MASCOT 2

13A Church Avenue, Mascot, NSW 2020
Development Application Landscape Report

ISSUE B
AU213013611.001

rpsgroup.com

A TETRA TECH COMPANY

REVISION	DATE	PREPARED BY	APPROVED BY
[A]	20/12/2023	JH/RG	BR
[B]	04/06/2024	RG/EO	BR

Prepared for:
Iglu

Site Location:
13A Church Avenue, Mascot

Prepared by:
RPS Australia East

Level 13 420 George Street NSW

Telephone: (02) 8099 3200

ABN: 44 140 292 762

rpsgroup.com

A TETRA TECH COMPANY

CONTENTS

1.0 SITE UNDERSTANDING

1.1 Context 05

1.2 Site Analysis 06

1.3 Indigenous land 07

2.0 DESIGN VISIONING

2.1 Design Statement 09

2.2 Design Drivers 10

3.0 LANDSCAPE PLANS & SECTIONS

3.1 Site Plan 12

3.2 Master Plan 13

3.3 Site Programme 14

3.4 Ground Level 15

3.5 Ground Level Movement 16

3.6 Ground Level Sections 17

3.7 Level 1 Plan 18

3.8 Level 1 Sections 19

3.9 Level 6 Plan 20

3.10 Level 6 Section 21

4.0 PLANTING STRATEGY

4.1 Deep Soil Diagram 23

4.2 Vegetation Management Plan 24

4.3 Water Management and Irrigation Plan 25

4.4 Lighting Plan 26

4.5 Planting Palette 27

4.6 Ground Level Planting Plan 29

4.7 Level 1 Planting Plan 30

4.8 Level 6 Planting Plan 31

4.9 Planting Schedules 32

4.10 Material Palette 33

5.0 APPENDIX

5.1 Typical Details 35

5.2 Specification Notes 36

5.3 Maintenance Guidelines 37

1.0 SITE UNDERSTANDING

1.1 CONTEXT

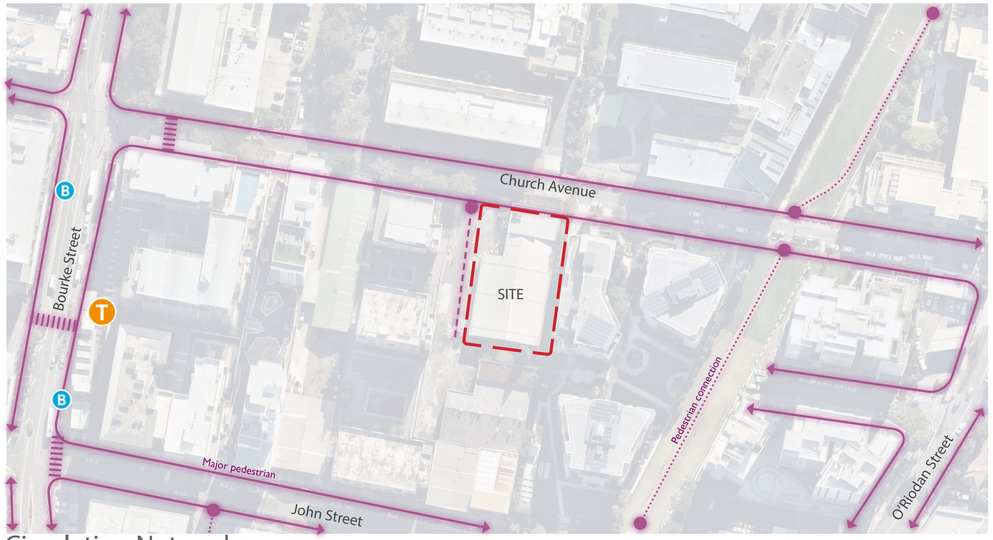
Precinct Context

John Street

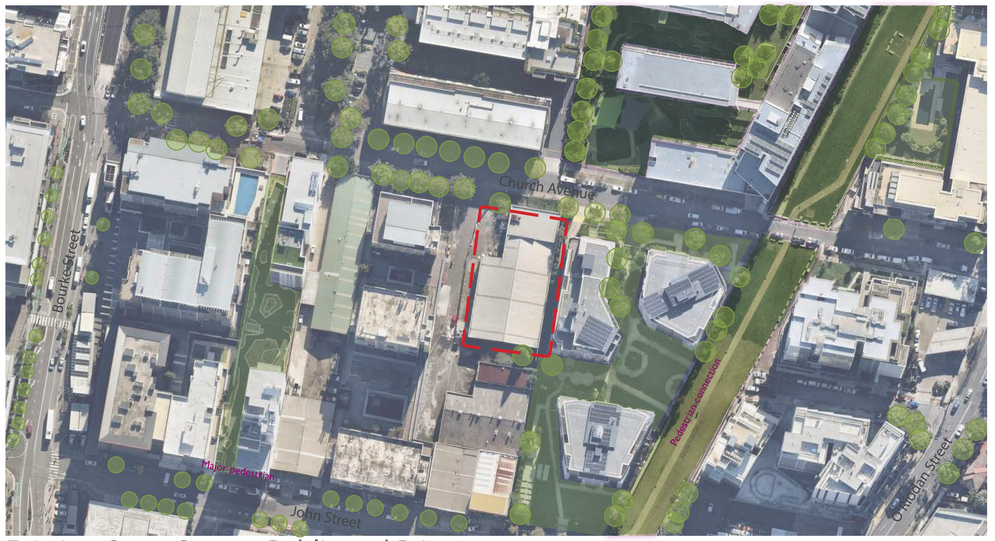
Church Avenue

Mascot Station and built form

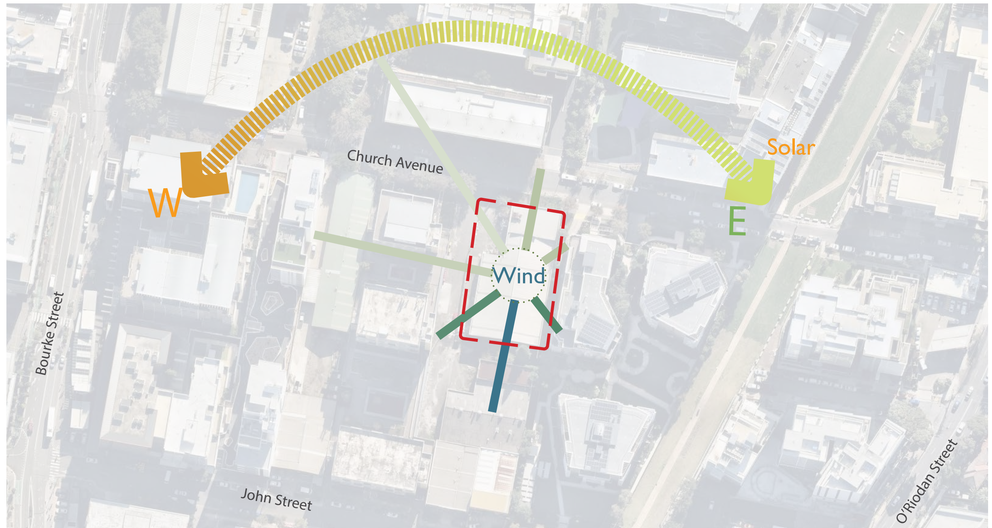
1.2 SITE ANALYSIS



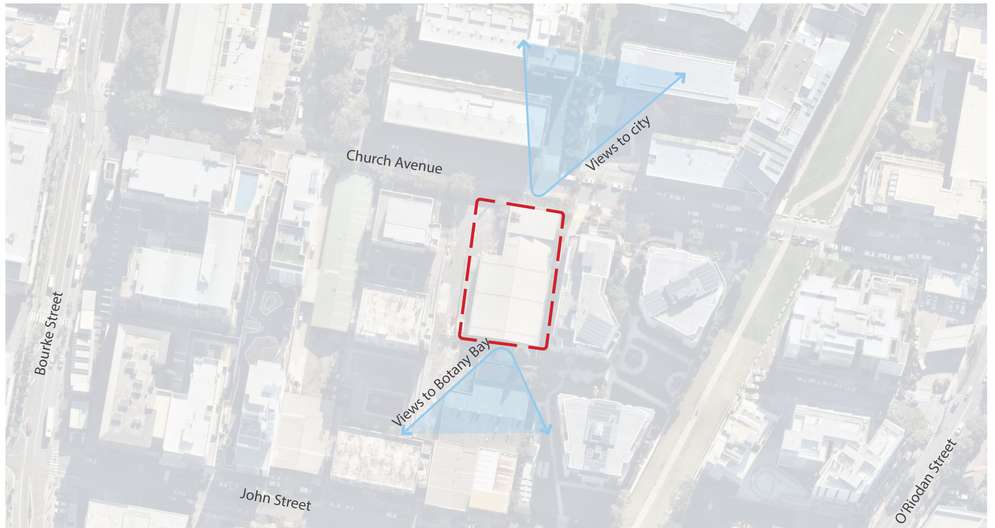
Circulation Networks



Existing Open Space - Public and Private



Solar & Wind



Prominent Views

1.3 INDIGENOUS LAND

“Bayside Council acknowledges the Gweagal, Bidjigal and Gadigal Clans which are the traditional custodians of the land in which we meet and work.
710 people identify as being of Aboriginal or Torres Strait islander descent in our community. The First Nations population represents 0.4% of the total Bayside population, compared with 0.3% of the NSW population.” [1]

Gweagal Clan:
The Gweagal people were said to be the guardians of the sacred white clay pits on their territorial land, now known as the Kurnell Peninsula. They used the clay to make body paint, medicine and when mixed with local berries it was also used as a dietary supplement.

Bidjigal Clan[2]
Bidjigal (also known as Bediagal), a clan group of the coastal Dharug people of the Sydney region.
They are known for their strong connection to the land, and their deep respect for the environment. Through their spiritual connection, they strive to maintain harmony between the natural and human worlds. They have a rich history of storytelling which is still passed down through the generations.

Gadigal Clan:
The Gadigal People of the Eora Nation (Eora meaning ‘here’ or ‘from this place’) are the traditional owners and knowledge holders of the land now called Sydney – Australia’s largest, both in size and population.

Existing Environment[3]
The site is within the Cumberland Lowlands physiographic region, which is largely characterised by low lying, gently undulating plains and low hills formed on Wianamatta GRoup shales and sandstones.

The site is within the Cooks River catchment, which includes rehabilitated portions of riparian vegetation. The occurence of recorded Aboriginal archaeological sites along this watercourse indicates its use by Aboriginal people in the past.

The geological history indicates that the site was dominated by the Triassic-aged Wianamatta Group with areas of Quaternary aged alluvium mapped within the floodplains of the Cooks River and Georges River. Comprising three formations, the Ashfield Shale, Minchinbury Sandstone and Bringelly Shale, the Wianamatta Group lies conformably over the Mittagong Formation and the Hawkesbury Sandstone. The Ashfield Shale is described as a black to dark grey siltstone and laminate. The Bringelly Shale comprises shale (claystone and siltstone), carbonaceuos claystone, laminite and fine to medium grained lithic sandstone.

There are little remains of the original native vegetation, surrounding the site. A study conducted by transgrid[3] suggests that the site was orinally vegetated with various woodland communities, with two distinct vegetation communities occuring - Alluvial Woodland and Shale Plains Woodland. The Alluvial Woodland community is often dominated by Cabbage Gum and Forest Red Gum, with Apple Box. Parramatta Green Wattle, Swamp Oak and Flax-leaved paperbark can also occur. Blackthorn often dominated the shrub stratum, and grasses such as basket grass, weeping grass, bordered panic, forest hedgehod grass, forest nightshade, whiteroot and native wandering jew feature in the understory.
Shale plains woodland is typically dominated by Grey Box, Forest Red Gum and Narrow leaved paperbark. Common groundcovers include kidney weed, threeawn speargrass, weeping grass, kangaroo grass, brunonielle, tender tick trefoil, thin leaf stink weed, blue bell and shorthair plumegrass.

Original vegetation communities would have supplied Aborginal people camping within or travelling the area a wise array of edible and otherwise useful plant species. Watercourses would have supported a large and diverse range of terrestrial, aquatic and avian fauna.

References:

1. “Aboriginal and Torres Strait Islanders | Bayside Council.” Www.bayside.nsw.gov.au, www.bayside.nsw.gov.au/community/aboriginal-and-torres-strait-islanders.
2. “The Bidjigal People.” Revesby Workers’ Club, rwc.org.au/about/blog/community/the-bidjigal-people/.
3. “Aboriginal Cultural Heritage Assessment Report.” https://www.transgrid.com.au/media/jeck3ful/appendix-i-aboriginal-cultural-heritage-assessment-report.pdf
4. Artwork - “First People of the Cooks River | the Dictionary of Sydney.” Dictionaryofsydney.org, dictionaryofsydney.org/entry/first_people_of_the_cooks_river.

