Design Requirements for Block 1 Section 61 MU

Strathnairn

Version 1.0 | April 2024

Ginninderry

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Part 1: Introduction

The Ginninderry vision: an inspiring 21st century community

The Ginninderry community will be unique in our region. It extends across the ACT/NSW border to the west of Belconnen and is being developed by a Joint Venture between the ACT Suburban Land Agency (SLA) and Riverview Developments (ACT) Pty Ltd.

From the start, our vision for Ginninderry has been to build a community of international significance, with innovation, diversity and ecological criteria at its core. Now we're bringing this vision to life.

Setting the highest standards

The multi-unit site at Ginninderry will form part of a whole neighbourhood design.

The project team has established high expectations for Ginninderry, perhaps best illustrated by the project's accreditation as Canberra's first 6 Star Green Star Community, through the Green Building Council of Australia. To achieve this certification, we've shown that Ginninderry will be a worldleading community, exhibiting international best practice in urban design and development.

All residents at Ginninderry will benefit from a vast conservation corridor, well connected pedestrian and cycling pathways, tree lined streets and easy access to public transport.

Ginninderry aspires to be recognised as a world leader in sustainable development, delivering a community that is:

- better planned and designed
- more dynamic and vibrant
- a healthy place to live work and play
- productive and prosperous
- flexible, adaptable and resilient.

Innovative ideas and technologies

Like all communities, Ginninderry will evolve and change over time, and so too will building design technologies and materials. It is quite possible that innovative energy, comfort and cost outcomes may be achieved by using new technologies, practices and principles not contemplated in this document.

At the discretion of the Development Manager, mandatory requirements may be varied if better alternatives and solutions are proposed, that do not compromise the overall integrity of Ginninderry's design philosophy.

Part 2: Design Approval Process

Multi-unit designs at Ginninderry need to comply with the following:

- These Design Requirements
- Plans relating to this block in Part 4 Appendices
- Relevant Territory Plan District and Zone Policies (as applicable)
- Relevant District and Zone Technical Specifications and ACT Housing Design Guide (as applicable)

Compliance Bond

An important part of the Contract for Sale of land at Ginninderry is the requirement for the payment of a Compliance Bond at the time of settlement. The Compliance Bond is to ensure the adherence to these Design Requirements.

Minimum Requirements

The conditions for the return of the Compliance Bond are:

- The design(s) has been submitted to and approved by the Development Manager prior to building commencement.
- The multi-unit homes have been built to the approved design in accordance with the Design Requirements
- A letter from your solar installer certifying that the PV system with inverter and Home Energy Management System has been installed to comply with the Sustainability Requirements
- Any damage caused by the construction of the multi-unit site to the surrounding verges, street trees, footpath, services and adjoining land has been rectified to the satisfaction of Transport Canberra and City Services (TCCS) and our Development Manager
- All waste on the public verge and adjoining land has been removed
- The purchaser (builder) may not seek to transfer the compliance bond requirements to the ultimate owner of the dwelling(s)
- If found to be compliant, your full Compliance Bond will be returned

Part 3: Design Requirements

The following information outlines the Design Requirements for Block 1 Section 61 within Strathnairn.

Design Principle	Design Requirements
Public Domain Interface Provide legible and attractive interfaces that achieve passive surveillance to public streets and lane-ways.	Front doors of each dwelling are clearly visible from a public street or lane-way and include a covered entry feature or portico. Windows fronting a public road from habitable rooms, balconies or decks overlook the public domain. Courtyard walls are to be provided to comply with the Belconnen District Specification and are required to be coordinated with all service requirements, including clearance to any water meters and free access to any electrical meter boxes. Where development frontages are adjacent to open spaces, parks, public walkways or located on a corner, the following requirements apply: • Habitable rooms have windows to provide passive surveillance (i.e. no 'blank' facades) • Building entries and pathways are visible and legible from public domain.

Surveillance of Public Domain

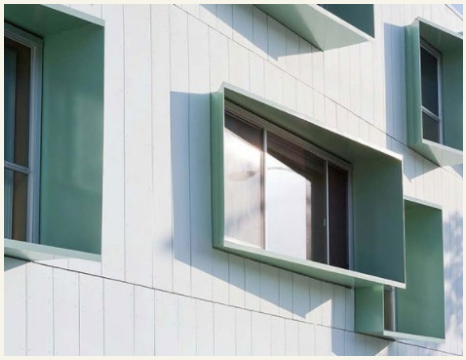
Clear entries behind courtyard walls

Design Principle	Design Requirements
Local Character and Context The built form, articulation and scale relates to the local character of the area and its context.	The design should sit comfortably with the Strathnairn Master plan. Block 1 Section 61 is situated on Pro Hart Avenue, the main arterial road through Strathnairn and should provide a high quality, well articulated and active street frontage to the public domain. The design should respond to its northern orientation with private and communal open spaces taking advantage of this orientation and linking to provide connection from the precinct to Pro Hart Avenue and the adjacent public open space to the West. The site's northern frontage is to Pro Hart Avenue, the main roadway through Strathnairn and into Macnamara. To the south, blocks 1-6 via Bob Whan Street with predominately single residential dwellings. A multi-unit site Block 2 Section 61 is located to the east and to the west is a small public open space area providing a pedestrian connection and an area of amenity from Macnamara through to Pro Hart Avenue
Landscape Design The landscape design requires healthy plant and tree growth space for medium and large sized trees.	Planting in open space areas must include either: - 1 x medium tree and 5 x large trees, or; - 9 x medium trees and 1 x large tree. Minimum planting area and dimensions - refer to Residential Zones Technical Specifications. The landscape plan proposes a combination of tree planting, for shade, mid height shrubs, lawn and ground covers. Include a mix of species that are appropriate for scale and shading. Synthetic or artificial grass is not permitted The verge areas between the front boundary of the land and the kerb must be turfed. Refer Appendix B for suggested Landscape Planting Palette.

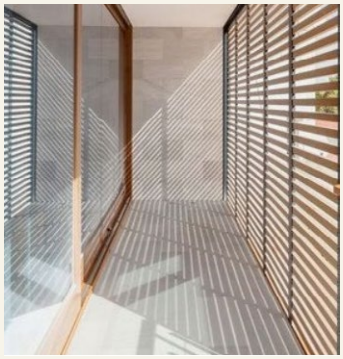
Courtyard spaces should allow natural light and cross-ventilation to living spaces

An example of a vertical greenwall to help soften small courtyard areas

Design Principle	Design Requirements
Visual Appearance and Façade Articulation To promote well designed buildings of high Architectural quality that contribute to the local character. The facades of the multi-unit homes must be designed as an integrated pack to provide an consistent streetscape.	The development is to incorporate articulation to frontages. The following elements help provide functional articulation. The design must demonstrate how it responds to the following elements: • Covered entry feature or portico is mandatory • A balcony, deck, pergola, terrace, or veranda • Extruded box window treatments • Bay windows • Awnings, sunhood, and louvres • Eaves • Access ramps as required The overall streetscape must have a light base colour as the prominent wall finish with light weight cladding and include a mix of materials to provide articulation. Double storey designs must incorporate balconies at bookends/ corners with a combination of solid and perforated metal or glass balustrades. Facade glazing to street frontages must be more vertical in proportion with mullion spacing less than 1.0m. Openings of 2.4m wide or more must be a minimum of 3 panels. Metal profile cladding systems or FC style boards with profile widths of a maximum 200mm are encouraged.



