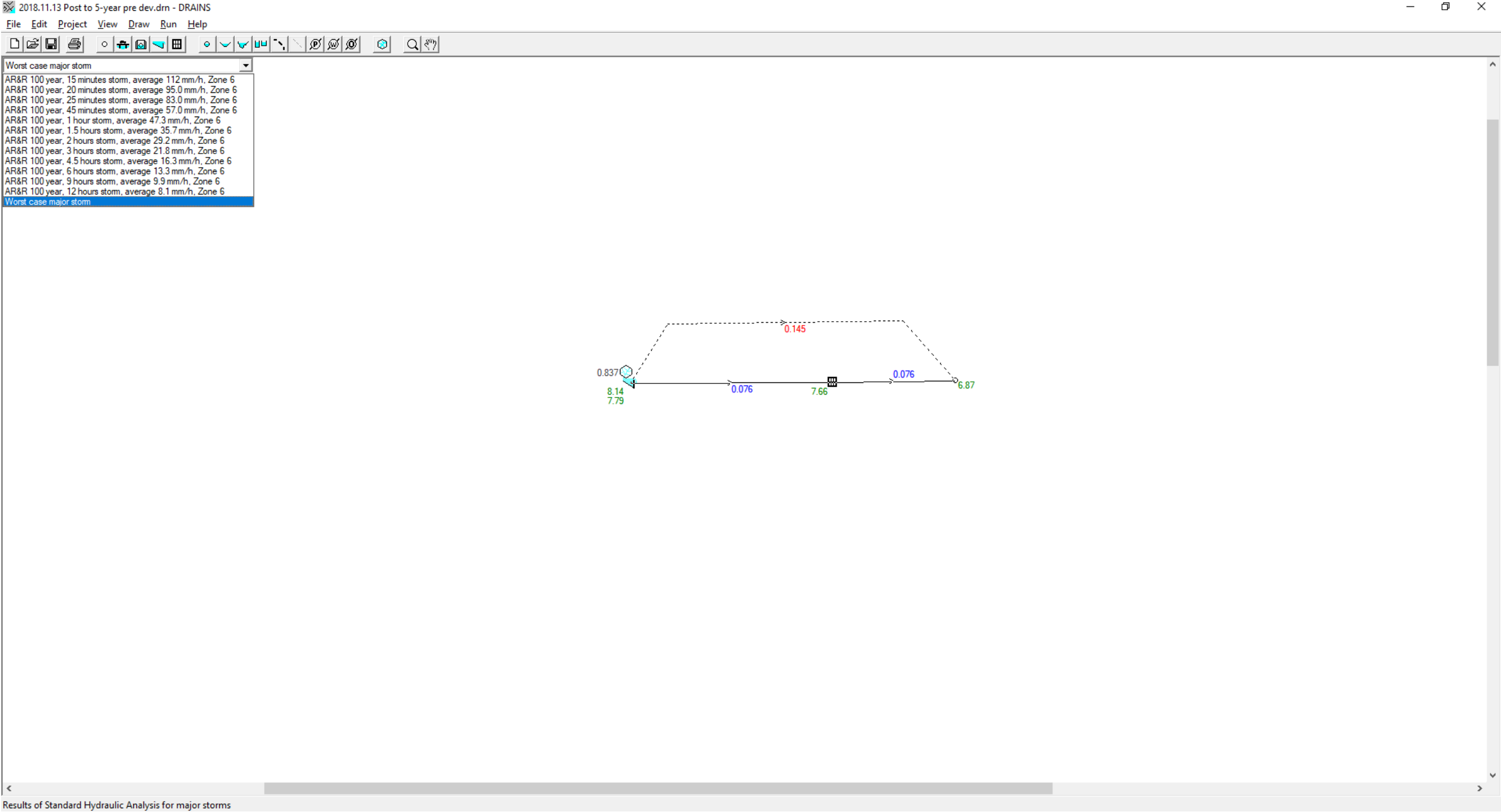
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Tank pre5	7.47		202.5	0.054	0.054
					0

CONTINUITY CHECK for AR&R 5 year, 25 minutes storm, average 35.9 mm/h, Zone 6

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
Tank pre5	236.17	140.51		95.66
Pre5	140.51	138.05		0
	2-Feb	138.05		0

Run Log for 2018.11.13 Post to 5 run at 11:34:17 on 28/11/2018
No water upwelling from any pit. Freeboard was adequate at all pits.
Flows were safe in all overflow routes.

Post Development 100-Years ARI Results



Results of Standard Hydraulic Analysis for major storms

Project Number: 17-1574
Project Name: Lot 1 Woodville Road, St Clair
Client: Aveo Group
DRAINS: Post Development 100-Years ARI Results

DRAINS results prepared from Version 2018.09

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pre5	7.66			0		0.99	None
	2-Feb 6.87			0.145			

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Post Dev	0.837		0.7	0.179	6	16	2 AR&R 100 year, 15 minutes storm, average 112 mm/h, Zone 6

Outflow Volumes for Total Catchment (1.96 impervious + 0.84 pervious = 2.80 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 100 year, 15 minutes storm, average 112 mm/h, Zone 6	784	604.09 (77.1%)	453.60 (82.7%)	150.49 (64.0%)
AR&R 100 year, 20 minutes storm, average 95.0 mm/h, Zone 6	886.67	690.63 (77.9%)	515.20 (83.0%)	175.43 (66.0%)
AR&R 100 year, 25 minutes storm, average 83.0 mm/h, Zone 6	968.33	752.99 (77.8%)	564.20 (83.2%)	188.79 (65.0%)
AR&R 100 year, 45 minutes storm, average 57.0 mm/h, Zone 6	1197.02	933.75 (78.0%)	701.41 (83.7%)	232.34 (64.7%)
AR&R 100 year, 1 hour storm, average 47.3 mm/h, Zone 6	1324.4	1033.43 (78.0%)	777.84 (83.9%)	255.59 (64.3%)
AR&R 100 year, 1.5 hours storm, average 35.7 mm/h, Zone 6	1499.35	1169.91 (78.0%)	882.81 (84.1%)	287.10 (63.8%)
AR&R 100 year, 2 hours storm, average 29.2 mm/h, Zone 6	1635.22	1274.53 (77.9%)	964.33 (84.2%)	310.19 (63.2%)
AR&R 100 year, 3 hours storm, average 21.8 mm/h, Zone 6	1838.62	1421.05 (77.3%)	1081.96 (84.1%)	339.09 (61.5%)
AR&R 100 year, 4.5 hours storm, average 16.3 mm/h, Zone 6	2061.91	1579.17 (76.6%)	1215.40 (84.2%)	363.77 (58.8%)
AR&R 100 year, 6 hours storm, average 13.3 mm/h, Zone 6	2243.23	1718.23 (76.6%)	1323.75 (84.3%)	394.48 (58.6%)
AR&R 100 year, 9 hours storm, average 9.9 mm/h, Zone 6	2512.27	1867.27 (74.3%)	1484.53 (84.4%)	382.74 (50.8%)
AR&R 100 year, 12 hours storm, average 8.1 mm/h, Zone 6	2725.64	2004.20 (73.5%)	1612.04 (84.5%)	392.16 (48.0%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P pre5	0.076		1.66	7.787	7.656 AR&R 100 year, 1.5 hours storm, average 35.7 mm/h, Zone 6
P pre5.	0.076		1.74	7.446	6.869 AR&R 100 year, 1.5 hours storm, average 35.7 mm/h, Zone 6

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF Q100	0.145		0.145	0	0.194	0.15	1.94	0.77 AR&R 100 year, 1.5 hours storm, average 35.7 mm/h, Zone 6

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Tank pre5	8.14		702	0.221	0.076 0.145

CONTINUITY CHECK for AR&R 100 year, 15 minutes storm, average 112 mm/h, Zone 6

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
Tank pre5	604.09	604.01		0.03
Pre5	604.01	604.34		0
2-Feb	604.34	604.34		0

Run Log for 2018.11.13 Post to 5 run at 11:21:47 on 28/11/2018
No water upwelling from any pit. Freeboard was adequate at all pits.
Flows were safe in all overflow routes.

These overflow routes carried water uphill (adding energy): OF Q100. These results may be invalid. You should check for water flowing round in circles (e.g. negative flow in adjacent pipes) at these locations. You may need to reformulate the model.

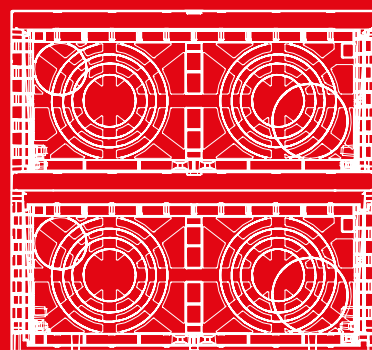
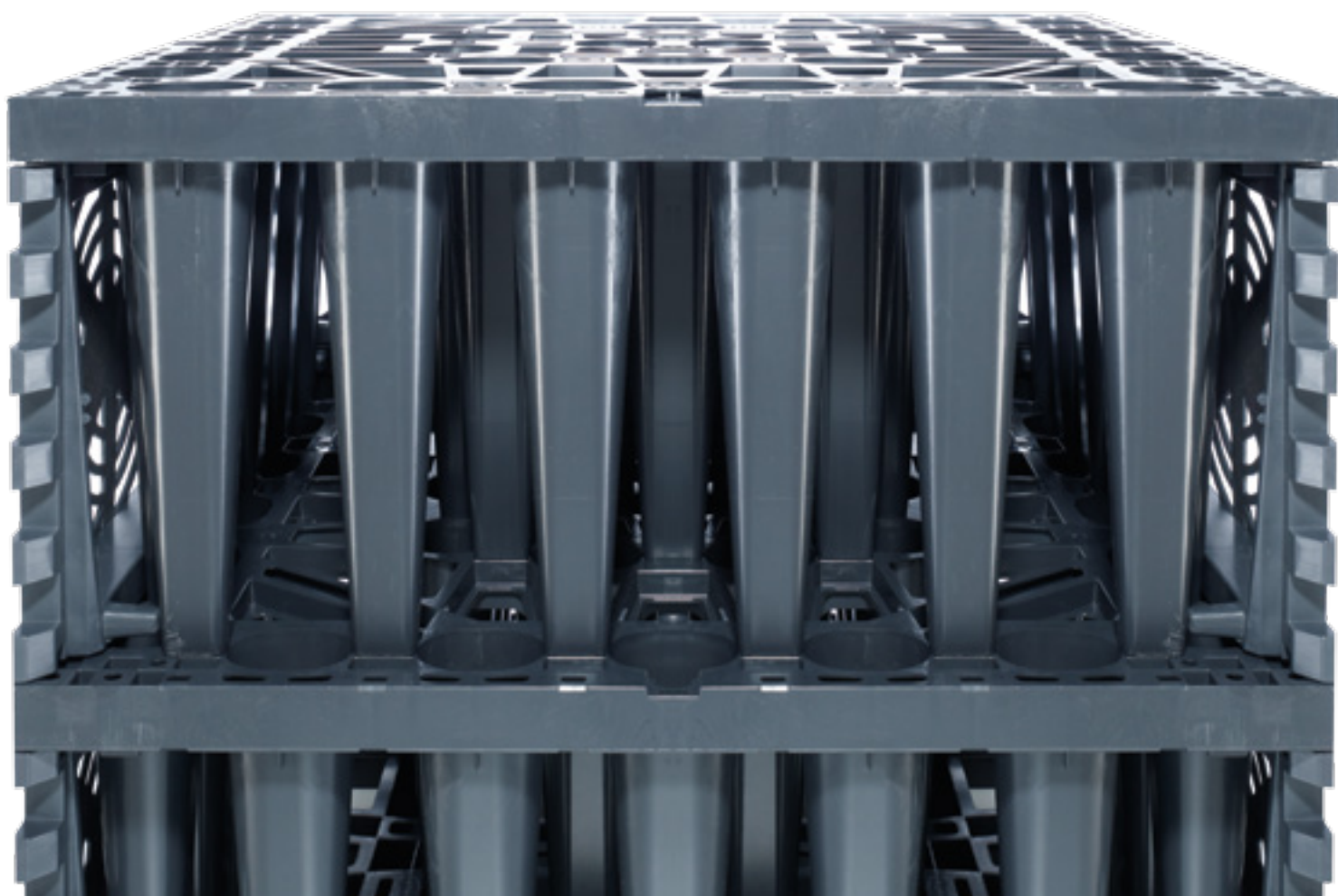
IGNORE THESE WARNINGS AT YOUR OWN PERIL.\cf1

Appendix D – GRAF ecobloc Information



EcoBloc System

Stormwater management





Production site in Dachstein (France)



Production site in Teningen (Germany) near Freiburg

GRAF – Setting standards in quality

Otto Graf GmbH has been supplying high-quality plastic products to its customers for 50 years. In 1974, GRAF developed its first pioneering range of rainwater harvesting products. Today we are market leader in numerous countries for Rainwater Harvesting Systems.

High Quality Manufacturing

Graf continuously invests in the expansion of its headquarters in Teningen, near Freiburg (Breisgau). The facility has now an approximate area of 155,000 m² and is one of the most modern production facilities for plastic products in the world. Our choice of Germany for the new production site was easy. On the one hand, we feel an obligation to the site because of our history. On the other, we would like to offer our customers products of the highest quality.

Where quality comes first

To ensure consistent high product quality, you need optimised production processes and outstanding quality management. Every individual tank at the new production site in Teningen is checked for dimensional accuracy, wall thickness and weight. All production parameters, e.g. material composition, machine settings and the staff involved in the production process, are documented for each individual product.

Our goal: your satisfaction

More than 100,000 satisfied customers already benefit from the advantages of GRAF products.



Manufacturing certified according to ISO 9001



Manufacturing certified according to ISO 50001



Internationally proven: GRAF infiltration technology



Warehouse, Kent (UK)



Housing development, Singapur (SG)



Energy supplier, Warwick (UK)



Daycare centre, Lörrach (DE)



University of Agriculture, Prague (CZ)



Industrial building, Tumeltsham (AT)

EcoBloc

Stormwater management system

Various applications

- ✓ Rainwater infiltration
- ✓ Stormwater attenuation
- ✓ Rainwater harvesting

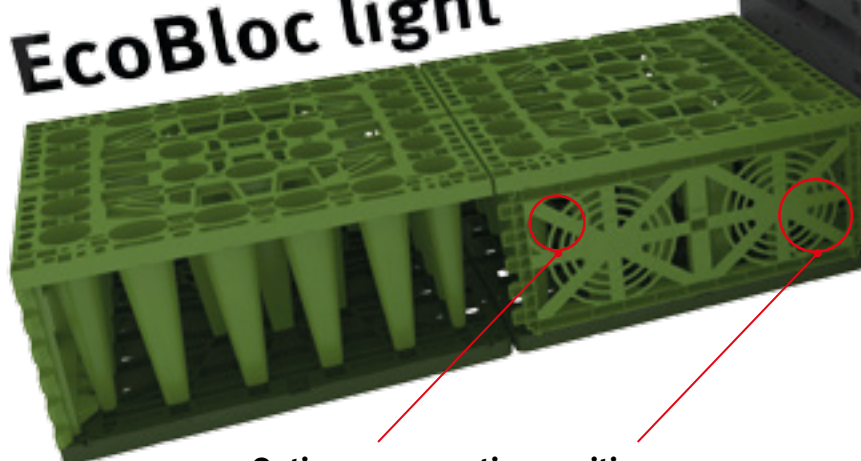


No tools
required

Fully integrated shaft

The Vario 800 flex shaft system (page 12) can be directly installed in an EcoBloc infiltration or infiltration/attenuation system. The connection surfaces of the inspection channels in the Vario 800 flex shaft system are accurately matched to the EcoBloc system.

load ★ ★
logistics ★ ★ ★ ★ ★
EcoBloc light



Optimum connection positions

Optimum connection positions ensure full use of infiltration ditch volume.

High storage volume

GRAF infiltration modules have three times the storage volume of a standard gravel infiltration ditch. One module therefore takes the place of around 1300 kg (1,4 tons) of gravel or a 50 m (164') drainage pipe. Since you don't have to excavate so much soil and enjoy great value for money compared with a standard gravel infiltration ditch, the GRAF modules save you hard-earned cash!

Service life of over 50 years

A durable product design ensures sustainability. The GRAF EcoBloc system and the Vario 800 flex shaft system is designed for a service life of over 50 years.

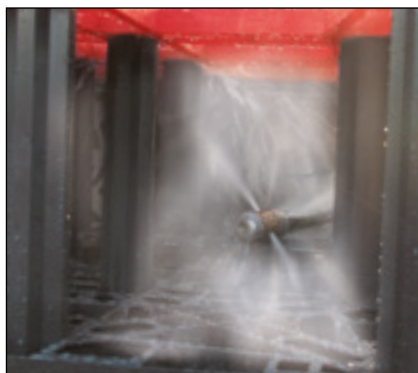
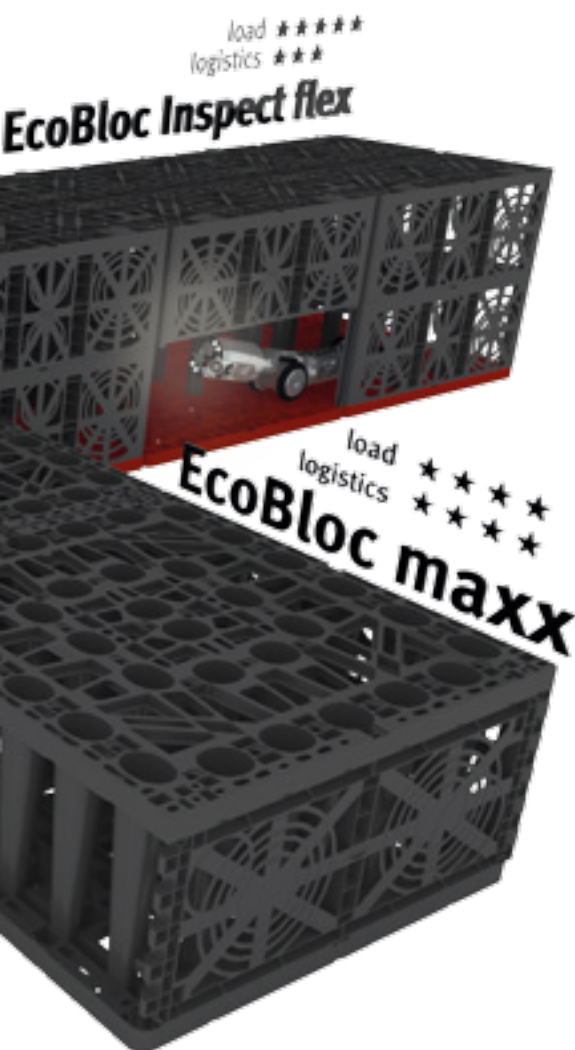
Easy to install

The modules are fitted simply, at speed and in various ways. They can be installed without heavy machinery – one EcoBloc Inspect flex module weighs just 8 kg (17.6 lbs), even only 7 kg (15.4 lbs) for one EcoBloc light



Lorry-bearing up to 60 tons

The GRAF EcoBloc Inspect flex has a heavy-duty lorry-bearing capacity of 60 tons with an 800 mm (2' 7.5") earth covering.



High pressure jetting possible

GRAF EcoBloc Inspect flex can easily resist high pressure jetting.



Easy to inspect

The standard inspection channel allows the entire infiltration/attenuation system to be monitored effectively. The EcoBloc Inspect flex allows access by commercially available inspection cameras. This has been confirmed by several independent testing authorities.



Up to 97% reservoir volume

The GRAF EcoBloc light has a gross volume of 225 litres (59.4 US gal.) and a reservoir volume of 219 litres (57.9 US gal.). With a reservoir volume in excess up to 97%, it is a market-leading product. The EcoBloc variants maxx and Inspect flex still offer a reservoir coefficient of 96% despite their high load-bearing capacity.

Installation depth of up to 5 metres (16' 4.8")

Even under very heavy loads, GRAF EcoBloc Inspect flex modules can be installed at a depth of up to 5 metres (16' 4.8"). This means that up to 14 layers are possible. Please consult GRAF when the installation depth is greater than 5 metres.

GRAF EcoBloc Configurator

Please ask your GRAF sales consultant for your login account information to the GRAF EcoBloc Configurator.



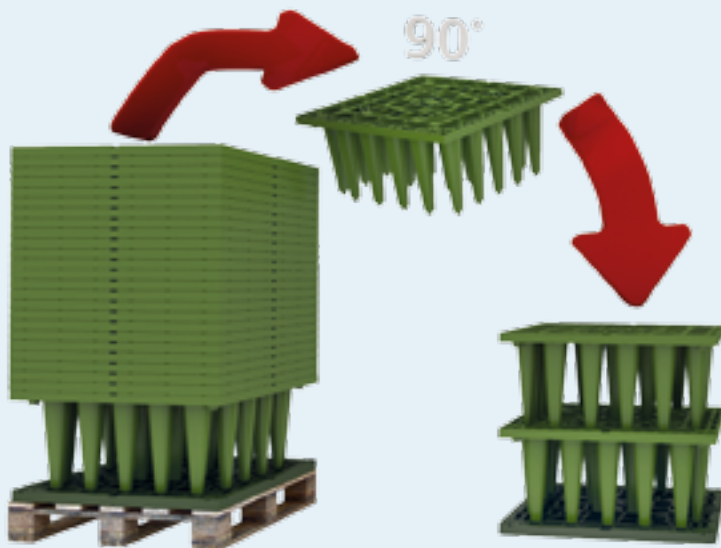
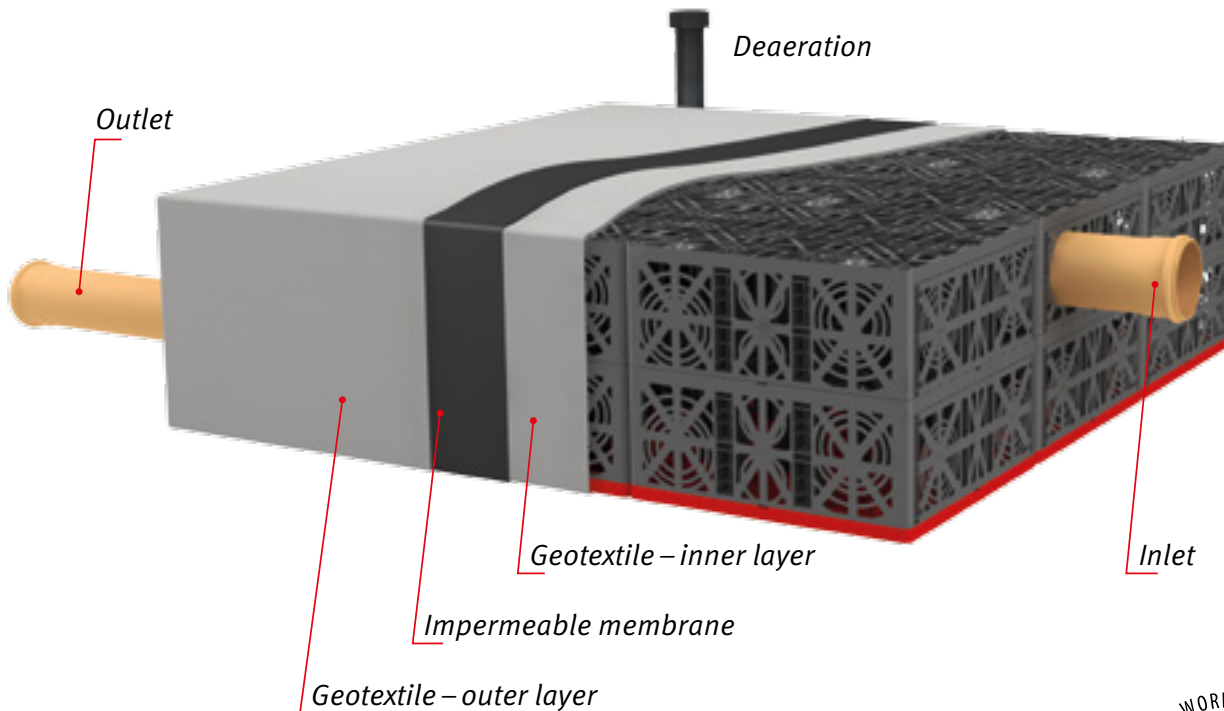
Application and logistics

Stormwater attenuation

The controlled discharge of rainwater is increasingly important during heavy rain. The GRAF EcoBloc modules can

be also surrounded by an impermeable membrane, which prevents water from escaping from the system unchecked.

Restricted outflow allows the water to be discharged into the sewage system in a controlled manner.



1. Stackable

To save space during transport, the EcoBloc maxx and EcoBloc light modules are stacked into each other. This minimizes transport costs, storage space in stock and CO₂ emissions.

2. Easy installation

The EcoBloc base plate forms the foundations of each EcoBloc system. Up to 14 EcoBloc modules can be fitted on one base plate.

3. Ready

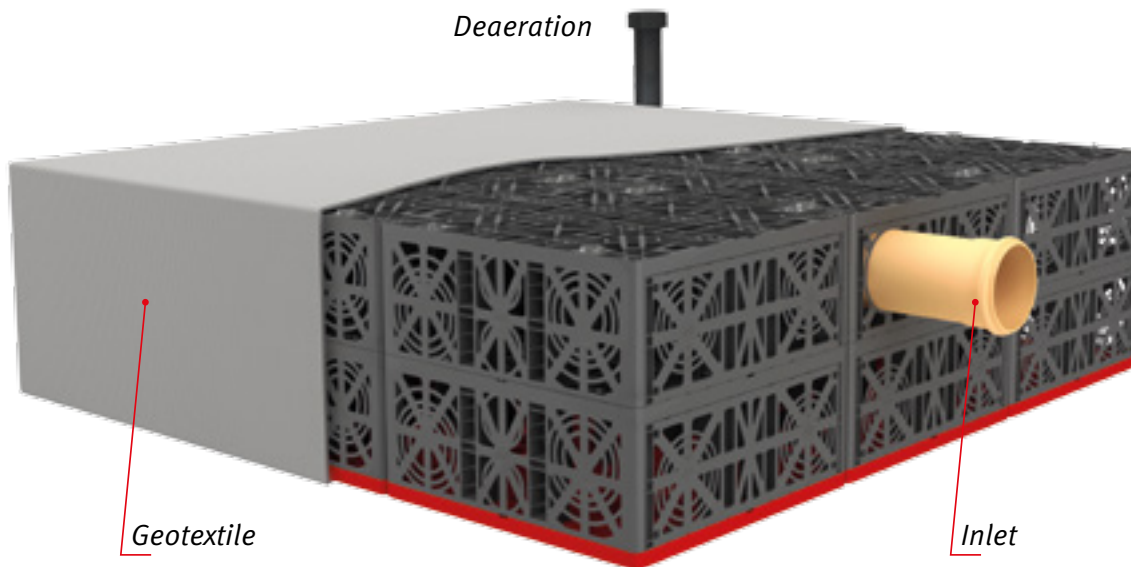
The side faces are sealed with EcoBloc end plates. The EcoBloc system can be adapted to match individual requirements.

Rainwater infiltration

Local infiltration of rainwater is gaining in importance. As we cover over more and more ground with concrete, we are interrupting the natural water

cycle. The GRAF EcoBloc modules combine environmental management of rainwater with the opportunity to protect against flooding. It stores rainwater

and gradually releases it back into groundwater reserves.



Eco-friendly product – green logistics

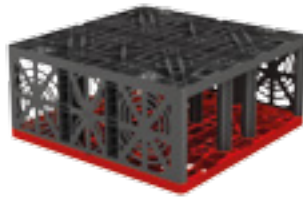
One lorry can transport up to 2700 EcoBloc light units. That corresponds to a volume of 610 m³ (161,145 US gal.). This reduces carbon emissions during transport by 85 %!