2.0 DESIGN VISIONING

2.1 DESIGN STATEMENT

Ground Floor

The design is intended to reflect the adjacent Mascot 1 project, utilising brick materials, concrete walling and a combination of native and introduced plant species. Functionally, the built form has driven the external space outcomes, with broad paved areas at the building threshold extending into the garden. A key design move is the integration of a cafe kiosk fronting Church Avenue which provides urban activation through increased socialisation, as well as passive surveillance through increased foot traffic along Church Avenue. An accessible ramp and staired entry provides access to both the arrival lobby and the cafe. An opportunity exists here for external cafe seating.

As per the previous project, an accessible multi-function lawn provides high amenity for users and is accessed from the main axes by timber deck bridges which traverse the linear water sensitive urban design channel. While the lawn can be used for passive recreation informal sports activity could also be accommodated.

A central planted garden with 2 large canopy trees, palm trees and lush understorey plants and groundcovers delivers a shaded garden oasis. A central water channel is intended to capture stormwater run-off and store this water for a short time, contributing to passive irrigation and providing a habitat for flora and fauna.

This combination of water, native vegetation and interpretive elements will be a key feature of the new development, creating a greater sense of place and Connection to Country. A range of seating areas occur across the space, giving students, residents and visitors the opportunity to work in an immersive planted environment without sacrificing amenity.

Level 1

The Level 01 landscape includes a multi functional and flexible space that caters for seating or external working. The open spatial arrangement is framed by a green edge (raised planter). An outdoor kitchen including BBQ's, sink and pizza oven provides opportunities for cooking and social gathering. A large pergola with climbing plants provides a sense of enclosure to the outdoor kitchen. A large raised planter with high stool seating offers separation to seating booths that create intimate social spaces.

Level 6

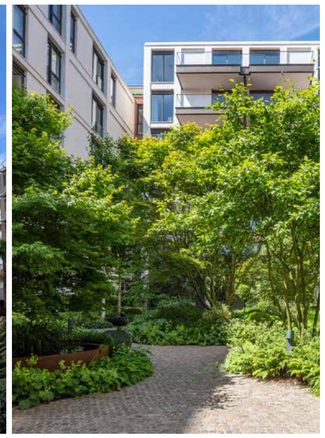
The Level 06 garden space has been designed to provide a range of functions within a compact area.
The outdoor dining and seating area is in close proximity to the BBQ area and framed by planters. Extended timber seating walls provides an informal social seating edge. A planted pergola structure overhead provides natural dappled shade and improves user comfort in this area. The undercover area provides a sheltered north facing covered garden space. A series of 3 'study nooks' arranged around large central tables provides areas for either work or socialising in a winter garden style setting.

Master Plan

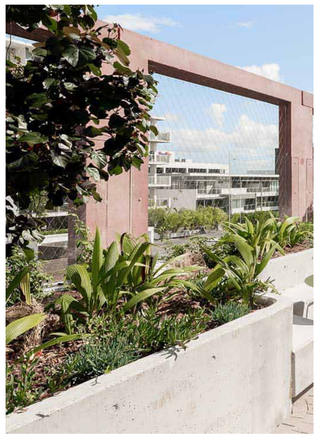
2.2 DESIGN DRIVERS

Borrowed Landscape

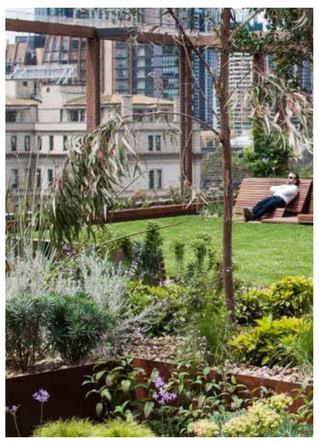
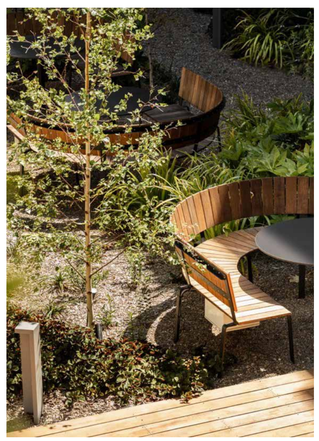