Sunhood and Awning



Light filled screened balconies.

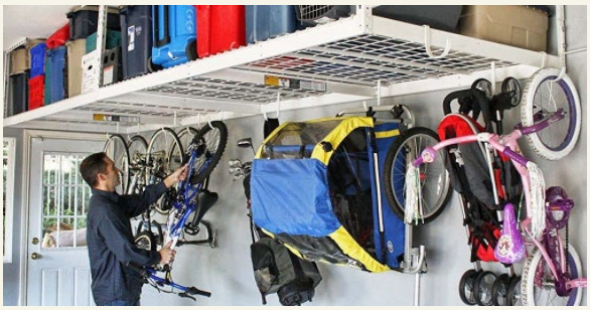
Clearly articulated facades add value and character to the streetscape

Passive Surveillance with articulated and screened balconies

Clearly articulated facades add value and character to the streetscape

Design Principle	Design Requirements
Visual Appearance and Articulation to Corners	Refer to the block planning controls. Articulation elements such as balconies, blade walls, pergolas, sunhoods, awnings, façade treatments, material use and expressed structure are required to add visual interest and avoid large blank wall planes to prominent corners. Buildings may need to be stepped back further on corners to permit balconies, glazing and larger eaves without encroachment into secondary front setbacks. All materials must wrap around the corner dwellings by at least 4 metres.
Roof Form	The roof treatments are integrated into the building design and positively respond to open space and laneway and provide for individual expression for each dwelling. The roof form must consider how to integrate the solar panels. Lights and ventilation systems are integrated into the roof design. • Gable roof – minimum 25 degrees if visible • Skillion – 10 to 15 degrees minimum if visible
Roofing Materials	Metal profile roof sheeting only. Refer to Approved Colours and Finishes palette Part 4.
Eaves, Awnings and Sunhoods	Minimum 450mm eaves required. Any windows that are not protected by an eave , i.e Parapet walls, require awnings or sunhoods, except south facing windows.
Mailbox	Mailboxes should be incorporated into a courtyard wall (where permitted). Standalone mailboxes must compliment the home and must be constructed of masonry such as smooth face brick, stone faced masonry, rendered or bagged masonry or natural stone. Any pre-fabricated stand alone mailboxes must be of a high quality and may only be approved on merit.
Bush Fire Requirements	There are no bush fire requirements within Strathnairn
Energy Efficiency Rating	A minimum NatHERS rating of 7.0 is required for each dwelling.
Zoning	Zone RZ3.
Building Height	Up to 2 storeys permitted.
Building Front Setback	Refer to Territory Plan District and Zone Policies, and; District and Zone Technical Specifications and ACT Housing Design Guide (as applicable).
Fencing & Courtyard Walls	Refer to Belconnen District Specification & Fencing Controls Plan.
PPOS Requirements	Refer to Territory Plan District and Zone Policies, and; District and Zone Technical Specifications and ACT Housing Design Guide (as applicable).

Design Principle	Design Requirements
Natural Ventilation	All habitable rooms must be naturally ventilated.
Dwelling Size and Layout	The dwelling has sufficient area to ensure the layout of rooms are functional, well organised and provide a high standard of amenity. Minimum Net Living Areas (NLA's) • 1 bed = 50m² • 2 bed = 70m² • 3+ bed = 95m² Kitchens are not part of circulation spaces such as hallways.
Garage and Garage Doors	Consider the use of masonry base elements to corners of garages and lightweight elements where appropriate. Provide panel lift or tilt up garage doors. Roller doors are not permitted.
Storage	Multi-unit designs must provide adequate internal storage for each unit. Minimum internal dwelling storage: • Studio dwellings = 2m² • 1 bed dwellings = 3m² • 2 bed dwellings = 4m² • 3+ bed dwellings = 5m² Refer to Residential Zones Specifications
End or Trip Facilities	Onsite bicycle parking and access pathway is to be provided in accordance with Residential Zones Specification. The following minimum bicycle parking spaces are to be provided: - 1 space per 2 bed dwelling - 2 spaces per 3+ bed dwelling - 1 space per 10 dwellings for visitors



Garage storage solutions

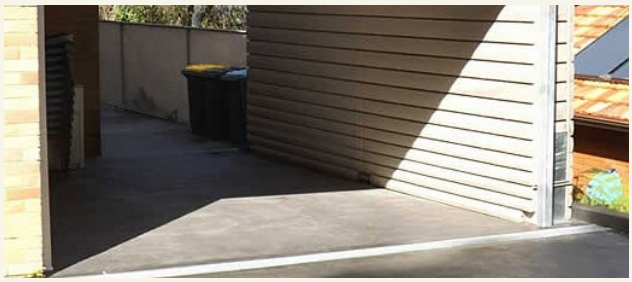
Bicycle storage solutions

Laundry linen storage

Design Principle	Design Requirements
Bin Locations	Storage for three bins must be provided including general waste, recycling and green waste. Bin locations should be integrated with the dwelling designs and screened from public view. Kitchen design must allow for easy waste separation.
Ceiling Heights	Ceiling heights are to achieve sufficient natural ventilation and provide daylight access and spatial quality. Minimum ceiling heights: • 2.7m to ground floor habitable rooms • 2.7m to upper floor living areas • 2.5m to upper level bedrooms
Glazing	uPVC or thermally broken aluminum double glazing is required to all external windows and doors.
Home Energy Systems	Dwellings must be all-electric with no mains or bottled gas connections. A PV System with a Home Energy Management System and compatible inverter must be installed for all dwellings under the following provisions: a. Minimum PV size: • 1-2 bedroom 3kW • 3 bedroom+ 4kW b. Home Energy Systems must be a Reposit Power (battery is required) or Evergen. c. The solar inverter must be compatible with the chosen Home Energy Systems above. d. Where PV panels are located on a roof section fronting a street, they must be installed flush with the roof. e. All hardware components must be installed by a certified Solar Accreditation Australia installer.
Appliances and Fixtures	Induction cooktops must be provided to all dwellings. All appliances, water fixtures and fittings must have a minimum 4 star rating under the water efficiency labeling and standards (WELS) scheme and (where required) a 4 star energy rating under the energy rating label (Energy Efficiency Rating) scheme. This includes showerheads, tap ware, toilets, fridges, freezers, washing machines, dryers and any other appliance provided with the dwelling.