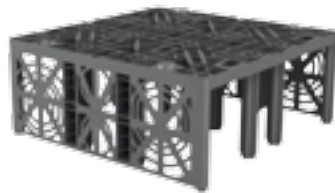
The system at a glance

EcoBloc Inspect flex

- Lorry-bearing 60 tons/HS-25
- 150 m³ (39,625 US gal.)/Truck
- Inspectable
- High pressure jetting possible



Load ★★★★★
Logistics ★★★

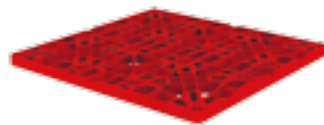


EcoBloc Inspect flex

DN 100 (4")/150 (6")/200 (8") connecting surfaces

Volume	Length	Width	Height	Weight	Colour	Order no.
205 l (54.2 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	320 mm (12.6")	8 kg (17.6 lbs)	grey	402005

Q Webcode G4107



EcoBloc Inspect flex base plate

Forms the foundation of the EcoBloc Inspect flex system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	grey	402006

EcoBloc Inspect flex end plates

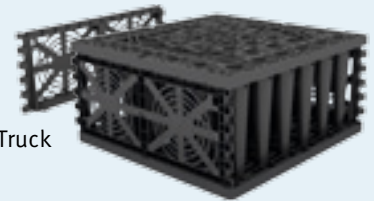
The front ends of an EcoBloc Inspect flex system are sealed by end plates with DN 100 (4")/150 (6")/200 (8") contact surfaces



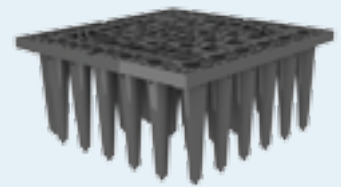
Item	Colour	Order no.
EcoBloc Inspect flex end plates (Set 2 units)	grey	402002

EcoBloc maxx

- Lorry-bearing 40 tons/HS-20
- 410 m³ (108,310 US gal.)/Truck



Load ★★★★★
Logistics ★★★★★



EcoBloc maxx

Connecting surfaces on EcoBloc maxx end plates

Volume	Length	Width	Height	Weight	Colour	Order no.
225 l (59.4 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	350 mm (13.8")	9 kg (19.8 lbs)	grey	402200

Q Webcode G4108



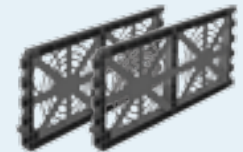
EcoBloc maxx base plate

Forms the foundation of the EcoBloc maxx system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	grey	402201

EcoBloc maxx end plates

The outside surface of an EcoBloc maxx system is sealed by end plates with contact surfaces DN 100 (4")/150 (6")/200 (8")/250 (10")



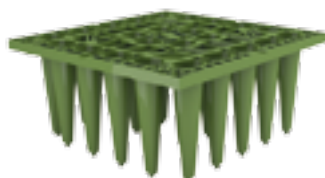
Item	Colour	Order no.
EcoBloc maxx end plates (Set 2 units)	grey	402203

EcoBloc light

- Lorry-bearing 12 tons
- 610 m³ (161,145 US gal.)/
Truck



Load ★★
Logistics ★★★★★

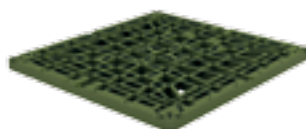


EcoBloc light

Connecting surfaces on EcoBloc light end plates

Volume	Length	Width	Height	Weight	Colour	Order no.
225 l (59.4 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	350 mm (13.8")	7 kg (15.4 lbs)	green	402300

🔍 **Webcode** G4109



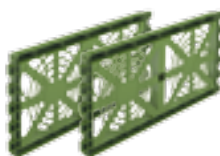
EcoBloc light base plate

Forms the foundation of the EcoBloc light system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	green	402301

EcoBloc light end plates

The outside surface of an EcoBloc light system is sealed by end plates with contact surfaces DN 100 (4") / 150 (6") / 200 (8") / 250 (10")



Item	Colour	Order no.
EcoBloc light end plates (Set 2 units)	green	402303

EcoBloc System accessories

EcoBloc connectors

For horizontal connection



Order no. 402015	Set 10 units
Order no. 402018	Set 25 units
Order no. 402020	Set 50 units
Order no. 402025	Set 200 units

Deaeration end

DN 100 (4")



Order no. 369017

Adaptor plate



Order no. 402030	DN 300 (12")
Order no. 402031	DN 400 (16")
Order no. 402032	DN 500 (20")

GRAF-Tex geotextile

size of 2.50 x 2.50 m (8' 2.4" x 8' 2.4")



Order no. 231006

Sold by the metre, roll width 5 m (16' 4.8")

Order no. 231002

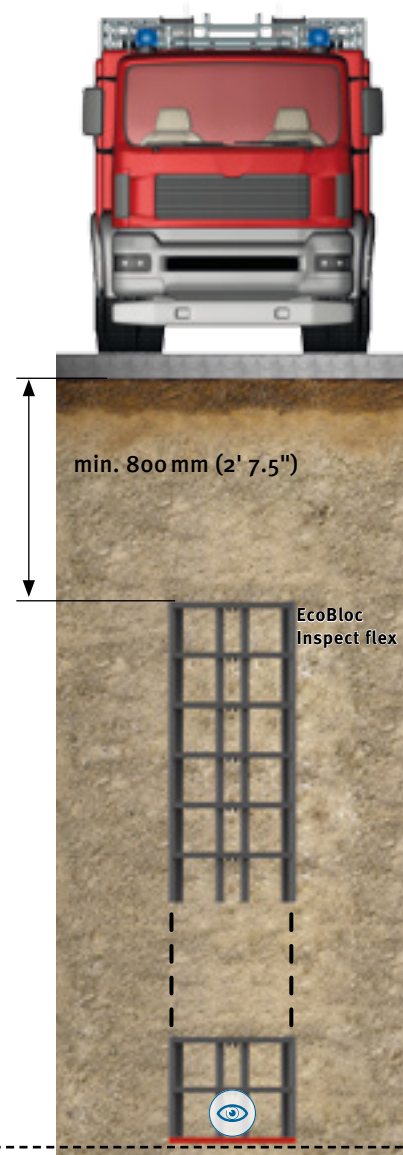
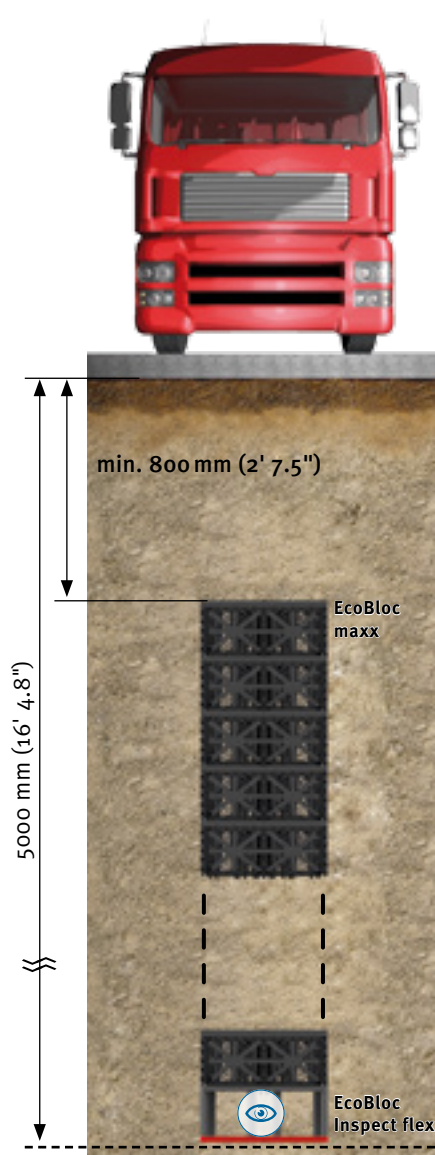
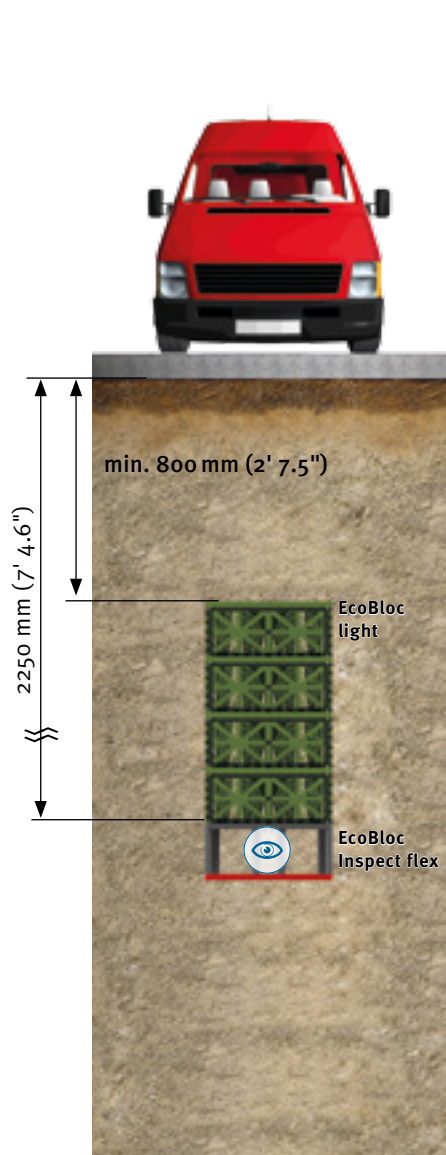
Applications and loads

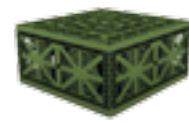



12 tons / H-10 / H-15

40 tons / HS-20

60 tons / HS-25





Infiltration module		EcoBloc Inspect flex	EcoBloc maxx	EcoBloc light
Gross volume		205 l (54.2 US gal.)	225 l (59.4 US gal.)	225 l (59.4 US gal.)
Net volume		195 l (51.5 US gal.)	217 l (57.3 US gal.)	219 l (57.9 US gal.)
Storage coefficient		96 %	96 %	97 %
Inspectable 		•		
High pressure jetting possible		•		
Load				
Load	Short-term	max. 100 kN/m ²	max. 100 kN/m ²	max. 75 kN/m ²
	Long-term	max. 59 kN/m ²	max. 59 kN/m ²	max. 35 kN/m ²
Without traffic load	min. earth covering	250 mm (9.8")	250 mm / 500 mm ¹⁾ (9.8") / (1' 7.7") ¹⁾	250 mm ²⁾ (9.8") ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1500 mm / 1250 mm ²⁾ (4' 11") / (4' 1.2") ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2500 mm (8' 2.4")
	max. number of layers	14	13	6
Vehicle	min. earth covering	250 mm (9.8")	250 mm / 500 mm ¹⁾ (9.8") / (1' 7.7") ¹⁾	500 mm / o.r. ²⁾ (1' 7.7") / o.r. ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1250 mm / o.r. ²⁾ (4' 1.2") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	14	13	4
Lorry 12/H-10/H-15	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm ¹⁾ (1' 7.7") / (2' 7.5") ¹⁾	800 mm / o.r. ²⁾ (2' 7.5") / o.r. ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1000 mm / o.r. ²⁾ (3' 3.3") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	13	12	4
Lorry 30	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm ¹⁾ (1' 7.7") / (2' 7.5") ¹⁾	800 mm / o.r. ²⁾ (2' 7.5") / o.r. ²⁾
	max. earth covering	2500 mm (8' 2.4")	2500 mm / 1750 mm ¹⁾ (8' 2.4") / (5' 8.9") ¹⁾	1500 mm / o.r. ²⁾ (4' 11") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	13	12	4
Lorry 40/HS-20	min. earth covering	500 mm (1' 7.7")	800 mm (2' 7.5") ¹⁾	800 mm (2' 7.5") ¹⁾
	max. earth covering	2250 mm (7' 4.5")	2250 mm / 1500 mm ¹⁾ (7' 4.5") / (4' 11") ¹⁾	1500 mm (4' 11") ¹⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	13	11	4
Lorry 60/HS-25	min. earth covering	800 mm (2' 7.5")		800 mm (2' 7.5")
	max. earth covering	2000 mm (7' 4.5")		1500 mm (4' 11")
	max. installation depth	5000 mm (16' 4.8")		2250 mm (7' 4.6")
	max. number of layers	13		4
Connections				
DN 100 (4")		•	•	•
DN 150 (6")		•	•	•
DN 200 (8")		•	•	•
DN 250 (10")		–	•	•
DN 300 (12")		• 3), 4)	• 3), 4)	• 3), 4)
DN 400 (16")		• 3), 4)	• 3), 4)	• 3), 4)
DN 500 (20")		• 4)	• 4)	• 4)
Measurements				
Length		800 mm (2' 7.5")	800 mm (2' 7.5")	800 mm (2' 7.5")
Width		800 mm (2' 7.5")	800 mm (2' 7.5")	800 mm (2' 7.5")
Height		320 mm (12.6")	350 mm (13.8")	350 mm (13.8")
Weight		8 kg (17.6 lbs)	9 kg (19.8 lbs)	7 kg (15.4 lbs)

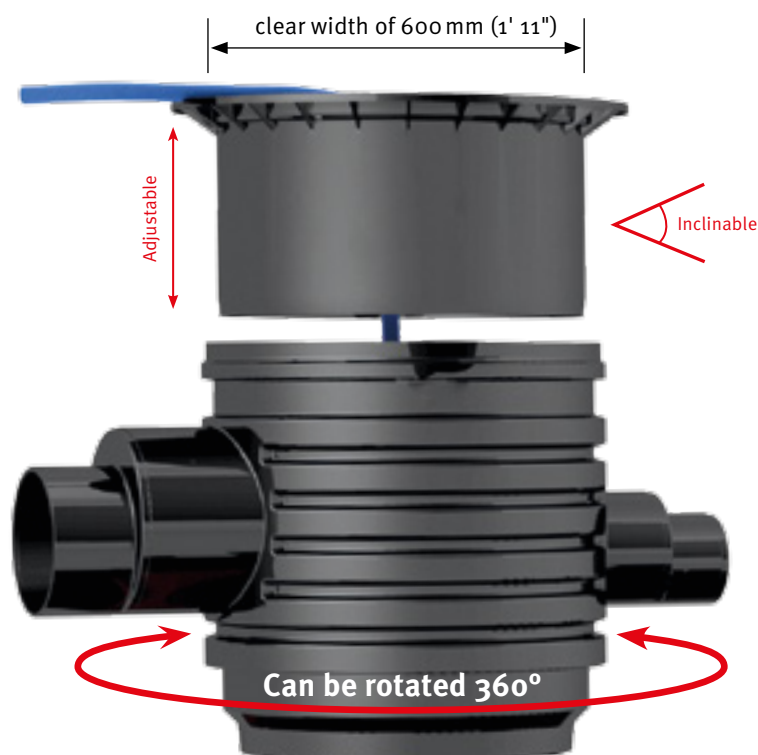
¹⁾ When combined with EcoBloc Inspect flex

²⁾ Values on request when combined with EcoBloc Inspect flex

³⁾ Optionally available with Vario shaft (page 12)

⁴⁾ Optionally available with adaptor plates (page 9)

Vario 800 flex shaft system



Flexible use

The GRAF Vario 800 shaft provides easy access to all EcoBloc modules. It can be used in many different ways:

- ✓ As an inspection shaft
- ✓ As an inlet shaft
- ✓ As a filter shaft
- ✓ As a flow control shaft

Easy to inspect

The Vario 800 shaft allows easy access to the EcoBloc system by commercially available inspection cameras. This has been confirmed by several independent testing authorities.

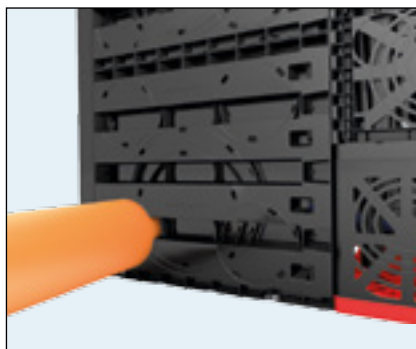


No tools required



Lorry-bearing up to 60 tons

The GRAF Vario 800 shaft has a heavy-duty lorry-bearing capacity of 60 tons with an 800 mm (2' 7.5") earth covering. The fibreglass reinforced material gives the shaft extra strength.



Connection surfaces up to DN 400 (16")

The Vario 800 comes with DN 200 (8"), DN 300 (12") and DN 400 (16") connection surfaces. The optional, freely rotating inlet module can be connected to pipes of sizes DN 150 (6"), DN 200 (8"), DN 250 (10") and DN 300 (12").



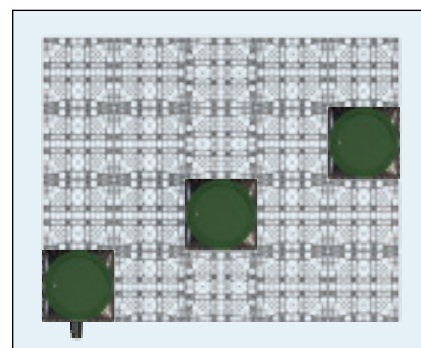
Wide access

The Vario 800 is terminated at the top by GRAF telescopic dome shafts. With a clear width of 600 mm, it gives easy access to the shaft. The base of the shaft itself is 800 x 800 mm (2' 7.5") x (2' 7.5") in size, providing sufficient space for all possible applications.



No additional excavation

The Vario 800 flex shaft system can be directly installed in an EcoBloc infiltration or detention system. The connection surfaces of the inspection channels in the Vario 800 flex shaft system are accurately matched to the EcoBloc system.



Can be positioned in any location

The dimensions of the Vario 800 shaft enable free positioning within the EcoBloc system. The corner position enables the connection of large pipe diameters of up to DN 400 (16") on the two side panels. The central position offers ideal access to the inspection camera from all directions. Using the optional inlet module, a connection of up to DN 300 (12") can be made with a freely defined angle.

Vario 800 flex shaft system



Vario 800 flex, type 1

shaft body for one or more layer of EcoBloc system

Volume	Length	Width	Height	Weight	Colour	Order no.
230 l (60.7 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	355 mm (1' 2")	16 kg (35.3 lbs)	grey	450050

 **Webcode** G9303



Vario 800 flex, type 2

shaft body for two or more layer of EcoBloc system

Volume	Length	Width	Height	Weight	Colour	Order no.
420 l (113.5 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	660 mm (2' 2")	27 kg (59.5 lbs)	grey	450051



Vario 800 flex, base/cover set

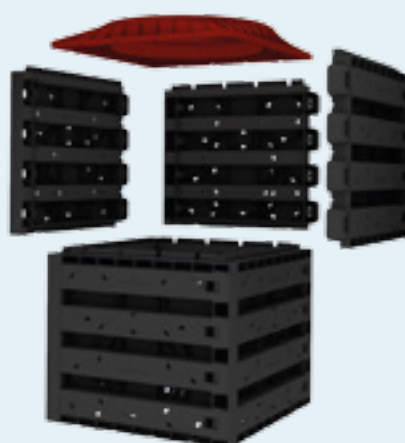
base- and cover for Vario 800 flex shaft

Item	Colour	Order no.
set consisting out of Vario base- and cover plate	grey	450052



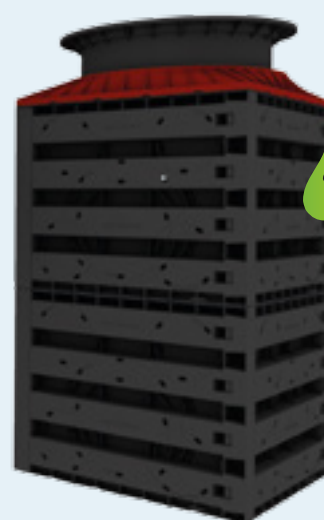
1. Stackable

To save space during transport and storage, the parts of the Vario 800 are stacked into each other. This minimizes transport costs and CO₂ emissions.



2. Easy installation

Groups of four wall elements are connected in a few simple steps and without tools to form a single height unit of the Vario 800. The height can be easily adjusted to the EcoBloc tank depth. A shaft cover and base plate complete the element.



3. Ready

GRAF accessory components can now be added to the Vario 800 shaft as required.



Shaft components

Infiltration filter strainer DN 600 (24")

Made entirely from stainless steel, mesh width 0.75 mm (0.03")

Order no. 340523



Infiltration inlet module DN 600 (24")

Incl. profile seal for telescopic dome shaft; DN 150 (6")/ DN 200 (8")/ DN 250 (10")/ DN 300 (12") connections

Order no. 330360



Infiltration connecting piece 1000 DN 600 (24")

With DN 200 (8") contact surface, incl. profile seal, length 1000 mm (3' 3.3"), 750 mm (2' 5.5"), 500 mm (1' 7.7")

Order no. 371015



Infiltration connecting piece 1000 DN 600 (24")

With DN 200 (8") pipe connections, incl. profile seal, length 1000 mm (3' 3.3"), 750 mm (2' 5.5"), 500 mm (1' 7.7")

Order no. 371016



Retention accessories

Choke drain DN 100 (4")

Incl. emergency overflow and DN 100 (4") connector seal; flow rate of 1.0 l (0.26 US gal.)/sec. up to 6.5 l (1.72 US gal.)/sec.

Order no. 330547



Choke drain DN 150 (6")

Incl. emergency overflow and DN 150 (6") connector seal; flow rate of 2.0 l (0.53 US gal.)/sec. up to 16 l (4.22 US gal.)/sec.

Order no. 330598



Tank Covers

Mini telescopic dome shaft

Suitable for pedestrian loading, height adjustable from 140 – 340 mm (5.5" – 13.4")

Order no. 371010



Maxi telescopic dome shaft

Suitable for pedestrian loading, height adjustable from 140 – 440 mm (5.5" – 17.3")

Order no. 371011



Cast iron telescopic dome shaft

Suitable for vehicle loading, height adjustable from 140 – 440 mm (5.5" – 17.3")

Order no. 371020



Telescopic dome shaft lorry

Suitable for lorry-bearing loading, height adjustable from 140 – 440 mm (5.5" – 17.3")

Order no. 371021



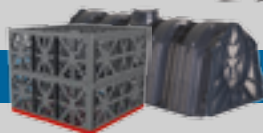
Cover and compensating ring to be provided on site



RAINWATER HARVESTING



INFILTRATION



WASTEWATER TREATMENT SOLUTIONS



MULTIPURPOSE CONTAINERS



Your expert specialist dealer:

Rainwater harvesting solutions

For more information about our rainwater harvesting solutions, ask for our catalogue.

Prices:

A price list with our export conditions is available on request.

Warranty clause:

The warranty mentioned in this brochure only refers to the tank in question and not to the accessories. Within the warranty period we grant free replacement of the material. Further benefits are excluded. Pre-condition for warranty benefits are proper handling, assembly and installation according to the mounting guidelines.

N.B. Protect tanks from frost when installed above ground! In case of groundwater installation, please contact us for further information prior to purchase!

For all dimensions and abstracts provided in this brochure, we reserve a tolerance of $\pm 3\%$. Depending on the connection type, the useful volume of the underground tanks may be up to 10% below the tank capacity.

Subject to technical modifications and errors. Design details, methods and standards of individual products may change as a result of technical advancements and environmental regulations.

For all our offers and conclusions of contract, only our General Terms and Conditions of Business dated 01/10/2012 shall apply, which we will send to you on request.

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Appendix E – SPEL Storm Chamber Information



Storm Chamber

The low impact, modular, stormwater storage solution
for retention, detention, infiltration and reuse.

www.spel.com.au



Benefits over other storage methods

- Helps counter drought conditions by maintaining groundwater base flow to streams.
- Superior load ratings for trafficable areas.
- Maximised volume for efficient storage void ratio.
- The least cost underground alternative.
- The lowest installed cost of any modular storage technology.
- Burial depths up to over 9m.
- Layered installations possible for restricted surface area sites.
- Superior design eliminates costly and complicated header manifold systems.
- Can be utilized for conveyance in remote locations.
- Recycled HDPE construction allows smaller excavation and decreased footprint.



A septic drainfield for storm water



Significantly less cost, quicker, easier than pipe for conveyance.

Benefits over similar technologies

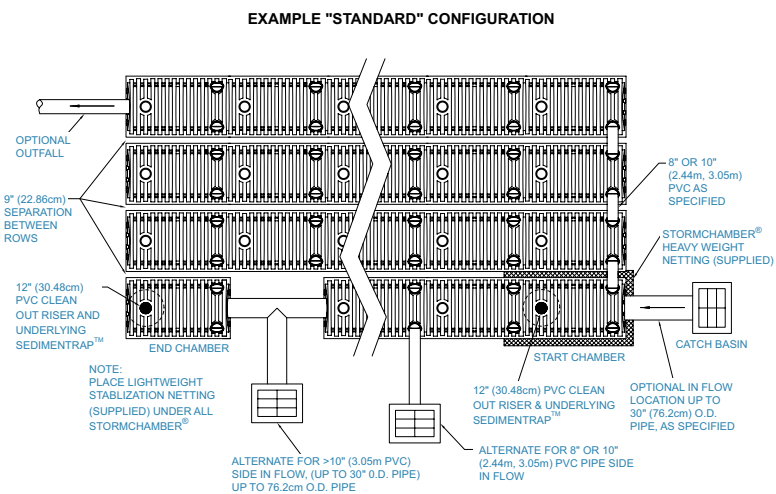
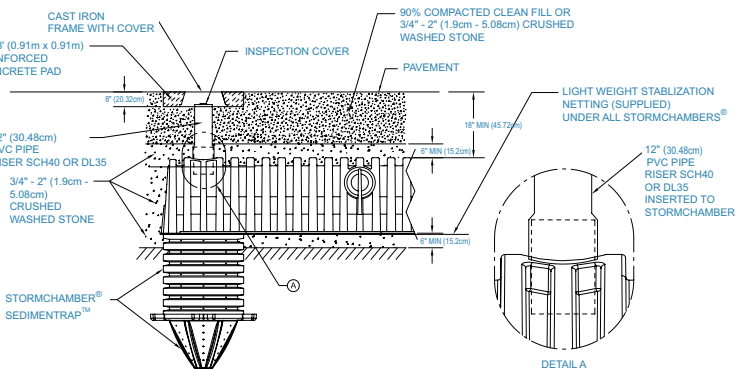
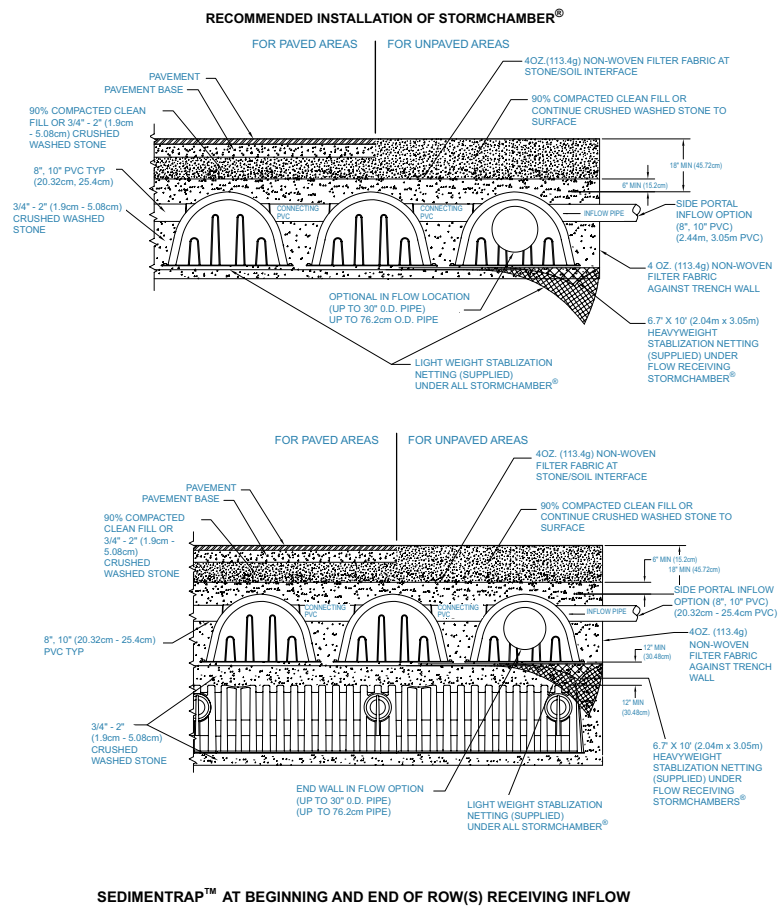
	Storm Chamber	Other Technology
Header pipe manifold in flow/out flow	No	Yes
AASHTO H-20 wheel load rating	Exceeds by 4X	Meets
End plates to purchase & install	No	Yes
Need for pre-treatment devices	No	Yes
Maximum height of fill	9.14m	2.44m
Require compacting stone base	No	Yes
Two & three layered installation	Yes	No
Number chambers required	40-45% fewer	40-45% more
Installed cost & time	Significantly less	Significantly more
Footprint	Significantly less	Significantly more
Excavation, stone, backfill	Significantly less	Significantly more
Compaction, grading & filter fabric		Significantly more

**Source: Brown, Whitney, Schueler, Thomas. National Pollutant Removal Performance Database for Stormwater BMPs, August 1997, Center for Watershed Protection, Ellicott City, Maryland.*

SPEL StormChamber Specifications

Storm Chamber storage = 2.12m³
Design storage capacity = 3.26 to 4.56m³
Length = 2.59m
Width = 1.52m
Height = 86.36cm

Typical Applications/Uses





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Phone: + 61 2 8838 1055
Fax: +61 2 8014 8699


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Queensland	61 7 3277 5110
Victoria & Tasmania	61 3 5274 1336
South Australia	61 8 8423 4564
West Australia	61 8 9350 1000
Northern Territory	61 2 8423 4564
New Zealand	64 9 276 9045
SA 0475 777 171 chris.michell@spel.com.au	
www.spel.com.au	

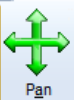
SPEL Environmental accepts no responsibility for any loss or damage resulting from any person acting on this information. The details and dimensions contained in this document may change, please check with SPEL Environmental for confirmation of current specifications.

Appendix F –MUSIC Modelling


MUSIC Inputs



Edit




Pan




Zoom


Navigation



Run (F5)




Properties




Edit

Drainage Link




Primary




Secondary

Source Node




Urban

Treatment Node




Wetland

Other Node




Junction

Nodes and Links




Background




Import / Export


Preliminary





Aveo [Residential]



Ecosol GPT 4300



Actil Avenue



78.7209

91.8853

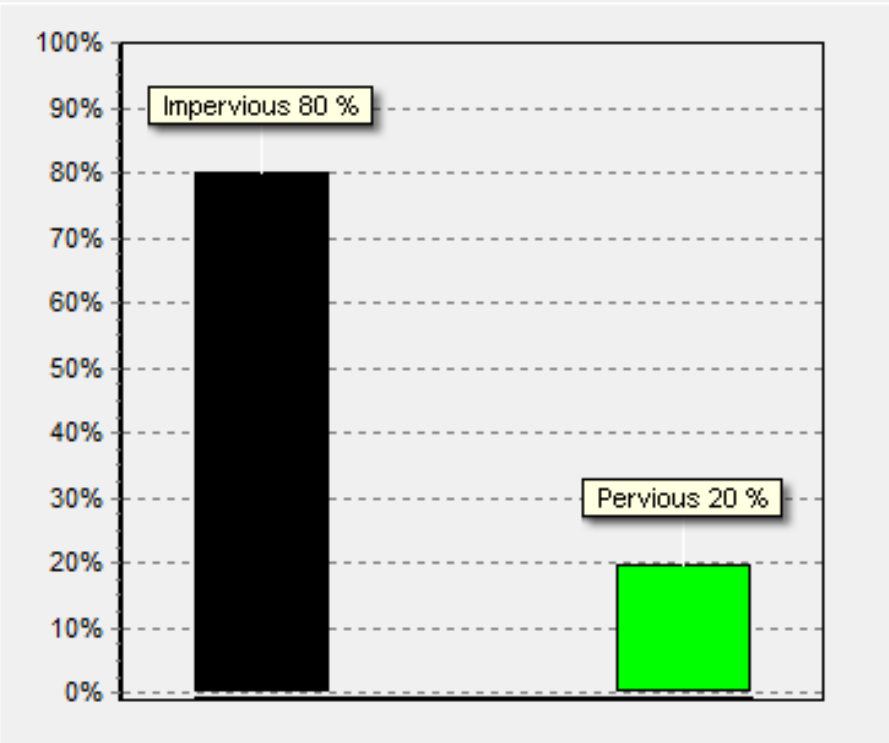
Catchment Details

Location

Areas

Total Area (ha)

Zoning/Surface Type:



☐ Import Flow

Rainfall-Runoff Parameters

Impervious Area Properties

Rainfall Threshold (mm/day)

Pervious Area Properties

Soil Storage Capacity (mm)

Initial Storage (% of Capacity)

Field Capacity (mm)

Infiltration Capacity Coefficient - a

Infiltration Capacity Exponent - b

Groundwater Properties

Initial Depth (mm)

Daily Recharge Rate (%)

Daily Baseflow Rate (%)

Daily Deep Seepage Rate (%)

Gross Pollutant Trap (GPT) Details

Location
Ecosol GPT 4300
Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)
0.00000

High Flow By-pass (cubic metres per sec)
0.12000

Transfer Functions

☒ Total Suspended Solids (mg/L)
☐ Total Nitrogen (mg/L)

☐ Total Phosphorus (mg/L)
☐ Gross Pollutants (kg/ML)

Total Suspended Solids (mg/L)

Transfer Functions

☐ Concentration Based Capture Efficiency
☒ Flow Based Capture Efficiency
☐ Both

Concentration Efficiency Transfer Function

Percentage Capture

Inflow (m ³ /s)	% Capture
0.0000	100.0000
0.0300	80.0000
0.0990	55.0000

Drag points on the graph to modify the transfer function

Apply All

Fluxes...
Notes...