Establish a Green Core


A Series of Outdoor Rooms

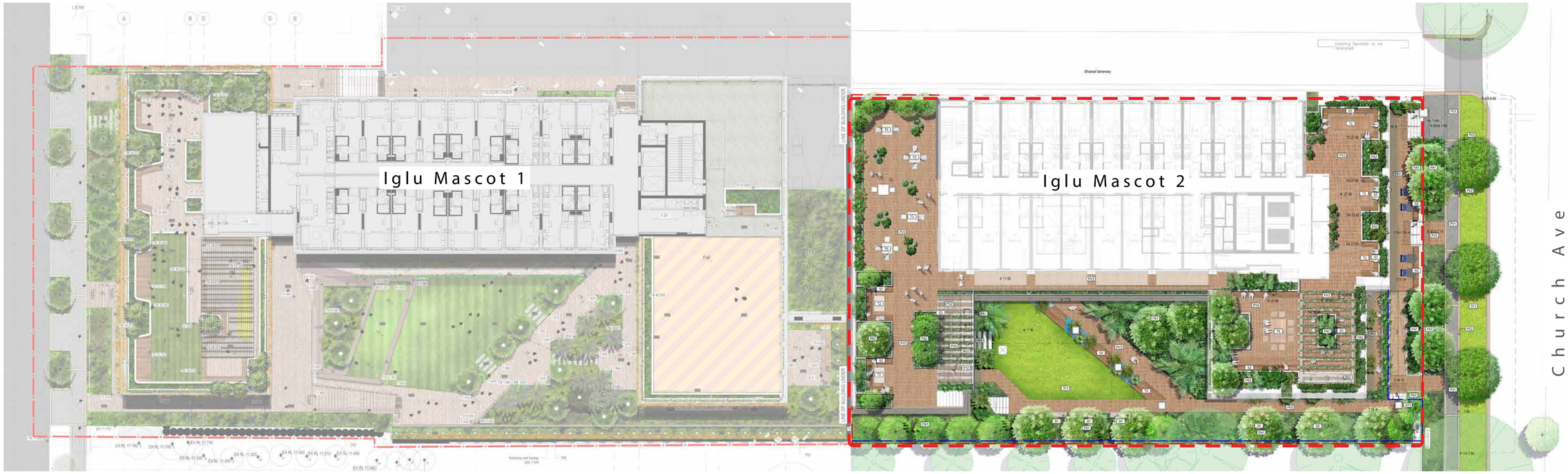
A Distinctive Green Halo



3.0 LANDSCAPE PLANS & SECTIONS

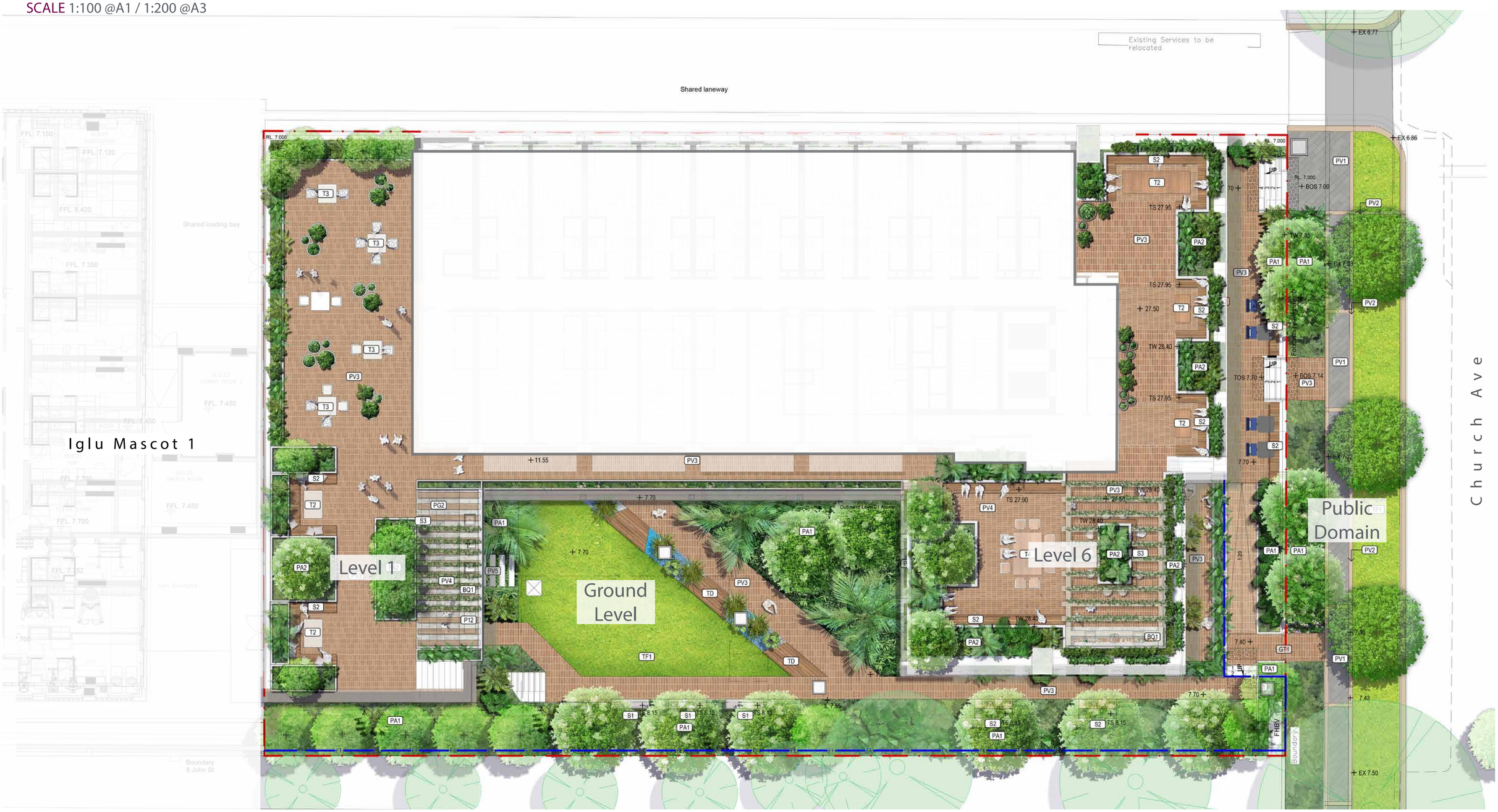
3.1 SITE PLAN

SCALE 1:200 @A1 / 1:400 @A3

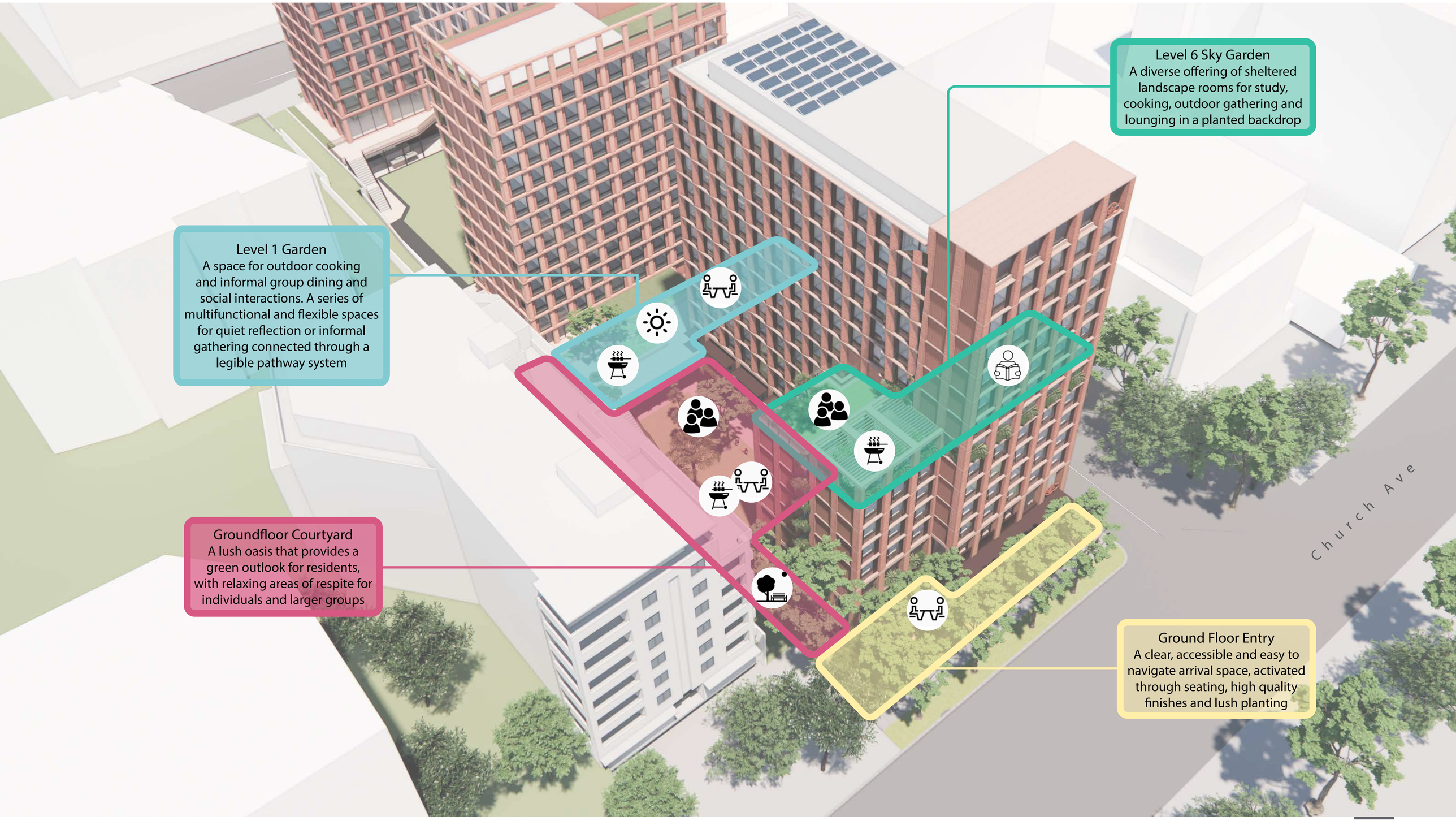


3.2 MASTER PLAN

SCALE 1:100 @A1 / 1:200 @A3



3.3 SITE PROGRAMME



3.4 GROUND LEVEL

SCALE 1:100 @A1 / 1:200 @A3

01 Brick paving to building edge (to match the adjoining project)

02 Native planting mix including semi mature palm trees and 2 large canopy trees with incorporated seat nooks

03 Corten edged linear WSUD swale (temporary inundation) with WSUD planting (capturing stormwater runoff for irrigation)

04 Timber deck bridges over plaza

05 Multi-function lawn area with perimeter timber topped concrete seating along pathways

06 Informal and moveable outdoor furniture adajcent building

07 Semi-private Individual seating / shaded outdoor working spaces with WIFI and power-points

08 Screen buffer planting with 3m side setback for deep soil in accordance with planning conditions

09 Communal break out courytard space

10 Arrival plaza space including DDA accessible staired entry and awalkway from street level

11 Public domain works (new footpaths, kerbs adjustment, verges and tree planting)

PA1 - Deep soil planting
PV1 - Havenslab 400x200x50/60mm, honed ebony with bluestone aggregate.
PV2 - Havenpave 200x200x50mm, honed oatmeal with river gravel aggregate.
PV3 - Brick paving

PV5 - Ash grey granite stepping stones
S1 - Timber bench on concrete plinth
S2 - Timber seat with backrest on concrete plinth
TF1 - Turf
TD - Timber deck
GT1 - Egress gate

F1 - 1.8m flat bar fence

3.5 GROUND LEVEL MOVEMENT

SCALE 1:100 @A1 / 1:200 @A3

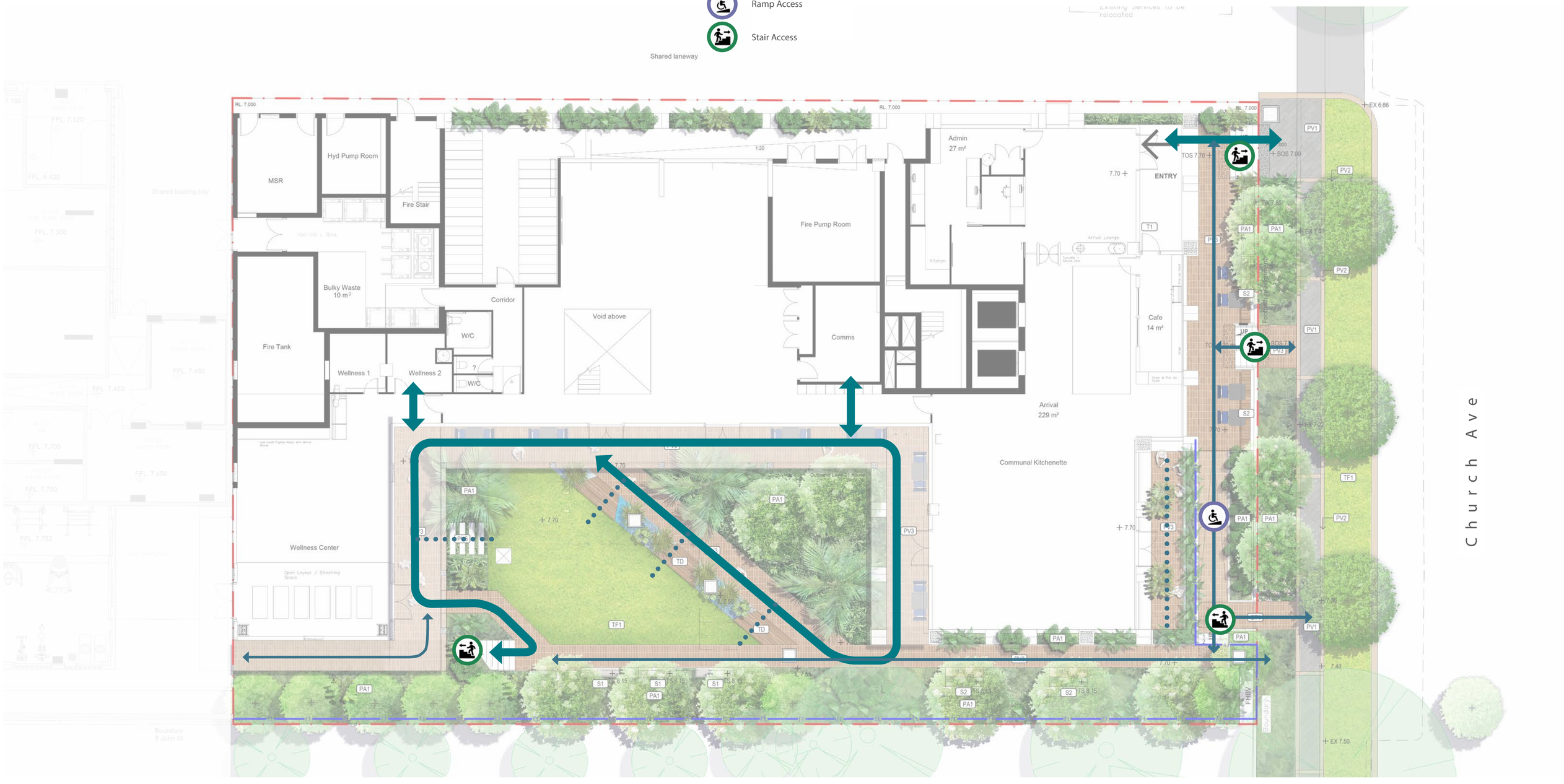
Primary walkway

Secondary movement

Minor walkway

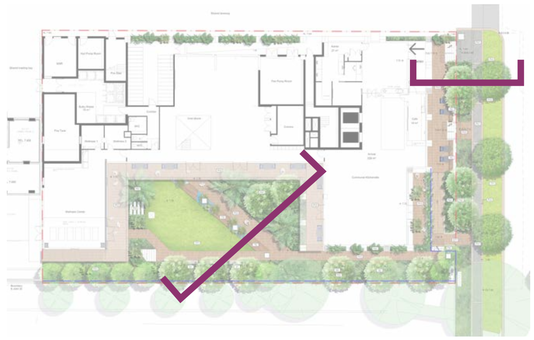
Ramp Access

Stair Access

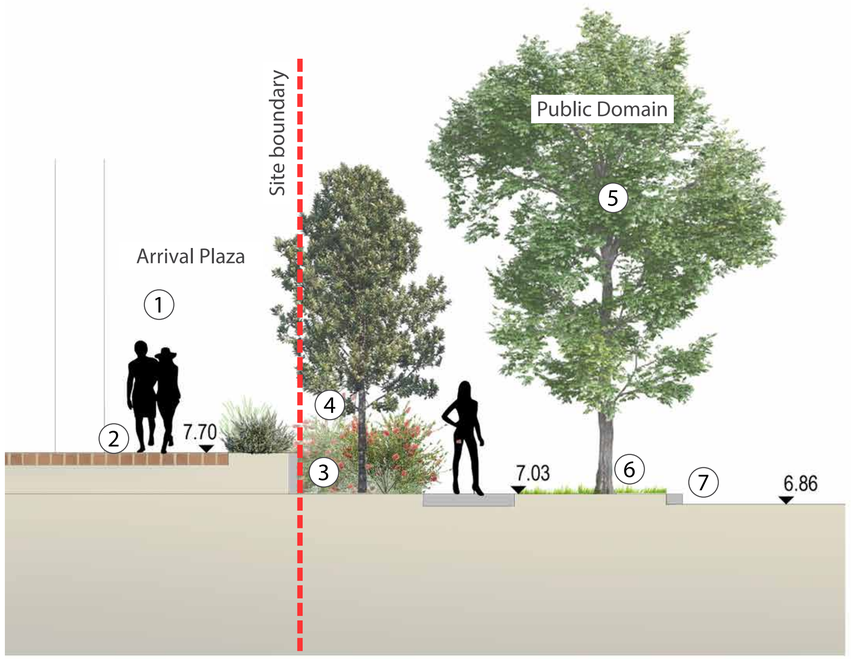


3.6 GROUND LEVEL SECTIONS

SCALE 1:50 @A1 / 1:100 @A3



1. 3m side setback for deep soil and lush planting
2. Timber topped concrete seating
3. Lawn
4. WSUD/ rain garden planting
5. Brick walkway
6. Deep soil area and lush courtyard planting



1. Entry terrace/arrival space
2. Brick paving
3. Retaining wall to terrace
4. Planting to building edge
5. Street tree planting
6. Turf verge
7. Kerb and road realignment

3.7 LEVEL 1

SCALE 1:100 @A1 / 1:200 @A3

01 Multi functional and flexible space for loose tables and chairs and moveable pot plant clusters

02 Green pergola with climbing plants with BBQ, kitchen, pizza oven and seating below

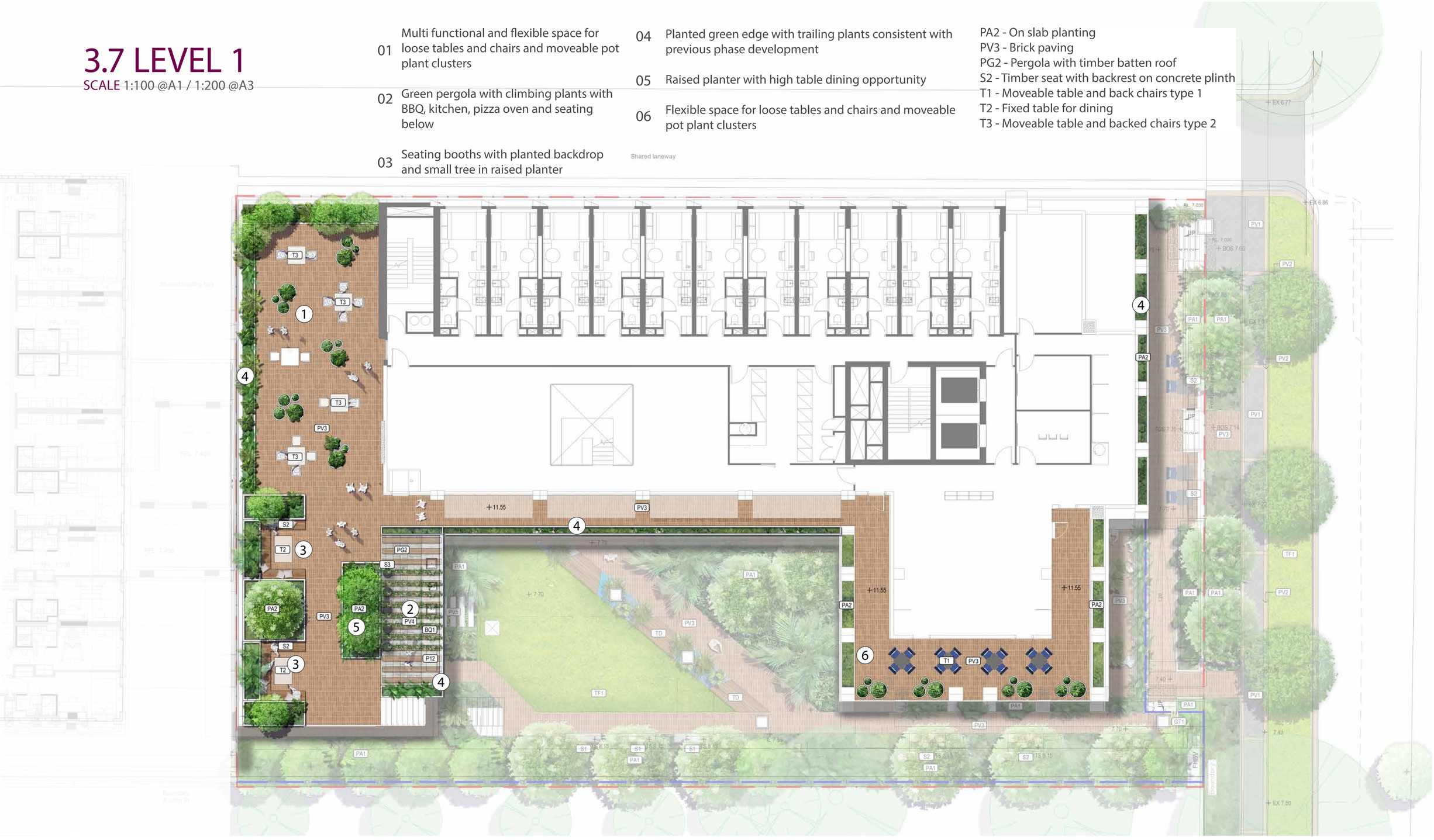
03 Seating booths with planted backdrop and small tree in raised planter