Design Principle	Design Requirements
Hot Water Systems	All dwellings must have a solar or heat pump hot water system installed. Roof top solar water collectors are not permitted on the roof fronting the street. Consideration must be given to the location of any tank including screening or placement within a cupboard or garage space. Hot water systems must be climate appropriate and have temperature application range down to -5 degrees ambient air temperature.
Heating and Cooling	Passive heating and cooling must be considered for all dwellings including ceiling fans and thermal mass) If Mechanical heating and/ or cooling systems are installed they must be: a. reverse cycle air conditioning with: • Energy Efficiency Rating of 3.1 or higher for cooling cycle • Coefficient of Performance of 3.5 or higher for heating cycle • Outdoor unit with sound pressure level of 57dBA or lower for heating and cooling cycle b. air conditioning with a cooling cycle only that achieves an Energy Efficiency Rating of 3.1 or higher c. ducted evaporative cooling with self-closing damper d. ground source heat pump. Considerations must be given to the location of any outdoor fan coil unit including screening and compliance with ACT EPA noise requirements.
Rainwater Tanks	Minimum requirement as per Residential Zones Specification. Please consider addition Water Sensitive Urban Design and Rainwater tank provisions for soft planting and environmental purposes.

Narrow style rainwatrer tanks can be used where space requirements are restrictive



Rainwater tanks incorporated into a carport design shows clever and effective use of small spaces

Design Principle	Design Requirements
Electric Vehicle (EV) Charging	One EV Ready charging point per dwelling with: • 10 Amp General Power Outlet (GPO) single phase socket with electrical cabling/wiring capacity rated to 32 Amp single phase. • Wiring installed from the EV charger position to individual switchboard • Space for double-width circuit breaker in switchboard • Data cabling (home ethernet data point) to be provided next to the GPO with the ability to be patched/ connected with home NBN router. If any future higher specification requirements are provided by the National Construction Code or ACT Government Territory Plan, the requirements from the National Construction Code or ACT Government Territory Plan take precedence.
Retaining Walls Extensive earthworks should be limited where possible to minimise the extent of retaining wall costs and the visual impacts to the streetscape.	**Minimum Requirements:** • The height of site cuts along the side boundaries with attached neighbouring wall cannot exceed 500mm in height • Retaining wall forward of the front building line must be constructed from the following materials at the discretion of the Ginninderry Development Manager - Approved face brick - Approved rendered masonry - Approved brickwork such as split face, honed or shot blast finishes - Approved stone faced masonry - Approved reinforced concrete finishes • Timber, concrete sleepers or prefabricated modular systems are not permitted forward of the building line. • Retaining walls alongside boundaries forward of the building line must be tapered or stepped in line with the finished ground level at the front boundary. • Where there are services such as water, electrical, communications, sewer and storm water, detailed coordination of all courtyard wall locations and associated services must be considered in the initial design process.

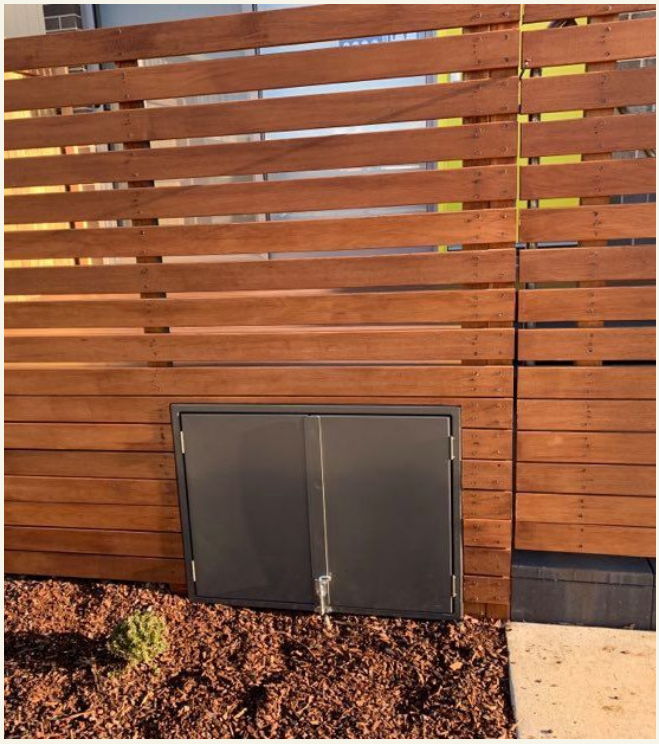
Arch split face block

Streetscape

Well articulated dwelling designs provide a functional and more attractive streetscape

Design Principle	Design Requirements
Vehicle Access	Block 1 Section 61 is to be accessed via Holzheimer Street. **Minimum Requirements:** • Driveways must be constructed from either - plain concrete or - maximum 5% Oxide finish
Services and ancillary structures	Services such as water, electricity meter boxes, NBN and home energy system cabinets can have an adverse impact on the overall streetscape if not considered as part of the overall design. The location of the above services will be required to be shown on the site plan as part of the design approval process. **Minimum Requirements:** • Water, electricity meter boxes, NBN and home energy system cabinets must be integrated into the front façade and located away from the front door • Solar panels must sit flush with the roof line if located to the street frontages of the dwellings • Storage tank for solar HWS is not permitted to be mounted on the roof fronting the street • Aerials, satellite dishes, antennae, heat pumps, A/C units and evaporative units are to be located to the rear of the dwellings and must not be visible from the street. • Clothes drying lines and garbage bins are to be located to the rear of the terraces. If they are located to the side of the house within the Primary Building zone, they must be screened from public view. • Sheds, outdoor structures are to be located to the rear of the terraces and away from public view.
Dog and Cat containment	**Minimum Requirements:** Suburbs within Ginninderry are Cat Containment and Dog on Leash areas. Designs should give consideration to responsible pet ownership principles including the use of enclosures or cat runs. More information can be obtained at: https://www.cityservices.act.gov.au/pets-and-wildlife/domestic-animals/cats/cat-containment • Dogs must remain on leash in public areas except within designated un-leashed areas such as dog parks. • Dogs are not permitted in the conservation corridor.

Cat containment



Integrated water meter details within courtyard walls

Site location map

Part 4:
Appendix A

Landscape Concept Planting Palette

Edible Plants

Below is a list of edible plants that Ginninderry encourages you to plant when landscaping your garden.