Cancel
Back
Finish

Location
Ecosol GPT 4300
Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)
0.00000

High Flow By-pass (cubic metres per sec)
0.12000

Transfer Functions

☐ Total Suspended Solids (mg/L)
☒ Total Nitrogen (mg/L)

☐ Total Phosphorus (mg/L)
☐ Gross Pollutants (kg/ML)

Total Nitrogen (mg/L)

Transfer Functions

☐ Concentration Based Capture Efficiency
☒ Flow Based Capture Efficiency
☐ Both

Concentration Efficiency Transfer Function

Percentage Capture

Inflow (m ³ /s)	% Capture
0.0000	100.0000
0.0300	45.0000
0.0990	40.0000

Drag points on the graph to modify the transfer function


Apply All

Fluxes...
Notes...

Cancel
Back
Finish

Location

Ecosol GPT 4300

 Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)

0.00000

High Flow By-pass (cubic metres per sec)

0.12000

Transfer Functions

☐ Total Suspended Solids (mg/L)

☐ Total Nitrogen (mg/L)

☒ Total Phosphorus (mg/L)

☐ Gross Pollutants (kg/ML)

Total Phosphorus (mg/L)

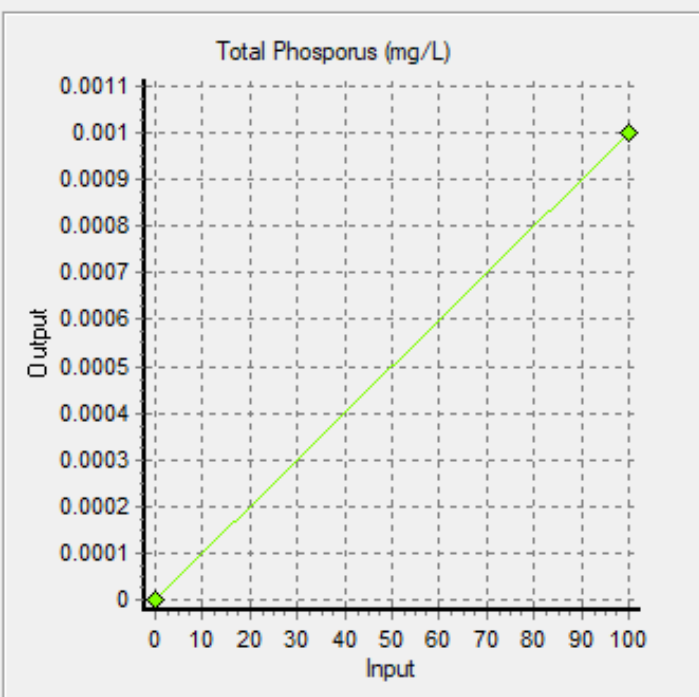
Transfer Functions

☐ Concentration Based Capture Efficiency

☒ Flow Based Capture Efficiency

☐ Both

Concentration Efficiency Transfer Function





Drag points on the graph to modify the transfer function

Percentage Capture


Inflow (m ³ /s)	% Capture
0.0000	100.0000
0.0300	45.0000
0.0990	40.0000

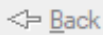
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Fluxes...

Notes...


 Cancel

 Back

 Finish

Location

Ecosol GPT 4300

 Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)

0.00000

High Flow By-pass (cubic metres per sec)

0.12000

Transfer Functions

☐ Total Suspended Solids (mg/L)

☐ Total Nitrogen (mg/L)

☐ Total Phosphorus (mg/L)

☒ Gross Pollutants (kg/ML)

Gross Pollutants (kg/ML)

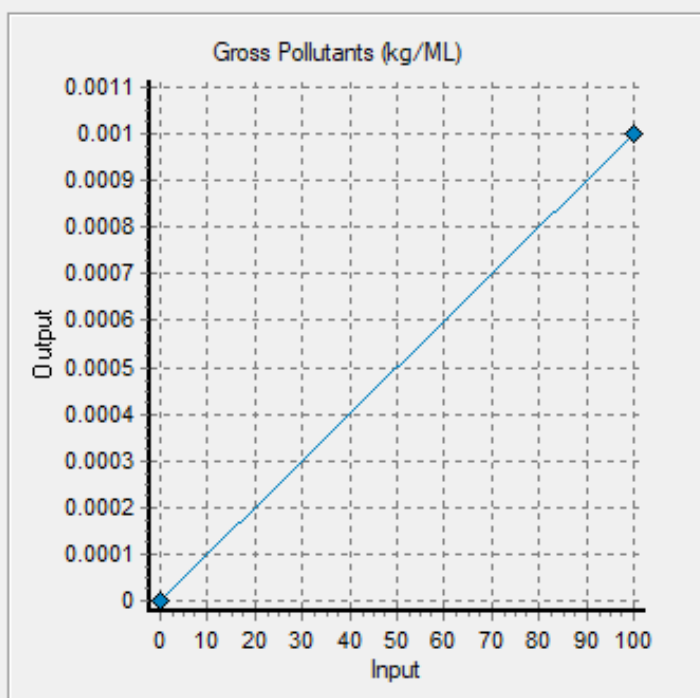
Transfer Functions

☐ Concentration Based Capture Efficiency

☒ Flow Based Capture Efficiency

☐ Both

Concentration Efficiency Transfer Function





Drag points on the graph to modify the transfer function

Percentage Capture


Inflow (m ³ /s)	% Capture
0.0000	100.0000
0.0300	99.0000
0.0990	99.0000

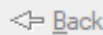
Apply All


 

Fluxes...

Notes...

 Cancel

 Back

 Finish

MUSIC Results

	Sources	Residual Load	% Reduction
Flow (ML/yr)	7.49	7.49	0
Total Suspended Solids (kg/yr)	1380	287	79.3
Total Phosphorus (kg/yr)	2.22	0.872	60.7
Total Nitrogen (kg/yr)	16.5	6.55	60.3
Gross Pollutants (kg/yr)	343	5.29	98.5





ABN 39 061 222 964
GREENHILL ENGINEERS PTY LTD

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Adelaide SA 5000

T 8406 1300
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17.1574

30 November 2018

Aveo Group
Level 2, 67 Greenhill Road
Wayville SA 5034

Attention: Rebecca Grundy

Dear Rebecca

RE: AVEO ST CLAIR INTEGRATED RETIREMENT COMMUNITY STORMWATER MANAGEMENT PLAN

During a Pre-Lodgement Panel Meeting, held on 27 August 2018, the City of Charles Sturt (CCS) Council confirmed that the development site is to ensure that the peak runoff from the 100-year ARI storm event is to be limited to the peak runoff from the 100-year ARI storm event in the pre-development scenario. This is in accordance with the Charles Sturt Council Development Plan General Section (Natural Resources) PDC 8B, which states that:

- Water discharged from a development site should not exceed the rate of discharge from the site as it existed in pre-development conditions; and
- Development should include stormwater management systems to protect it from damage during a minimum of a 1 in 100-year average return interval flood.

As part of the St Clair Expression of Interest issued by Renewal SA in November 2016 and the 2017 a Local Government Search was provided on the property as part of the supporting information. This document listed Conditions required by the Development Assessment Commission (DAC), with item 3 (2016) and item 14 (2017) being in relation to the Stormwater Management. This states that "*Any net increase in peak stormwater discharge from the site (post-development to pre-development) for the design storm event (major) shall be managed and/or disposed of onsite via an engineered drainage system (detention, retention, and/or combination of both and/or other engineered means).*"

The Stormwater Management Plan must achieve the following:

For Individual Allotments:

- For the minor storm event stormwater discharge from allotments must be restricted to pre-development Q5 flows.*



For Land Division:

- (i) For minor storm events an underground stormwater drainage system must be designed to cater for pre-development Q5 flows for each contributing catchment;*
- (ii) For storms greater than the minor storm event, flow paths shall be clearly defined using roadways giving consideration to public safety and protection to properties;*
- (iii) This must be achieved by restricting the flow using engineered detention and retention systems located in Public Road Reserves for ease of access and maintenance;*
- (iv) Where overland flow paths stormwater drainage system are in open space areas, then prior to the development of the Stormwater Management Plan, consent must be obtained from the Council and additional open space may be required; and*
- (v) Define how the quality of the stormwater discharge will be managed with pollution prevention devices that effectively remove solids and liquid pollutants.*

Once the Storm Water Management Plan has been approved by the Council, the Developer must prepare engineering Design Plans, calculations and supporting information as required in Land Division Consent Condition 'Public Infrastructure and Utility Services'."

The Aveo development has proposed a stormwater system to meet with the City of Charles Sturt Development Plan and the Conditions outlined in the Local Government Search, listed above. An underground pit and pipe system is proposed to convey stormwater to a detention storage system located within the site. The grade of the site and the design floor levels of the buildings will enable the site stormwater runoff to be directed to the detention storage system, prior to discharging into the existing downstream system in St Clair Avenue.

Preliminary detention sizing has been undertaken based on limiting the minor 5-year ARI postdevelopment flows in the underground system to the predevelopment 5-years ARI, with the combined underground pipe network and the overland flow from the site during the 100-years ARI limited to the predevelopment 100-year ARI.

It is proposed that the detention system be in the form of an underground detention tank system located within the north western portion of the site. This detention system will then connect into the existing downstream infrastructure, at the corner of Actil Avenue South and St Clair Avenue.

Details of the proposed detention system are as noted below:

- Depth - 1.3 m
- Volume - 700 m³
- Outlet size - 225 mm outlet pipe

It is noted that during early construction stages, a temporary detention basin will be created to restrict flows from the site, as required. As the development progresses, this temporary basin will be converted to the proposed underground tank.

During the detailed design phase, further investigations will be undertaken into the form of detention tank system to be used for this site, and confirmation of the detention size and inlet/outlet structure details. Early investigations indicate that the use of a high early discharge system may further reduce the volume of storage required for this site.

Alternative detention storage forms have been investigated, such as proprietary products by manufacturers such as SPEL and GRAF.

Water Sensitive Urban Design

Stormwater water quality treatment measures to treat stormwater prior to discharge from the site are proposed for this development in the form of a Gross Pollutant Trap (GPT). The aim of the GPT is meet the EPA water quality policy targets. The current EPA water quality targets are:

- 90% reduction in litter/gross pollutants;
- 45% reduction in average annual total nitrogen;
- 60% reduction in average annual phosphorous;
- 80% reduction in average annual suspended solids.

A Second Pre-Lodgement Panel Meeting was held on 10 October 2018 with the Department of Planning, Transport and Infrastructure (DPTI). No representative from the CCS was present at this meeting. The following comments were provided by The CCS Council after the meeting.

"CCS stormwater management plan guidelines (development guide 34) requires that the pre development flow for a 1 in 5 year ARI is not exceeded by the post development flows for a 1 in 100 year ARI.

The new stormwater system in St Clair Avenue extension is only designed for a 1 in 5 year ARI underground. The development will need to discharge into the system at the 1 in 5 year ARI. Based on rough calculations, the allowable flow to the Council system should be around 160L/s and not 225L/s as proposed."

The most recent comments provided by the CCS are contradictory to the Development Pan and the required DAC Conditions. It is noted that based on preliminary assessment of the CCS revised comments would result in a detention storage volume of approximately 1,500 m³ (more than double the stormwater detention proposed on site).

It is also noted that the underground stormwater system in the new St Clair Avenue extension, and the existing St Clair Land Development (to the north-west of the site) is designed for the minor storm event, 5-years ARI, and it is expected to also have the capacity to cater for the major storm event with a capacity estimated to exceed 1m³/s within the road reserve. The major storm event generated by the proposed development with the currently proposed stormwater detention is estimated to be less than 0.23m³/s and far below the downstream road drainage capacity.

Finally, the existing St Clair Development was designed with a large wetland and detention basin system, appropriately sized for this catchment so that there should be no increased downstream risk of flooding.

Yours sincerely,

For GREENHILL



Monish Bhindi

Director

Enc. Charles Sturt Council Development Plan, General Section, Natural Resources
Local Government Search
City of Charles Sturt Council Stormwater Management Plan Guidelines (D34)

Natural Resources

OBJECTIVES

- 1 Retention, protection and restoration of the natural resources and environment.
- 2 Protection of the quality and quantity of South Australia's surface waters, including inland, *marine and estuarine* and underground waters.
- 3 The ecologically sustainable use of natural resources including water resources, including *marine waters*, ground water, surface water and watercourses.
- 4 Natural hydrological systems and environmental flows reinstated, and maintained and enhanced.
- 5 Development consistent with the principles of water sensitive design.
- 6 Development sited and designed to:
 - (a) protect natural ecological systems
 - (b) achieve the sustainable use of water
 - (c) protect water quality, including receiving waters
 - (d) reduce runoff and peak flows and prevent the risk of downstream flooding
 - (e) minimise demand on reticulated water supplies
 - (f) maximise the harvest and use of stormwater
 - (g) protect stormwater from pollution sources
- 7 Storage and use of stormwater which avoids adverse impact on public health and safety.
- 8 Native flora, fauna and ecosystems protected, retained, conserved and restored.
- 9 Restoration, expansion and linking of existing native vegetation to facilitate habitat corridors for ease of movement of fauna.
- 10 Minimal disturbance and modification of the natural landform.
- 11 Protection of the physical, chemical and biological quality of soil resources.
- 12 Protection of areas prone to erosion or other land degradation processes from inappropriate development.
- 13 Protection of the scenic qualities of natural and rural landscapes.

PRINCIPLES OF DEVELOPMENT CONTROL

- 1 Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.
- 2 Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.

- 3 Development should not significantly obstruct or adversely affect sensitive ecological areas such as creeks, wetlands, estuaries and significant seagrass and mangrove communities.
- 4 Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.

Water Sensitive Design

- 5 Development should be designed to maximise conservation, minimise consumption and encourage reuse of water resources.
- 6 Development should not take place if it results in unsustainable use of surface or underground water resources.
- 7 Development should be sited and designed to:
 - (a) capture and re-use stormwater, where practical
 - (b) minimise surface water runoff
 - (c) prevent soil erosion and water pollution
 - (d) protect and enhance natural water flows
 - (e) protect water quality by providing adequate separation distances from watercourses and other water bodies
 - (f) not contribute to an increase in salinity levels
 - (g) avoid the water logging of soil or the release of toxic elements
 - (h) maintain natural hydrological systems and not adversely affect:
 - (i) the quantity and quality of groundwater
 - (ii) the depth and directional flow of groundwater
 - (iii) the quality and function of natural springs.
- 8 Water discharged from a development site should:
 - (a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state
 - (b) not exceed the rate of discharge from the site as it existed in pre-development conditions.
- 9 Development should include stormwater management systems to protect it from damage during a minimum of a 1 in 100 year average return interval flood.
- 10 Development should have adequate provision to control any stormwater over-flow run-off from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.
- 11 Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.
- 12 Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.

- 13 Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.
- 14 Stormwater management systems should
 - (a) maximise the potential for stormwater harvesting and reuse either on-site or as close as practicable to the source
 - (b) utilise, but not be limited to, one or more of the following harvesting methods:
 - (i) the collection of roof water in tanks
 - (ii) the discharge to open space, landscaping or garden areas, including strips adjacent to car parks
 - (iii) the incorporation of detention and retention facilities
 - (iv) aquifer recharge.
- 15 Where it is not practicable to detain or disposed of stormwater on site, only clean stormwater runoff should enter the public stormwater drainage system.
- 16 Artificial wetland systems, including detention and retention basins, should be sited and designed to:
 - (a) ensure public health and safety is protected
 - (b) minimise potential health risks arising from the breeding of mosquitoes.
- 17 Site drainage should not discharge into or onto a service lane unless adequately designed and engineered for such function.

Water Catchment Areas

- 18 Development should ensure watercourses and their beds, banks, wetlands and floodplains are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.
- 19 No development should occur where its proximity to a swamp or wetland will damage or interfere with the hydrology or water regime of the swamp or wetland.
- 20 A wetland or low-lying area providing habitat for native flora and fauna should not be drained, except temporarily for essential management purposes to enhance environmental values.
- 21 Along watercourses, areas of remnant native vegetation, or areas prone to erosion, that are capable of natural regeneration should be fenced off to limit stock access.
- 22 Development such as cropping, intensive animal keeping, residential, tourism, industry and horticulture, that increases the amount of surface run-off should include a strip of land at least 20 metres wide measured from the top of existing banks on each side of a watercourse that is:
 - (a) fenced to exclude livestock
 - (b) kept free of development, including structures, formal roadways or access ways for machinery or any other activity causing soil compaction or significant modification of the natural surface of the land
 - (c) revegetated with indigenous vegetation comprising trees, shrubs and other groundcover plants to filter run-off so as to reduce the impacts on native aquatic ecosystems and to minimise soil loss eroding into the watercourse.

- 23 Development resulting in the depositing of an object or solid material in a watercourse or floodplain or the removal of bank and bed material should not:
- (a) adversely affect the migration of aquatic biota
 - (b) adversely affect the natural flow regime
 - (c) cause or contribute to water pollution
 - (d) result in watercourse or bank erosion
 - (e) adversely affect native vegetation upstream or downstream that is growing in or adjacent to a watercourse.
- 24 The location and construction of dams, water tanks and diversion drains should:
- (a) occur off watercourse
 - (b) not take place in ecologically sensitive areas or on erosion-prone sites
 - (c) provide for low flow by-pass mechanisms to allow for migration of aquatic biota
 - (d) protect the needs of downstream users
 - (e) minimise in-stream or riparian vegetation loss
 - (f) incorporate features to improve water quality (e.g. wetlands and floodplain ecological communities)
 - (g) protect ecosystems dependent on water resources.
- 25 Irrigated horticulture and pasture should not increase groundwater-induced salinity.
- 26 Development should comply with the current *Environment Protection (Water Quality) Policy*.

Biodiversity and Native Vegetation

- 27 Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.
- 28 Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, *including marine animals and plants, and their breeding grounds and habitats*.
- 29 Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following:
- (a) provides an important habitat for wildlife or shade and shelter for livestock
 - (b) has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities
 - (c) provides an important seed bank for indigenous vegetation
 - (d) has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views
 - (e) has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture
 - (f) is growing in, or is characteristically associated with a wetland environment.

- 30 Native vegetation should not be cleared if such clearing is likely to lead to, cause or exacerbate any of the following:
- (a) erosion or sediment within water catchments
 - (b) decreased soil stability
 - (c) soil or land slip
 - (d) deterioration in the quality of water in a watercourse or surface water runoff
 - (e) a local or regional salinity problem
 - (f) the occurrence or intensity of local or regional flooding.
- 31 Development that proposes the clearance of native vegetation should address or consider the implications that removing the native vegetation will have on the following:
- (a) provision for linkages and wildlife corridors between significant areas of native vegetation
 - (b) erosion along watercourses and the filtering of suspended solids and nutrients from run-off
 - (c) the amenity of the locality
 - (d) bushfire safety
 - (e) the net loss of native vegetation and other biodiversity.
- 32 Where native vegetation is to be removed, it should be replaced in a suitable location on the site with locally indigenous vegetation to ensure that there is not a net loss of native vegetation and biodiversity.
- 33 Development should be located and occur in a manner which:
- (a) does not increase the potential for, or result in, the spread of pest plants, or the spread of any non-indigenous plants into areas of native vegetation or a conservation zone
 - (b) avoids the degradation of remnant native vegetation by any other means including as a result of spray drift, compaction of soil, modification of surface water flows, pollution to groundwater or surface water or change to groundwater levels
 - (c) incorporates a separation distance and/or buffer area to protect wildlife habitats and other features of nature conservation significance.
- 34 Development should promote the long-term conservation of vegetation by:
- (a) avoiding substantial structures, excavations, and filling of land in close proximity to the trunk of trees and beneath their canopies
 - (b) minimising impervious surfaces beneath the canopies of trees
 - (c) taking other effective and reasonable precautions to protect both vegetation and the integrity of structures and essential services.
- 35 Horticulture involving the growing of olives should be located at least:
- (a) 500 metres from:
 - (i) a national park
 - (ii) a conservation park

- (iii) a wilderness protection area
 - (iv) the edge of a substantially intact stratum of native vegetation greater than 5 hectares in area
 - (b) 50 metres from the edge of stands of native vegetation 5 hectares or less in area.
- 36 Horticulture involving the growing of olives should have at least one locally indigenous tree that will grow to a height of at least 7 metres sited at least every 100 metres around the perimeter of the orchard.

Soil Conservation

- 37 Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.
- 38 Development should be designed and sited to prevent erosion.
- 39 Development should take place in a manner that will minimise alteration to the existing landform.
- 40 Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity.

Local Government Search

Certificate Number:	CERT2848/17
Date:	09 August 2017

Renewal Sa
PO Box 292
ADELAIDE SA 5001

Property No: 167751
Assessment No: 2504698018

Owner: Urban Renewal Authority
Property: St Clair Oval Woodville Road ST CLAIR SA 5011

Lot/Section/Title Reference: Lot 1 DP 84492 Vol 6063 Fol 756

Ward: Woodville

Pursuant to Section 187 of the Local Government Act 1999 I certify that the following amounts are due and payable in respect of, and are a charge against, the above property as at the date of this certificate:

Rates for Financial Year 01/07/17 to 30/06/18	\$0.00
Please contact City of Charles Sturt Financial Services for further property details	
Amount Due & Payable	\$0.00

Please note:

Outstanding rates balance is correct as at the above date. If you are seeking updated rating information more than 30 days from the above date or in a new financial year, a new Section 187 request is required to be lodged.

This Property is currently exempt from Council rates. If Sold Council rates may apply

Chief Executive Officer

Per Authorised Officer:



Property No: 167751
Property Address: St Clair Oval Woodville Road ST CLAIR SA 5011

Prescribed enquiries under section 7 of the Land and Business (Sale and Conveyancing) Act and Regulations.

Prescribed Encumbrances	Other Particulars Required
<p>Development Act 1993</p> <p>Part 3 – Development Plan</p> <p>Title or other brief description of zone or policy area in which the land is situated (as shown in the Development Plan):</p> <p>District Centre (Woodville Policy Area 5) Precinct 21 Recreation/Education</p> <p>Is the land situated in a designated State Heritage Area?</p> <p>Is the land designated as a place of local heritage value?</p> <p>Is there a current Development Plan Amendment released for public consultation by a council on which consultation is continuing or on which consultation has ended but whose proposed amendment has not yet come into operation?</p> <p>If YES, State the name of the council:</p> <p>Is there a current Development Plan Amendment released for public consultation by the Minister on which consultation is continuing or on which consultation has ended but whose proposed amendment has not yet come into operation?</p>	<p>No</p> <p>No</p> <p>Yes – Residential City-Wide Policies DPA; Urban Employment Zone DPA; Privately Funded Seaton Mixed Use (Residential and Commercial) DPA. City of Charles Sturt</p> <p>No</p>
Section 42 – Condition (that continues to apply) of a development authorisation	Yes
<p>Application No. 252/0026/17 Description Land Division – Section 49 – 252/G436/16 – Creating three allotments from two (creating new road) Decision: PLANNINGAS DA Issue Date 5/04/2017</p> <p>Development Assessment Commission Conditions</p> <p>CONDITIONS OF APPROVAL</p>	

Prescribed Encumbrances	Other Particulars Required
<ol style="list-style-type: none"> That except where minor amendments may be required by other relevant Acts, or by conditions imposed by this application, the development shall be established in strict accordance with the details and plans submitted in Development Application No 252/G436/16: <ul style="list-style-type: none"> Alexander Symonds REF: A110115.0001 DWG NO: A110115PROP (B) REV B RHF09.11.2015 Jensen Planning + Design - Planning Report - St Clair Avenue Extension Land Division - November 2015 AECOM - Traffic Management Report - Woodville St Clair Development - 13 November 2015 Tree Environs - Tree Report - Tree Survey at St Clair Oval, Woodville - 26 September 2014 That semi-mature native tree species (>1m in height) indigenous to the local area shall be planted on a 2 for 1 basis to compensate for the removal of each regulated tree and a 3 for 1 basis for each significant tree (for a total of 7 trees). The replacement tree planting shall occur within 18 months of a tree's removal and shall be maintained in good condition at all times and replaced if necessary. A copy of the final location of replacement tree plantings shall be provided to the State Planning Commission. 	
<p>Commissioner of Highways Conditions</p> <ol style="list-style-type: none"> The Woodville Road/New Road junction shall be restricted to left-in/left-out movements only. A raised solid central median shall be installed along Woodville Road to prevent right-in/right-out access to the new junction. This median shall extend from the existing median associated with the Woodville Road level crossing to the Woodville Road / Stanley Street junction. A left-turn deceleration lane (CHL) shall be provided at the Woodville Road/New Road junction in accordance with the Austroads 'Guide to Road Design, Part 4A'. Bus Stop 222 must be relocated to cater for the CHL and shall be provided with an indented bus bay that is consistent with the width of the adjoining left-turn deceleration lane. The Woodville Road/New Road junction shall be designed and constructed to the satisfaction of DPTI, with all costs (including design, construction and infrastructure delivery management) to be borne by the developer. The applicant shall contact this department's Project Manager, Andrew Nicolson, Ph. (08) 7109 7727 or (mob) 0432 358 395 or via andrew.nicolson@sa.gov.au <mailto:andrew.nicolson@sa.gov.au> prior to undertaking any works. The relocated bus stop must be provided with DDA compliant facilities (including shelter & tactiles), with all associated costs to be borne by the developer. The applicant must contact this department's Senior Project Officer, Public Transport Operations & Planning, Mr Wayne Stewart on telephone (08) 7109 7240 or via wayne.stewart@sa.gov.au <mailto:wayne.stewart@sa.gov.au> to discuss all works associated with the relocated bus stop. The existing Glenys Nunn Drive junction with Woodville Road shall be permanently closed as soon as the new junction is opened. Upon the closure of Glenys Nunn Drive, suitable sections of bicycle path, footpath or shared use path shall be provided to ensure that the existing shared use path adjacent the nearby railway line is connected to the pedestrian/bicycle actuated crossing adjacent the level crossing. All access from/to Allotments 1000, 1001 & 1002 shall be gained via the abutting local road network only, and must be located well clear of the Woodville Road/New Road junction. 	