04 Planted green edge with trailing plants consistent with previous phase development

05 Raised planter with high table dining opportunity

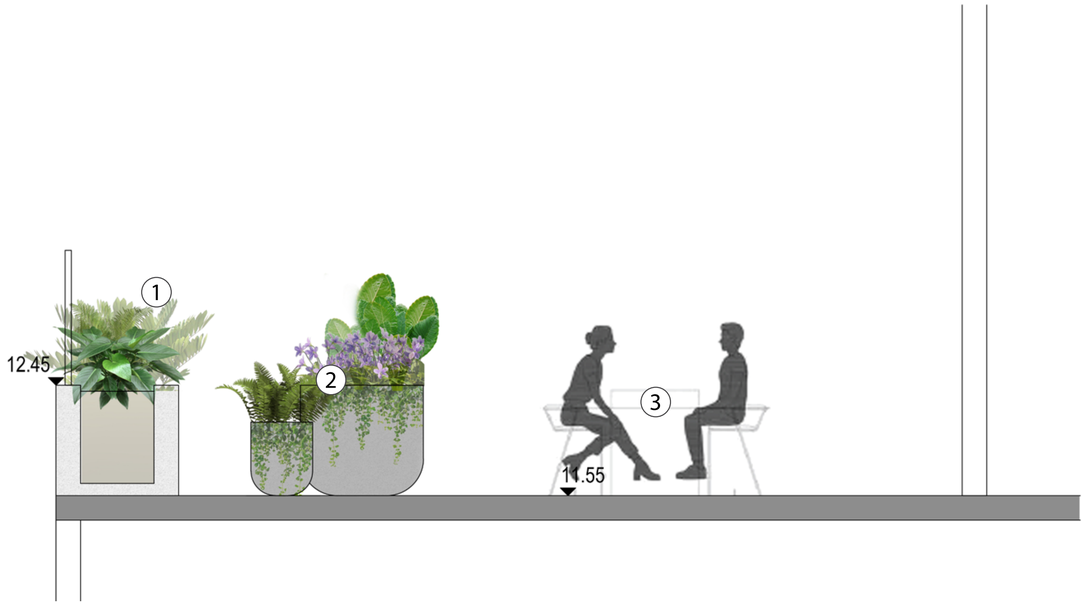
06 Flexible space for loose tables and chairs and moveable pot plant clusters

PA2 - On slab planting
PV3 - Brick paving
PG2 - Pergola with timber batten roof
S2 - Timber seat with backrest on concrete plinth
T1 - Moveable table and back chairs type 1
T2 - Fixed table for dining
T3 - Moveable table and backed chairs type 2



3.8 LEVEL 1 SECTION

SCALE 1:25 @A1 / 1:50 @A3



1. Raised planter to building edge
2. Moveable pot plant cluster
3. Moveable table and chairs

3.9 LEVEL 6

SCALE 1:100 @A1 / 1:200 @A3

01 Large outdoor dining/working table

02 Perimeter planters providing a green edge with timber topped seating walls

03 BBQ and kitchen space with central raised planter and high stools, green pergola structure, BBQ blade and shared high table

04 Study nooks with timber booth seats and tables, WIFI and powerpoints

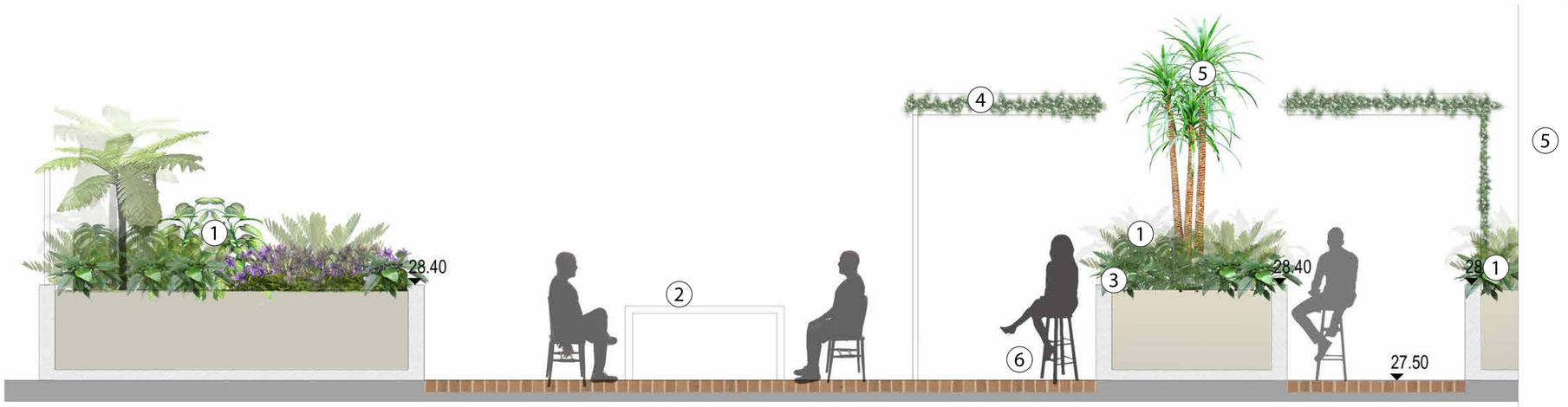
05 Undercover lush and shade tolerant planting providing winter garden feel

06 Scattered arrays of plants in pots to create a parlour style space

BQ1 - Outdoor bench with barbeque
PA2 - On slab planting
PV3 - Brick paving
PG2 - Pergola with timber batten roof
S1 - Timber bench on concrete plinth
S2 - Timber seat with backrest on concrete plinth
S3 - Loose stools
T2 - Fixed table for dining
T4 - Large fixed dining/working table

3.10 LEVEL 6 SECTION

SCALE 1:25 @A1 / 1:50 @A3



1. Raised planter
2. Outdoor dining/working table
3. Central raised planter and high stools
4. Green pergola structure with central cut out for planting
5. Building column

4.0 PLANTING & MATERIAL STRATEGY

4.1 DEEP SOIL DIAGRAM

SCALE 1:100 @A1 / 1:200 @A3

	Ground Level	Level 1	Level 6	Total	Site Area	Percentage
Deep Soil Planting	306 m²	n/a	n/a	311.5 m²	2007m²	15.5%
On Slab Planting Min. soil depth 800mm	n/a	77 m²	90 m²	167 m²		12.8%

4.2 VEGETATION MANAGEMENT PLAN

SCALE 1:100 @A1 / 1:200 @A3

Existing vegetation to be removed
refer to the arborist report

Existing vegetation to be retained
refer to the arborist report

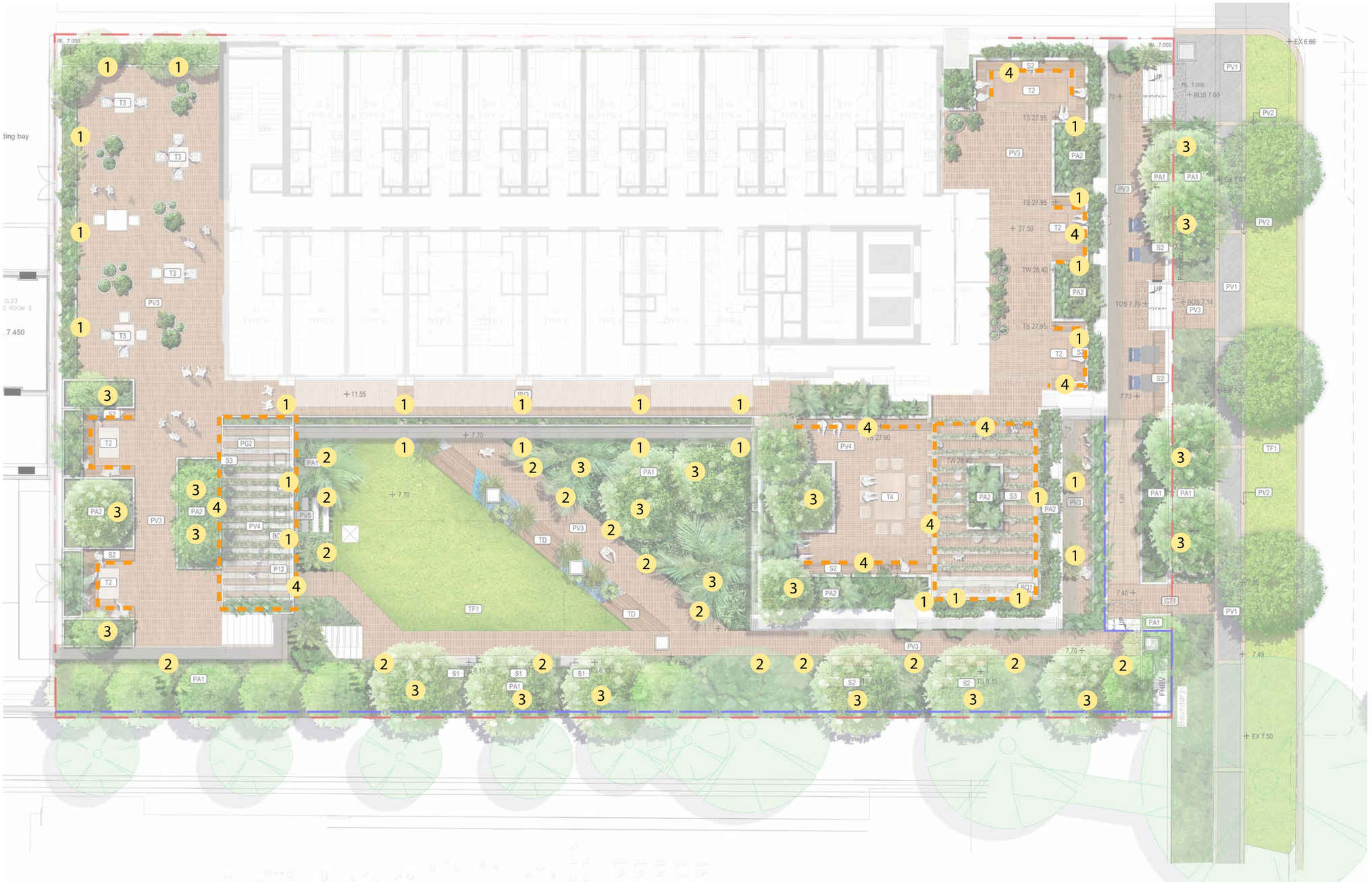
4.3 WATER MANAGEMENT AND IRRIGATION CONCEPT PLAN

SCALE 1:100 @A1 / 1:200 @A3

4.4 LIGHTING PLAN

SCALE 1:100 @A1 / 1:200 @A3

Lighting to reflect IGLU 1 development



1. Wall/column downlight

2. Bollard light

3. Tree/planting uplight

4. LED strip light to seat and pergola

4.5 PLANTING PALETTE

Courtyard + Cascading Plants

The planting palette for the courtyard will reflect the historical vegetation communities of the Mascot area, while also incorporating select exotic species to provide a diverse and robust palette. A canopy of mature native trees, palms and ferns will provide a cool and shaded environment for the understory plants. The courtyard understory supports a mix of native and exotic plants providing a textured and coloured landscape.