Code	Botanical Name	Common Name	Mature Plant Size	Container Size	Spacing
Small Trees					
Mad	Malus domestica	Apple	3m x 3m	100L	-
Pyc	Prunus cerasifera	Cherry Plum	5m x 5m	100L	-
PrpA	Prunus persica 'Anzac'	Australian Peach	4m x 4m	100L	-
PrsAB	Prunus salicina 'Angelina Burdett'	Plum	4-10m x 2-4m	100L	-
Large Shrubs					
Cil	Citrus limon 'Meyer'	Meyer Lemon	3m x 2m	25L/300mm	1.5/m²
Fes	Feijoa sellowiana	Pineapple Guava	4m x 2m	25L/300mm	1.5/m²
Mia	Microcitrus australasica	Finger Lime	4m x 2m	25L/300mm	1.5/m²
Small Shrubs					
Roo	Rosemarinus officinalis	Rosemary	0.5-1.5m x 1m	5L/200mm	3/m²
Vac	Vaccinium corymbosum	Blueberry - Blue Rose	1-2m x 1-2m	5L/200mm	3/m²
Cij	Citrus japonica	Kumquat	2-3m x 3m	5L/200mm	3/m²
Groundcovers/ Climbers					
Fra	Fragaria ananassa	Strawberry	0.3m H	2.5L/150mm	4/m²

Small Trees

Malus domestica

Malus domestica – fruit

Prunus cerasifera

Prunus persica

Prunus salicina - fruit

Large Shrubs

Citrus limon

Feijoa sellowiana

Microcitrus australasica

Groundcovers

Fragaria ananassa

Small Shrubs

Rosemarinus officinalis

Vaccinium corymbosum

Citrus japonica

Ginninderry

Landscape Concept Planting Palette

Native Plants

Below is a list of native plants that Ginninderry encourages you to plant when landscaping your garden.

Code	Botanical Name	Common Name	Mature Plant Size	Container Size	Spacing
Large Shrubs (Hedging)					
BNm	Banksia marginata	Silver Banksia	5m x 3m	25L/300mm	1.5/m²
BNsp	Banksia spinulosa	Hairpin Banksia	3m x 3m	25L/300mm	1.5/m²
Cbf	Callistemon 'Great Balls of Fire'	Bottlebrush	2m x 2m	25L/300mm	1.5/m²
Ckp	Callistemon 'King's Park Special'	Bottlebrush	2-4m x 3-4m	25L/300mm	1.5/m²
Cra	Callistemon viminalis 'Red Alert'	Creek Bottlebrush	4m x 2m	25L/300mm	1.5/m²
Gpp	Grevillea 'Poorinda Peter'	Poorinda Peter Grevillea	3m x 4m	25L/300mm	1.5/m²
Gpq	Grevillea 'Poorinda Queen'	Poorinda Queen Grevillea	3m x 4m	25L/300mm	1.5/m²
Gho	Grevillea 'Red Hooks'	Red Hooks Grevillea	3m x 4m	25L/300mm	1.5/m²
Small Shrubs					
Anf	Anigozanthus 'Bush Gem'	Kangaroo Paw	0.6m x 1m	5L/200mm	3/m²
BKl	Baeckea linifolia	Flax-leaf Heath Myrtle	1-2.5m x 0.5-2m	5L/200mm	3/m²
Gco	Grevillea confertifolia	Dense-leaf Grevillea	2m x 1-2m	5L/200mm	3/m²
Gla	Grevillea lanigera	Wooly Grevillea	0.5-1m x 1-2m	5L/200mm	3/m²
Wab	Westingia sp. 'Aussie Box'	Coast Rosemary	1.5m x 1.5m	5L/200mm	3/m²
Small Shrubs (Hedging to Frontage)					
Cvc	Callistemon viminalis 'Captain Cook'	Bottlebrush		5L/200mm	3/m²
Etm	Philotheca myoporoides	Long-leaf Waxflower	1.5-2m x 2m	5L/200mm	3/m²
Gba	Grevillea baueri	Bauer's Grevillea	0.6-1.5m x 2m	5L/200mm	3/m²
Wew	Westingia fruticosa 'Grey Box'	Coastal Rosemary	2m x 4m	5L/200mm	3/m²
Groundcover/Climbers					
Acc	Acacia cognata 'limelight'	Dwarf River Wattle	0.5m x 1m	2.5L/150mm	4/m²
Asfp	Astartea fascicularis	Winter Pink	0.3m x 1.5m	2.5L/150mm	4/m²
BNsp	Banksi spinulosa 'Birthday Candle'	Birthday Candle Banksia	0.5m x 1.5m	2.5L/150mm	4/m²
BRm	Brachyscome multifida	Rock Daisy	0.3m x 1.5m	2.5L/150mm	4/m²
Coc	Convolvulus cneorum	Bush Morning Glory	0.6m x 1m	2.5L/150mm	4/m²
Gbr	Grevillea sp. 'Bronze Rambler'	Bronze Rambler Grevillea	0.3m x 2m	2.5L/150mm	4/m²

Hav	Hardenbergia violacea	Purple Coral Pea	3m x 1m	2.5L/150mm	4/m²
Myp	Myoporum parvifolium	Creeping Boobialla	0.2m x 2m	2.5L/150mm	4/m²
RHs	Rhagodia spinescens 'Aussie Flat Bush'	Aussie Flat Bush	0.3-0.5m x 1m	2.5L/150mm	4/m²
Vih	Viola hederacea	Australian Native Violet	0.1m x 0.5m	2.5L/150mm	4/m²
Grasses					
Dlc					
Dic	Dianella caerulea 'Cassa Blue'	Cassa Blue Flax Lily	0.7m x 1m	Growtube	6/m²
Dll	Dianella longifolia	Pale Flax Lily	0.6m x 0.4m	Growtube	6/m²
Dlr	Dianella revoluta	Black Anther Flax Lily	0.5m x 0.5m	Growtube	6/m²
Dlt	Dianella tasmanica	Blue Flax Lily	0.7m x 1m	Growtube	6/m²
LDlC	Lomandra longifolia 'Cassica'	Cassica Mat Rush	1.2m x 0.8m	Growtube	6/m²
LDlT	Lomandra longifolia 'Tanika'	Tanika Mat Rush	0.5m x 0.5m	Growtube	6/m²
POAlE	Poa labillardieri	Tussock Grass	0.6m x 0.4m	Growtube	6/m²
THt	Themeda triandra	Kangaroo Grass	1m x 0.5m	Growtube	6/m²

Large Shrubs (Hedging)

Banksia marginata

Banksia spinulosa

Callistemon ‘Balls of Fire’

Callistemon ‘Kings Park’

Callistemon ‘Red Alert’

Grevillea ‘Poorinda Peter’

Grevillea ‘Poorinda Queen’

Grevillea ‘Red Hooks’

Small Shrubs

Angiozanthus 'Bush Gem'

Baeckea linifolia

Grevillea confertifolia

Grevillea lanigerav

Small Shrubs (Hedging to Frontage)

Callistemon viminalis

Philotheca myoproides

Grevillea baueri

Westringia 'Grey Box'

Groundcover/Climbers

Acacia cognata 'Limelight'

Astartea fascicularis

Banksia 'Birthday Candles'

Brachyscome multifida

Convolvulus cneorum

Grevillea 'Bronze Rambler'

Hardenbergia violacea

Myoporum parvifolium

Rhagodia spinescens

Viola hederacea

Grasses

Camellia sasanqua

Cupressus sp.