Prescribed Encumbrances	Other Particulars Required
<p>9. Stormwater run-off shall be collected on-site and discharged without jeopardising the safety and integrity of Woodville Road. Any alterations to the Woodville Road drainage infrastructure required to facilitate this shall be at the applicant's expense.</p>	
<p>Council Conditions</p>	
<p>10. Tree Protection Zone required</p> <p>Tree Protection Zones (TPZ) shall be provided around trees 27 and 31 and no works of any kind shall occur within this zone, unless specified and agreed to by Council's Arborist. This protection zone shall be maintained until the proposed development has been completed in its entirety. The protection zone is to encompass the critical root zone of the tree. In this case a protection zone of a 7.44 metre radius from around the base of the tree 27 and an 8.52 metre radius from around the base of tree 31 shall be provided.</p> <p>Reason: To ensure the tree survives long after the development is completed.</p>	
<p>11. Tree Protection Zone fencing</p> <p>The Tree Protection Zone shall be fenced before any works commence on site. The fence shall be constructed from 1.8 metre high steel mesh panels, which will be 2.5 metres in width. The panels shall be inserted in temporary concrete base blocks and the posts at the top shall be clamped.</p> <p>Reason: To ensure no tree damaging activity occurs within the critical root zone.</p>	
<p>12. Signs around Tree Protection Zone</p> <p>Clearly legible signs shall be incorporated on all sides of the Tree Protection Zone fence displaying the words "Tree Protection Zone No Unauthorised Entry".</p> <p>Reason: To notify all contractors to the site that this area cannot be utilised.</p>	
<p>13. Work Within the Tree Protection Zone</p> <p>Any works required within the Tree Protection Zone must be undertaken using no destructive techniques such as air-spading and hand trenching without severing roots and must be supervised by a qualified Arborist.</p> <p>Reason: To ensure no damage is caused to the tree protection zone.</p>	
<p>14. Public Lighting</p> <p>Design and Installation of Public lighting shall be in accordance with relevant Australian Standards and shall be at the applicant's expense.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p>	

Prescribed Encumbrances	Other Particulars Required
<p>15. Public Infrastructure and Utility Services</p> <p>After the Stormwater Management Plan has been endorsed Public infrastructure must be designed to comply with the requirements of Council's Engineering and Open Space Development Guidelines. Where a Developer proposes to design or construct infrastructure outside the requirements of the Guidelines, then agreement must be reached with the Council about the design and construction of that proposed infrastructure before it is documented and submitted for approval.</p> <p>Public infrastructure and utility services must be designed, documented and prepared under the guidance of a Professional Engineer having extensive experience relating to these matters and engaged by the Developer within the meaning of regulation 55(3) of the Development Regulations 2008 ("the Engineer").</p> <p>The engineering Design Plans, calculations and supporting information must be certified by the Developer's Engineer prior to submission to the Council. The submitted must be in accordance with the format standards described in Council's Engineering and Open Space Development Guidelines, including construction of suitable traffic calming measures to the satisfaction of Council.</p> <p>The Council will approve the Plans and the supporting information and the Developer must issue a set of the approved plans marked 'Issued for Construction'.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p> <p>15. Road Reserves</p> <p>The width of Public Road Reserves and the provision of corner allotment cut offs must comply with the requirements of the Engineering and Open Space Guideline.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p> <p>16. Stormwater Management</p> <p>A Stormwater Management Plan must be provided demonstrating how stormwater will be managed for a minor storm event of 1 in 5 years and for a major storm event of 1 in 100 years. Any net increase in peak stormwater discharge from the site (post-development to pre-development) for the design storm event (major) shall be managed and/or disposed of on-site via an engineered drainage system (detention, retention, and/or combination of both and/or other engineered means).</p> <p>The Stormwater Management Plan must achieve the following;</p> <p>For Individual Allotments:</p> <p>(i) For the minor storm event stormwater discharge from allotments must be restricted to pre-development Q5 flows.</p> <p>For Land Division:</p>	

Prescribed Encumbrances	Other Particulars Required
<ul style="list-style-type: none"> (i) For minor storm events an underground stormwater drainage system must be designed to cater for pre-development Q5 flows for each contributing catchment; (ii) For storm events greater than the minor storm event, flow paths shall be clearly defined using roadways giving due consideration to public safety and protection to properties; (iii) This must be achieved by restricting the flow using engineered detention and retention systems located in Public Road Reserves for ease of access and maintenance; (iv) Where overland flow paths stormwater drainage systems are in open space areas, then prior to the development of the Stormwater Management Plan, consent must be obtained from the Council and additional open space may be required; and (v) Define how the quality of the stormwater discharge will be managed with pollution prevention devices that efficiently remove solids and liquid pollutants. <p>Once the Storm Water Management Plan has been approved by the Council, the Developer must then prepare engineering Design Plans, calculations and supporting information as required in Land Division Consent Condition 'Public Infrastructure and Utility Services'.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p>	
<p>17. Allotment Filling and Drainage</p> <p>Where filling is undertaken on the land (whether on proposed residential allotments, roads or open space areas), the Developer must ensure that the filling is undertaken using appropriate materials and is compacted in accordance with AS 3798, 2007 'Guidelines on Earthworks for Commercial and Residential Developments'. Where required under this standard the Developer must obtain and provide a copy to Council of a Certificate from a suitably qualified geotechnical engineer confirming that the filling has been undertaken in accordance with this standard.</p> <p>Individual allotments must be graded towards the adjoining street(s) to ensure that stormwater water runoff from each of the individual allotments does not flow onto adjoining allotments.</p> <p>Should the grading of any individual allotment result in a difference in level at a boundary with another allotment or road reserve that does not exceed 1.0 metre, then where required to ensure the stability of the ground, a concrete plinth or retaining wall must be constructed to retain the fill material</p> <p>Should the grading of any individual allotment result in a difference in level at a boundary with another allotment or road reserve that does exceed 1.0 metre, then subject to the approval of the Council, the allotments may be graded away from the street(s) and allotment underground drainage installed for pre-development Q5 flows.</p> <p>Note: Should any plinth or retaining wall referred to in this condition be higher than 1m it will require a separate development approval under the Development Act, 1993.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p>	

Prescribed Encumbrances	Other Particulars Required
<p>18. Management of Work</p> <p>The construction work must be managed by the Developer's Engineer, Council's Engineer will then monitor and inspect the work based on the following:</p> <ul style="list-style-type: none"> (i) Prior to construction work commencing the Developer's Engineer must issue to Council a detailed Works Program for the construction work outlining each stage of the work and relevant hold points for the work; (ii) Other than for stage one, prior to construction work commencing on subsequent stages, the Developer's Engineer must make arrangement for the Council's Engineer to inspect the work already being carried out; (iii) All new underground Council infrastructure and or points of connection to existing underground infrastructure shall be inspected and approved by Council's Engineer prior to back filling; (iv) Where the construction work reaches a 'hold point' identified in the Works Program, the work must cease until the Council's Engineer has undertaken an inspection and indicated in writing that construction work may proceed; (v) During the construction period, the Developer's Engineer must provide Project Updates monthly summarising the work completed against the submitted Works Program, reasons for variance and include all relevant documentation and compaction test results endorsed by the Developer's Engineer; (vi) Where the work requires variation from the 'Issue-for-Construction' plans, Council must be notified and work must stop. The Developer's Engineer and the Council's Engineer must agree on the required action and where a change in design is required, the Developer's Engineer must submit the new design to the Council's Engineer for approval. Work must only restart once the approval is issued; and (vii) Any damage caused by the construction work to the existing public infrastructure and utility services including damage to the roadways, paths and stormwater drainage must be reported to Council's Engineer immediately for direction from the Council's Asset Manager. <p>Reason: To ensure the development proceeds in an orderly manner.</p> <p>19. Completion of Work</p> <p>When the Developer's Engineer considers that the works have reached the stage of Practical Completion, they must give notice to the Council accompanied with:</p> <ul style="list-style-type: none"> (i) A table containing each approved variation and the date of the Council approval of that variation; (i) The "As Constructed" plans in B1 size on which there is a certification by the Developer's Engineer that they are a true and correct record of the construction; 	

Prescribed Encumbrances	Other Particulars Required
<ul style="list-style-type: none"> (iii) A table of the infrastructure that the Council is to inherit containing asset detail and construction cost; (iv) All compaction test reports and material compliance certificates; (v) All warranties, guarantees and instruction manuals; (vi) A CCTV report demonstrating that a thorough cleaning of the entire stormwater drainage system including all junction boxes, and side entry pits has been undertaken; and (vii) Confirmation in writing that all accumulated material and debris has been removed from the site. <p>After receipt of the above documents, the Developer's Engineer must arrange an inspection of the works with the Council's Engineer and with the Contractor. Council will inspect the works and advise the Developer's Engineer of any outstanding work and defects.</p> <p>The Developer's Engineer must then issue of the Certificate of Practical Completion containing outstanding work and defects and the Certificate will be accepted by the Council.</p> <p>Reason: To ensure the development proceeds in an orderly manner.</p>	
<p>20. Defects Liability Period</p> <p>Upon acceptance of the Certificate of Practical Completion by the Council, the Defects Liability Period of 12-month will commence. During this period:</p> <ul style="list-style-type: none"> (ii) Council may direct the Developer to repair a defect that may become evident, whether it is listed on the Certificate of Practical Completion or not; (iii) The Developer must undertake any repair directed by the Council as quickly as possible, but in any case, no longer than 3-months; (iv) Immediately prior to the end of the Defects Liability Period the Developer's Engineer must arrange for any material and debris which will inhibit inspection of the work to be removed; (v) At the end of the Defects Liability Period the Developer's Engineer must arrange an inspection of the works with the Council's Engineer and with the Contractor. Council will inspect the works and advise the Developer's Engineer of the outstanding work and defects; and (vi) Once the outstanding work and defects are completed to the satisfaction of the Council's Engineer, the Developer's Engineer must issue of the Certificate of Final Completion and the Certificate will be accepted by the Council. <p>Reason: To ensure the development proceeds in an orderly manner.</p>	



Stormwater Management Plan

What is a Stormwater and Siteworks Plan?

All applications must identify the method of stormwater disposal. Plans, specifications and computations must be provided to demonstrate compliance with the requirements in *Table 1: Requirements and Guidelines*. This is a requirement for planning approval.

The following check list is provided to assist in identifying and specifying components of the proposed stormwater systems:

- Pervious and impervious area identification
- Existing site and adjacent road levels
- Existing and proposed floor levels
- Proposed site levels
- Directions of flow
- Pollutant control devices
- All proposed drainage lines
- Pipe sizes
- Pipe gradients
- Pipe levels
- Collection points
- Discharge points
- Pits, sumps
- Soakage systems

Table 1: Requirements and Guidelines

Requirements	Guidelines
1. No run-off shall be directed from the development site to adjacent properties.	<p>Runoff from the whole site shall be directed to the street gutter via one or more of the following:</p> <ul style="list-style-type: none"> • Gravity drains • Sealed pressure drains • Overflows from soakage pits • Overflows from detention/retention systems • Pump systems • Site-works grading • Overflow paths.
2. The floor levels, site works and drainage system shall be designed to provide 100-year ARI protection against inundation of buildings and any flood intolerant structures.	<ul style="list-style-type: none"> • This applies to a 1 in 100 year ARI storm over the development site. • This is to be achieved by a combination of the above drainage systems and the setting of safe floor and site-works levels. • All finished floor levels (excluding undercroft car park) shall be a minimum of 0.3m above the highest adjacent street water table level. • It is required to be demonstrated that driveway profile(s) comply with the vehicle clearance and grade requirements of AS2890. The levels, distances, gradients and any required transitions for the entire driveway (from the roadway crossfall and including the footpath) are required to be specified. Any required alterations to a footpath are required to be detailed, must comply with AS1428 (limiting longitudinal gradient 1 in 14) and Council's requirement for a maximum crossfall of 2.5%. • Reference must also be made to the Development Information Guide Stormwater Inundation Mitigation for requirements for dwellings at risk to stormwater inundation in a 1 in 100 year ARI event. These requirements may exceed the requirements here in this document.
3. Measures shall be incorporated within the site-works along the property boundary to contain gutter flows.	<ul style="list-style-type: none"> • Driveway and property levels along the property/road reserve boundary shall be specified at least 225mm above the adjacent street gutter levels (unless in a flood zone, refer to Development Information Guide D33 – Stormwater Inundation). • If the property falls away from the roadway or the floor levels are less than 0.3m above the highest adjacent street

Requirements	Guidelines
	<p>gutter level, measures are to be specified to form a continuous (including its driveway) barrier along or near the lot frontage at a minimum of 0.3m above adjacent street gutter levels.</p>
<p>4. Measures shall be incorporated in all development to ensure no stormwater borne pollutants (including litter, silt and any harmful substances) are discharged into Council's drainage system.</p>	<ul style="list-style-type: none"> • For Residential development: by the provision of silt and litter traps. • For Commercial/Industrial development: by the provision of devices to remove solid and liquid pollutants, prior to discharge to Council's drainage system. (For Commercial/Industrial development at risk to large fuel spills additional EPA requirements may be applicable.)
<p>5. Soakage systems shall be safely located, shall provide effective detention and shall be environmentally appropriate.</p>	<p>Soakage systems:</p> <ul style="list-style-type: none"> • Shall be located only class A and S sites OR alternatively borelog testing is required for council assessment to determine if the site soil conditions are sufficient for soakage system. • Shall be designed for a 1 in 100 year ARI. • Shall not be located within 3m of any footing or property boundary and not be located on ground sloping more than 30 degrees. • Shall collect only roof and surface runoff from clean, non-vehicular areas and comply with EPA requirements. • For Detention purposes systems shall be demonstrated to be empty within 24 hours of a storm. • Shall incorporate an overflow for when/if the storage capacity is exceeded.
<p>6. Pump System Design and pump system failure. When pump system failure may result in inundation of any building or adjacent property, measures shall be incorporated to minimise the risk of failure during a storm.</p>	<p>If failure of the pump system is likely to result in flooding of a building, under-croft or adjacent properties then the following shall apply:</p> <ul style="list-style-type: none"> • Two pumps shall be provided, each capable of the design flow rate. • The pumps shall be configured to automatically alternate as the duty pump. • The system shall be configured to automatically revert to the alternate pump should the duty pump fail. • An Audible Alarm system must be provided • Either a back-up power supply or a safe power failure storage (below and/or above ground) with a volume equal

Requirements	Guidelines
	to a 5 year ARI, 4 hour duration storm run-off without pump operation and without flooding of buildings, under-crofts or any properties shall be provided.
7. When a development property abuts a Council laneway, buildings shall be located safely and have safe floor levels to reduce flood risk from the laneway.	<p>Where a building or structure is proposed at a location abutting a Council lane-way, the following additional minimum requirements apply:</p> <ul style="list-style-type: none"> Proposed buildings and structures shall be set back a minimum distance of 2m from the property/laneway boundary. Proposed floor levels shall comply with other applicable requirements and shall be a minimum of 0.20m above the highest adjacent laneway level, whichever is the highest. No stormwater is permitted to discharge to a laneway.
8. All works necessary beyond the property boundaries shall be to Council's requirements and standard details.	All works (e.g. connections across Council's footpath, connection to Council's drains, new entranceways and removal and reinstatement of abandoned entranceways) shall be specified on the plan to meet Councils requirements and standard details.
9. Discharge rates	<ul style="list-style-type: none"> The maximum discharge rate per development to council street water table is 10L/s. All residential development is required to be discharge stormwater to the street water table. Development with large pre development flows will be assessed on their own merits.
10. Maintenance	It is the responsibility of the property owner to ensure all Drainage Infrastructure within the development site shall be maintained, serviced, cleaned and sustained operational as required by the stormwater design.

Note: Further requirements will apply for sites identified as flood prone. See City of Charles Sturt [Development Information Guide D33 – Stormwater Inundation](#).

What are the requirements for stormwater detention on site?

For some development, Council requires the discharge of stormwater from the site to Council's drainage system to be restricted. The objectives are to minimize flooding and the impact of increased runoff from infill development within catchments. Compliance with Council's requirements can require detailed engineering analysis and computations. To simplify this process for Applicants, two options are provided. Option 1 is a simplified requirement which can be applied for specific conditions. All other development or Applicants not choosing to comply with Option 1, are required to comply with Option 2.

Option 1

For new dwellings or extensions to a dwelling, with total proposed roof area up to 400 m² and a street frontage of more than 5m, provision of an above ground rainwater detention tank, collecting a minimum 90% of the total proposed roof area, draining to Council's drainage system or street gutter via a 20mm orifice restriction such that the volume is available at all times, will be considered as complying with Council's detention requirements without computations.

The minimum detention tank volumes are:

<u>Total proposed roof area (m²):</u>	<u>Detention volume (litres):</u>
Up to 50 m ²	Nil
Up to 200 m ²	2000 litres
Up to 300 m ²	4000 litres
Up to 400 m ²	6000 litres
Greater than 400 m ²	Option 2 applies

For underground detention tank(s) and all other development, stormwater detention systems and computations are required as per Option 2.

Option 2

- All commercial and industrial development
- Sites identified as at risk of flooding (as defined by City of Charles Sturt to [Development Information Guide D33 – Stormwater Inundation](#))
- Development Applications for more than two dwellings
- Sites which abut laneways
- Vacant Land
- Sites which; form part of a larger development, where detention has already been incorporated, may be exempt from this requirement. Please refer to Council's Planning Department for advice regarding exemptions.
- Note development of less than 50 square meters is excluded from this requirement.

For the above identified development, the post development peak rate of runoff from the development site from the "design" storm must not exceed that from the pre development site from a 5 year ARI storm.

Note:

- The critical storm duration must be identified.
- For residential development of less than 3 dwellings and more than 50m², the "design" storm is 5 year Average Recurrence Interval (ARI).
- For all other development the "design" storm is 100 year ARI.

- Any required detention storage can be either above or below ground tanks, soakage systems or graded site areas or any combination.
- Any outflow restriction device shall be calculated and specified on the plan.
- Computations shall be provided to demonstrate compliance with the requirements.
- Impervious, detained and un-detained catchments shall be identified.
- Detention storages must be available at all times and must be demonstrated to be emptied within 24 hours of a storm.
- Retention storages for re-use or plumbing to a dwelling are not permitted for detention purposes. Detention tanks must be empty at the beginning of a rain event.

What are the requirements for stormwater retention on site?

Requirements: An additional water supply must supplement mains water:

- For all new dwellings; and
- For extensions and additions which include a toilet, laundry or water heater.

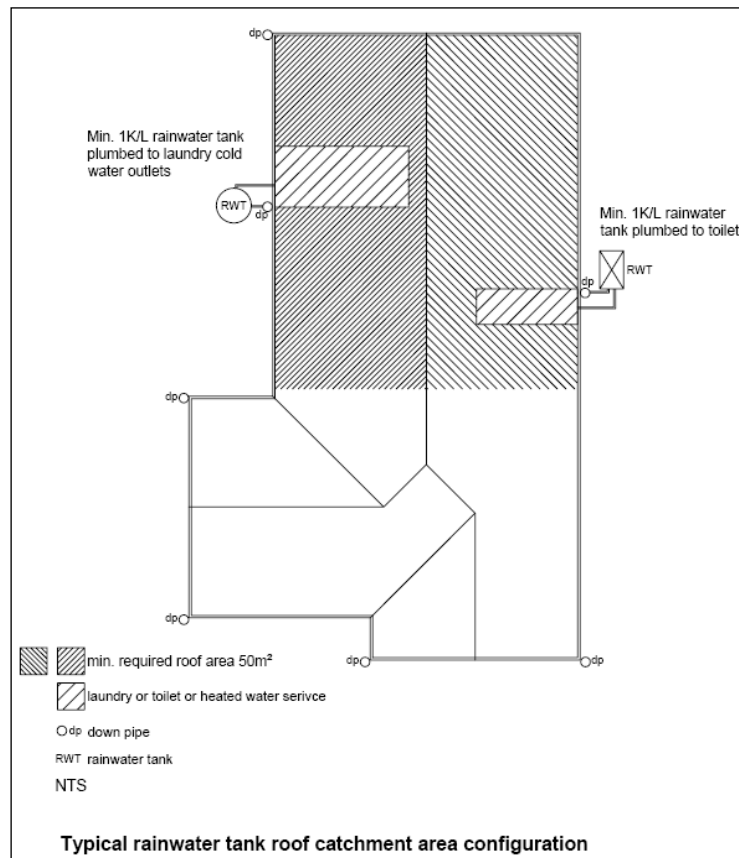
What minimum size rainwater tank do I require and does it need to be plumbed into my house?

Rainwater from a minimum of 50m² of the roof catchment area must be collected by gutters and downpipes; stored in a rainwater tank with a minimum capacity of 1 kilolitre (1000 litres) and plumbed to either:

- A toilet; water heater; or all cold water laundry outlets.

The Floor Plan / Plan View must include:

- Roof layout showing catchment area and location of downpipes and water tanks.
- An overflow device must be fitted to the tank and to ensure water quality a mosquito proof, non-degradable screen must be attached.



Example of roof water re-use plan provided by Department of Planning and Local Government above.

Where multiple dwellings utilise a communal rainwater tank, the minimum capacity of the tank must be multiplied by the number of dwellings contributing to it. Plumbing work must be done by a licensed plumber and comply with AS/NZS 3500:2003, the National Plumbing and Drainage Code and any SA variations published by SA Water. The technical requirements of rainwater tanks are contained in Section 14 of AS/NZS 3500:2003 and the SA Water variations.

Further Information:

Department of Planning, Transport and Infrastructure

Web: <http://www.dpti.sa.gov.au/>

SA Water

Web: www.sawater.com.au

Phone: 1300 650 950

Department of Environment, Water and Natural Resources

Web: <http://www.environment.sa.gov.au>

EPA

Web: www.epa.sa.gov.au

Phone: 8204 2004

Development Information Guides are intended to help applicants to submit applications which are complete, well prepared, and can be processed efficiently. The information provided is intended as a general guide only and applicants are encouraged to refer to the City of Charles Sturt Development Plan and to seek professional advice if necessary. This information is subject to frequent updates. This version last updated January 2016. Access the Development Plan and current versions of information guides at www.charlessturt.sa.gov.au.



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*Aveo St Clair Integrated Retirement
Community Development*

Waste Management Plan

Prepared for: Aveo Group

12 December 2018

- IMPORTANT NOTES -

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Document verification

Description	Aveo St Clair Integrated Retirement Community Development		
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Name	C. Colby	Client	C Colby
Signature			

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1 Introduction

This document presents a Waste Management Plan (WMP) for the Aveo St Clair Integrated Retirement Community Development (the “Development”).

The WMP explains how the Development can manage waste effectively to achieve regulatory requirements and desired design and operating objectives, including those recommended by the South Australian Better Practice Guide (State Guideline) (Zero Waste SA, 2014) and required by the Council Guideline (City of Charles Sturt, 2010) for waste management in new residential and/or mixed use developments. The WMP should be read in conjunction with other planning approval documentation for the Development referenced herein.

2 Development Description

The Development would be in the City of Charles Sturt (Council). The Development site fronts Woodville Rd and is approximately 3.74 ha – see Figure 1 (plan layout) two pages overleaf. The proposal entails the construction of 6 retirement apartment building and one residential aged care facility.

Table 1 overleaf summarises the Development’s land use metrics (used for waste system design).

- *This table includes the recommended Waste Resource Generation Rate (WRGR) classification (for each land use) based on the State Guideline (Zero Waste SA, 2014), which were used for estimation of waste and recycling volumes to assess waste storage required for the site¹.*
- *Some of these WRGRs are modified or proprietary versions of these WRGRs as the State Guideline values are not suitable or do not cover some of the land use activities at this site.*

The Development would comprise:

- **Six (6) multi-storey residential buildings** (independent retirement living units, ILUs) –
 - *These buildings would all be five storeys high and share (and be inter-connected by) a common undercroft parking level, which would be also connected to the RACF building basement via Building 5 – see Figure 2 two pages overleaf.*
 - *Each building would have a different number of units or apartments (per Table 1) with a total of 341 dwellings across all six buildings.*
 - *There would be a mix of 1, 2 and/or 3 bed apartments in each building, with an average of ca. 1.95 beds per apartment across the six buildings.*
 - *The buildings and their apartments would operate as Retirement Village managed by Aveo under the South Australian Retirement Villages Act 2016:*
 - *Under this Act, apartments are leased to residents.*
 - *Building 1 at Ground Level includes some shared resident community areas (e.g. kitchen/dining area, craft room, library, lounge, etc.) for exclusive use by residents and their family/friends (i.e. not available to public), a consulting room for visiting healthcare professionals, and offices for Aveo’s Village Management and support staff.*
- {Cont. overleaf below Table}

¹ The State Guidelines WRGRs were used over those in the Council Guideline as the State Guideline WRGRs are per bed as opposed to per dwelling in Council Guideline. For this type of development where dwellings were < 2 bed on average and expected resident demographic, the per bed State Guideline WRGR was deemed more relevant.

Table 1 – Summary of land uses for the Development, their WRGR Description(s) and relevant Development Metric(s)

Land Use	Location		WRGR Description / Assumption*	Development Metric(s)	
Residential - Independent Living	Building 1 inc. Aveo Admin. & Community Centre (at Ground Level)	Residential (Levels 1-4)	High Density Apartments	62	Apartments
				125	Bedrooms
		Kitchen / Dining (Ground)	Proprietary (based on residential occupancy & WRGRs)*	160	m ² GFA allowed
		Bar / Lounge / Craft / Gym / Other Activity/Public Access Areas (Ground)	Showrooms	230	m ² GFA allowed
		Admin / Reception / Office (Ground)	Offices or Consulting Rooms	275	m ² GFA allowed
		Medical Consult/Treatment (Ground)	Offices or Consulting Rooms (Medical^)	20	m ² GFA allowed
	Building 2 (Ground - Level 4)		High Density Apartments	60	Apartments
				120	Bedrooms
	Building 3 (Ground - Level 4)		High Density Apartments	60	Apartments
				110	Bedrooms
	Building 4 (Ground - Level 4)		High Density Apartments	55	Apartments
				99	Bedrooms
	Building 5 (Ground - Level 4)		High Density Apartments	60	Apartments
				124	Bedrooms
	Building 7 (Ground - Level 4)		High Density Apartments	44	Apartments
				88	Bedrooms
RACF (Building 6)	Resident Aged Care Rooms (Ground - Level 4)		Serviced Apartments (Medical^)	144	Apartments/Rooms
				144	Bedrooms
	Communal/Public Areas		Showrooms	1030	m ² GFA allowed
	Reception/Offices/Admin/Staff		Offices or Consulting Rooms	340	m ² GFA allowed
	Medical Consulting		Offices or Consulting Rooms (Medical^)	25	m ² GFA allowed
	Drug Store		Retail < 100m ² (Medical^)	30	m ² GFA allowed
	Café		Café / Restaurants (Modified#)	25	m ² GFA allowed
	Kitchen/Café/Servery		Proprietary (based on residential occupancy & WRGRs) *	285	m ² GFA allowed
	Dining Areas			400	m ² GFA allowed

* Per classification for Waste Resource Generation Rates (WRGRs) in the State Guidelines (Zero Waste SA, 2014)

Modified Café / Restaurant WRGR to reflect Light Café scenario: General waste WRGR derated by 40%, recycling by 25%, and food waste by 50%.

^ Modified WRGR with proprietary value allowed for potential medical waste generation.

* Proprietary WRGR based on occupancy to consider incremental amount (only) of waste generation likely to occur from separate on-site food preparation (to avoid double counting of WRGRs for residential component).

- **Residential aged care facility (RACF) –**

- This building would be five storeys and comprise:
 - 144 single bed rooms for residents; plus
 - Ancillary on-site facilities across the building, including nurse stations, dining and servery areas, facility reception area, offices for administration staff, communal areas (e.g. sitting rooms, craft rooms, etc.), some consulting rooms for visiting health professionals, commercial kitchen and laundry.
- The RACF would be located on a separate title and owned, managed and operated by the Aveo Group.
- There would be separate service access to the RACF from Actil Ave South:
 - Northern access point – which provides access to Basement vehicle ramp; and
 - Southern access point – which provides access to Service Yard on West side of the building.

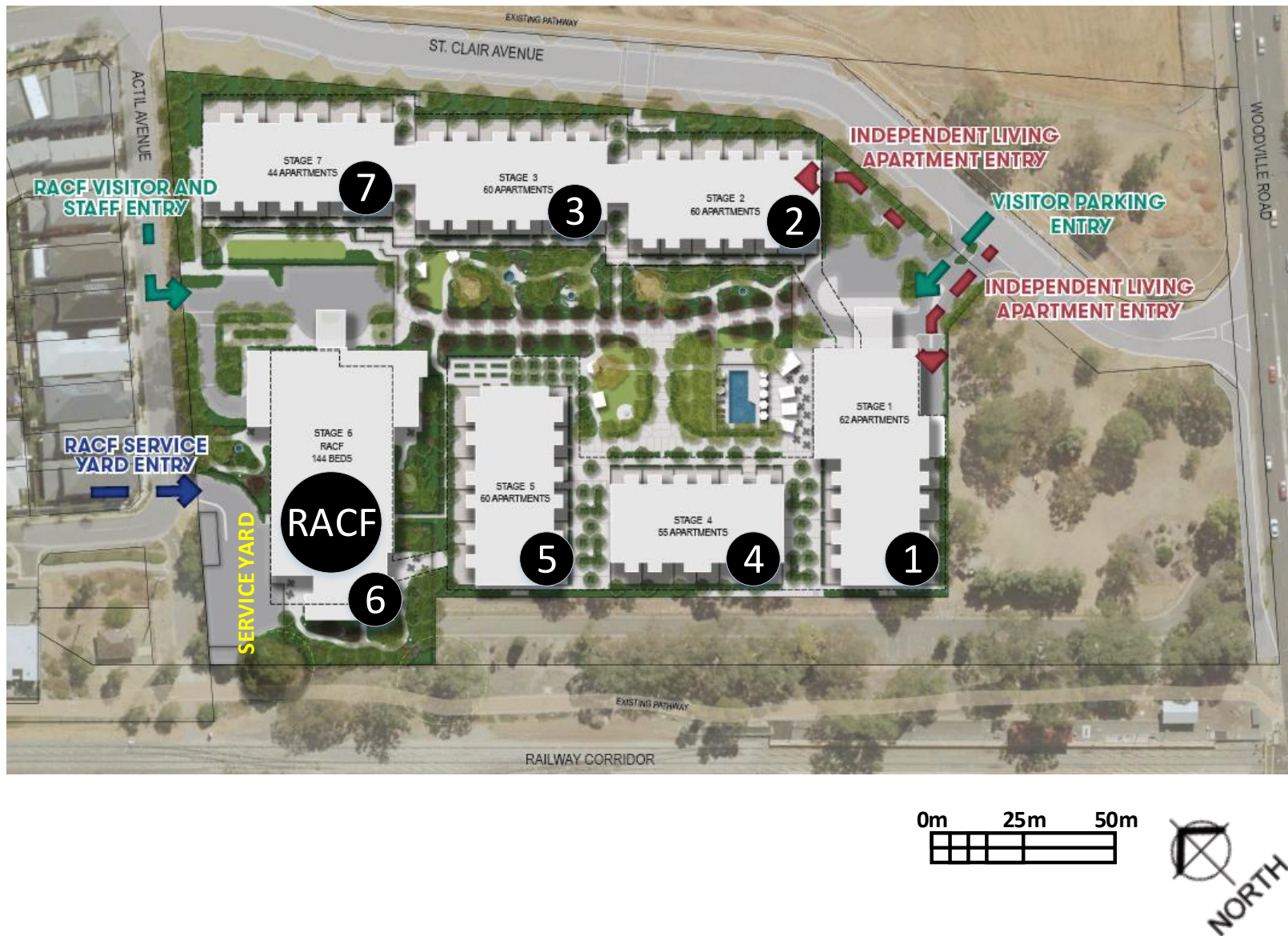


Figure 1 – Plan layout of Development at site, reproduced from the Drawings (issued 12 December 2018). Building numbers referred to in Table 1 below are marked, key site access points are marked with arrows.

3 Design Assumptions

3.1 Council Requirements

A meeting was held with Council to understand their expectations for waste management at the Development. The following was identified.

- **Council collection for Retirement Village ILU residents** – Council would provide its rear-lift bulk bin collection services to these buildings.
 - *Residents should have access to a 3-bin equivalent service:*
 - *Council's service provides weekly collection of general waste and recycling skip bins.*
 - *Food waste collection (weekly bulk bin) is not yet offered (by Council), but waste system design must allow for a future service to be introduced (and may elect to use a private food waste collection service in the interim).*
 - *Collection access would need to design for a 10.24m (long) rear-lift waste truck per the Council Guideline (City of Charles Sturt, 2010).*
 - *All other design elements for these waste systems should seek to comply with requirements for "Service Type C – Alternative waste service" in the Council Guideline (City of Charles Sturt, 2010).*
- **Hard Waste collection for ILU residents** – Council would be willing to provide residents with access to their current at-call waste service (www.charlessturt.sa.gov.au/HardWaste) subject to agreement with the Village Manager to coordinate collection events at the site.
 - *Otherwise or where Council hard waste collection was not suitable, the Village Manager would provide residents with access to separate private (hard waste) collection services.*
- **RACF Waste Collection** – This was a commercial site and (waste collection) would need to be serviced privately.

3.2 Waste & Recycling Service Provision

Table 2 overleaf outlines the recommended waste services by land use. The different waste service classifications listed in Table 2 are explained below.

- **Routine Services** – These require on-site waste storage and routine and regular collections, which would include general waste, dry (comingled) recyclables and food waste (where applicable).
- **At-call services** – These involve non-frequent collections, such as Hard waste, printer cartridges and batteries for residents and can include clinical waste and confidential paper (e.g. for Building 1), which are organised and provided on an as-needed basis.
- **Maintenance services** – Some waste items (e.g. lighting in the common areas of buildings, garden waste from the site, sanitary waste from toilets) would be removed and disposed of by the contractor providing the related maintenance service (and hence on-site waste storage is not usually needed or provided).
- **External Services** – Whilst not applicable to this site, these can be where waste items (e.g. printer cartridges, lighting) can be dropped off by tenants/residents at external locations (e.g. Officeworks, waste depot) (and thus, separate on-site waste storage is not usually needed or provided).