Trees


WATERHOUSEA floribunda

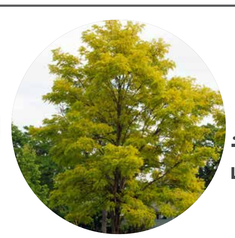

CYATHEA cooperi


ELAEOCARPUS eumundii


GREVILLEA robusta


LIVINGSTONIA australis


JACARANDA mimosifolia


ROBINIA frisia

Foliage


ADIANTUM aethiopicum


ALCANTAREA 'Silver Plum'


ALOCASIA brisbanensis


ASPLENIUM australasicum


BLECHNUM 'Silver lady'


ALPINIA caerulea


MOLINERIA capitulata


BANKSIA spinulosa


PHILODENDRON 'Rojo Congo'


PHILODENDRON xanadu


PTERIS cretica

Groundcovers


DICHONDRA repens


FITTONIA species


OPHIOPOGON japonicus


LOMANDRA 'Lime Jet'


GREVILLEA 'Gaudi Chaudii'


SYNGONIUM 'Pixie'


VIOLA hederacea


DIANELLA 'little jess'

Raingarden


LOMANDRA hystrix


FICINIA nodosa


PENNISETUM nafray

Roof + Vertical Greening

The planting palette for the roof spaces and the associated trellis system will provide a hardy and colourful landscape. Low maintenance plants have been selected to provide robust and functional spaces that support the communal uses of the roof top areas.

Trees


HIBISCUS tiliaceus


TRISTANIOPSIS laurina

Shrubs


ALCANTAREA 'Silver Plum'


CORDYLINE 'Kaspar'


MOLINERIA capitulata


WESTRINGIA fruticosa

Groundcovers


CARPOBROTUS glaucescens


DICHONDRA Repens


GREVILLEA 'Poorinda Royal Mantle'


RHODANTHE chlorocephala ssp rosea


PYCNOSORUS globosus


PTERIS cretica


LAVANDULA dentata

Vertical


CISSUS antarctica


PYROSTEGIA venusta

Streetscape + Ground Planting

Trees


ULMUS parvifolia


TRISTANIOPSIS laurina

Shrubs


CALLISTEMON Candy Burst


GREVILLEA honey gem


WESTRINGIA fruticosa

Groundcovers


CARPOBROTUS glaucescens


LOMANDRA 'Lime Jet'


GREVILLEA 'Gaudi Chaudii'

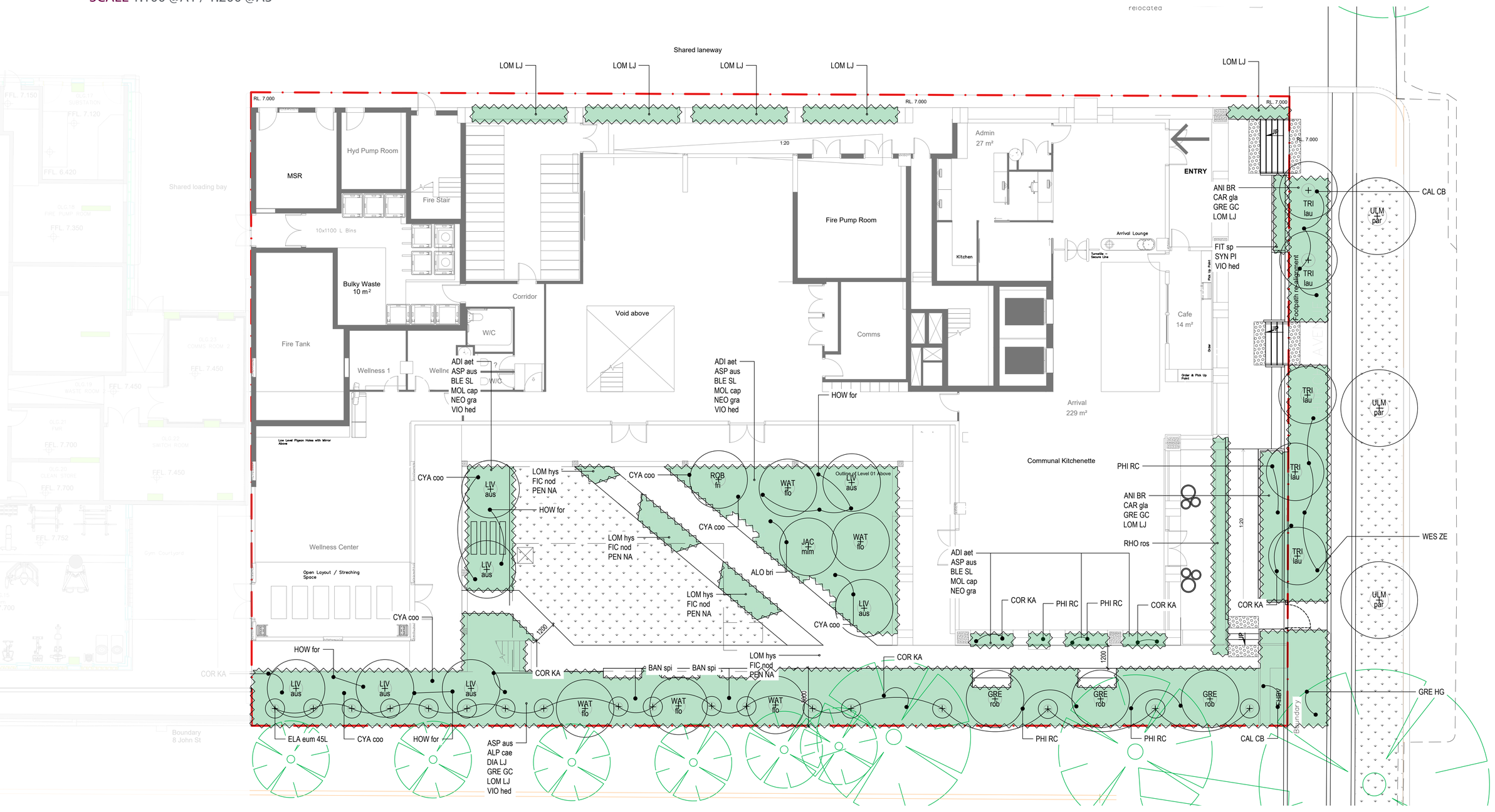

ANIGOZANTHOS 'big red'