Michelia figo

Thuja sp.

Viburnum tinus

Lomandra ‘Tanika’

Poa labillardieri

Themeda triandra

Ginninderry

Landscape Concept Planting Palette

Exotic Plants

Below is a list of exotic plants that Ginninderry encourages you to plant when landscaping your garden.

Code	Botanical Name	Common Name	Mature Plant Size	Container Size	Spacing
Small trees/Large Shrubs					
Acb	Acer buergeranum	Trident Maple	5m x 3m	100L	
Acj	Acer japonicum	Japanese Maple	5m x 5m	100L	
Cil	Citrus x Lemon	Lemon	-	25L/300mm	1.5/m2
Cra	Cordyline Australis	Cabbage Tree	2m x 1.5m	5L/200mm	3/m²
CNc	Cornus capitata	Evergreen Dogwood	3m x3m	25L/300mm	1.5/m²
Dyk	Diospyros kaki	Japanese Persimmon	6-8m x 6m	100L	-
Dia	Dicksonia antarctica	Soft Tree Fern	2-4m x 2.5m	25L/300mm	-
Kop	Koelreuteria paniculata	Golden Rain Tree	5m x 8m	100L	-
Lai	Lagerstroemia indica	Crepe Myrtle	3m x 2m	25L/300mm	-
MGl	Magnolia grandiflora 'Little Gem'	-	6m x 3m	100L	-
Mgso	Magnolia soulangeana	Saucer Magnolia	4m (h)	100L	-
Mgst	Magnolia stellata	Star Magnolia	4-6m x 4.5m	100L	-
Pcp	Prunus cerasifera 'Pissardii'	Cherry Plum	5m x 5m	100L	-
Pcs	Prunus cerasifera 'Spire'	Black Cherry Plum	6m x 2m	100L	-
Pyc	Pyrus calleryana	Ornamental Pear	11m x 4m	100L	-
Large Shrubs (Hedging)					
CAMs	Camellia sasanqua	Sasanqua Camellia	4m x 3m	25L/300mm	1.5/m²
Cup	Cupressus sp.	Cypress Sp.	-	25L/300mm	-
Eiv	Escallonia sp. 'Iveyi'	Escallonia	3m x 3m	25L/300mm	1.5/m²
MIf	Michelia figo	Port Wine Magnolia	2m x 2m	25L/300mm	1.5/m²
Pitt	Pittosporum tenuifolium 'Green Pillar'	Pittosporum	3m x 2m	25L/300mm	1.5/m2
Pla	Prunus lauocerasus	Cherry Laurel	5m x 3m	25L/300mm	-
Plu	Prunus lusitanica	Portugese Laurel	4m x 2m	25L/300mm	-
THj	Thuja Sp.	Cedar Sp.	-	25L/300mm	-
VIO	Viburnum odoratissimum	Sweet Viburnum	4-6m x 4m	25L/300mm	1.5/m²
VIT	Viburnum tinus	Lauristinus	3m x 3m	25L/300mm	1.5/m²

Small Shrubs					
Azs	Azalea sp.	Azalea		5L/200mm - 25L/300mm	3/m²
Bey	Beschorneria yuccoides	Mexican Lily	1-1.5m x 1-2m	25L/300mm	-
Epp	Escallonia sp. 'Pink Pixie'	Escallonia	0.8m x 0.8m	5L/200mm	3/m²
LVA	Lavandula angustifolia	White English Lavender	0.3m x 0.3m	5L/200mm	3/m²
LOn	Lonicera nitida	Dwarf Honeysuckle	2m x 3m	25L/300mm	1.5/m²
NNn	Nandina domestica 'Nana'	Dwarf Screen Bamboo	0.3m x 2m	5L/200mm	3/m²
Small Shrubs (Hedging to Frontage)					
ABg	Abelia grandiflora	Glossy Abelia	1.5m x 1.2m	5L/200mm	3/m²
BUs	Buxus sempervirens	English Box	2m x 1m	5L/200mm	3/m²
CYt	Choisya ternata	Mexican Orange Blossom	1.5m x 1.5m	25L/300mm	1.5/m²
Erk	Escallonia sp. 'Red Knight'	Escallonia	1.5m x 1.5m	25L/300mm	1.5/m²
GAf	Gardenia augusta 'Florida'	Gardenia Florida	1-1.5m x 1m	5L/200mm	3/m²
Groundcovers/Climbers					
AJr	Ajuga reptans	Common Bugle	0.1m x 0.3m	2.5L/150mm	4/m²
COPk	Coprosma x kirkii	Mirror Plant	0.6m x 1m	2.5L/150mm	4/m²
HEc	Hedera canariensis (green form only)	Canary Island Ivy	n/a	2.5L/150mm	4/m²
HYc	Hypericum calycinum	Aaron's Beard	0.3m x 0.5m	2.5L/150mm	4/m²
RSl	Rosmarinus lavandulaceus	Creeping Rosemary	0.3m x 0.3m	2.5L/150mm	4/m²
TRj	Trachelospermum jasminoides	Chinese Star Jasmine	n/a	2.5L/150mm	4/m²
VIa	Vitis amurensis	Ornamental Grape Vine	n/a	2.5L/150mm	-
Grasses					
LIEg	Liriope 'Evergreen Giant'	Evergreen Giant Lily	0.4m x 0.7m	Growtube	6/m²
Opn	Ophiopogon planiscapus 'Nigrescens'	Black Mondo Grass	0.2m x 0.8m	Growtube	6/m2

Grasses

Liriope 'Evergreen Giant'

Ophiopogon 'Nigrescens'

Small Trees/ Large Shrubs

Acer buergeranum

Acer japonicum

Citrus x limon

Cordyline australis

Cornus capitata

Diospyros kaki

Koelreuteria paniculata

Lagerstroemia indica

Magnolia grandiflora

Magnolia soulangeana

Magnolia stellata

Prunus cerasifera ‘Pissardii’

Prunus cerasifera ‘Spire’

Ptrus calleryana

Large Shrubs (Hedging)

Camellia sasanqua

Cupressus sp.

Michelia figo

Thuja sp.

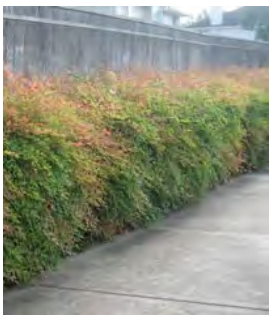
Viburnum tinus

Small Shrubs

Camellia sasanqua

Cupressus sp.

Michelia figo



Thuja sp.