Table 2 – Expected or recommended waste & recycling services for the Development

Service Type	Building 1 ILU + Aveo Admin & Community Centre	Buildings 2-5 & Building 7 ILUs	RACF (Building 6)						
			Residential Age Care (Ground - Level 3)	Communal/Public Areas	Reception/Offices/Admin/Staff	Healthcare Consulting	Drug Store	Café	Kitchen/Servery/Dining
Routine (regularly scheduled)	<ul style="list-style-type: none">General WasteRecycling (inc. Bulky Cardboard)Food waste	<ul style="list-style-type: none">General WasteRecycling (inc. Bulky Cardboard)Food waste	<ul style="list-style-type: none">General WasteRecyclingSanitary (Option)Clinical Waste (where required)	<ul style="list-style-type: none">General Waste	<ul style="list-style-type: none">General WasteRecyclingFood waste (Staff room)Confidential paper	<ul style="list-style-type: none">General WasteRecyclingConfidential (Optional)Clinical Waste (Optional)		<ul style="list-style-type: none">General WasteRecyclingCardboard (Optional)Food wasteRecycled Deposit Containers (Optional)Cooking Oil (Optional)	
At-call (as needed)	<ul style="list-style-type: none">Confidential (Offices)Clinical Waste (Consulting)	<ul style="list-style-type: none">Hard/E-wasteLighting (On-site Local Disposal and temporary Storage in Building 1)Printer Cartridges (On-site Local Disposal and temporary Storage in Building 1)Batteries (On-site Local Disposal and temporary Storage (in Building 1)							
Maintenance (waste removed by contractor)	<ul style="list-style-type: none">Lighting (where applicable)Garden wasteProperty maintenance waste								
External (by resident/tenant off-site)	Not Applicable to this site: All services provided on-site by Village Management				Not Applicable to this site: All services provided on-site by RACF Management				

3.3 Waste & Recycling Volumes

Table 3 overleaf estimates expected waste and recycling volumes for the Development (in Litres/week).

- Refer Table 1 for WRGR assumptions.
 - *Note: WRGRs (in the State Guideline) do not exist for sanitary, lighting, printer cartridge or battery waste. Volumes of these waste items, however, are relatively small, and thus, have not been estimated.*
 - *The waste generation for garden waste at the site is not estimated as this is a maintenance service and on-site storage for separate collection is reasonably assumed as not needed.*
- The waste and recycling volumes for RACF in the Table is an aggregated value across all land uses at the site.

These expected waste and recycling volumes were used to size waste storage areas across the Development.

3.4 Staging of Development (& Temporary Arrangements)

The Development would be built over a period of 5-10 years in the following sequence.

- Stage 1 – Building 1
- Stage 2 – Building 2
- Stage 3 – Building 3
- Stage 4 – Building 4
- Stage 5 – Building 5
- Stage 6 – RACF (inc. Service Yard) or Building 6
- Stage 7 – Building 7

In this WMP, it is proposed that Council bulk bin collection of residential waste from the ILUs (during all Development stages) would be from a central point in the RACF Service Yard (accessed from Actil Ave South) (which was discussed with Council at the 5 September 2018 meeting).

This RACF Service Yard would be established and fenced off during Stage 1 of the Development so available for bin presentation and collection services during all stages of the Development. Until the RACF Building is constructed at Stage 6 (and the interconnection with undercroft of Building 5 is established), bins from (already constructed) ILU buildings would be transferred using a motorised tug (as proposed in this WMP) from undercroft via the Building 1 car park ramp in the north east corner of the site and internal roads and temporary (sealed) paths set up across the site to the Service Yard (for Council collection) – an example of such temporary transfer path arrangement and bin presentation proposed at Stage 5 is illustrated in Figure 3 two pages overleaf.

Table 3 – Estimated waste & recycling volumes (Litres/week) for Development. N/A – Not Applicable; NE – Not estimated

Waste / Recycling Service	Building 1					Building 2	Building 3	Building 4	Building 5	Building 7	RACF*
	Residential	Kitchen / Dining	Bar / Lounge / Craft / Gym / Other Activity/Public Access Areas	Admin / Reception / Office	Medical Consult/Treatment						Whole Building
	L/week	L/week	L/week	L/week	L/week						L/week
General Waste	3750	540	420	410	40	3600	3300	2970	3720	2640	12325
Dry Comingled Recycling	3130	450		410	30	3000	2750	2480	3100	2200	7143
Food waste	1250	180		70		1200	1100	990	1240	880	2960
Confidential Paper				70	5						420
Medical Waste					20						440
Sanitary Waste (AHP)											1080
Sanitary Waste (Feminine)	NE (Maintenance Service)										
Hard waste	875	189	18	21	2	840	840	735	980	616	1269
E-waste	156	34	2	6	0.4	150	150.0	131	175	110	211
Lighting waste	NE (Minimal Volume)										
Printer Cartridges/Batteries	NE (Minimal Volume)										
TOTAL	9161	1393	440	987	97	8790	8058	7257	9083	6446	25847

* Aggregated value for all land uses in this building.

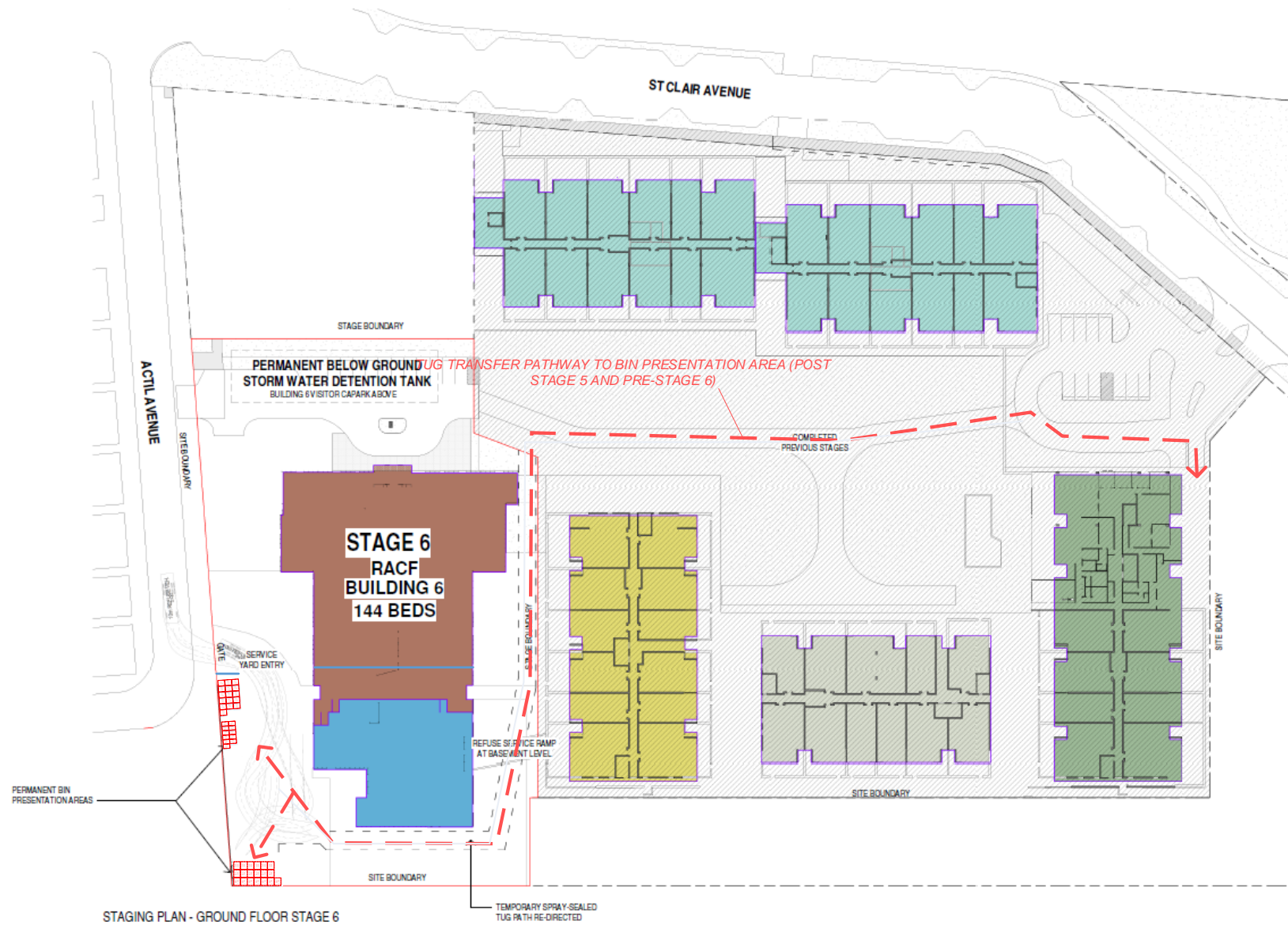


Figure 3 – Illustration of bin transfer path across site using a motorised tug to Council bin presentation area in RACF Service Yard after Stage 5 is built and before RACF building is completed. .

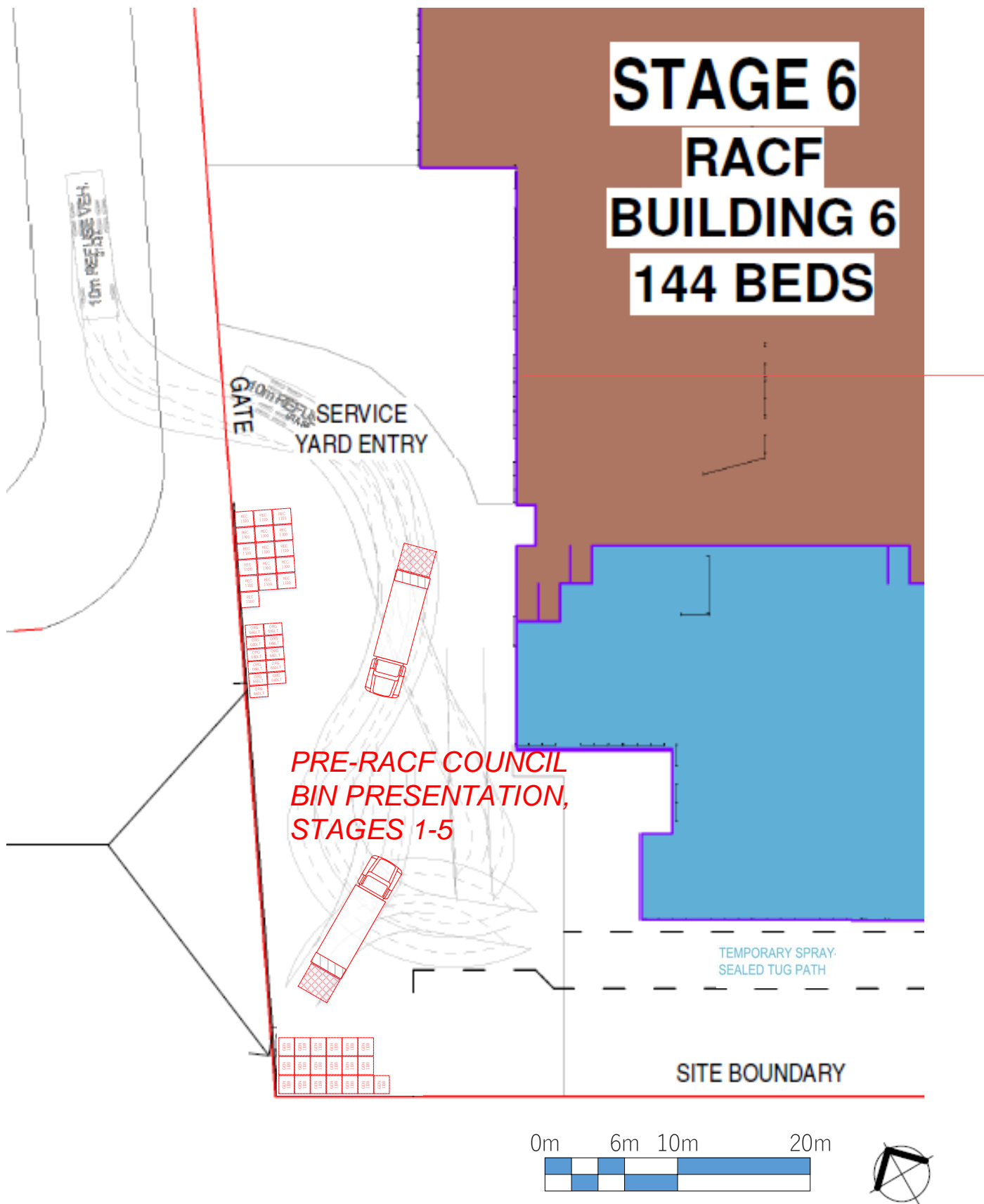


Figure 4 – Close-up of bin presentation in RACF Service Yard for Council collection at Stage 5, illustrating expected maximum number of bins to be presented and collection truck parking. This figure also shows swept path modelling of 10m truck by Traffic Engineer to demonstrate collection access.

4 Waste Management System & Plan

4.1 Waste Storage Area(s) – Routine Services

There would be the following areas for Routine Service waste and recycling bin storage (Waste Storage Areas) at the Development, which are illustrated in Figure 5, Figure 8, Figure 9, Figure 10 and Figure 11 on pages overleaf.

1) ILU Building 1 to 5 and Building 7 Waste Storage Areas – see *illustrations in Figure 5, Figure 9, Figure 10 and Figure 11*

- The Waste Storage Areas for all these buildings would be rooms in the undercroft areas, accessible to residents by lift access from apartments on levels above.
- Each room would include:
 - Separate local Disposal area for disposal by residents of waste and recycling into skip bins for:
 - General waste
 - Dry recycling (and cardboard)
 - Food waste
 - Bin storage area for full and empty bins transferred from and to the local disposal area by Village Management staff
- The bin storage areas in each room would store the expected number of bins required to cater for the waste storage requirements in that building based on weekly Council collection and waste volumes in Table 3 – see Table 4 later on pg. 20 for bin schedule.
- The storage provision presently allows for food waste (660L) bulk bins but these may not be installed initially until Council commences food waste collections (and this space may be used for extra general waste bin storage if needed to accommodate these food waste volumes during this period).
- These rooms would have negative pressure mechanical ventilation to avoid potential odour build-up

2) RACF Waste Storage Room – see *Figure 8*

- This waste storage would be a room located at Basement Level in the RACF building.
- It would store the required number of bins to cater for the waste storage requirements in that building based on up to 3 collections per week by a private contractor and waste volumes in Table 3 – see Table 4 later on pg. 20 for bin schedule.
- The waste storage area includes some spare area for other services (e.g. recycled deposit container) or items that may need to be stored for collection (e.g. lighting, printer cartridges, batteries).
- A bin lifter (see Figure 12 later in this report) would be in the room to tip (and aggregate) waste and recycling from smaller bins or MGBs into larger skip bins.
- This room would have negative pressure mechanical ventilation to avoid potential odour build-up.

{Cont. on pg. 20}

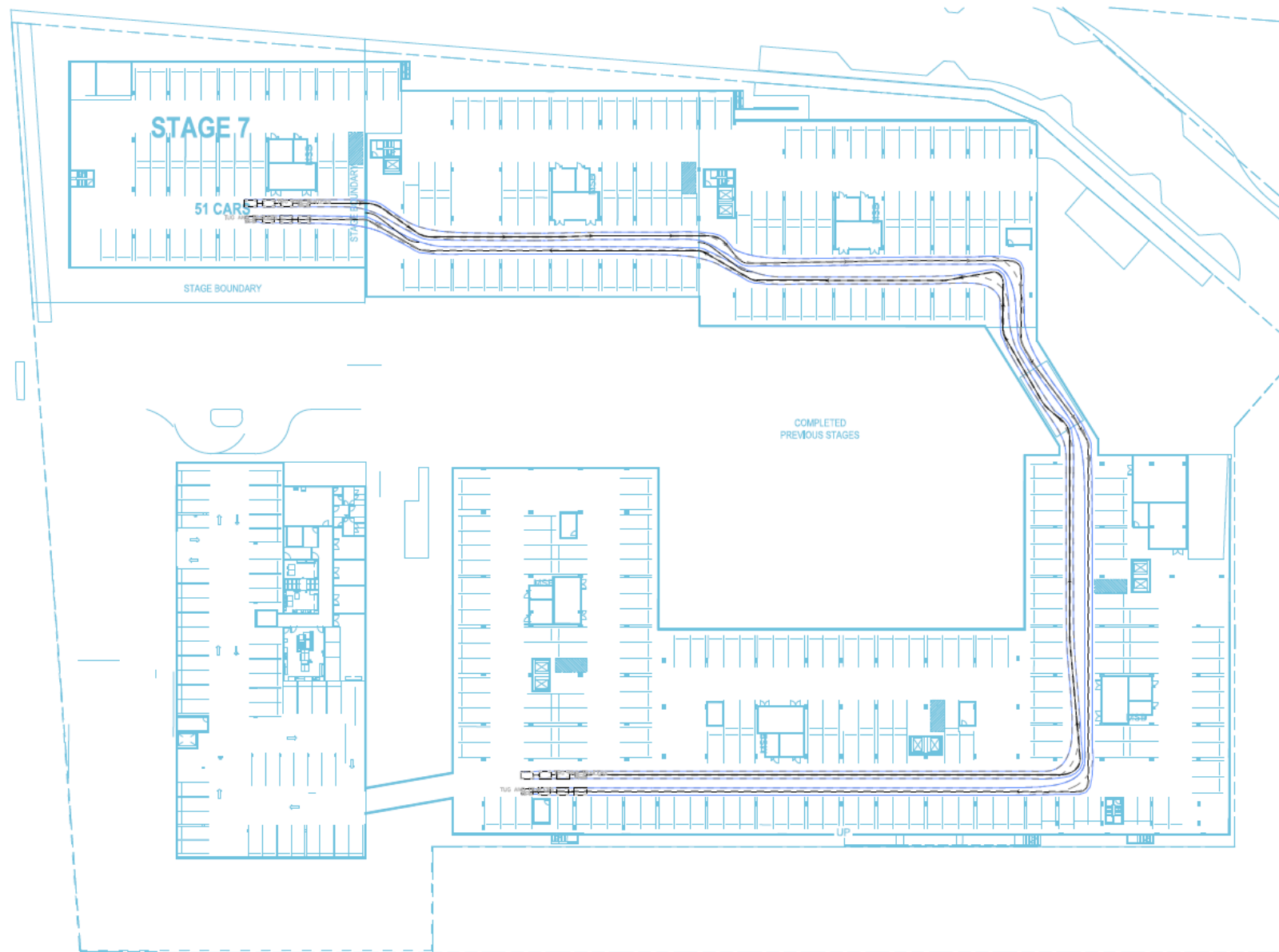


Figure 6 – Example of tug transfer of residential bins from Building 7 through undercroft area to RACF building connection point to Building 5. Swept path modelling provided by Traffic Engineer, refer to their Traffic Report for original and other examples at all stages of the Development

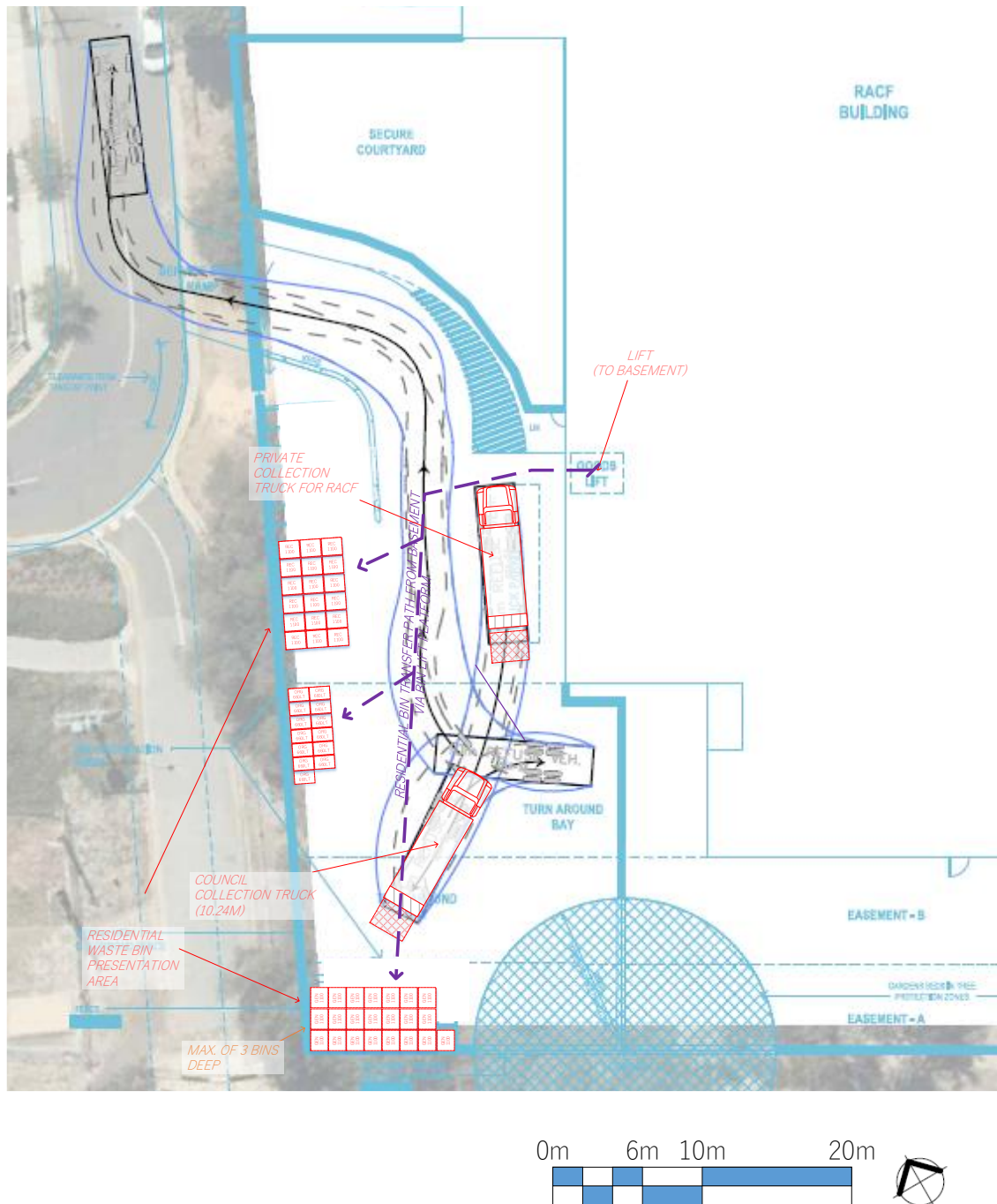


Figure 7 – RACF Service Yard with presentation area for ILU bulk bins for Council collection, bin transfer path from lift platform to presentation area, parking area for Council and private collection trucks to pick up ILU bulk bins or RACF waste, and swept path modelling for collection truck access to the Service Yard from Actil Ave South. No. bins shown are maximum (up to) that could be presented by ILUs at full development. Swept path modelling provided by Traffic Engineer, original should be presented in their Traffic Report.

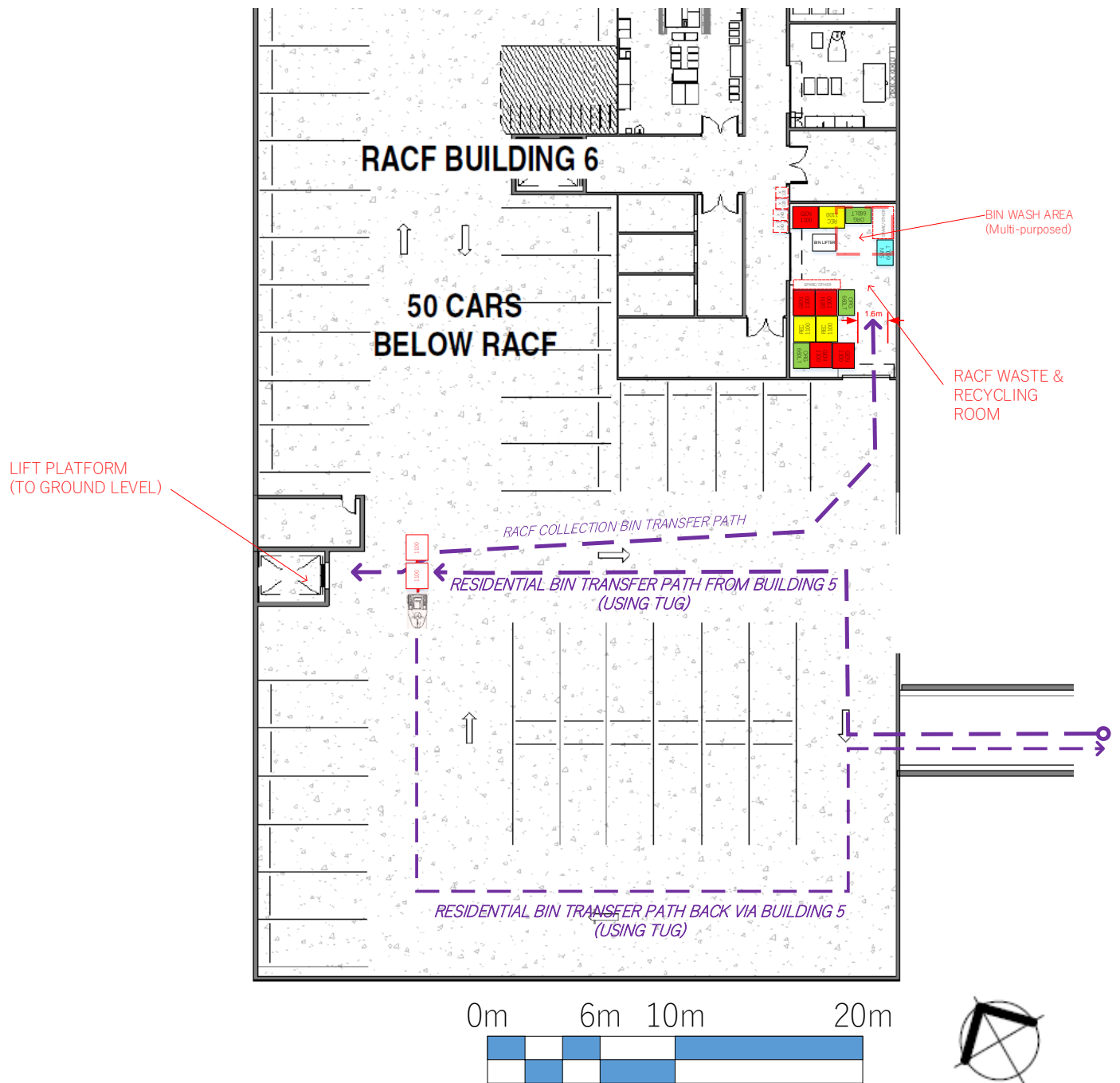


Figure 8 – RACF Basement section illustrating RACF waste room, and RACF bin transfer path and residential bin transfer path (through basement from Building 5) to lift platform (which connects to Service Yard Ground Level)

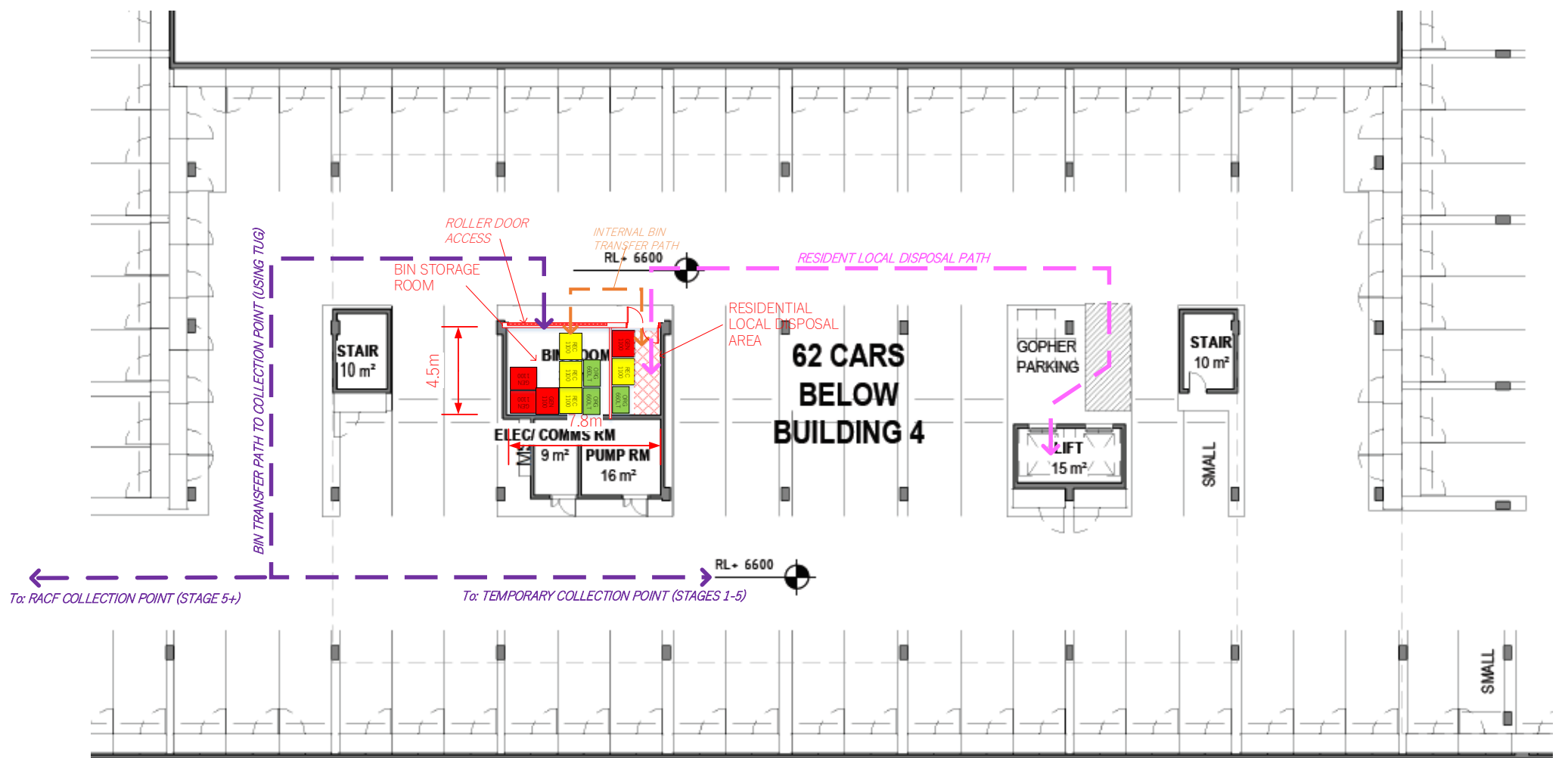


(a)