PLECTRANTHUS australis


NEOMARICA gracilis

4.6 GROUND LEVEL PLANTING PLAN

SCALE 1:100 @A1 / 1:200 @A3

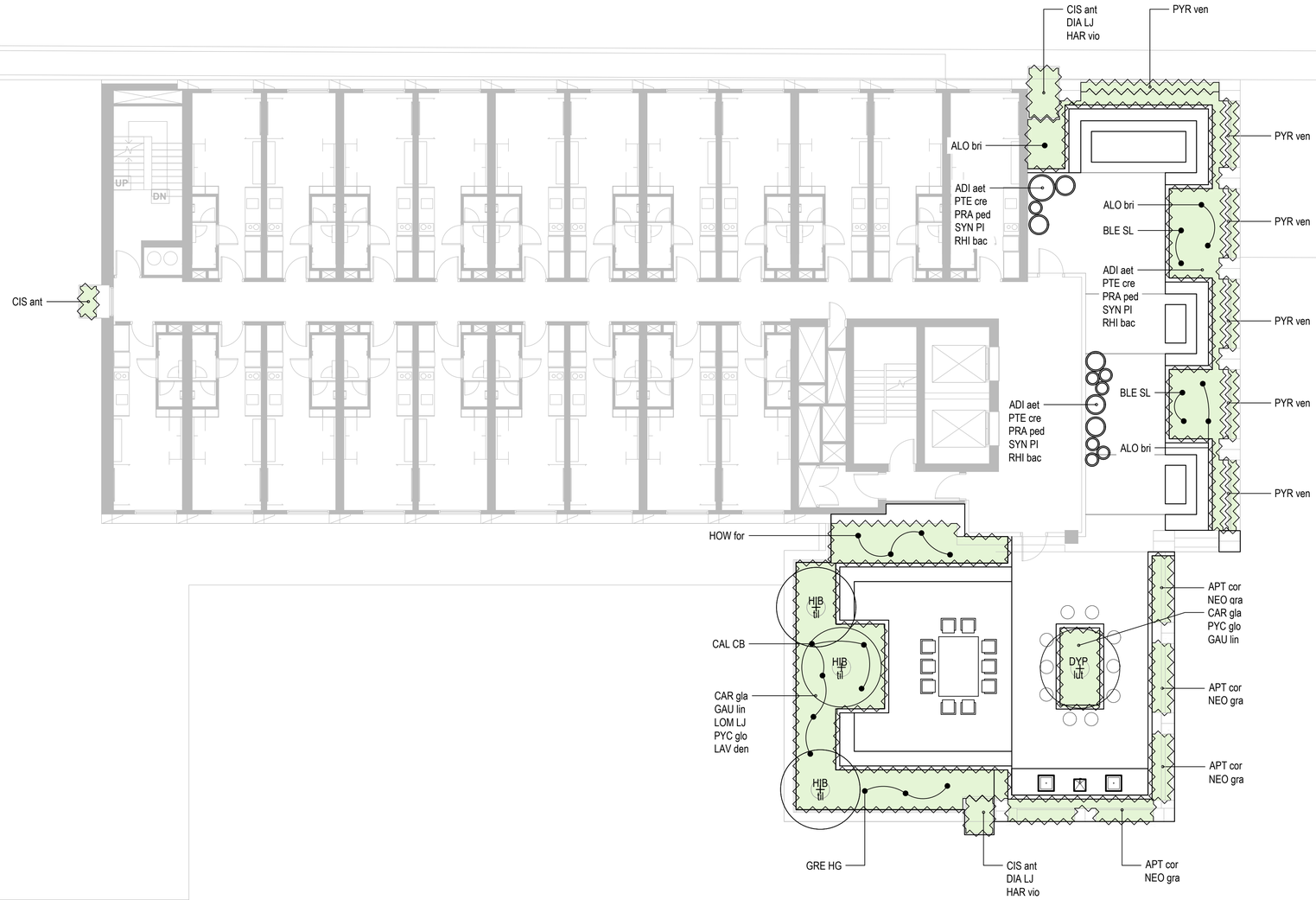


4.7 LEVEL 1 PLANTING PLAN

SCALE 1:100 @A1 / 1:200 @A3

4.8 LEVEL 6 PLANTING PLAN

SCALE 1:100 @A1 / 1:200 @A3



4.9 PLANTING SCHEDULES

PLANT SCHEDULE

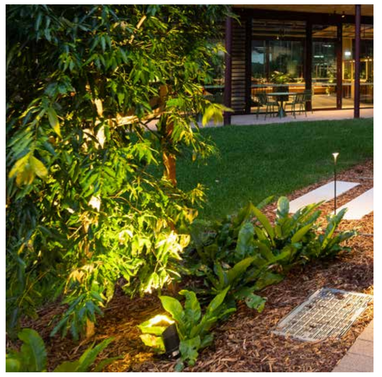
Code	Botanical Name	Common Name	Native	Minimum Potsize	Minimum Install HeightxSpread	Estimated Mature HeightxSpread
TREES						
CYA coo	Cyathea cooperi	Australian Tree Fern	Sydney Area Native	100L	2.5m clear trunk	10m x 8m
ELA eum	Elaeocarpus eumundi	Smooth Leafed Quandong	Australian Native	200L	3.5m x 1.5m	7m x 2m
ELA eum 45L	Elaeocarpus eumundi	Smooth Leafed Quandong	Australian Native	45L	1.5m high x 0.75m	7m x 2m
DYP lut	Dypsis lutescens	Golden Cane Palm	Exotic	45L	1.5m high x 0.75m	4-6m x 3m
GRE rob	Grevillea robusta	Silky Oak	Australian Native	200L	3.5m x 1.5m	30m x 10m
HIB til	Hibiscus tiliaceus	Cottonwood	Australian Native	200L	3.5m x 1.5m	8m x 4m
HOW for	Howea forsteriana	Kentia Palm	NSW Native	200L	3.5m x 1.5m	15m x 5m
JAC mis	Jacaranda mimosifolia	Jacaranda	Exotic	200L	3.5m clear trunk	15m x 10m
LIV aus	Livingstonia australis	Cabbage Tree Palm	Sydney Area Native	N/A	3.5m clear trunk	20mx6m
ROB fri	Robinia pseudoacacia 'Frisia'	Golden Robinia	Exotic	200L	3.5m clear trunk	15m x 10m
TRI lau	Tristaniopsis laurina	Kanooka Gum	NSW Native	200L	3.5m x 1.5m	12m x 4m
WAT flo	Waterhousea floribunda	Weeping Lilly Pilly	Australian Native	200L	3.5m x 1m	15m x 9m
SHRUBS						
ALC SP	Alcantarea imperialis 'Silver Plum'	Silver Plum Bromeliad	Exotic	45L	0.5m high	1m x 1m
ALO bri	Alocasia brisbanensis	Cunjevoi	Sydney Area Native	45L	0.6m high	2m x 1m
ALP cae	Alpinia caerulea	Native Ginger	Sydney Area Native	200mm	0.5m high	2.5m x 2m
ASP aus	Asplenium australasicum	Bird's Nest Fern	Sydney Area Native	45L	0.6m high	1.5m x 1.5m
BAN spi	Banksia spinulosa	Hairpin Banksia	Australian Native	200mm	0.5m high	3m x 2m
BLE SL	Blechnum gibbum 'Silver Lady'	Silver Lady Fern	Exotic	45L	0.6m high	1m x 1m
CAL CB	Callistemon spp 'Candy Burst'	Weeping Bottlebrush	Australian Native	200mm	0.5m high	3m x 1.2m
COR KA	Cordyline australis 'Kasper'	Kaspar Palm Grass	Australian Native	45L	0.5m high	2m x 1m
GAU lin	Gaura lindheimeri 'Pink'	Butterfly Bush	Exotic	300mm	0.5m high	1.2m x 1m
GRE HG	Grevillea 'Honey Gem'	Grevillea	Australian Native	45L	0.5m high	6m x 5m
MOL cap	Molineria capitulata	Palm Grass	Australian Native	300mm	0.4m high	1m x 1m
PHI RC	Philodendron 'Rojo Congo'	Rojo Congo Philodendron	Exotic	45L	0.6m high	3m x 3m
WES ZE	Westringia fruticosa 'Zena'	Coastal Rosemary	Australian Native	45L	0.5m high	1.5m x 1.5m
GROUNDCOVERS						
ADI aet	Adiantum aethiopicum	Common Maidenhair Fern	Sydney Area Native	140mm	0.2m high	0.5m x 0.75m
ANI BR	Anigozanthos 'Big Red'	Kangaroo Paw	Australian Native	140mm	0.2m x 0.3m	0.2m x 2m
CAR gla	Carpobrotus glaucescens	Pig Face	Sydney Area Native	140mm	0.2m x 0.3m	0.2m x 2m
DIA cae	Dianella caerulea 'Little jess'	Blueberry lily	Australian Native	140mm	0.25m high	0.75m x1m
FIC nod	Ficinia nodosa	Club rush	Sydney Area Native	140mm	0.25m high	1.3m x 0.7m
FIT sp	Fittonia species	Nerve Plant	Exotic	140mm	0.1m high	0.15m x 0.5m
GRE GC	Grevillea 'Gaudi Chaudii'	Prostrate Grevillea	Australian Native	140mm	0.2m high	0.2m x 6m
LAV den	Lavandula dentata	French Lavender	Exotic	140mm	0.2m high	0.75m x0.75m
LOM hys	Lomandra hystrix	Mat Rush	Sydney Area Native	140mm	0.25m high	0.75m x0.75m
LOM LJ	Lomandra 'Lime Jet'	Mat Rush	Sydney Area Native	140mm	0.25m high	0.75m x0.75m
NEO gra	Neomarica gracilis	Walking Iris	Exotic	300mm	0.4m high	0.5m x 0.4m
PEN NA	Pennisetum alopecuroides 'Nafray'	Fountain Grass	Australian Native	140mm	0.25m high	0.60m x 0.65m
PRA ped	Pratia pedunculata	White Star Creeper	Australian Native	140mm	0.25m high	0.1m x 1m
PTE cre	Pteris cretica	Ribbon Fern	Exotic	140mm	0.2m high	0.75m x 0.6m
PYC glo	Pycnosorus globosus	Billy Buttons	Australian Native	140mm	0.25m high	0.75m x 0.25m
RHO ros	Rhodanthe chlorocephala ssp rosea	Everlasting Dasiy	Australian Native	140mm	0.25m high	0.75m x 0.25m
SYN PI	Syngonium podophyllum 'Pixie'	Arrowhead Plant	Exotic	140mm	0.2m high	0.3m x 0.15m
VIO hed	Viola hederacea	Native Violet	Sydney Area Native	140mm	0.1m high	0.2m x 1m
CASCADING						
APT cor	Aptenia cordifolia	Baby sun rose	Exotic	200mm	0.5m Length	0.15mx0.6m
CIS ant	Cissus antarctica	Kangaroo Vine	Sydney Area Native	200mm	0.9m Length	4m x 6m
EPI MQ	Epipremnum 'Marble Queen'	Pothos	Exotic	200mm	0.5m Length	0.5m x 3m
HAR vio	Hardenbergia violacea	False Sarsaparilla	Sydney Area Native	200mm	0.9m Length	0.5m x 2m

4.10 MATERIAL PALETTE

PV1 & PV2 Public domain paving

PV3 Brick paving

BBQ Concrete bench with inset sink



PA1 Deep soil planting

PG2 Pergola with BBQ and outdoor kitchen

S1 Timber bench on concrete plinth

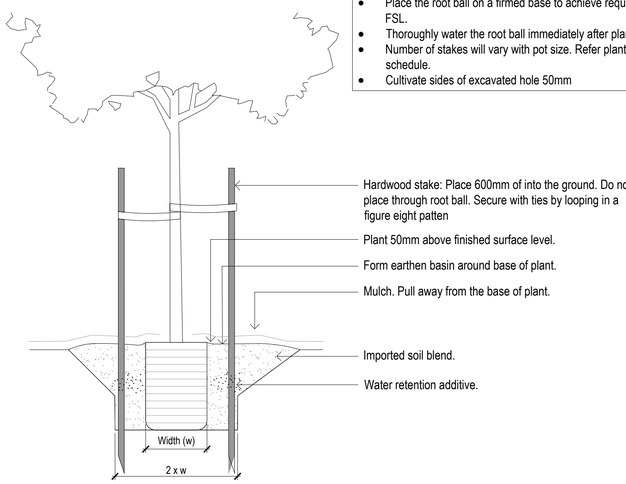
S2 Timber seat with backrest on concrete plinth

F1 1.8m flat bar fence

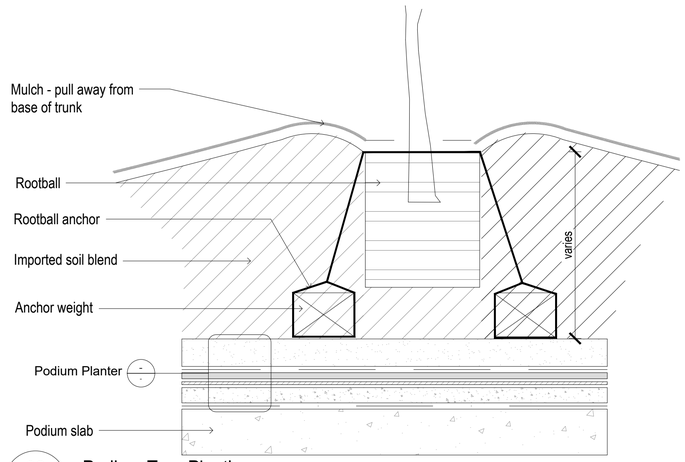
5.0 APPENDIX

5.1 TYPICAL DETAILS

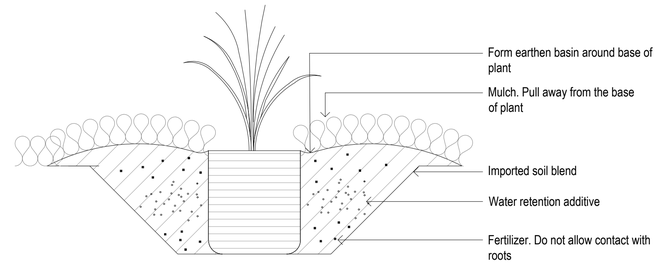
Notes:
- Place the root ball on a firmed base to achieve required FSL.
- Thoroughly water the root ball immediately after planting.
- Number of stakes will vary with pot size. Refer plant schedule.
- Cultivate sides of excavated hole 50mm



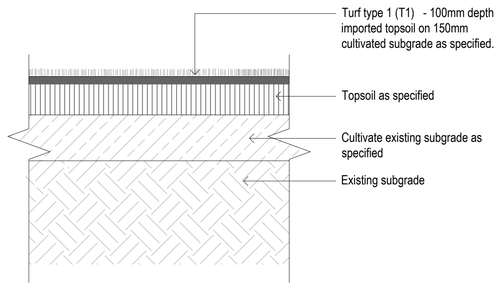
01 Tree Planting
SCALE 1:20



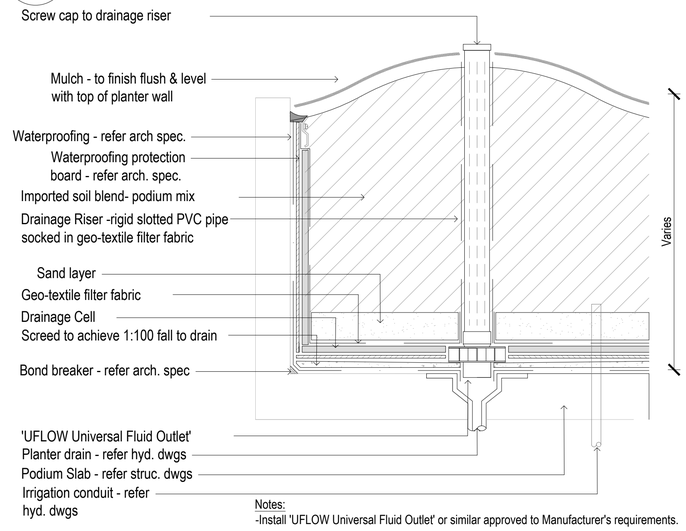
02 Podium Tree Planting
SCALE 1:10



03 150mm - 300mm Planting
SCALE 1:10

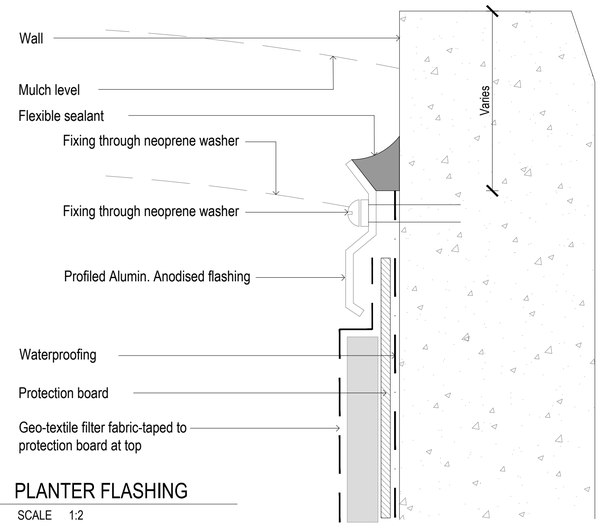


04 Turf
SCALE 1:10



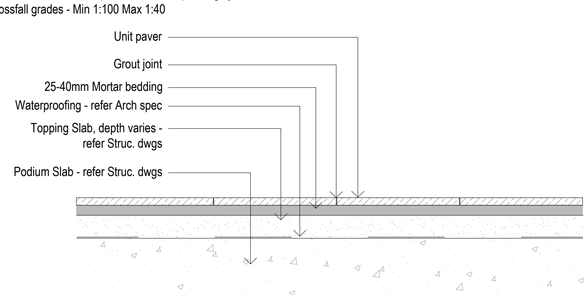
Notes:
-Install 'UFLOW Universal Fluid Outlet' or similar approved to Manufacturer's requirements.

05 Podium Planter
SCALE 1:10

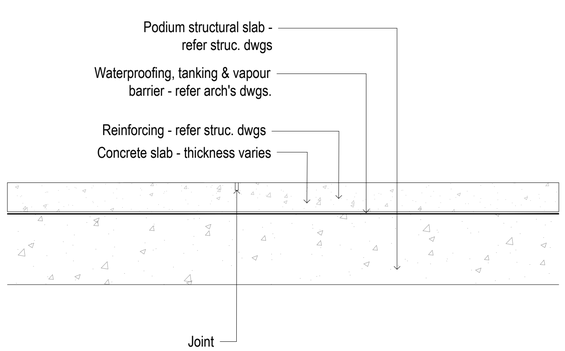


06 PLANTER FLASHING
SCALE 1:2

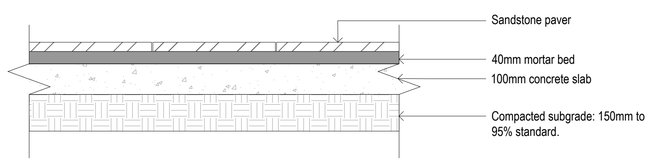
Notes:
- Mortar mix must be compatible with waterproofing system
- Crossfall grades - Min 1:100 Max 1:40



07 Unit Pavers on Podium
SCALE 1:10



08 Concrete Pavement on Podium
SCALE 1:10



09 Unit Pavers on Ground
SCALE 1:10

5.2 SPECIFICATION NOTES

SCOPE OF WORK
The work includes the organisation for and supply of all relevant labour, materials, plant and equipment as required to execute the works. The scope of works includes, but is not limited to, the supply, construction, installation, placement, and execution of works as documented on the landscape drawings and within the technical specification.