Viburnum tinus

Small Shrubs (Hedging to Frontage)

Abelia grandiflora

Buxus sempervirens

Choisya ternata

Gardenia augusta

Groundcover/Climbers

Ajuga repens

Coprosma x 'Kirkii'

Hedera canariensis

Hypericum calycinum

Rosmarinus lavandulaceus

Trachelospermum sp.

Vitis amurensis

Ginninderry

Pest Plant List

Not for use at Ginninderry

Botanical Name	Common Name	Reason
Ailanthus altissima	Tree of Heaven	Declared pest plant of the ACT
Alnus glutinosa	Black Alder	Declared pest plant of the ACT
Alternanthera philoxeroides	Alligator Weed	Declared pest plant of the ACT
Andropogon gayanus	Gamba Grass	Declared pest plant of the ACT
Annona glabra	Pond Apple	Declared pest plant of the ACT
Anredera cordifolia	Madeira Vine	Declared pest plant of the ACT
Asparagus aethiopicus	Ground Asparagus Fern	Declared pest plant of the ACT
Asparagus africanus	Climbing Asparagus Fern	Declared pest plant of the ACT
Asparagus asparagoides	Bridal Creeper	Declared pest plant of the ACT
Asparagus asparagoides Western Cape Form	Bridal Creeper – Western Cape Form	Declared pest plant of the ACT
Asparagus declinatus	Bridal Veil	Declared pest plant of the ACT
Asparagus plumosa	Climbing Asparagus Fern	Declared pest plant of the ACT
Asparagus scandens	Asparagus Fern	Declared pest plant of the ACT
Austrocylindropuntia (ALL species)	Coral Cacti	Declared pest plant of the ACT
Cabomba caroliniana	Cabomba	Declared pest plant of the ACT
Carduus nutans	Nodding Thistle	Declared pest plant of the ACT
Carduus pycnocephalus	Slender Thistle	Declared pest plant of the ACT
Carduus tenuiflorus	Slender Thistle	Declared pest plant of the ACT
Carthamus lanatus	Saffron Thistle	Declared pest plant of the ACT
Celtis australis	Nettle Tree	Declared pest plant of the ACT
Centaurea maculosa	Spotted Knapweed	Declared pest plant of the ACT
Chrysanthemoides monilifera	Bitou Bush / Boneseed	Declared pest plant of the ACT
Cortaderia jubata	Pampas Grass	Declared pest plant of the ACT
Cortaderia selloana	Pampas Grass	Declared pest plant of the ACT
Cotoneaster franchettii	Cotoneaster	Declared pest plant of the ACT
Cotoneaster glaucophyllus	Cotoneaster	Declared pest plant of the ACT
Cotoneaster pannosus	Cotoneaster	Declared pest plant of the ACT
Cotoneaster salicifolius	Willow-leaf Cotoneaster	Declared pest plant of the ACT
Cotoneaster simonsii	Cotoneaster	Declared pest plant of the ACT

Botanical Name	Common Name	Reason
Crataegus monogyna	Hawthorn	Declared pest plant of the ACT
Cryptostegia grandiflora	Rubber Vine	Declared pest plant of the ACT
Cylindropuntia (ALL species)	Pear Cacti	Declared pest plant of the ACT
Cytisus (ALL species)	Broom species	Declared pest plant of the ACT
Echium plantagineum	Paterson's Curse	Declared pest plant of the ACT
Echium vulgare	Viper's Bugloss	Declared pest plant of the ACT
Eichornia crassipes	Water Hyacinth	Declared pest plant of the ACT
Equisetum species	Horsetail	Declared pest plant of the ACT
Eragrostis curvula	African Love Grass	Declared pest plant of the ACT
Genista (ALL species)	Broom species	Declared pest plant of the ACT
Gymnocoronis spilanthoides	Senegal Tea Plant	Declared pest plant of the ACT
Hedera helix	English Ivy	Declared pest plant of the ACT
Hieracium aurantiacum	Orange Hawkweed	Declared pest plant of the ACT
Hieracium pilosella	Mouse-ear Hawkweed	Declared pest plant of the ACT
Hymenachne amplexicaulis	Hymenachne	Declared pest plant of the ACT
Hypericum perforatum	St John's Wort	Declared pest plant of the ACT
Jatropha gossypiifolia	Bellyache Bush	Declared pest plant of the ACT
Kochia scoparia	Kochia	Declared pest plant of the ACT
Lagarosiphon major	Lagarosiphon	Declared pest plant of the ACT
Lantana camara	Lantana	Declared pest plant of the ACT
Ligustrum lucidum	Broad-leaf privet	Declared pest plant of the ACT
Ligustrum sinense	Narrow-leaf privet	Declared pest plant of the ACT
Lonicera japonica	Japanese Honeysuckle	Declared pest plant of the ACT
Lycium ferocissimum	African Boxthorn	Declared pest plant of the ACT
Macfadyena unguis-cati	Cat's Claw Creeper	Declared pest plant of the ACT
Mimosa pigra	Mimosa	Declared pest plant of the ACT
Miscanthus sinensis (ALL varieties)	Chinese Fairy Grass	Declared pest plant of the ACT
Myriophyllum aquaticum	Parrot's Feather	Declared pest plant of the ACT
Nasella tenuissima	Mexican Feather Grass	Declared pest plant of the ACT
Nassella charruana	Lobed Needlegrass	Declared pest plant of the ACT
Nassella neesiana	Chilean Needle Grass	Declared pest plant of the ACT
Nassella trichotoma	Serrated Tussock	Declared pest plant of the ACT
Onopordum acanthium	Scotch Thistle	Declared pest plant of the ACT
Onopordum illyricum	Illyrian Thistle	Declared pest plant of the ACT
Opuntia (ALL species) (excludes O. ficus-indica)		
Prickly Pears	Declared pest plant of the ACT	
Parkinsonia aculeata	Parkinsonia	Declared pest plant of the ACT
Parthenium hysterophorus	Parthenium Weed	Declared pest plant of the ACT
Pennisetum setaceum	African Fountain Grass	Declared pest plant of the ACT