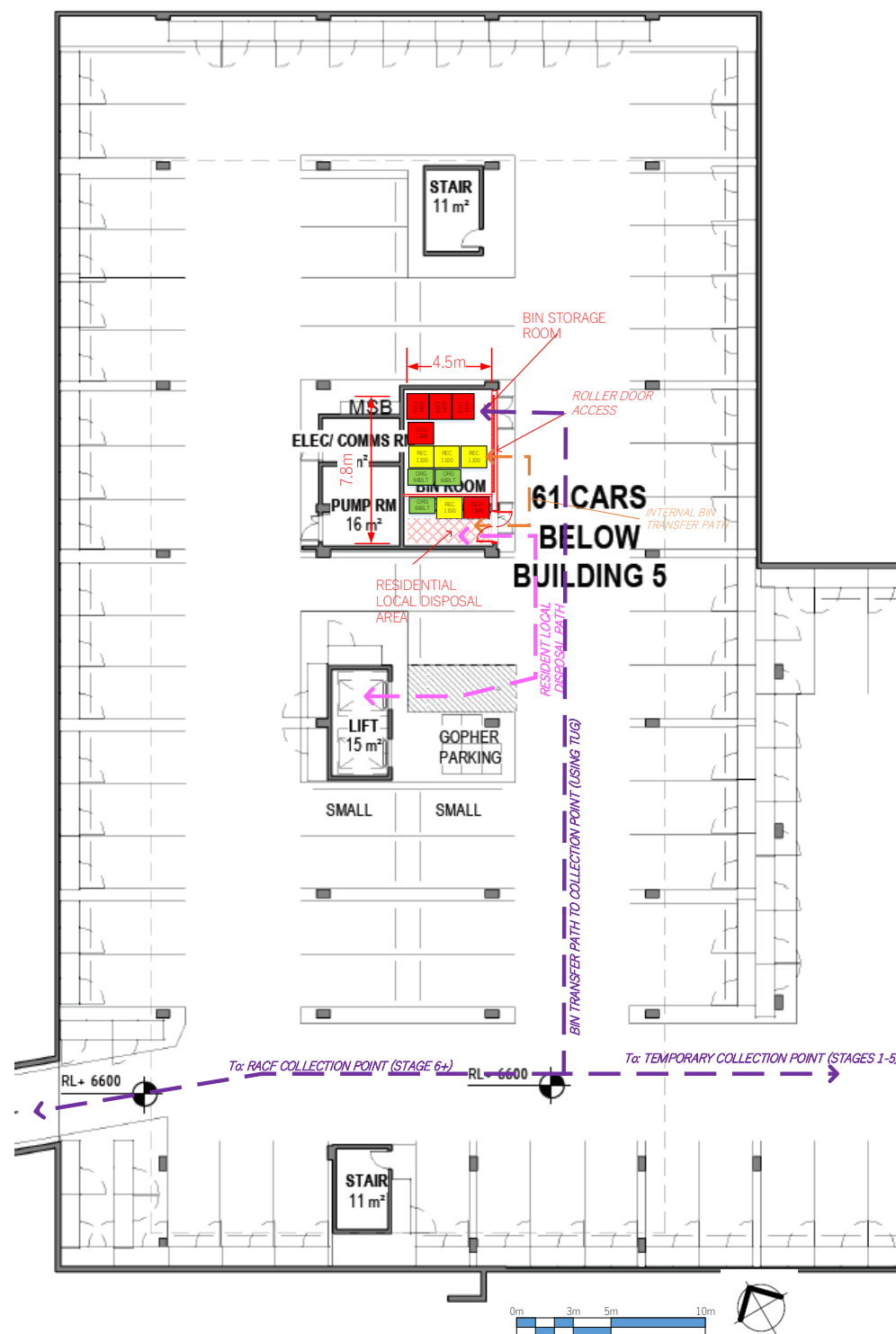


(b)

Figure 9 – (a) Building 2 Waste Storage; (b) Building 3 Waste Storage



(a)



(b)

Figure 10 – (a) Building 4 Waste Storage; (b) Building 5 Waste Storage

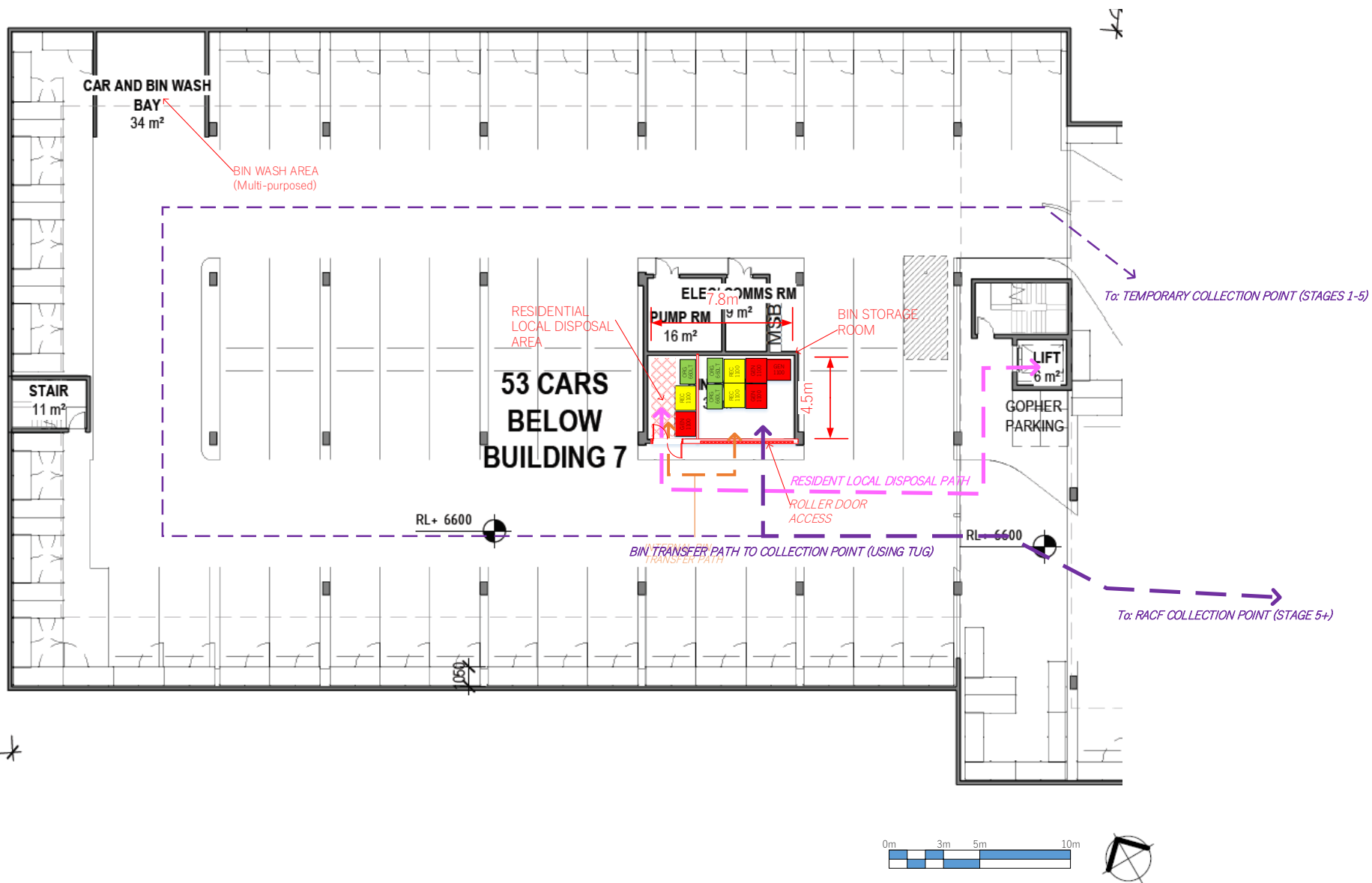


Figure 11 – Building 7 Waste Storage + On-site bin wash area

Table 4 below gives a schedule of recommended bin storage in each of these Waste Storage Areas (for Routine Services). This Table includes for each land use and service:

- Number (maximum) and type of bins;
- Collection frequency (expected or proposed); and
- Service provider and expected collection truck type.

Potential/example bin configurations (which may be refined at detailed design stage) in the Waste Storage Areas for recommended bin storage (per Table 4) are illustrated in Figure 5, Figure 8, Figure 9, Figure 10 and Figure 11.

- These illustrations demonstrate that adequate space is provided in these Waste Storage Areas to meet the site's waste management requirements.

Table 4 – Waste storage and bin schedule for Routine Services, including collection frequency and collection service provider

Storage Area	Service	Waste volume (L/week)	Collection Point(s)	Service Provider	Collection (No/week) Frequency	Bins collected (up to, per event)			
						No	Size		
Building 1	General Waste	5120	RACF Service Yard	Council	Weekly	5	1,100	L	Skip
	Dry Comingled Recycling	3980				4	1,100	L	Skip
	Food waste*	1490				3	660	L	Skip
	Confidential Paper (At-call)	75		Private	Every 3-4 weeks	1	240	L	MGB
	Medical Waste (At-call)	20			Every 2-4 weeks	1	80	L	MGB
Building 2	General Waste	3600		Council	Weekly	4	1,100	L	Skip
	Dry Comingled Recycling	3000				3	1,100	L	Skip
	Food waste*	1200				2	660	L	Skip
Building 3	General Waste	3300				3	1,100	L	Skip
	Dry Comingled Recycling	2750				3	1,100	L	Skip
	Food waste*	1100				2	660	L	Skip
Building 4	General Waste	2970				3	1,100	L	Skip
	Dry Comingled Recycling	2480				3	1,100	L	Skip
	Food waste*	990				2	660	L	Skip
Building 5	General Waste	3720				4	1,100	L	Skip
	Dry Comingled Recycling	3100				3	1,100	L	Skip
	Food waste*	1240				2	660	L	Skip
Building 7	General Waste	2640				3	1,100	L	Skip
	Dry Comingled Recycling	2200				2	1,100	L	Skip
	Food waste*	880				2	660	L	Skip
RACF (Building 6)	General Waste	12325	RACF Basement	Private	3	5	1,100	L	Skip
	Dry Comingled Recycling	7143			3	3	1,100	L	Skip
	Food waste	2960			3	2	660	L	Skip
	Confidential Paper	420			1	3	140	L	MGB
	Medical Waste	440			1	4	140	L	MGB
	Sanitary Waste (AHP)	1080			2	1	660	L	Skip

* This service may not occur until Council commences a bulk bin service

4.2 System Operation

4.2.1 Routine Services

The following summarise how the waste systems should operate for Routine Services to each land use at the Development. For simplicity and practicality, mention is made in these sections for how At-call Services would operate where these may be co-located and/or managed with Routine Services.

4.2.1.1 Buildings 1 to 5 and Building 7 Residential ILUs

User Storage – Residents would be provided with suitable kitchen bins with handles to enable easy carriage from their dwellings to their Local Disposal Area, e.g.

- a) General waste bin – at least 20L in size (bag lined)
- b) Commingled recycling waste bin - at least 20L in size
- c) Food organics bin (as specified or otherwise agreed with Council) (compostable bag lined)

Note: Council offers Council residents a one-off offer of a free kitchen caddy with a roll of compostable corn-starch bags support collection of food waste/scraps (see:

<http://www.charlessturt.sa.gov.au/FoodWaste>) which should be facilitated by Aveo Group when a building becomes operational and a new resident moves into an apartment.

Local Disposal – The residents would transport waste and recycling (carry by hand using handles or using shopping-type trolley provide by Village Management) in their kitchen bins to a local disposal room at undercroft level in their buildings – per Figure 5, Figure 9, Figure 10 and Figure 11

- *This local disposal room would include:*
 - General waste – 1100L skip bin
 - Recycling – 1100L skip bin
 - Provision for future food waste disposal – 660L skip bin (with compostable bag liner)
- *Note: The local disposal room would be ventilated and operate under negative pressure to avoid any odour build-up or transmission to elsewhere in the building.*
- *The bins in this room would be checked up to twice daily or equipped with level sensors providing text message notification or alerts to Village Management staff when bins were becoming full and needed to be swapped over with empties (located in the Waste Storage).*

Waste Storage – Would be located in same room in undercroft (but separated from the local disposal area) – as illustrated in Figure 5, Figure 9, Figure 10 and Figure 11 with bin storage provided as per Table 4.

Presentation/Collection Transfer – On weekly basis the Village Management staff would transfer full bins in the waste rooms to the presentation area for Council collection.

- *These transfers would be performed using a motorised tug – see photo example in Figure 13 overleaf.*
- *This tug would be securely parked in the Building 1 undercroft (or other suitable undercroft location) when not in use (e.g. see proposed location in Figure 5).*
- *The transfer path(s) for the tug would be:*
 - *Stages 1-5 – Via undercroft to Building 1, up the vehicular access ramp from Building 1 (e.g. see example illustrated in Figure 5) to Ground level visitor parking area in front of Building 1, then via existing internal roads and/or temporary sealed paths to the bin presentation area in RACF Service Yard, e.g. see Figure 3 and Figure 4.*
 - *Once the RACF or Stage 6 is completed – Via undercroft to Building 5, through to RACF basement (see example in Figure 6 and illustration in Figure 8), then manually transferred via lift platform in RACF Basement to Ground Level Service Yard presentation area (see Figure 7).*
- *The tug would be specified and selected with the supplier, so it was able to:*
 - *Easily tow up to 3x1,100L bins filled with uncompacted general waste or 2x660L bins filled with food waste (whichever was deemed heavier) through the undercroft area to the RACF lift platform area (e.g. assuming not steps and Min. Grade 1:10).*
 - *Note: During Stages 1-5, the tug would be required to tow bins up a ramp (expected to be 1:8) from Building 1 to Ground Level.*

Collection – Would be performed by the Council contractor on weekly basis using rear-lift collection truck.

- *Collection would occur from the RACF Service Yard (see Figure 3, Figure 4 and Figure 7).*

- *Note: The number of bins shown for presentation in Figure 4 and Figure 7 is the maximum potential number of bins (at the relevant Development staging) assuming collection for all services occur on the same day and all bins from Waste Storage Areas are presented.*
 - *It is likely that there will be far fewer bins presented for collection each week than these maximums, especially if service collections were scheduled on different days of the week by Council.*
- *Furthermore, the presentation of bins in each case has them organised as up to several rows of bins, which helps with space efficiency and reducing transfer distance for waste contractor when emptying bins.*
 - *This presentation format should not be an issue for Council rear-lift collections as their waste contractor would pull out several bins (or a column) at a time, place them behind the truck, empty them, then return them together (so they can be stacked back neatly as a column).*
 - *Rear-lift collection are not like kerbside collection where the truck must be next to each bin to lift it.*
 - *It should be a neutral issue or even an advantage for the Council waste contractor as it minimises transfer distance from presentation to rear of truck.*
- *The Traffic Engineer has performed swept path modelling for the Council rear-lift truck (per specifications in the Council Guideline) to demonstrate access to both areas can be achieved by forward entry and exit to the site – this modelling is reproduced in Figure 4 and Figure 7.*
- *Note:*
 - *Council may require Aveo Group as owner and manager of the retirement village for Building 1-5 and Building 7 ILUs to indemnify Council's waste contractor when driving their vehicle for collecting waste on-property.*
 - *Council skip bin collections may occur on the same day or separate days which should be confirmed with Council when the building becomes operational.*
 - *If access to the RACF Service Yard is securely gated, the Council contractor would require relevant key or secure access codes.*
- *The RACF Service Yard presentation and collection areas would need to be designed with: suitable hard /paved surfaces (for bin mobility and collection truck access) with no steps and minimal grade (e.g. 1:12); should naturally ventilate (to disperse and avoid any odour build-up); visually unobtrusive to residents, neighbours and the public (e.g. through use of suitably designed façade-type walls or fencing, vegetation screening and landscaping features); and may be open (i.e. not enclosed) so long as bin lids are closed during presentation.*

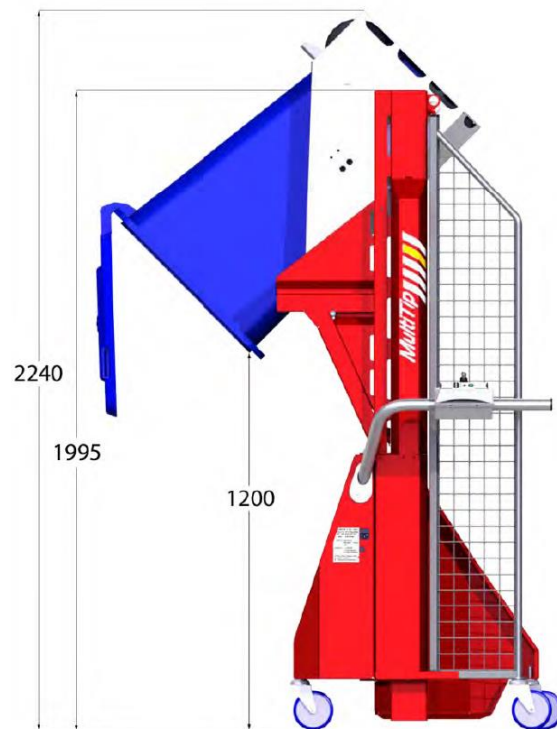


Figure 12 – Picture example of commercially available bin lifter for MGBs (that can operate within 2.7m headroom available in undercroft at Development). Source: <https://www.spacepac.com.au/product/multitip-bin-tipper-1200-1600mm-high-150kg-tipping-capacity>



Figure 13 – Picture example of commercially available motorised tug pulling 1,100L bins, final selection to be decided at detailed design. Source: <http://ev.spacepac.com.au/products/dec-modena-australia/dec-modena-bull-1p-2p-4p/>

4.2.1.2 Building 1 Community Centre and Village Management/support office

User Storage – These Ground Level areas in Building 1 would have suitable bins for disposal of waste and recycling.

- *The types and size of bins would be decided during fit-out to reflect the activities taking place in different areas and to allow staff and/or cleaners to safely and efficiently transfer the waste and recycling to the undercroft waste storage area for disposal into skip bins, and/or for non-standard items (e.g. battery, printer cartridges), to suitable storage room at Ground Level or undercroft for separate (at-call) collection by a private contractor.*

Local Disposal – Staff and/or cleaners would transfer standard waste & recycling via corridors, Staff Lobby and Lift to the undercroft waste storage room – per Figure 5 – and empty it into the skip bins or MGBs provided in the local disposal area.

- *Note: Non-standard waste items (e.g. clinical waste, confidential paper, batteries, etc.) would be disposed to Ground Level bins/receptacles in a Ground Level or undercroft storage room (for collection by private (non-Council) contractor).*

Waste Storage area – Would be the Building 1 Waste Storage area.

- *The bin types and numbers in Table 4 (on pg. 20) for Building 1 residential waste include provision for standard waste & recycling volumes generated at Ground Level by these (residential living-associated) land use activities (which will be aggregated with residential waste & recycling from ILUs).*
- *Non-standard waste items may be stored at Ground Level or undercroft (e.g. where bin/receptacles are located or in back-of-house store room) (for collection by private (non-Council) contractor).*
 - *Table 4 also suggests nominal bin types and numbers for confidential paper and clinical waste that may be required, and these bins would be collected by a private contractor and may be at-call services (and/or end up not needed).*

Presentation/Collection Transfer – The residential (standard) waste and recycling skip bins from the Building 1 undercroft waste storage area would be transferred to the presentation point for Council collection as outlined in Section 4.2.1.1 (for ILU residential waste).

- *Non-standard waste and recycling (confidential paper, clinical waste, battery bin, printer cartridge box, lighting boxes, etc) can be presented in or near the undercroft waste storage area or at Ground Level for private contractor collection (i.e. via pull-in, pull-out service).*

Collection – The residential (standard) waste and recycling skip bins from the Building 1 undercroft waste storage area would be collected from the presentation point by Council contractor as outlined in Section 4.2.1.1 (for ILU residential waste).

- *Non-standard waste and recycling (confidential paper, clinical waste, battery bin, printer cartridge box, lighting boxes), however, would be collected direct from their presentation area by the private contractor.*
- *For this purpose, the waste contractor would temporarily park (e.g. for 5-10 min) in the visitor car park area in front of Building 1 (accessible from St Clair Ave).*

4.2.1.3 RACF

User Storage – The RACF would have bins for disposal of waste and recycling suited to the different activities taking place across the building.

- *The types and size of bins would be decided during fit-out and would allow staff and/or cleaners to safely and efficiently transfer the waste and recycling to the waste room in basement (see Figure 8) for disposal into skip bins and/or for non-standard items (e.g. battery, printer cartridges) presentation for collection by a private contractor.*

Local Disposal – RACF staff and/or cleaners would transfer waste & recycling via corridors and lifts to the RACF waste room in Basement – per Figure 8 – and empty it into the larger skip bins or MGBs provided or present the items for collection.

- *A bin lifter would be provided for emptying smaller bins or MGBs in to larger skips, e.g. see Figure 12.*
- *Non-standard waste items (e.g. clinical waste, confidential paper, batteries, etc.), however, could be disposed to bins/receptacles located and more conveniently stored elsewhere in the building (for direct collection by commercial (non-Council) contractor).*

Waste Storage area – Would be the RACF Waste Room in Basement

- *The bin types and numbers located in this room for Routine Services based on collection frequencies of 1-3 times per week are recommended in Table 4 (on pg. 20).*

Presentation/Collection Transfer – The RACF Waste Room would be the presentation point for waste collection.

Collection – A private contractor would access the RACF Service Yard from Actil Ave South, park near the Lift Platform, use the Lift Platform to transfer the waste and recycling bins/items from the Waste Room at Basement Level, empty/lift them, return any empty bins to the Waste Room, then manoeuvre within the Service Yard (as illustrated in Figure 7) to exit back onto Actil Ave South in forward direction.

4.2.2 At-call

4.2.2.1 Hard waste/E waste – Residential ILUs/Community Retirement Village

These services would be provided for residents as follows.

- **Council Hard Waste Service** –
 - *Council presently offers all residents up to 2 free at-call hard waste collections per financial year– see: www.charlessturt.sa.gov.au/HardWaste.*
 - *Residents would book hard waste collection through the Village Manager and work with Council to coordinate and manage collection events to the site (e.g. as require every 1-2 months).*
 - *The presentation area for hard waste would be a temporary area set up using 2-3 car parks in the visitor car park area on front of Building 1 (or alternative area agreed with Council).*
 - *These car parks would be temporarily fenced off and the Village Management staff would assist residents (if required) to transfer and place their hard waste in this area the day before the collection was scheduled.*
 - *Following completion of the collection event, the Village Management staff would clear the temporary area and remove fencing to restore the car parking spaces.*
- **Private Collection Service** –
 - *Where the Council Hard Waste Service was not suitable or not available, residents would be able to book at any time a private hard waste collection from their apartment through the Village Manager.*
 - *The waste contractor would be able to temporarily park in the visitor car park area in front of Building 1 or closer to the Building where the service was required using the internal roads available at the site for emergency and maintenance vehicle access.*

4.2.2.2 Hard waste/E waste – RACF

Hard waste collection from the RACF would be delivered by a private contractor at call by RACF staff. The private contractor would park in the Service Yard.

4.2.2.3 Other Non-standard waste/recycling services

These have already been mentioned in the Routine Services section (4.2.1) and may include confidential paper, clinical waste, battery, printer cartridge and lighting waste/bin/receptacle collections. These services would be delivered by private waste contractors:

- **Building 1 Community Centre and Village Management support office** – As previously mentioned, a private contractor would park in the visitor car park in front of Building 1 and provide a pull-in, pull-out service to collect these items/bins.
- **RACF** – A private contractor would park in the RACF Service Yard and provide a pull-in, pull-out service to collect these items/bins (which may be presented within the building and/or RACF Waste Room).

4.2.3 Maintenance

Common or public grounds at the Development would generate garden and public place waste. In addition, waste would be generated by maintenance activities in ILU Buildings and the RACF or to other common area or shared infrastructure at the site (e.g. lighting, repair work, roads, public lighting etc.). These maintenance-generated waste materials would be handled and disposed of by the contractor undertaking these services. [Dedicated on-site storage for these waste materials is therefore not needed.]

4.2.4 External

There is no requirement for external services at the Development as these would be provided on-site by the Village Manager for the residential ILUs and at the RACF.

4.2.5 Bin cleaning (& On-site Bin Wash Area)

4.2.5.1 Residential ILUs/Community Retirement Village

A dedicated on-site bin cleaning area would be provided and multi-purposed with a car wash area in the undercroft of Building 7 – see Figure 11.

- *This bin wash area would require grading to a sewer drain with basket screen to remove gross solids, tiles or epoxy coating to water-proof adjacent walls and flooring, standard cold-water supply faucet and commercial-grade electrical power supply (if pressure washer system is to be used), plus bunds and screens for use during bin wash events.*
- *Bin washing activity would be managed by the Village Manager.*
- *Bin washing would be timed to occur immediately after bins are emptied.*

Until Building 7 is completed, bin cleaning at the Development would be outsourced to an external contractor (e.g. <http://binforce.com.au/>).

- *These external contractors generally have self-contained bin washing systems on back of ute or truck that enable them to clean bins on site – Figure 14 below.*
 - *Or some will remove bins from site, replacing them with an empty spare, clean the bins, then return them to site.*
- *Their vehicles can usually access basements where the waste storage areas are located (e.g. to min. clearance of 2.2m).*
 - *Or could park at Ground Level adjacent building (with bins temporarily brought up for cleaning (using tug) by the Village Management staff).*



Figure 14 – On-site bin wash system for rear-lift trucks on back of ute. Source: <http://binforce.com.au/>

4.2.5.2 RACF

The Basement Waste Room would similarly have a bin wash area multipurposed with bin storage, which could be set up for bin cleaning. It would be designed like that described above for the bin wash area for the Residential ILUs/Community Retirement Village. The RACF may elect to outsource bin cleaning to an external contractor too, which would be able to park in the Service Yard near Lift Platform or in Basement near the Waste Room to provide this service.

4.2.6 Transfer pathways

There are range of transfer pathways for the waste systems at the Development, which were described in Sections 4.2.1 to 4.2.3. The following is provided as a guide for sizing and designing these transfer pathways.

- **Transfer pathways –**
 - *Local disposal – should be less than 50m and free of steps, no grades greater than 1:15, and cater for mobility impaired users.*
 - *Local disposal points to central storage – enough width to accommodate relevant bins or waste loads being transferred, free of steps, no grades greater than 1:12*
 - *Collection (manual) – less than 30m with no steps or grades greater than 1:10*
 - *Collection (tug transfers) – at least 2.5m wide, hard driveable surface with navigable bends (in all weather conditions if external path), no steps or grades greater than that which can be accommodated by the tug or are unsafe for towing skip bins downhill.*
- **Corridor widths –**
 - *240L MGBs or smaller bins / loads – min. 1,000 mm (1,200mm preferred)*
 - *660L skip bins – min. 1,200mm (1,400mm preferred)*
 - *1,100L skip skips and/or other waste loads – min. 1,500mm (1,600mm preferred)*
- **Doors –**
 - *Local disposal access – 800mm*
 - *Transfer pathways– Appropriate to the size of bin to be transported, e.g.*
 - *240L MGB (or smaller) – min. 800mm*
 - *660L skip – min. 1,200mm*
 - *1,100L skip – min 1,500mm*
- **Floors –** *Hard surfaces where bins and skips are to be carted*
- **Lifts –** *All lifts should be sized to allow for bulky hard waste items.*

Based on current plans, these requirements for transfer pathways in the Development appear to be generally satisfied. All relevant transfer pathways should be reviewed and confirmed at detailed design stage to ensure they are appropriate.

4.3 Collection Arrangements

4.3.1 Collection Point(s), Vehicles & Access

The waste collection points for the Development introduced above are listed and reiterated below.

4.3.1.1 Residential ILUs/Community Retirement Village –

- **Council collection of standard waste & recycling –**
 - *Would occur from the RACF Service Yard as identified in Figure 3, Figure 4 and Figure 7.*
 - *The collection truck used would be a Council-specified rear-lift vehicle per Council Guideline – per Figure 15 overleaf.*
 - *The Council contractor can access this collection point from Actil Ave South in forward direction, and manoeuvre on site and exit in forward direction as demonstrated in Figure 7.*
 - *This collection point and parking location should be screened by a façade fence, trees and other landscaping at site boundary and is located on other side of building and well away from neighbouring residents on Actil Ave South.*
 - *The collection frequency would be weekly per service (or 3 collection events per week).*

- Collection vehicles may need to park on site for 20-40 minutes (depending on number of bins presented).

Rear loading collection vehicle	
Length overall	10.24m
Width overall	2.5m
Operational height	3.5m
Travel height	3.5m
Weight (vehicle only)	12.4 tonnes
Weight (payload)	9.5 tonnes
Turning circle	18.0m
Gross vehicle weight (when full)	21.9 tonnes

Figure 15 –Recommended specifications for rear-lift trucks from City of Charles Sturt Guidelines (City of Charles Sturt, 2010) that should be accommodated for Council bulk bin collections

- **Council collection of hard waste –**
 - The Council collection truck would be a rear-lift vehicle of same size as that cited above or smaller (e.g. ca. MRV-sized or 8.8m length).
 - It would access the visitor car park in front of Building 1 for collection of residential waste.
 - It may need to park on-site for up to 20-30 minutes to load the waste (depending on number of items presented).
- **Private contractor collection of non-standard waste & recycling items from Building 1 Community Centre and Village Management support office –**
 - These collection trucks may be rear-lift vehicles, flat beds and/or Pan-techs depending on the waste item.
 - The collection trucks would temporarily park in the visitor car park in front of Building 1, to collect or load waste/recycling bins/items.
 - The size and length of these trucks should all be less than the Council-specified rear-lift vehicle per Council Guideline (per Figure 15), so there should be no items with access to the site (by forward entry-forward exit from St Clair Ave).
 - The collection frequency would depend on the service and (as examples) may be every 1-2 weeks for confidential paper or every several months for battery bins.
 - Collection vehicles should only need to park for no more than 5-15 minutes to perform the collection (assuming for one resident only).

4.3.1.2 RACF–

- Private collection services –
 - All waste and recycling from the RACF would be provided by a private contractor.
 - There would be a range of collection vehicles delivering these services including rear-lift vehicles to empty skip bins and flat beds and/or Pan-techs for some non-standard waste/recycling items such as confidential paper bins, clinical waste, printer cartridges, etc.
 - These vehicles should generally be similar or less (in size) than the Council-specified rear-lift vehicle per Council Guideline (per Figure 15).

- The Traffic Engineer has demonstrated that collection vehicles can enter and exit the RACF Service Yard in forward direction, manoeuvre, and exit back to Actil Ave South in forward direction (see Figure 7).
- The time parked on site would depend on service being delivered and where bins/items are being collected from and could range from as short as 5-10 minutes up to 30 minutes.
- It is recommended that collections are scheduled between 7am-6pm weekdays and 9am-5pm on weekends to minimise potential noise inconvenience to neighbouring residents along Actil Ave South.

4.3.2 Potential Collection & Traffic Issues

Assessment of refuse collection traffic issues has been undertaken by the Traffic Engineer in their report (GTA Consultants, 11 December 2018). Care has been taken to place collection points in unobtrusive locations and ensure access by forward entry-exit. The trucks proposed are similar too or no different to that already used by Council for kerbside or bulk bin collection services to other properties in the area. It is not expected that the collection services proposed for the Development should prove problematic for local traffic or cause any traffic issue (outside that already occurring from existing private and/or Council collection services in the area).