EARTHWORKS
Earthworks shall involve the removal of existing compacted material, the cultivation of subsoil, the supply and mixing in of additives, the supply and spreading of topsoil and the fine grading of such soil and existing soil profiles to all landscaped areas to form the finished levels and profiles.
Install all surfaces with falls of minimum 3% away from the existing buildings, to edges or kerbs as required, to ensure drainage of surface water to the drainage systems around the site.
Finished surfaces shall finish flush with existing pit covers, rollover kerbs, edges and adjacent surfaces. Where flush kerbs are installed to road edges grass levels should finish 50mm below such flush kerbs.
Excavate for underground services. Ensure that all service trenches, including subsoil drains and irrigation main spray lines are back filled and compacted.

FILL
Use inorganic, non-perishable material that will form stable fill to comply with AS 3798, section 4. Where fill profiles coincide with plant growing medias fill materials shall also comply with plant growing media requirements.

Plant Growing Media
All plant growing media to be in accordance with "Soils for Landscape Development" (SLD).
Quality assurance, control and material validation shall be in accordance with the following SLD specifications;
- G1 Quality assurance and control
- G2 Hold points
- G3 Compliance certification

As a minimum the contractor shall provide for approval test results which correlate to the specified SLD specifications prior to materials being sent to site, followed by third party testing of the installed material from in situ samples of each horizon obtained by a qualified soil scientist/agronomist with experience in urban soil management with a certified fitness for purpose statement to be provided by the same by a qualified soil scientist agronomist.
Where further soil design or selection is required in response to conditions which fall within the contractors scope of responsibility this shall be undertaken in accordance with the methodology described in Soils for Landscape Development (S.Leake and E.Haege, 2014) and a certified fitness for purpose statement shall be provided by a qualified soil scientist/agronomist with experience in urban soil management.
Testing to be carried out by a NATA accredited laboratory to the specified planting media specification in accordance with the SLD Quality Assurance, Control and Material Validation specification.
Soil is to be free from noxious weeds, rocks, roots, rubbish or any other deleterious material. Refer SLD specifications.

Placement of plant growing media
- Place plant growing media in the locations specified on the landscape drawings, with horizon profiles and depths as detailed. Shaping of topography is to occur at the lowest specified soil profile with subsequent profiles to be of a consistent depth. Spread and grade evenly.
- Consolidate in 150mm thick layers as material is installed.
- Ensure that the consolidated finished surface levels are as specified.
- Only work soils when moisture levels are appropriate for soil texture classification.
- Prevent compaction by construction plant and relieve compaction where this has occurred.

In planting beds, podium planters and landscape planters mound plant growing media at centre to promote drainage. Finish sides to allow the thickness of mulching material to be at the same level as adjacent finished surface levels.
Carry out soil amendments if required by testing results. Once amendments have been carried out site topsoil is to be tested for a second time as per above 'Testing' section.
Supply and place 100mm diameter PVC capped conduits 350mm deep under pavements (excluding vehicular pavements) to enable installation of sub-soil drainage and irrigation systems. Mark ends of conduits with a 6mm diameter brass pin set into paving. Backfill trenches and compact as specified.

DRAINAGE
Subsoil drainage is to intercept groundwater seepage and prevent water build-up behind walls, in garden areas and under pavements.
Subsoil drainage to be a black polyethylene slotted corrugated subsoil drainage pipe with a minimum nominal diameter of 90 mm to comply with AS 2439 (all parts).
Gravel surround to be 10 mm size.
Subsoil drainage must be connected to surface drains or to the stormwater drainage system. Connections are to be thoroughly sealed.
Test all lines on completion to ensure their correct functioning.

Surface Drains
Surface drains are to collect surface run-off and prevent ponding of water in pavement areas to AS/NZS 3500.3.
Surface drains are to be stainless steel with heel guard grates and R11 slip rating
Surface drains must be connected stormwater drainage system. All connections shall be thoroughly sealed.

Podium Planter Drainage
Install podium planter drainage to bases of podium planter and planter box areas.
Podium planter drainage to be an approved high-density black polyethylene slotted modular drainage cell with a minimum depth of 40mm.
Drainage cell to be covered with layer of geotextile, non-woven, needle punched fabric prior to covering.
Podium planter drainage must be connected to surface drains or to the stormwater drainage system.

PLANTING
Contractor Qualifications: Minimum five years experience in similar work as required by this Specification. Submit evidence of completed similar work with contact names and telephone numbers.

Fertiliser
Deliver fertiliser to the site in bags, branded with the type and manufacturer's name.

Mulch
Provide mulch free of deleterious or extraneous matter such as soil, weeds, rocks, and twigs. Mulch to finish level with surrounding finished levels after settlement allowances of the topsoil and mulch. Place mulch clear of plant stems to avoid rotting at ground level.

Planting
Adopt planting procedures that produce healthy plants within the prevailing soil, climatic and management environment of this project.
The following is the minimum expected:
- Excavate a hole for each plant twice the diameter of the rootball and 100 mm deeper than the root ball. Break up the base of the hole to a further depth of 100 mm and loosen the sides of the hole.
- Remove the plant from the container with minimum disturbance to the root ball, and place it in its final position, in the centre of the hole and plumb. Ensure the plant root ball is level with the finished surface of the soil surrounding the hole or bed.
- Thoroughly water plants immediately after planting and at such times during the contract period as is required to maintain growth free from water stress. Each plant will require a minimum of 10 litres of water at the time of planting.
- Backfill with topsoil as specified. Lightly tamp and water thoroughly to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball.

Containers
Collect empty plant containers daily during planting operations and remove from site.

Spraying
Report any evidence of insect attack or disease amongst plant material immediately. If directed by Superintendent, spray with an insecticide and/or fungicide approved prior to use, in accordance with manufacturer's directions and statutory requirements.

Locations
Do not vary the plant locations from those shown on the drawings unless otherwise directed. If it appears necessary to vary the locations and spacing for any reason apply for directions from Superintendent.

Plants

Definitions
The following definitions to apply to all plants:
- Batch: means a group of plants of like size and species as identified in the plant schedule
- Calliper: the stem or trunk diameter at a specified point, measured 300mm above the top of the root ball.
- Clean stem height: the height of the trunk above ground, which is free of branches.
- Clear trunk - palms: Overall height for palms shall be based on measurement taken from the top of the root ball, adjacent to and perpendicular to the start of the spear emergence (newest shoot/frond-tip).
- Ex-ground: means trees grown in the ground and dug for delivery. Includes both in-ground container grown trees and balled and bur lapped trees.
- Growing-on: shall mean the process of progressively re-potting smaller plants prior to the final planting out to promote plant growth sufficient to meet the height, spread and calliper size specified.
- Height: shall be measured from the top of the root ball, adjacent to and perpendicular to the top of the natural foliage projection.
- Spread: shall be measured as the mean diameter of the horizontal branches.

Plant Quality
All plants to be true to scheduled nomenclature, well formed, hardened off nursery stock. They are to be container grown in potting mixture with a healthy root system, fully established but not pot bound. The containers to be of the size and type specified for the plant size specified as set out in the Plant Schedule.
All plants to have a well-balanced branching habit and no plant is to be cut back so severely that growth and development of natural form are retarded. Pruning scars to be clean cut to leave little or no protrusion from trunk or branch and budding or grafting scars to be clean, with well-developed calluses. Leaves shall be of normal size, shape, colour, and texture for the species, with a minimum of physical or insect injuries, and to be free from living insects, pests, and disease. All pots shall be free of weeds.

Containers
All non-ex-ground plants are to be grown or acclimatised in a container. Plants specified in pots or bags to be grown in new or sterilised recycled polypropylene containers or polythene bags of potting media.

Acclimatisation
All plants to be fully sun or shade hardened-off to suit their on-site growing position for a minimum period of six (6) weeks.

Delivery
Order sufficient of each species shown on the drawings to achieve the detailed planting layouts and ensure that the supplier retains in stock sufficient additional stock for replacement of failed, stolen, damaged, or unhealthy specimens.

Tree Quality
Prepare live materials in advance of installation to NAT SPEC Guide – Specifying Trees: A Guide to Assessment of Tree Quality (2003) standard to ensure satisfactory performance and growth rate after planting and/or placement at project site.

Anti-Transpirant
To be applied only to street trees and advanced or Ex-Ground stock as noted in Schedule - Materials & Finishes. Prior to removing the plants from their containers, spray on the specified anti-transpirant to the top and underside of foliage at the specified application rates. Follow manufacturer's recommendations for application. Ensure no overspray occurs on other hard landscape elements.
The application of anti-transpirant should be repeated at intervals as per the manufacturer's recommendations during the Establishment Period.

Stakes and Ties
Use stakes and ties where indicated on the Plant Schedule.
Stakes
Use durable hardwood, straight, free from knots or twists, pointed at one end. Where the Plant Schedule indicates 2 stakes, locate the stakes on opposite sides of the root ball.

Driving
Drive stakes 600 mm into the ground on each side of the tree, either before the tree is placed, or in such a manner as to avoid damage to the root system. Remove shattered ends.

Ties
Use 50 mm wide Hessian webbing. Fix ties securely to stakes in a figure eight pattern. Place other ties where necessary to stabilise the tree.

Guying
Use guys where indicated on the Plant Schedule install to manufacturer's requirements.

Adjustable steel guys (stainless steel below planting surface) sufficient to stabilise and support tree.

Fixing
Fixings on podium planters must not damage waterproofing.

Trunk Protection
Adopt guying procedures which minimise damage to plant.

Rootball Anchoring
Use sub-surface anchoring systems where indicated on the Plant Schedule and to manufacturers requirements.
Provide turnbuckles to allow for tensioning of guys.

Completion of Planting
Practical completion of the planting works shall include but not be limited to establishment of turfed areas and replacement of plants and turf that have failed, vandalised, or stolen during the work prior to practical completion.

Plant Material Establishment
The Establishment period commences at the date of Practical Completion of the Works. Refer to Schedule - Materials & Finishes for period duration.

Recurrent Works
Maintain horticultural practices, as well as rectifying defects that become apparent in the works under normal use including, but not limited to, the following items where required:
- Watering, weeding, fertilising, pest and disease control, edging, renovating, pruning, rubbish removal and keeping the site neat and tidy.
- Maintain mulched surfaces in a clean and tidy condition and top up to the specified depth if necessary.
- Spray against insect and fungus infestation if considered necessary by the Superintendent in accordance with the manufacturer's directions.
- Trees, and garden bed areas are to be watered regularly so as to ensure continuous healthy growth.
- Remove rubbish and weed growth that may recur throughout the contract area, at weekly intervals, and maintain in a completely clean and tidy condition.
- Rectify soil subsidence or erosion which may occur after the soil filing and preparation operations.
- Throughout the establishment period, ensure pathways, pavements and road are kept clean of mulch, soils and landscape litter.
- Prune trees and shrubs as directed by the Superintendent. Pruning will be directed for the maintenance and dense foliage or miscellaneous pruning as beneficial to the condition of the plants.
- Prune damaged growth.

Plant Replacement
Replace failed or damaged plants. This does not include vandalised or stolen plant material. (Vandalised or stolen plant material will be replaced prior to practical completion.)

Replanting in Establishment Period
Where new plant material has been supplied to replace dead or dying plants, these shall be subject to a full establishment period.

IRRIGATION
Design, supply, install, and maintain for the duration of the Establishment Period, a fully automatic irrigation system to all planting and turf areas within the property alignments. Provide an irrigation system that will provide uniform coverage with sufficient water to achieve optimum plant growth. Items not specified, but normally required to conform to such intent, are considered part of this work. Minimum precipitation rate to all areas is to be 30mm per week. The number, size and location of water supply points and associated pipework cast into podium slabs will be determined by the irrigation design.
The irrigation system must be designed to a standard that would be considered best industry practice and in accordance with Efficient Irrigation for Water Conservation Guideline. The system must have sufficient stations to allow planting and turf areas with different microclimatic conditions to receive different quantities of water. Turf and planting areas must be on separate stations.
Sprinklers and drippers must be suppled in sufficient quantity and arranged to deliver water optimum for plant growth to all plant material regardless of their size and location.
The system is to be designed and certified as an efficient irrigation system by a Certified Irrigation Professional. Show to scale the locations of all irrigation components including control valves, identity (model/brand) of each component, show pipeline type and sizes,

show sprinkler arcs/coverage, provide a section/details of mains pipeline and trench, articulated riser assembly, controller assembly including lockable box and control valve assembly in valve boxes. Provide specification notes as required.