Botanical Name	Common Name	Reason
Phyllostachys aurea	Yellow Bamboo	Declared pest plant of the ACT
Pinus radiata	Radiata Pine	Declared pest plant of the ACT
Pistia stratiotes	Water Lettuce	Declared pest plant of the ACT
Populus alba	White Poplar	Declared pest plant of the ACT
Populus nigra 'Italica'	Lombardy Poplar	Declared pest plant of the ACT
Prosopis spp.	Mesquite	Declared pest plant of the ACT
Pyracantha angustifolia	Firethorn	Declared pest plant of the ACT
Pyracantha coccinea	Scarlet Firethorn	Declared pest plant of the ACT
Pyracantha fortuneana	Firethorn	Declared pest plant of the ACT
Robinia pseudoacacia	False Acacia	Declared pest plant of the ACT
Rosa rubiginosa	Sweet Briar, Briar Rose	Declared pest plant of the ACT
Rubus fruticosus (aggregate) All species except for the permitted cultivars: R. armeniacus and R. ulmifolius species hybrid R. armeniacus species hybrid R. ursinus and R. armeniacus species hybrid	All Blackberry except for the permitted cultivars: Black Satin, Chester Thornless, Dirksen Loch Ne and Chehale.	Declared pest plant of the ACT
Sagittaria platyphylla	Sagittaria	Declared pest plant of the ACT
Salix ALL species of willow, except for the permitted species: Salix babylonica S. babylonica S. caladendron S. reichardtii	All Willows except for the permitted species: Weeping Willow Weeping Willow Pussy Willow Sterile Pussy Willow	Declared pest plant of the ACT
Salvinia molesta	Salvinia	Declared pest plant of the ACT
Senecio madagascariensis	Fireweed	Declared pest plant of the ACT
Solanum elaeagnifolium	Silverleaf Nightshade	Declared pest plant of the ACT
Sorbus sp.	Service Tree, Rowan	Declared pest plant of the ACT
Spartium junceum	Spanish Broom	Declared pest plant of the ACT
Tamarix aphylla	Athel Pine	
Toxicodendron succedaneum	Rhus Tree	Declared pest plant of the ACT
Ulex europaeus	Gorse	Declared pest plant of the ACT
Vinca major	Periwinkle	Declared pest plant of the ACT
Xanthium occidentale	Noogoora Burr	Declared pest plant of the ACT
Xanthium spinosum	Bathurst Burr	Declared pest plant of the ACT
Landscaping Plant Species		
Agapanthus species	Agapanthus	Multiple varieties where the seed is easily distributed and forms dense monocultures in conservation areas

Botanical Name	Common Name	Reason
Nandina domestica	Sacred Bamboo	Berries toxic to birds, seed easily distributed into the conservation zone
Photinia species	Photinia	Seed easily distributed into conservation zone
Wisteria sinensis	Chinese Wisteria	Spread by seed, particularly along established waterways

Appendix B

Ginninderry

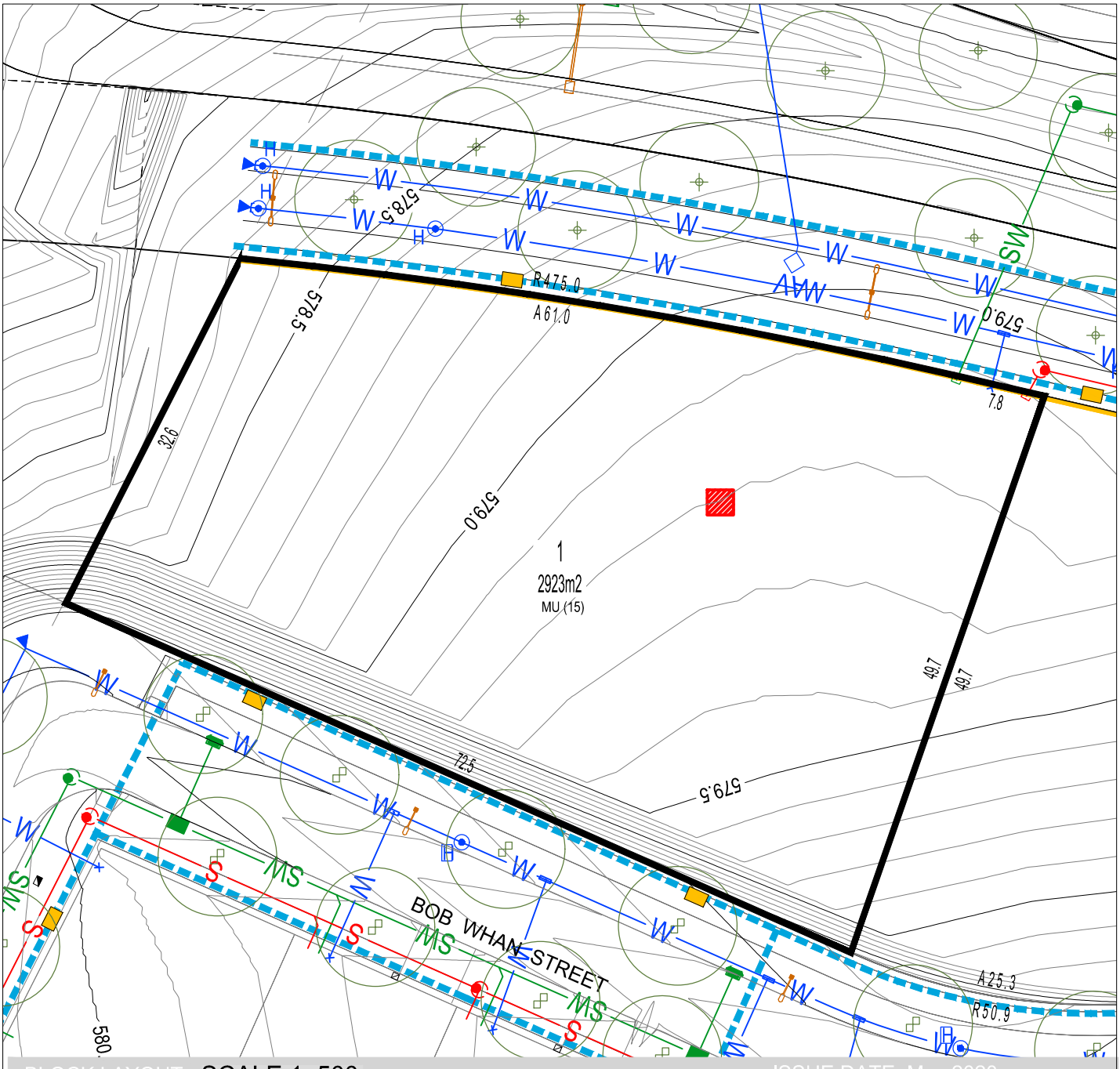
BDP 2B3

Stage

Section 61 (AR)

Block 1 (a)

Block Disclosure Plan



BLOCK LAYOUT - SCALE 1: 500 ISSUE DATE: May 2020

LEGEND

- LOT BOUNDARY
- EASEMENT
- 550.0 CONTOUR 0.5m INTERVAL
- CONTOUR 0.1m INTERVAL
- RETAINING WALL
- SEWER MAINTENANCE ACCESS ROUTE REQUIRED
- SEWER MAIN / MANHOLE / TIE
- STORMWATER MAIN / SUMP / MANHOLE / TIE
- WATER MAIN / STOP VALVE / HYDRANT / TIE
- WATER MAIN (IRRIGATION)
- REINFORCED CONCRETE DRIVEWAY BY PURCHASER
- POTENTIALLY NOISE AFFECTED BLOCK
- P ONLY ONE (1) ONSITE PARKING SPACE REQUIRED
- SERVICES TRENCH
- NBNCo. PIT
- STREETLIGHT / OPEN SPACE PEDESTRAIN LIGHTING
- ABOVE GROUND MINIPILLAR
- IN GROUND MINIPILLAR
- FRONT FENCING AND WALLS BY DEVELOPER
- WASTE COLLECTION POINT
- SUBSTATION
- STREET TREES
- 1.0 GARAGE OFFSET FROM REAR BOUNDARY
- # BLOCK SUBJECT TO MID-SIZED PROVISIONS
- MANDATORY LOT CONTROL - WALL INDENT FOR WATER METER