4.4 Management & Communication

4.4.1 Responsibilities

Table 5 below (and overleaf) summarises the responsibilities of different parties / stakeholders for proposed waste management and operational activities at the Development. In summary,

- **Community retirement village/residential ILUs** – The Village Manager would be responsible for managing the waste system, but residents would play an important role in managing their local disposal activities, and Council would support the Village Manager with resident engagement and education to help drive good waste management outcomes; and
- **RACF** – The RACF operator would manage the waste system, including ensuring that good waste management outcomes were achieved.

Table 5 – Management & operational responsibilities for the waste systems at the Development

Waste System	Activity	Responsible party
Residential ILUs/Community Retirement Village	<i>Local Disposal (by residents and Village Management staff)</i>	Residents and Village Management staff
	<i>Waste Storage Areas, Collection transfer, Presentation, Bin Cleaning</i>	Village Management
	<i>Collection services – Standard Waste & Recycling</i>	Council
	<i>Collection services – Hard Waste by Council</i>	Council & Village Management (Coordination)
	<i>Collection services – Hard Waste by Private Contractor</i>	Private Contractor & Village Management (Coordination)
	<i>Collection services – Non-Standard Waste & Recycling</i>	Private Contractor(s)
	<i>Management</i>	Village Management
	<i>Education, Training & Engagement (Residents and Staff)</i>	Village Management & Council
RACF	<i>Local Disposal</i>	RACF staff and cleaners
	<i>Waste Storage Areas, Collection transfer, Presentation, Bin Cleaning</i>	RACF Management
	<i>Collection services - All</i>	Private Contractor(s)

	Management	RACF Management
	Education, Training & Engagement (Residents and Staff)	RACF Management

4.4.2 Implementation & Communication

4.4.2.1 Residential ILUs/Community Retirement Village

To successfully implement this WMP, the following may need to be considered or should be put in place.

- **Mandated responsibilities for apartment residents** – Obligations for residents to properly access, operate and use the waste systems provided should be detailed in a Resident Information Pack.
- **Resident Induction** – Should include guidance on how to correctly use the waste systems.
- **Council engagement and involvement** – Council should be engaged on waste system operation, management and performance and may provide on-going advice, review and support to the Village Manager and residents.
- **Building User Manual** – Advice and instructions on waste management and using the waste systems should be included in the Building User Manual(s) developed for residents, including contact information for further information, questions and issues.
 - *Council should be consulted on this advice and instructions and may provide relevant information to include in the Building User Manual(s).*
- **Emergency Response or Property Management Plan(s)** – Should include response measures (or contingencies) for:
 - *Service provision to temporarily mobility impaired residents;*
 - *Waste collection services suspended or not available; and*
 - *Tug failure.*

4.4.2.2 RACF

Like the Residential ILUs/Community Retirement Village above, the following should be put in place

- **Site Management System / Manual** – Advice and instructions on waste management and using the waste systems should be provided for staff, including contact information for further information, questions and issues.
- **Resident Induction** – Should include guidance on how to correctly use the waste /recycling bins in their rooms as well as the site approach to waste and recycling.
- **Emergency Response or Site Management Plan(s)** – Should include response measures (or contingencies) for:
 - *Waste collection services suspended or not available.*

4.5 Other Waste System Design or Management Issues

The following would be considered and/or implemented for waste systems at the Development. More details for some of these items can be resolved at detailed design stage with the waste contractor and/or Council.

- 1) **Bins** – These should align to Council bin colours or otherwise comply with Australian Standard for Mobile Waste Containers (AS 4213).
 - *For the Residential ILUs/Community Retirement Village, Council should be consulted on bin selection and colours for residential bulk bins and local disposal MGBs and may provide these bins as part of their collection service.*
- 2) **Signage** –
 - Signage in Local Disposal Areas should be used to ensure correct disposal of waste and recycling.
 - This signage should conform to the signage requirements of Council and/or the State Guideline (Zero Waste SA, 2014).
 - *Council should be consulted on signage for Residential ILUs/Community Retirement Village waste systems and may supply signage to the Development for this purpose.*
- 3) **Vermin, hygiene & odour management (inc. ventilation)**
 - **Inspection & Cleaning** –
 - An inspection and cleaning regime should be developed and implemented by Village Manager and RACF Management for their waste systems at the Development, including ensuring that surfaces and floors around disposal areas, transfer pathways and waste storage areas are kept clean and hygienic and free of loose waste and recycling materials.
 - *All Local Disposal and Waste Storage areas should be graded to a sewer drain with tiling or epoxy coating to floors and adjacent walls to waterproof the area and for cleaning.*
 - **Odour Control** –
 - All Local Disposal and Waste Storage Areas in Buildings at the Community retirement village –
 - *Would be mechanically ventilated for control of odours.*
 - *The ventilation would extract to atmosphere, to prevent odour build up.*
 - *The extraction vent discharge location would be selected to avoid impact on residents, tenants and/or neighbours.*
 - *It should be a requirement for waste bins in Local Disposal and the Waste Storage areas that lids are closed after use.*
 - The Waste Room for the RACF –
 - *Would be negative pressure mechanically ventilated to prevent any odour build-up.*
 - *It should be a requirement for food waste, general waste and/or sanitary (AHP) bins in that lids are closed after use.*
- 4) **Access & security** –
 - All Local Disposal and Waste Storage Areas in Buildings at the Community retirement village should be secure and only accessible by key or fob or access code.
 - *This key or fob or access codes would be provided to residents, village property management staff and/or private waste contractor(s) if collecting from these areas.*
 - The Waste Room for the RACF should be secure and only accessible by key or fob or access code.
 - *This key or fob or access codes would be provided to RACF staff, cleaners and/or waste contractor(s) delivering services to the Development.*

5 References

- Adelaide City Council. (2016). *Guide to waste & recycling bins*.
- City of Charles Sturt. (2010). *Residential Waste and Recycling Guidelines for New Developments - December 2010*.
- GTA Consultants. (11 December 2018). *Aveo St Clair Integrated Community St Clair Avenue, St Clair Transport Impact Assessment*.
- Zero Waste SA. (2014). *South Australian Better Practice Guide – Waste Management in Residential or Mixed Use Developments*.



AVEO - St Clair
Signage specifications V2
December 2018



- 1 TYPE 1: Entry feature signage to base of Porte Cochre
Refer to Signage package for details
- 2 TYPE 2 EXAMPLE: Corner feature wall
Refer to Signage package for details
- 3 TYPE 3 EXAMPLE: Flag poles 5m total height at approx. 10m centres
Flag size 2m high x 0.75m wide
Refer to Signage package for details
- 4 TYPE 4 EXAMPLE: Illuminated 'AVEO' Signage
On walls of buildings (not roof). Refer to Signage package for details.
- 5 TYPE 5 EXAMPLE: Double sided pylon sign
Refer to Signage package for details
- 6 TYPE 6 EXAMPLE: Marketing banner signage
Refer to Signage package for details





CLIENT	Aveo	DATE	06/12/2018	Drawn by	Ryan Westley
JOB	Signage visuals	SIZE	Various	Revised	
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CLIENT	Aveo	DATE	06/12/2018	Drawn by	Ryan Westley
JOB	Signage visuals	SIZE	Various	Revised	
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CLIENT	Aveo	DATE	06/12/2018	Drawn by	Ryan Westley
JOB	Signage visuals	SIZE	Various	Revised	
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SE ELEVATION : BUILDING 2

CLIENT	Aveo	DATE	07/12/2018	Drawn by	Ryan Westley
JOB	Signage visuals	SIZE	Various	Revised	

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SW ELEVATION : BUILDING 1

CLIENT	Aveo	DATE	07/12/2018	Drawn by	Ryan Westley
JOB	Signage visuals	SIZE	Various	Revised	
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Chemset Product to use

WARNING



ANY SERVICES SHOWN ARE APPROXIMATE. THE EXACT LOCATION IS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK.

Notes:

Materials:

Aluminium logo water jet cut from 20mm aluminium
Fabricated return from 16mm aluminium welded to text and logo

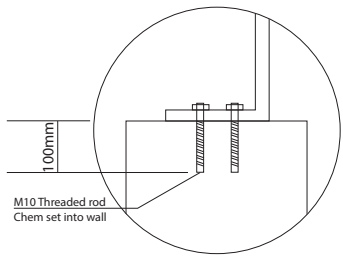
Structure to be 2pac painted specified colour - gloss finish

10 mm thick fixing pins to be chem set into wall,
Sign to be fixed into position

Non illuminated signage,
Client may illuminate with up lights

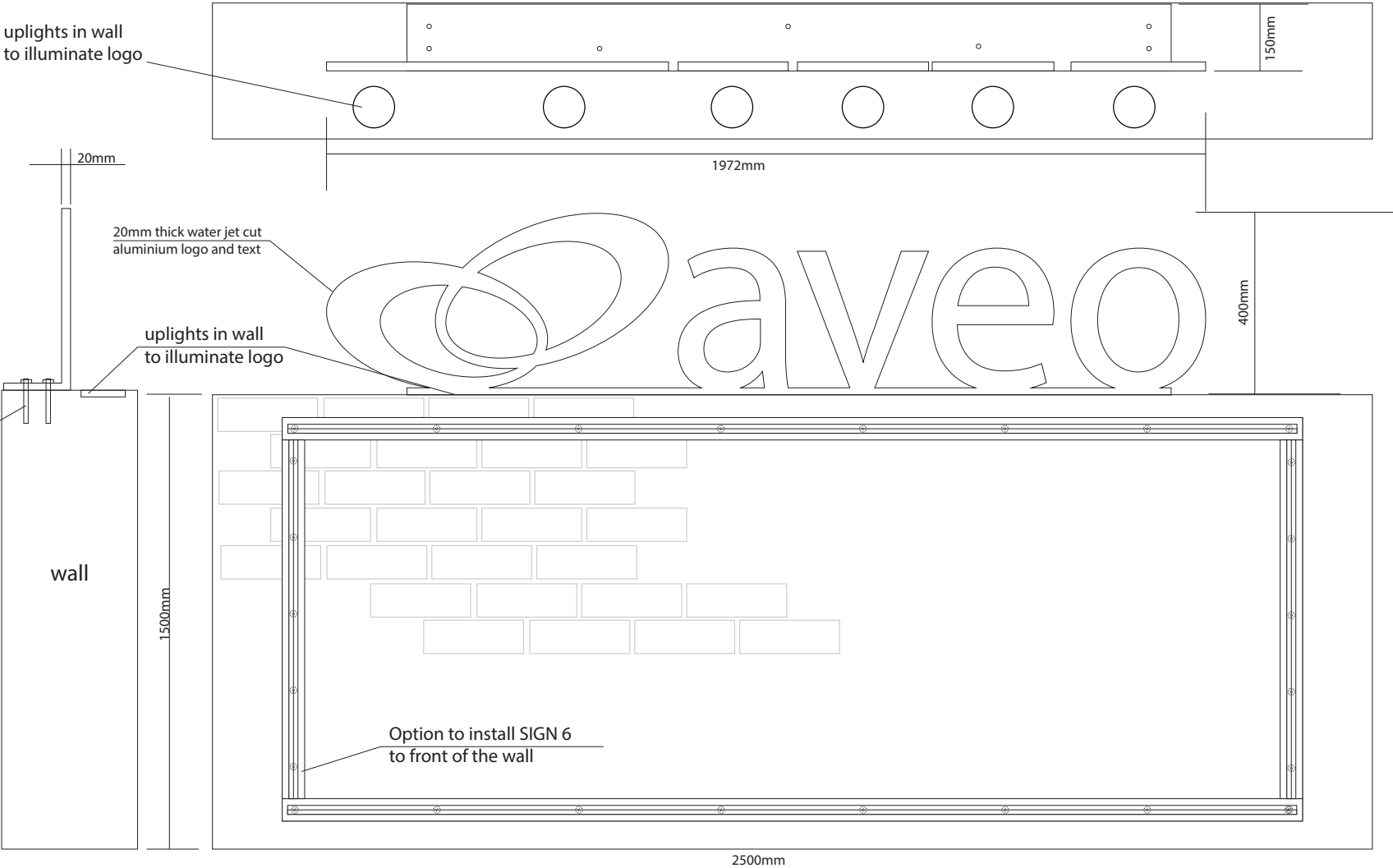
ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE FROM DRAWING
REMOVE ALL FLASH, BURRS AND SHARP EDGES
ALL WELDS TO BE 6mm CONTINUOUS FILLET ALL ROUND
ALL WELDS, CLADDING AND PAINTING MUST BE EXCELLENT FINISH AND WORKMANSHIP

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216 Brighton road
Somerton Park
5044
p: 8294 0211
info@triosolutions.com.au
triosigns.com.au



M10 Threaded rod
Chem set into wall

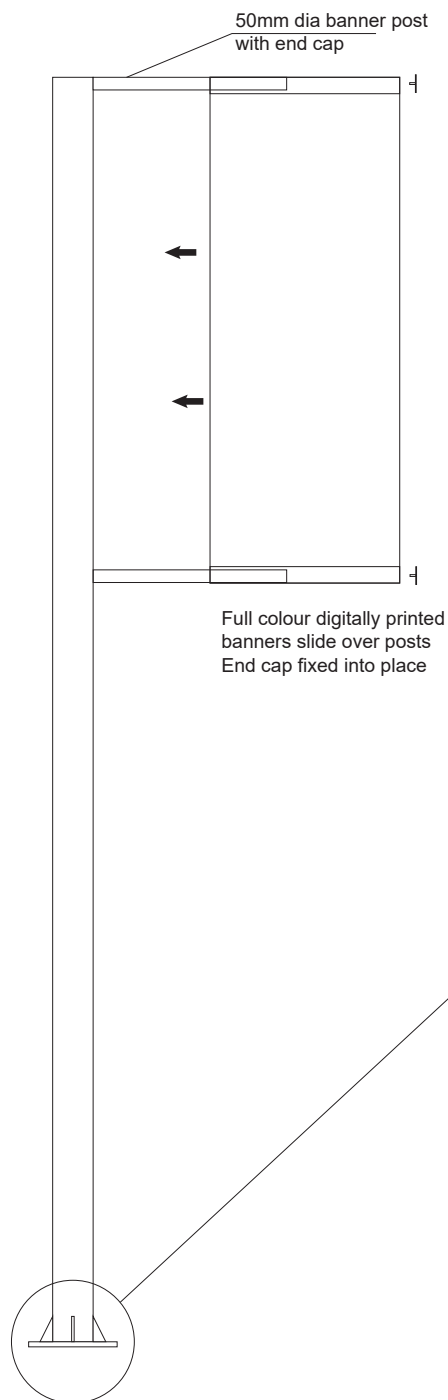
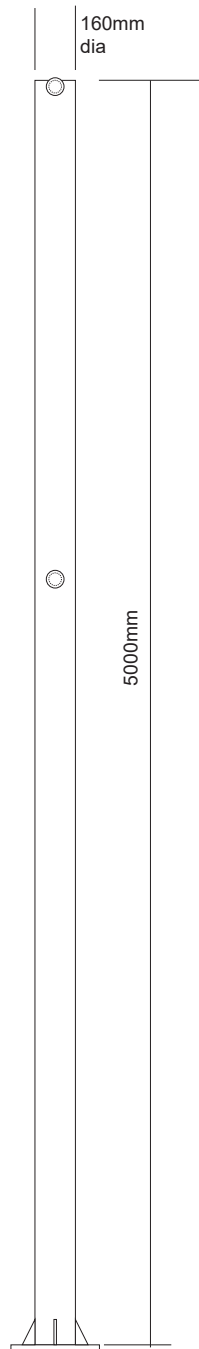
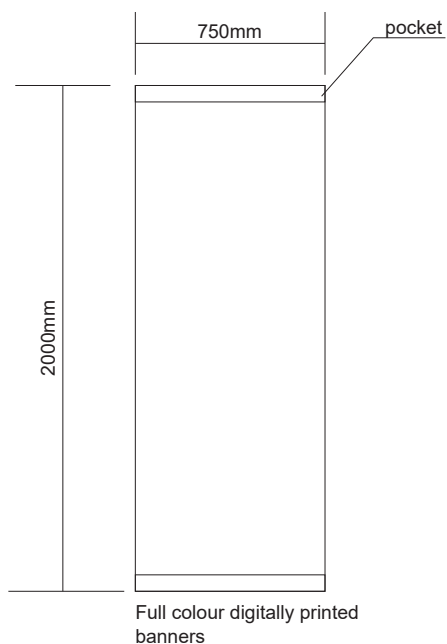
Painted finish
Aluminium logo and text to be
2pac painted specified colour
Gloss finish



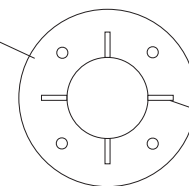
CLIENT	Aveo - St Clair	DATE	11/12/2018	Drawn by	Ryan Westley		
JOB	Sign 2 - wall mounted logo - illuminated up lighting	SIZE	400mm x 1972mm	Revised			

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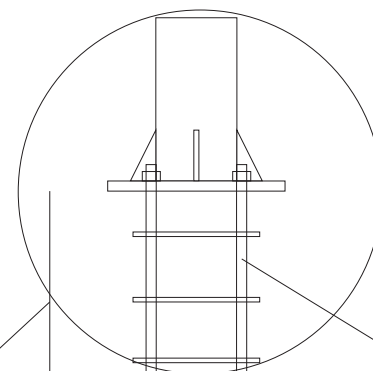




350mm dia x 20mm thick
base plate welded to base of post
4 x fixing points to cage footing



10mm gussets



M20 Threaded rod - fixing points

Cage footing fabricated from
9mm reo bar

1600mm

250mm

WARNING



ANY SERVICES SHOWN ARE APPROXIMATE.
THE EXACT LOCATION IS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK.

Notes:

Materials:

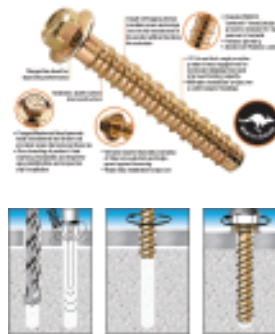
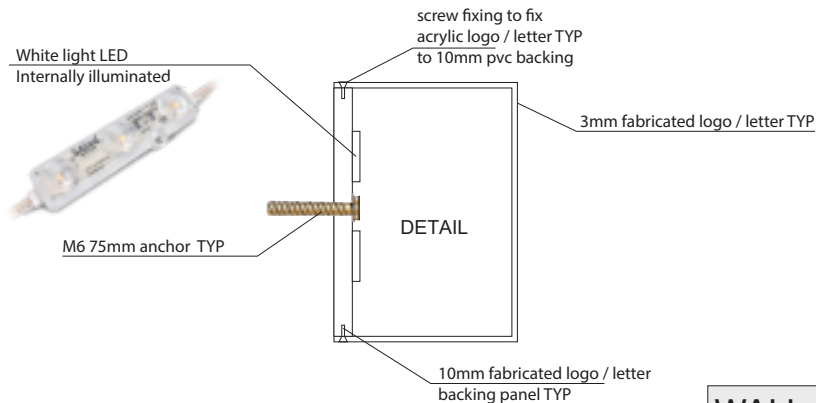
Fabricated main structure from
160mm x 5mm dia post,
Banner support posts to be
50mm x 3mm dia
welded to main post with 6mm
continuous fillet all around

Banner to be full colour digital printed
Double sided and removable.

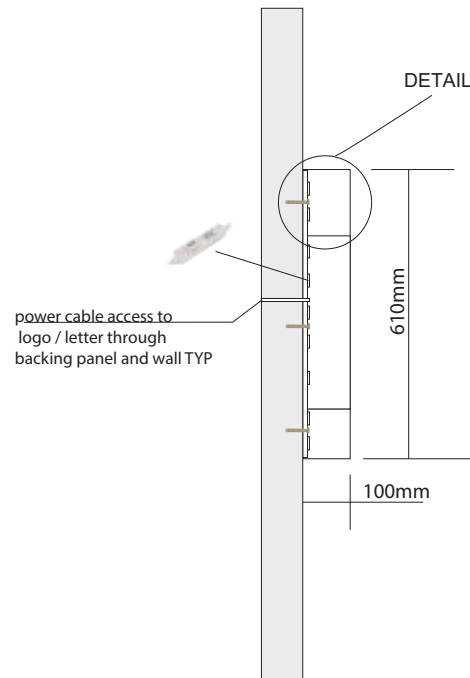
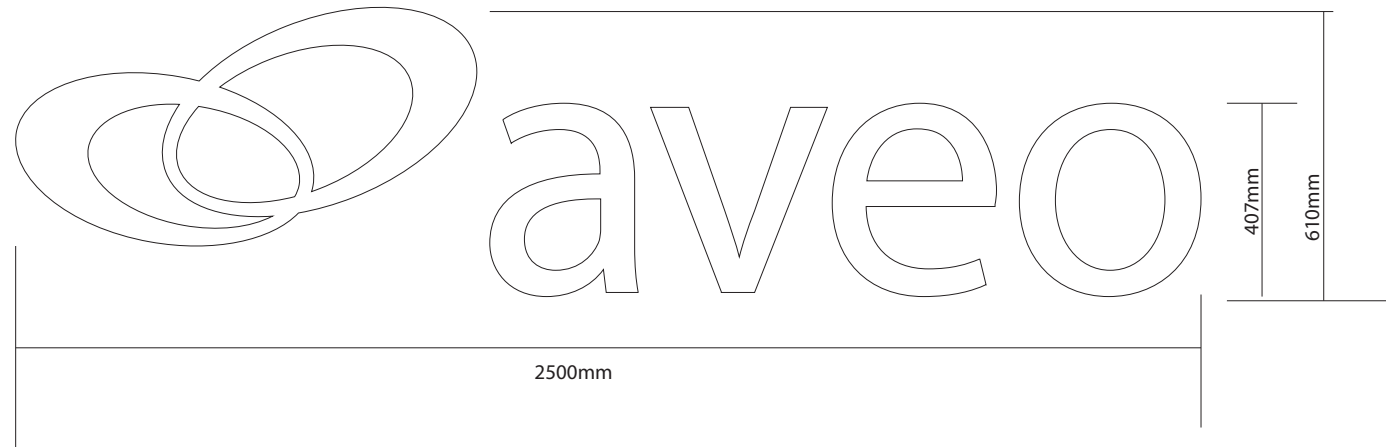
ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE FROM DRAWING
REMOVE ALL FLASH, BURRS AND SHARP EDGES
ALL WELDS TO BE 6mm CONTINUOUS FILLET ALL ROUND
ALL WELDS, CLADDING AND PAINTING MUST BE EXCELLENT
FINISH AND WORKMANSHIP

Trio sign solutions
216 Brighton road
Somerton Park
5044
p: 8294 0211
info@triosolutions.com.au
triosigns.com.au

CLIENT	Aveo - St Clair	DATE	11/12/2018	Drawn by	Ryan Westley		
JOB	Sign 3 - free standing banner posts - non illuminated	SIZE	160mm x 5000mm	Revised			
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WALL				
972mm	312mm	372mm	346mm	382mm



WARNING



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THE EXACT LOCATION IS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK.

Notes:

Materials:

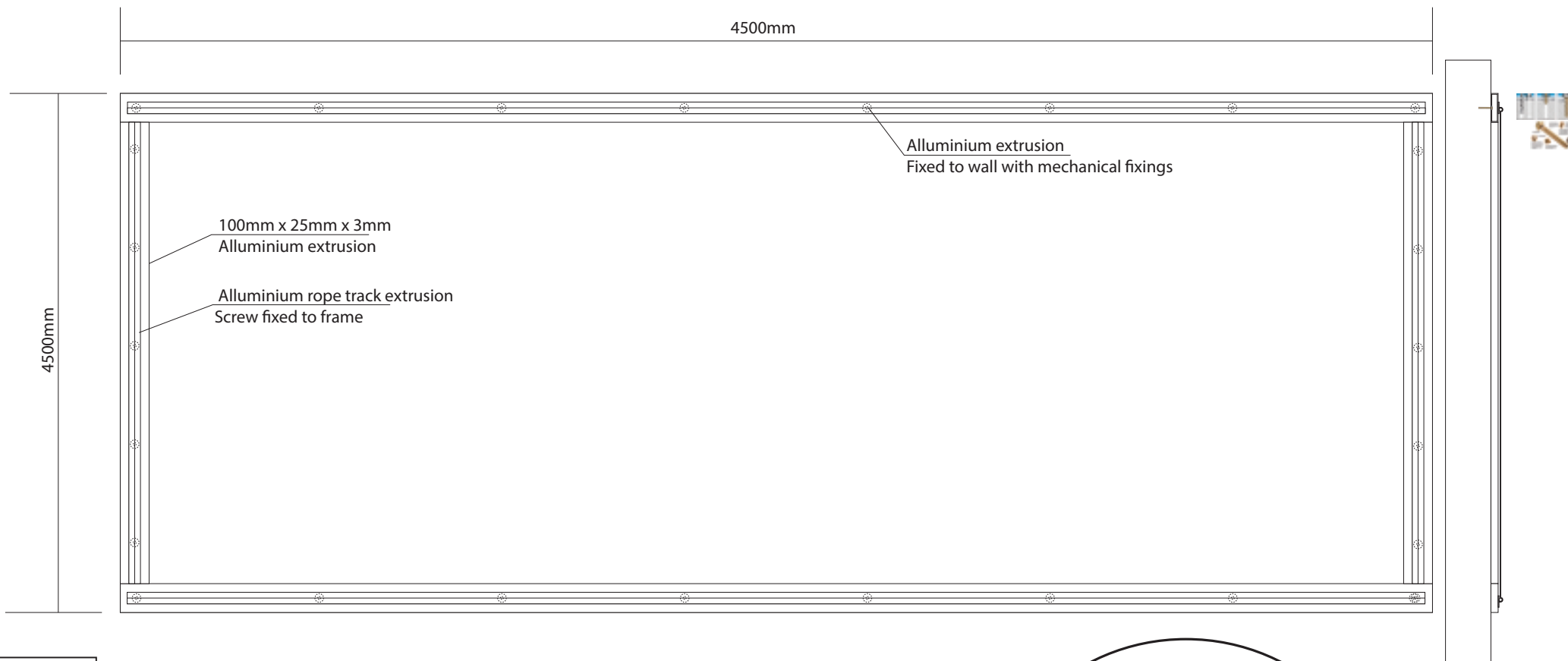
Fabricated 3mm opal acrylic logo and text,
10mm PVC backing panel for each letter to fix acrylic shape to internally illuminated with white light LED's - non flashing

Letters to be mechanically fixed to building,
Power to be looped between letters

ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE FROM DRAWING
REMOVE ALL FLASH, BURRS AND SHARP EDGES
ALL WELDS TO BE 6mm CONTINUOUS FILLET ALL ROUND
ALL WELDS, CLADDING AND PAINTING MUST BE EXCELLENT FINISH AND WORKMANSHIP

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info@triosolutions.com.au
triosigns.com.au

CLIENT	Aveo - St Clair	DATE	11/12/2018	Drawn by	Ryan Westley		
JOB	Sign 4 - wall mounted logo - internally illuminated	SIZE	610mm x 2500mm	Revised			
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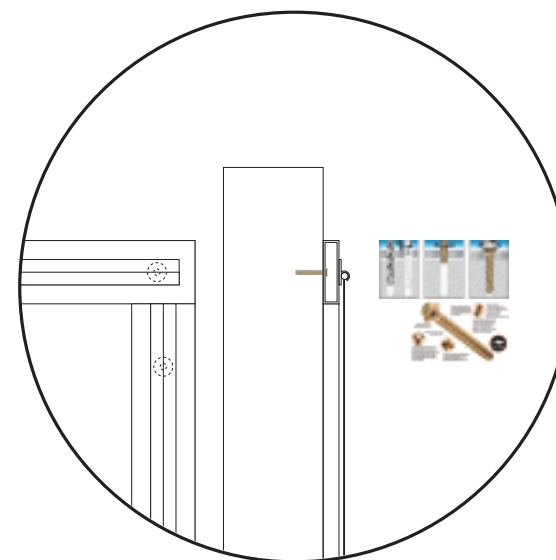
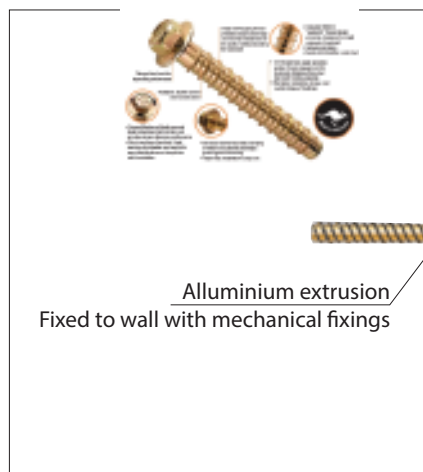
Notes:

Materials:

Frame structure fabricated from 100mm x 25mm x 3mm aluminium extrusion, screw fixed to wall with mechanical fixings.
Aluminium rope track extrusion fixed to main frame structure
Full colour digitally printed banners with kadar all around edges, fixed to rope track.