Water Connection

Water for irrigation shall be supplied via rainwater tanks and an irrigation pump. The rainwater tanks and irrigation pump is part of Hydraulic Services. Refer to plan for location and sizes. Mains water (town water) shall NOT be used within the irrigation system. An isolating gate valve and filter (120 mesh) to be provided after the Irrigation pump. The sizing of all pipework to be determined by the design parameters set out in this Specification. Gate valves or water supply points connected to the rainwater tank have been shown on the drawings. The number, size and location of these water supply points shall be refined and determined by the final irrigation design. It is essential that the irrigation contractor coordinates such water supply points with the Builder at the start of building works.
System Type – Fully Automatic High Pressure – (Option 1)
Use Class 12.5 MDPE main line reticulation with pop up spray irrigation to turfed areas and planting areas. The system is to be fully automatic. Minimise overspray of roads and paths. Overspray of buildings or parts of buildings is not acceptable.

Products

All irrigation products to be either NETAFIM or HUNTER or approved equivalent and should be accredited with Smart Approved Watermark.

Component Identification

All pipework including subsurface dripper lines shall be identified by a purple/lilac colour in accordance with AS 2700.
All lids on valve boxes shall be identified by a purple/lilac colour in accordance with AS 2700

All caps on popup sprinklers and QCVs shall be identified by a purple/lilac colour in accordance with AS 2700

Spray Irrigation – High Pressure

Install sprinklers to turf areas. Use pop up sprinklers with pressure compensation and radius arc adjustment. All sprinklers shall integral check-valves, have matched precipitation across all arcs of coverage and be constructed of stainless steel and engineering plastic. The maximum output capacity of all (each) sprinkler head must not exceed 9 litres/minute

Planting Areas

Sprinklers shall have 300mm pop up bodies and shall be spaced head to head. All planting areas shall have the sprinklers arranged on both sides of narrow planting areas to ensure thorough coverage. Sprinklers located only on one side of a planting area are unacceptable.

Controllers

Irrigation system is to be controlled by solid state/hybrid controllers via 24vac remote control valves.
Controller shall have two spare stations, ENERGEX approved 240/24 vac transformer, multiple start times per day, multiple 7/14day program ability, manual and semi-manual override provision, capable of full automatic unattended operation, rain sensor override compatible and non-volatile 100 year memory retention. Mount controller and power supply together inside a galvanised steel, colourbond, weatherproof cabinet with a lockable T handle as supplied by B & R products or equivalent.
Install an automatic rainswitch or rain sensor to terminate the program in the event of excessive rainfall. Refer to plan for location of rainswitch or rain sensor.
All exposed wiring is to be conduited. Conduit to be painted to match external wall colour.

Controller Location and Power Supply

Provide a 240V, 10 AMP weatherproof general-purpose outlet 1500mm above ground level. Refer to plan for location.

Valve Boxes

House all valves in lockable black valve boxes, foot traffic grade. Secure all lids by a stainless steel or hot dipped galvanised bolt. Size and locate each box to enable easy access to each valve assembly for operation and maintenance.
Install valve boxes in planting areas wherever possible and locate close to mowing strips.
Valve boxes to be placed at grade in turfed areas or 20mm above soil level in planting areas.
Provide a 50mm deep, 10mm aggregate on a geotextile layer at the bottom of all valve boxes. The tops of all valves shall be no deeper than 150mm below the top of the valve box.

Control Valves

Automatic station control valves to have 24 vac remote actuation, with manual bleed and integral flow control, pressure regulating, manual shut-off and be constructed of industrial plastic and stainless steel and to have minimum pressure rating of 1033 kPa. All valves shall be identified with a 40mm laser engraved plastic tag attached to the valve stem with a cable tie. The tag shall show the station number identified on the "As Built" drawing.
Locate valves in lockable valve boxes so that all parts of the valve can be reached for servicing.

Isolating Valves

Install manually-operated isolating valves throughout the system to permit isolation of areas for maintenance purposes with minimum disruption to the system. Install one isolating valve on the up-stream side of each automatic control valve. All isolating valves to be bronze and pressure rated to 1033 kPa.
Locate valves in lockable valve boxes so that all parts of the valve can be reached for servicing

Reticulation

All mainline and sprayline piping to be MDPE class 12.5. Fittings to be compression type. Piping to be sized to ensure that velocities do not exceed 1.0m/sec in mainlines and 1.5m/sec in lateral lines under any circumstances. Maximum flow rate to be 6 litres/second. Arrange and support pipework as necessary so that it remains free from vibration while permitting necessary movements such as thermal expansion and contraction.
Trenches to have minimum 50mm clearance to all pipework. Minimum cover over mains pipework to be 450mm and lateral pipework to be 350mm. Spacing between multiple pipes in common trench to not be less than 50mm. Mainline pipework to be laid on a minimum of 50 mm thick sand bed. Backfill to trenches to be free from rocks, sticks and construction debris and compacted thoroughly.

Control Wiring

Common wiring to be 7/0.85 and 7/0.67, 4mm and 2.5mm. Single core, multi-strand, and polyethylene insulated and sheathed. Each controller to have separate common wires.
Active cables to be 7/0.67 and 7/0.50, 2.5mm and 1.5mm multi core, multi-strand and polyethelene insulated and sheathed. Each controller to have separate active wires.

Installation

Run all wiring in the mainline trench without any breaks between the Controller and Automatic valves. Bundle tie all wiring together at 3m intervals and place beneath pipework
Minimum depth of cover to be 300mm
All field joints to be housed in a separate valve box
Loop all wiring at least 300mm at each valve or junction
Joints to be Tyflo Heat-Shrink joint or a waterproof direct burial splice kit such as 3M DBY or equivalent.

Commissioning

Remove all spoil, rubbish and construction debris from site.

Ensure that the operation of all components is functioning correctly and that all equipmentv has been installed as specified.

Practical Completion

Apply for only after system has been run for four consecutive fully-programmed cycles over a period of four days.

Establishment Period

The irrigation system is to be fully maintained during the establishment period

5.3 MAINTENANCE GUIDELINES

General

MINIMISING MAINTENANCE NEEDS

The maintenance of the landscape will be important to its success both in the critical establishment phase (the first 12 months) and ongoing for its life span. The reduction and practicality of ongoing maintenance requirements has been intrinsic in the design with key considerations as follows:

- Use of endemic and native species and those known to do well in the local area.
- Selection of species by their size and habit, which do not require frequent pruning to maintain their form as a hedge or to contain then within the desired planting zone.
- Species selected for each area determined based on the micro-climatic conditions, particularly in respect to sun and shade conditions.
- Selection of low water plants to reduce the need for additional watering.
- Roof water to be collected for use in irrigation to reduce the need for the use of potable water for this purpose. Automatic irrigation provided throughout the landscape areas.

MAINTENANCE SCHEDULE

The maintenance of the landscape will be undertaken by the contractor for the first 12 months to ensure successful establishment. Following this the maintenance will be taken over by a maintenance contractor.

The maintenance to be undertaken will be detailed in the landscape specification in the form of a Landscape Maintenance Plan. The Landscape Maintenance Plan will ensure the necessary scope and level of maintenance is achieved to ensure the plants remain healthy and other landscape elements are maintained in a safe, functional and attractive condition and will include the following:

SHRUB PRUNING & TRIMMING

- Tip prune shrubs and ground covers to encourage density in spring and winter. Length removed depending on vigor of previous plant growth.
- Pruning should reflect the natural growth, flowering and regrowth habit of the individual species. Generally prune after flowering. Inspect for failed or dying plants requiring replacement monthly and record probable cause.
- All plants that have died or failed (lost more than 50% of their normal foliage cover) shall be replaced with the same species and commercially available size as the plant to be replaced.
- Generally plant material shall be uniformly high quality stock equal to best available for 'retail sale'. The root systems shall be balanced in relation to the size of the plant.
- Plants shall be healthy well grown, hardened off specimens of good shape and free from pests and diseases and in accordance with 'Specifying Trees: a guide to assessment of tree quality' (Clark 2006). Should the contractor believe that alternative species should be utilised a proposal is to be put to SHMH for approval. Inspect climbers, trailing plants monthly, train leaders onto supports as required. Prune long leaders which cannot be reattached to climbing frame or mesh supports in summer.

TREE MAINTENANCE

- Inspect trees monthly during the first 12 months and annually thereafter. Ensure trees are not showing any signs of stress, adjust watering as required to ensure good health and top up mulch to specified depths as required.
- Avoid unnecessary pruning during the first three years. Prune only critical branches and remove damaged or dead wood. Remove branches that limit public access or present a safety risk.
- Lift the crown of the trees to maintain clear site lines where required to a level of 2.5m.
- Structural tree work including the removal of large branches should be undertaken by a qualified arborist with appropriate applications for the works made to Council.

TURF MAINTENANCE

- Mow turf every 2 weeks in summer, 3 weeks in Spring / Autumn and 4 weeks in winter. Mow at heights of between 40 to-60mm & remove no more than 1/3 of the leaf blade at any one time. Do not mow under wet conditions.
- Apply fertiliser at rates as recommended by manufacturer in Spring and Autumn. Apply fertiliser at rates as recommended by manufacturer
- Inspect for compaction and thatching in Spring. Carry out aeration treatment if required using dethatching or verticutting equipment
- Inspect for failed turf requiring replacement and record probable cause in Winter. Remove failed turf, prepare surface & lay new turf in accordance with original turf specified.

FERTILISING, SOIL IMPROVEMENT & PEST CONTROL

- Soil testing is to be undertaken at the commencement of the maintenance contract and shall include taking samples from a cross section of planting areas. Slow release fertiliser selected to take into account the soil testing results and the insitu plants should be applied annually in spring and in accordance with the manufacturer's recommended rate. Prior approval required for fertiliser use.
- Check for incidence of fungal and insect attack monthly.
- Apply appropriate treatment for fungal and insect attack if necessary subject to approval.
- Avoid use of chemical sprays. If chemical control is considered necessary, these should be mixed and applied in strict accordance with manufacturer's directions. Do not spray in windy or extreme weather. Prior approval required of chemical to be applied.
- Do not remove leaf litter from planted areas unless depth of litter is impacting on plant growth.

MULCHING & WEEDING

- Prevent reproduction of weeds by removal of seedlings and established weeds before seed set. This work should be carried out regularly so that the planted and mulched areas are weed free when observed at monthly intervals.
- Weed garden areas manually or with approved herbicide monthly. Prior approval required for Herbicide use. Approved Herbicide use to be in accordance with regulation rates and manufacturer's recommendation. Protect plants from overspray and avoid if rain is likely within 12 hour period
- Surface mulch is to be replenished as required, at least annually in spring, to maintain a consistent depth as specified at installation. Mulching materials to be consistent with those specified at installation.
- Plant and other litter to be removed from paths and garden areas where required.

ADJUSTMENT OF TREE STAKES & TIES

- Inspect stakes and ties monthly, replace as required. Check the straps during spring and autumn, ensuring they are loose around the tree to prevent damage to the trunk.
- Remove all stakes and ties at the completion of the 12 month establishment period.

Irrigation Strategy

IRRIGATION

Automatic irrigation system to be inspected monthly as per manufacturers specifications. The following are to be checked:

- Controller and soil moisture sensor
- Cabinets clean / clear
- Wiring condition and electrical connections
- Back flow prevention device
- Battery replacement
- Valve covers, valve boxes
- Heads missing, clogged, leaking, broken, tilted or misdirected
- Drip emitters connected to flex line, flex line connected to riser, micro adjustment nozzles connected
- Service filter strainer
- Automatic flush valves
- Operational pressures
- Frequency adjusted to maintain healthy plant growth.

Planting areas not covered by the irrigation system will be covered by the provision of hose cocks at regular intervals which will allow for hose watering as required during establishment and during particularly dry conditions to ensure healthy plant growth.

MAINTENANCE OF HARD LANDSCAPE ELEMENTS

- Sweep paved areas, particularly in high use ares monthly. Oil stains in any key areas to be removed using a mild dish washing liquid and warm water solution.
- Inspect paving and walls for areas of moss or mold and remove if found using a mild ammonia solution.
- Weeds are to be removal from all landscape walls, paving and gravel areas monthly.
- Leaf Litter to be removed from all paving areas, paths and gravel areas monthly.
- Drainage pits are to be cleared of mulch and other material regularly so that all pits are cleared when observed at monthly intervals or after significant storm events.
- Inspect seats, benches, tables and other furniture monthly. Undertake any repairs or replacement as required.
- Inspect garden bed edges between soft surfaces annually. Repair any damage or replace as specified.
- Inspect all retaining and planter walls annually. Should any cracking, settling or displacement be observed notify the owner and determine required rectification actions to be undertaken.
- Inspect all pergolas, mesh screens, climbing structures and shelters annually. Should any rust, damage or structural issues be identified notify the owner and determine required rectification actions to be undertaken.

RECORD KEEPING

A log book will be required to be kept detailing the maintenance works undertaken. The records shall include details of materials and procedures used as well as time and method of application. A record of inclement weather should also be kept to verify inability to carry out work within the specified time frames. Monthly and annual maintenance reports will be prepared to track the results of the maintenance and detail any