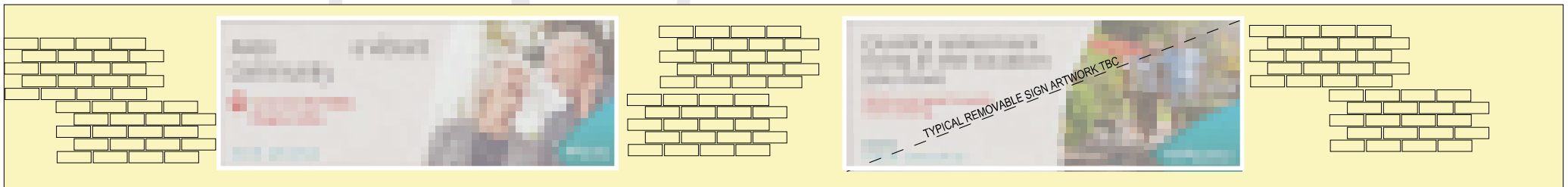
ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE FROM DRAWING
REMOVE ALL FLASH, BURRS AND SHARP EDGES
ALL WELDS TO BE 6mm CONTINUOUS FILLET ALL ROUND
ALL WELDS, CLADDING AND PAINTING MUST BE EXCELLENT FINISH AND WORKMANSHIP

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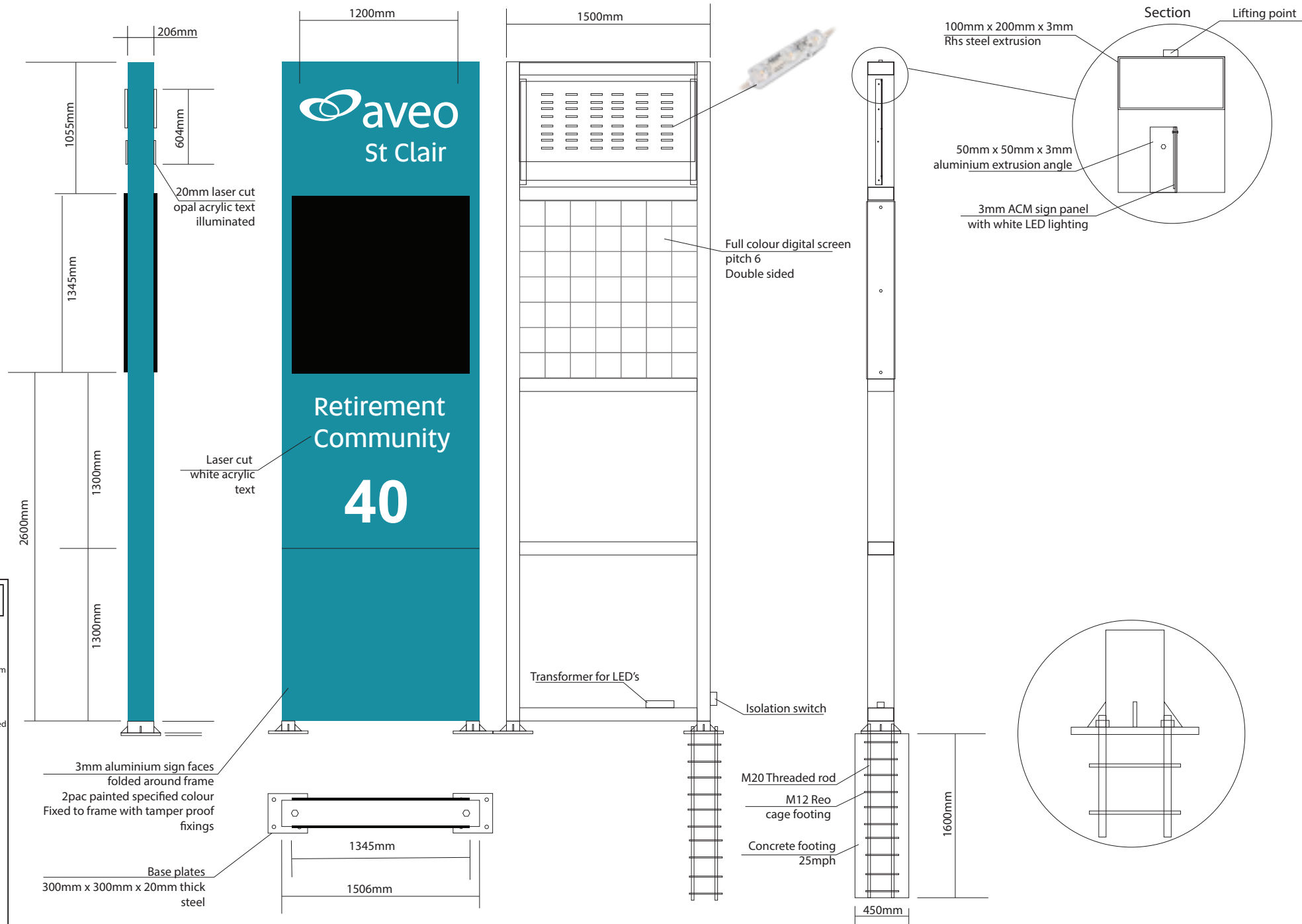


CLIENT	Aveo - St Clair	DATE	11/12/2018	Drawn by	Ryan Westley		
JOB	Sign 6 - wall mounted banner system - non illuminated	SIZE	1800mm x 4500mm	Revised			

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CLIENT	Aveo	DATE	07/12/2018	Drawn by	Ryan Westley
JOB	Signage 6 visuals - wall banners	SIZE	4500mm x 1800mm	Revised	
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CLIENT	Aveo - St Clair	DATE	13/12/2018	Drawn by	Ryan Westley		
JOB	Sign 5 - Free standing Pylon sign	SIZE	1500mm x 5000mm	Revised			

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BESTEC[®]

BRINGING BUILDINGS TO LIFE

AVEO ST CLAIR DEVELOPMENT

ELECTRICAL, COMMUNICATIONS,
HYDRAULIC AND
FIRE PROTECTION SERVICES

SITE INFRASTRUCTURE REPORT

REPORT ISSUE REGISTER

REVISION	DATE	REVISION DESCRIPTION
01	22.10.17	Draft Issue
02	07.09.18	Revised Issue
03	29.11.18	Revised Issue

CONTENTS

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Introduction	1
Electrical and Communications Services	2
Hydraulic Services	3
Fire Protection Services	4
Appendix A	5

Introduction

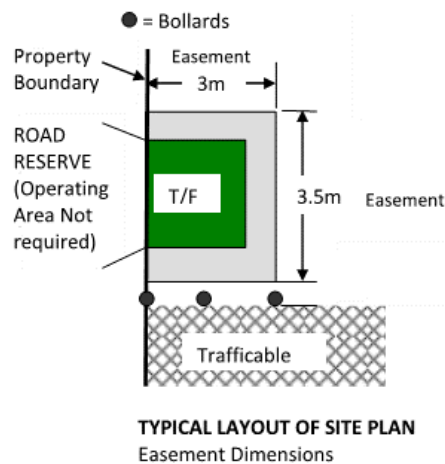
The following report describes the proposed Authorities connections, site services infrastructure and major plant arrangements for the Electrical, Hydraulic and Fire Protection Services for the above development.

All services have been designed to take into account the specific requirements of the proposed site construction staging plan.

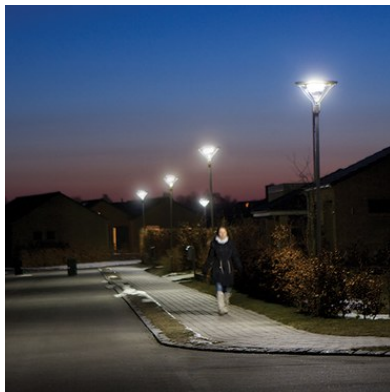
Electrical and Communications Services

The Electrical and Communications services connections and major external infrastructure provisions consist of the following:-

- Access provision for SA Power Networks underground high voltage cabling from St Clair Avenue Extension and Actil Avenue South to the development, reticulating within the internal roadways to SA Power Networks pad mounted transformers TF.1 and TF.2. A four (4) metre wide easement will exist over the SA Power Networks high voltage cabling.



- Site Main Switchboards will be provided immediately adjacent the transformers to supply each building. SMSB.1, located adjacent TF.1, will supply buildings 1 – 5 and building 7. SMSB.2, located adjacent TF.2, will supply the Retirement Aged Care Facility (RACF).
- Provision for site metering located within each building main switchboard, utilising embedded metering systems to allow recovery of apartment energy usage.
- Access provision for NBN Co underground network and infrastructure from Actil Avenue South to the development, reticulating through the internal roadways to provide telecommunications services to all buildings.
- Pole mounted and bollard type lighting will be provided to the internal roadways, caprarks and pathways in accordance with Australian/New Zealand Standard 1158 - Public Lighting.



Pole Mounted Lighting



Bollard Lighting

Hydraulic Services

The Hydraulic services connections and major external infrastructure provisions consist of the following:-

- Domestic cold water to serve the retirement village (RV) buildings will be provided via 100mm diameter South Australian Water Corporation metered water connections located at the St Clair Avenue and Actil Avenue Boundaries.
- Domestic cold water supply to serve the Retirement Aged Care Facility (RACF) will be provided via 1 off 50mm diameter South Australian Water Corporation metered water connection to the existing 200mm SA Water Corporation water main within Actil Avenue South.
- Domestic cold water pipework will reticulate underground and suspended at high level within basement car parks to serve each building.
- Privately owned water meters will be provided at each apartment for the purpose of recovering water usage outgoings.
- Sewer drainage to serve the retirement apartment buildings, will be provided via SA Water Corporation sewer connections located at either the St Clair Avenue for the RV and Actil Avenue boundary for the RACF. The SA Water Corporation sewer connections are as follows:-
 - RV - 2 off 150mm and 2 off 225mm SA Water Corporation sewer connections off the SA Water Corporation sewer main located within the St Clair Avenue extension – note connections are existing having been constructed as part of the new roadway.
 - RACF - 1 off 150mm SA Water Corporation sewer connection off the 225mm SA Water Corporation sewer main located within Actil Avenue South.
- Gravity sewer drainage will be provided to provide sewer drainage to all buildings. The sewer connections for the RV area has sufficient depth to allow for the staged construction sequence.
- Natural gas supply to the retirement apartment buildings will be provided via an APA Group metered natural gas connection off the existing high pressure APA Group natural gas main located within Actil Avenue South.
- Natural gas supply to serve the RACF will be provided via 1 off APA Group metered natural gas connection

Fire Protection Services

The Fire services connections and major external infrastructure provisions consist of the following:-

- 150mm diameter fire service connection to the 150mm diameter SA Water Corporation town main within St Clair Avenue to serve the site fire protection services for stages 1-5 and 7.
- South Australia Metropolitan Fire Service (SAMFS) suction and booster assembly located adjacent the St Clair Avenue site entrance to serve the fire hydrant and sprinkler system. Booster assembly located within a powdercoated and signposted sheet steel cabinet. The booster will serve the fire hydrant and sprinkler systems for Stages 1-5 and 7.
- Diesel driven fire pump to serve the fire hydrant and sprinkler system. Provision of an in-line pump to the town main within St Clair Avenue is subject to approval from the SA Water Corporation.
- Fire sprinkler control valve assemblies located adjacent fire stair entrance points within the common basement to serve the sprinkler system associated with the buildings in stages 1-5 and 7.
- External fire hydrant standpipes located throughout the site.
- 150mm diameter fire service connection to the 200mm diameter SA Water Corporation town main in Actil Avenue South to serve the Retirement Aged Care Facility.
- South Australia Metropolitan Fire Service (SAMFS) suction and booster assembly located adjacent the Actil Avenue South site entrance. Booster assembly to be located within a powder coated and sign posted sheet steel cabinet. The booster will serve the fire sprinkler and hydrant systems for the Retirement Aged Care Facility.
- Diesel driven fire pump to serve the fire hydrant system located within the Aged Care Facility.

Note: Pending discussion with SAMFS, lower hydrant operating pressures may be accepted, based on the building being sprinkler protected.

Appendix A

Electrical Services drawing ESK-01 - Site Plan

Hydraulic Services drawing HSK-01 - Sewer Drainage Study

Hydraulic Services drawing HSK-02 - Domestic Water, Natural Gas and Fire Services provisions

Issue	Amendments	Date	Init.
01	PRELIMINARY ISSUE	07.09.18	RM
02	PRELIMINARY ISSUE	29.11.18	RM

BESTEC
DOCUMENT ISSUE

Date
29-Nov-18

BESTEC
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BUILDING ENGINEERING
SERVICES TECHNOLOGIES
CONSULTING ENGINEERS

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Project
AVEO ST CLAIR DEVELOPMENT

Title
ELECTRICAL SERVICES
SITE PLAN

Drawn	Checked	Date
RM		SEPT 2018
Designed	Checked	Scale
MBR		1:500 @A1
Drawing Number	Sheet of	Issue
ESK-01 55623	1 of 1	01

PRELIMINARY

LEGEND OF SYMBOLS

DENOTES UNDERGROUND CONDUIT ROUTE FOR LOW VOLTAGE CABLING.
PIT & DUCT SYSTEM CONDUIT SIZES TO BE CONFIRMED

DENOTES UNDERGROUND COMMUNICATIONS CONDUIT ROUTE FOR COMMUNICATIONS CABLING.
PIT & DUCT SYSTEM CONDUIT SIZES TO BE CONFIRMED

⊠

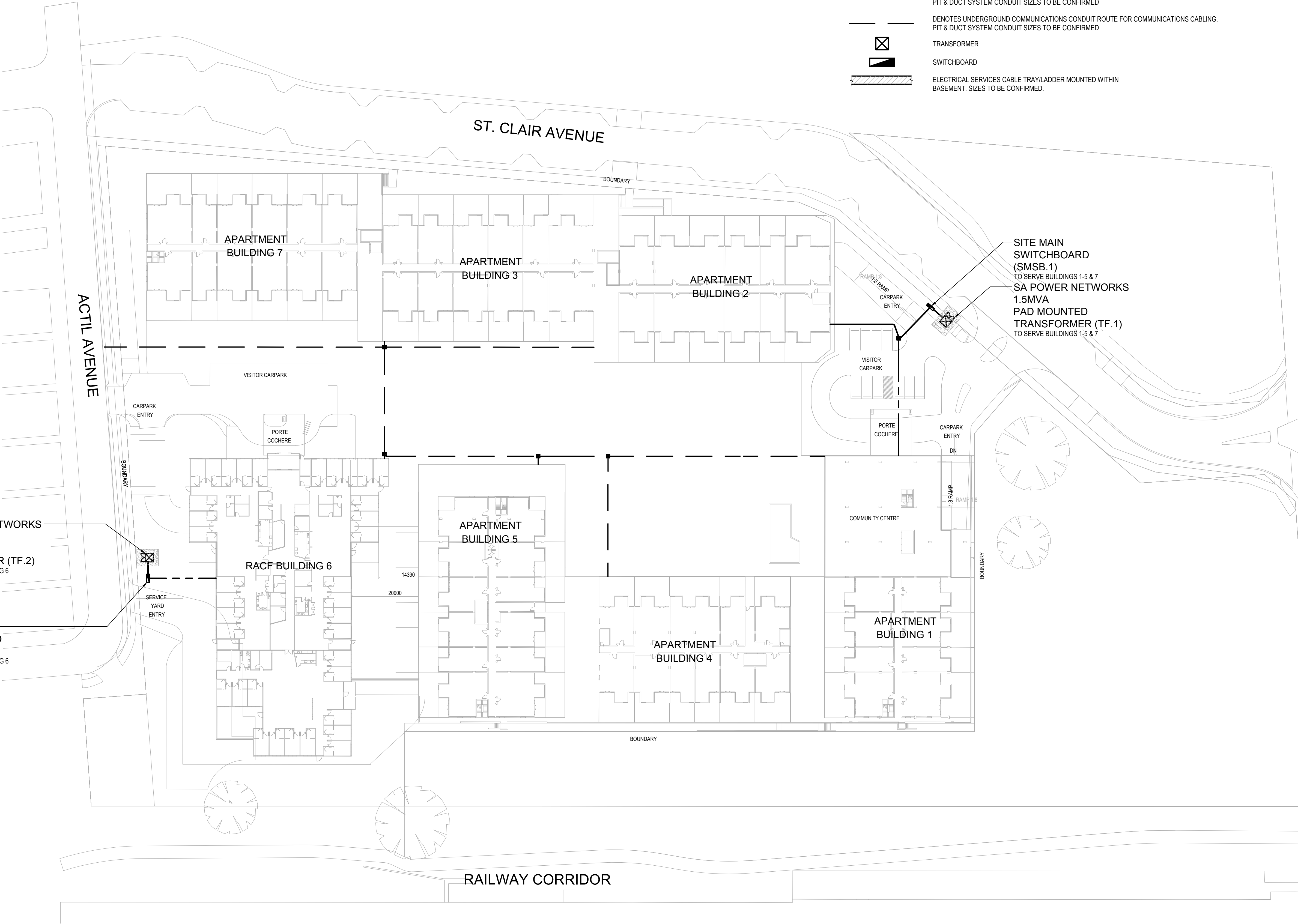
TRANSFORMER

▬

SWITCHBOARD

▨

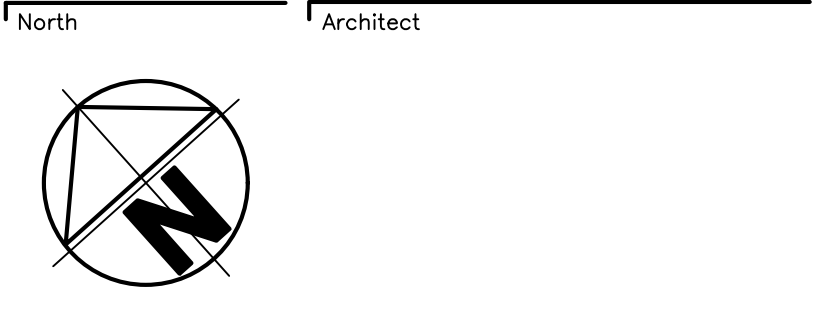
ELECTRICAL SERVICES CABLE TRAY/LADDER MOUNTED WITHIN
BASEMENT. SIZES TO BE CONFIRMED.



P:\55623\Drawings\ELECT\55623 ESK-01.dwg 29/11/2018 4:53:52 PM michael bradley

P:\55623 Drawings\HYD\55623 HSK-01.dwg 29/11/2018 4:54:30 PM michael bradley

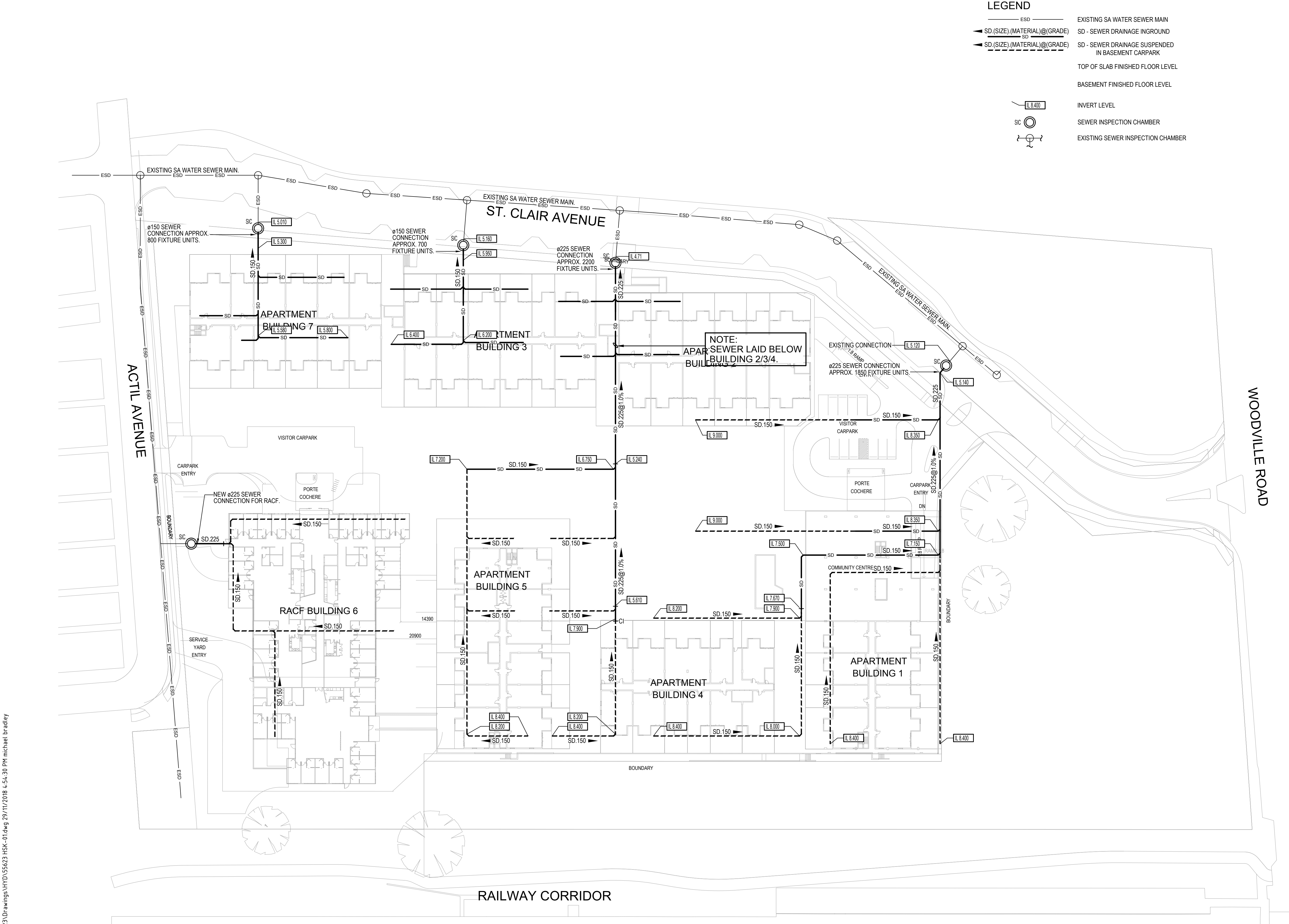
Issue	Amendments	Date	Init.
01	PRELIMINARY ISSUE	06.09.18	JVE
02	PRELIMINARY ISSUE	29.11.18	JVE



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Project	AVEO ST CLAIR INTEGRATED RETIREMENT COMMUNITY
Title	HYDRAULIC SERVICES
Retirement Village	SEWER DRAINAGE STUDY

Drawn	JVE	Checked		Date	SEPT 2018
Designed	MDB	Checked		Scale	1:500 @A1
Drawing Number	HSK-01	Sheet	1	Issue	01



LEGEND

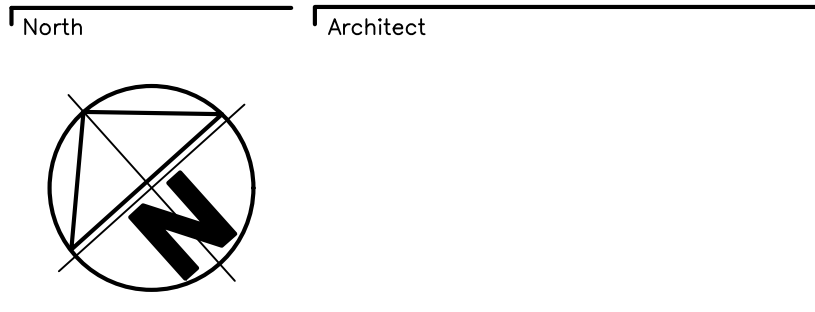
- EXISTING SA WATER SEWER MAIN
- SD - SEWER DRAINAGE INGROUND
- SD - SEWER DRAINAGE SUSPENDED IN BASEMENT CARPARK
- TOP OF SLAB FINISHED FLOOR LEVEL
- BASEMENT FINISHED FLOOR LEVEL
- INVERT LEVEL
- SEWER INSPECTION CHAMBER
- EXISTING SEWER INSPECTION CHAMBER

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Issue	Amendments	Date	Init.
01	PRELIMINARY ISSUE	06.09.18	JVE
02	PRELIMINARY ISSUE	29.11.18	JVE



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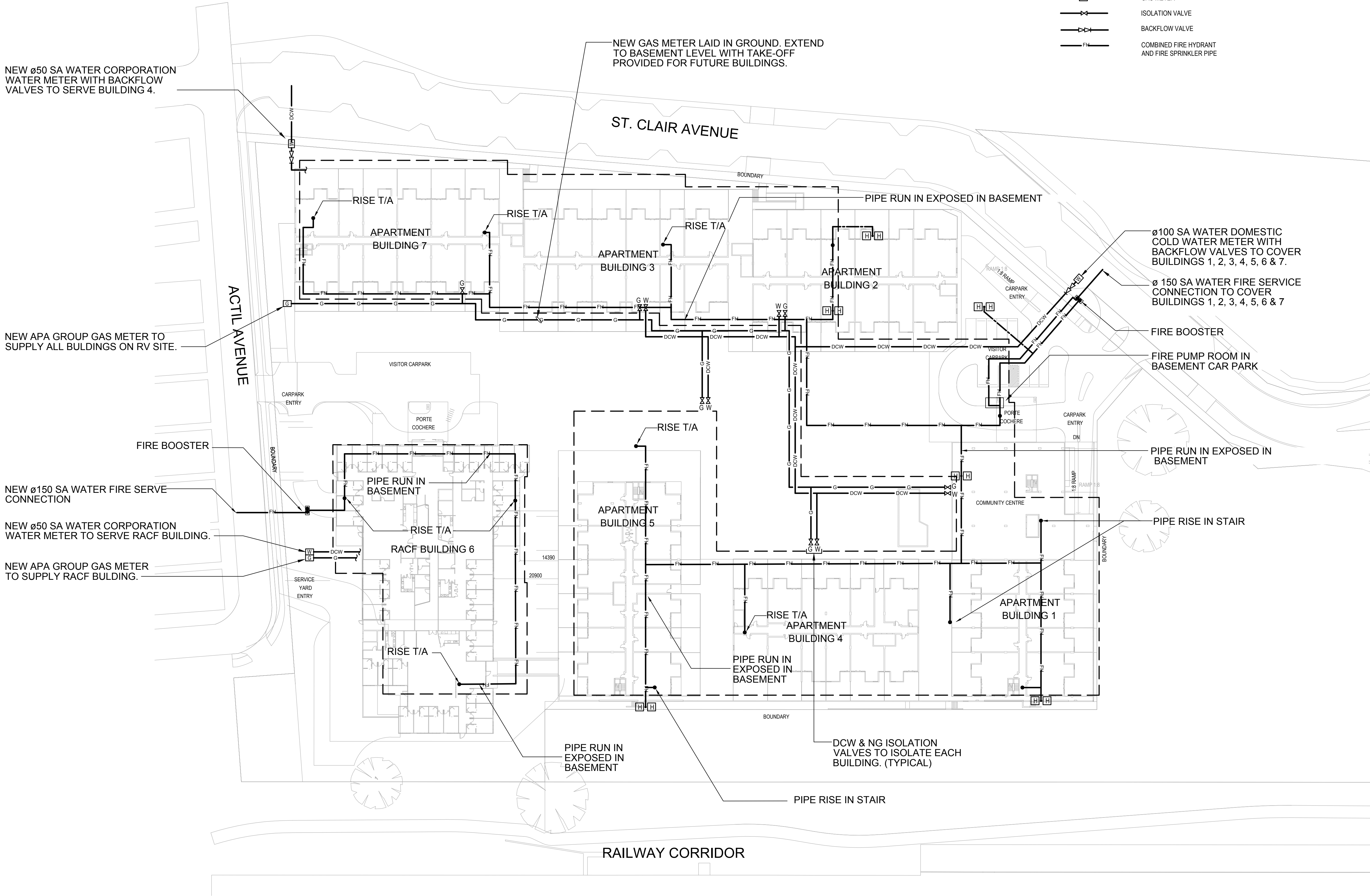
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Project	AVEO ST CLAIR INTEGRATED RETIREMENT COMMUNITY
Title	HYDRAULIC SERVICES
Retirement & RACF Village	DOMESTIC COLD WATER, GAS & FIRE SERVICES STUDY

Drawn	JVE	Checked		Date	SEPT 2018
Designed	MDB	Checked		Scale	1:500 @A1
Drawing Number	HSK-02	Sheet of	22	Issue	01

LEGEND

ECW	EXISTING SA CORPORATION WATER MAIN
SD (SIZE) (MATERIAL) DCW	DCW - COLD WATER RETICULATION
SD (SIZE) (MATERIAL) G	GAS - NATURAL GAS RETICULATION
---	BASEMENT OUTLINE
W	WATER METER
G	GAS METER
X	ISOLATION VALVE
X	BACKFLOW VALVE
FI	COMBINED FIRE HYDRANT AND FIRE SPRINKLER PIPE



BESTEC DOCUMENT ISSUE
Date 29-Nov-18
BESTEC ABN 43 909 272 047 BUILDING ENGINEERING SERVICES TECHNOLOGIES CONSULTING ENGINEERS

PRELIMINARY



DELIVERING
**ENVIRONMENTAL
SOLUTIONS**

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Our ref: 170905-01 L03

27 September 2018

Ms Rebecca Grundy
Aveo Group
Level 2, 67 Greenhill Road
Wayville SA 5034

Dear Rebecca

Lot 1000 Woodville Road, St Clair Environmental remediation status

LBW co Pty Ltd (LBWco) acts for Aveo Group Ltd (Aveo) in the role of site contamination adviser for the proposed redevelopment of Lot 1000 Woodville Road, St Clair.

The site has been subject to two Site Contamination Audit Reports (SCAR).

SCAR 1: ERM (2012), *St Clair Recreation Reserve Site Contamination Audit Report (Amended). Allotment 1, Plan D84492, Woodville, SA 5001*. 29 March 2012.

Due to elevated concentrations of polycyclic aromatic hydrocarbons (PAH) in some of the fill materials onsite, the auditor concluded that in its current form, and in the absence of ongoing management measures, the site is not suitable for sensitive uses such as medium to high density residential.

The auditor advised that site management measures must be implemented to manage contaminated soil at the site, including constructing barriers over PAH contaminated fill.

SCAR 2: Australian Environmental Auditors (2017), *Site Contamination Audit Report, Proposed Allotment 1000, Plan D84492, St Clair Recreation Reserve, St Clair, South Australia*. 26 July 2017.

This SCAR was undertaken to provide an audit in accordance with current national guidelines that were revised in 2013, which led to the risk assessment made in SCAR 1 being superseded.

The auditor considered that the investigations undertaken to inform SCAR 1 were adequate to characterise the nature and extent of site contamination at the property, and further considered that the site is suitable for sensitive land use with minimal opportunities for soil access, such as the proposed multi-storey building with basement car parking.

Following SCAR 2, LBWco undertook detailed soil investigations at the site for Aveo to inform preparation of a soil management strategy for the proposed redevelopment. These investigations were more comprehensive than previous soil assessments by others and were reported to Aveo in:

LBWco (2018) *Allotment 1000 Woodville Road, St Clair, SA. Soil Assessment Report* (ref: 170905-01 R01). 22.01.2018.

Our investigations identified site contamination in fill materials across the site, with respect to sensitive land use, at concentrations that were not identified by the previous investigations by others. Chemicals of concern included PAH and cadmium, both of which were known to be present onsite and are commonly found in fill materials across Adelaide. Site contamination was present with respect to standard residential use and residential with minimal opportunities for soil access.

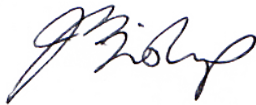
Remediation is required to mitigate risks posed by the contaminated fill materials onsite and make the site suitable for Aveo's proposed use.

Remediation works will include the excavation and removal of all fill from the site, followed by a validation assessment to confirm successful remediation. The remediation works will be subject to a new SCAR to be prepared by Mr Graeme Miller of Senversa Pty Ltd, acting for Renewal SA. The new SCAR has been commissioned, so the planning approval authority can have confidence that the site will be made suitable for the intended use and verified via the new SCAR prior to Development Approval.

It is LBWco's opinion that the remediation and validation of the site is a straight forward matter and accordingly, the planning consent should be granted with a simple condition that requires the SCAR to be completed and submitted to the authority prior to the granting of development approval.

Please contact me on 8331 2417 for any enquiries on these matters.

Yours sincerely
For LBW co Pty Ltd



Jarrod Bishop
Director | Senior Principal