PLEASE NOTE: INFORMATION SHOWN IN THIS DRAWING IS PRELIMINARY ONLY, AND SUBJECT TO CHANGE PRIOR FINAL DESIGN
REFER ALSO TO PLANNING CONTROLS PLAN AND FENCING CONTROLS PLAN

Appendix C

FOR CONTINUATION REFER TO DRAWING 16-001983-SG.3+

LEGEND

- STAGE 2 EDP BOUNDARY
- PUBLIC LAND RESERVE BOUNDARY
- RETAINING WALL
- 620.0 — SITE REGRADING - NEW CONTOURS (1.0m CONTOUR INTERVAL)
- 620.0 — EXISTING CONTOURS (1.0m CONTOUR INTERVAL)
- GRADING LIMITS
- TREES RETAINED
- TREES TO BE REMOVED
- EXISTING 132 KV POWER LINE AND EASEMENT
- NOT PART OF STAGE 2 DA
- CUT DEPTH GREATER THAN 5.5m
- CUT DEPTH 5.0m TO 5.5m
- CUT DEPTH 4.5m TO 5.0m
- CUT DEPTH 4.0m TO 4.5m
- CUT DEPTH 3.5m TO 4.0m
- CUT DEPTH 3.0m TO 3.5m
- CUT DEPTH 2.5m TO 3.0m
- CUT DEPTH 2.0m TO 2.5m
- CUT DEPTH 1.5m TO 2.0m
- CUT DEPTH 1.0m TO 1.5m
- CUT DEPTH 0.5m TO 1.0m
- CUT DEPTH 0.0m TO 0.5m
- FILL DEPTH 0.0m TO 0.5m
- FILL DEPTH 0.5m TO 1.0m
- FILL DEPTH 1.0m TO 1.5m
- FILL DEPTH 1.5m TO 2.0m
- FILL DEPTH 2.0m TO 2.5m
- FILL DEPTH 2.5m TO 3.0m
- FILL DEPTH 3.0m TO 3.5m
- FILL DEPTH 3.5m TO 4.0m
- FILL DEPTH 4.0m TO 4.5m
- FILL DEPTH 4.5m TO 5.0m
- FILL DEPTH GREATER THAN 5.0m

PLANNING AND DEVELOPMENT ACT 2007

APPROVAL GRANTED

SUBJECT TO THE CONDITIONS SET OUT IN THE NOTICE OF DECISION PURSUANT TO SECTION 162

Delegate name DALE BILLING

Date 4/6/2019

SURVEY PROVIDED BY LANDData SURVEYS
DATE OF SURVEY OCTOBER 2016

NOTE

THIS DRAWING INDICATES PRELIMINARY GRADING ONLY.

		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		SB	JK			10/10/2017	
AMENDMENTS							
	A	SB	JK			13/02/2018	ROAD 150 AMENDMENTS
	B	SB	JK			24/07/2018	PROJECT TITLE AMENDED, BLOCK CHANGES IN SECTIONS AY,BC,BD, ROADS 232, 150 AMENDED
	C	PL	JG			07/05/2019	STAGE 2 BDY LINE AMENDED

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RobertsDay planning·design·place

GROUPGSA

Cia landscapes + colour

WAE No.

PROJECT No.

A3 PLOT SCALE (METRES) A1 PLOT
1:2000 10 5 0 10 20 30 40 50 1:1000

CONSULT AUSTRALIA

CLIENT: Ginninderry

PROJECT: GINNINDERRY ESTATE AT STRATHNAIRN
STAGE 2 - ESTATE DEVELOPMENT PLANS

calibre CONSULTING www.calibreconsulting.co

DRAWING TITLE: FILL PLAN
SHEET 1 OF 6

DRAWING NUMBER: 16-001983-SG.1+ PLAN No: 27.1 AMEND. C

FOR CONTINUATION REFER TO DRAWING 16-001983-SG.2+

PLANNING AND DEVELOPMENT ACT 2007

APPROVAL GRANTED

SUBJECT TO THE CONDITIONS SET OUT IN THE NOTICE OF DECISION PURSUANT TO SECTION 162

Delegate name DALE BILLING

Date 4/6/2019

FOR CONTINUATION REFER TO DRAWING 16-001983-SG.5+

FOR CONTINUATION REFER TO DRAWING 16-001983-SG.4+

FOR CONTINUATION REFER TO DRAWING 16-001983-SG.1+

GINNINDERRY
FUTURE ESTATE

ROAD 205
ROAD 100
ROAD 218
ROAD 236
ROAD 215
ROAD 237
ROAD 238
ROAD 220
LANE 277
LANE 276
LANE 279

AR a MU (15) b MU (13)
AS MU (4)
AP p MU (21)
AP b MU (12)
AQ a MU (17)
AU a b MU (2)
AT a MU (2) b c d MU (2)
AV MU (2)
AV MU (3)
BA
BV
AL
AJ

NOTES:

1. REFER TO DRAWING 16-001983-SG.1+ FOR NOTES AND LEGEND.

SURVEY PROVIDED BY	LANDData SURVEYS
DATE OF SURVEY	OCTOBER 2016

AMENDMENTS	FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
		SB	JK	CEL	NB	10/10/2017	
A		SB	JK	CEL	NB	13/02/2018	ROAD 238 AMENDMENTS, OFFSITE GRADING
B		SB	JK	AB	CEL	24/07/2018	PROJECT TITLE AMENDED, BLOCK AND KERB AMENDMENTS, SECTION AP/LANE 279 ADDED

Knight Frank
Knight Frank Town Planning ABN 95 169 090 294
+61 2 6230 7855 Planning.ACT@au.knightfrank.com

RobertsDay planning·design·place

GROUPGSA

Cia landscapes + colour

WAE No.

PROJECT No.

CONSULT AUSTRALIA

A3 PLOT SCALE (METRES) A1 PLOT
1:2000 10 5 0 10 20 30 40 50 1:1000

CLIENT
Ginninderry

PROJECT
GINNINDERRY ESTATE AT STRATHNAIRN
STAGE 2 - ESTATE DEVELOPMENT PLANS

calibre CONSULTING
www.calibreconsulting.co

DRAWING TITLE
FILL PLAN
SHEET 3

DRAWING NUMBER
16-001983-SG.3+ PLAN No: 27.3

AMEND.
B

Appendix D

SITE CLASSIFICATION REPORT SUMMARY

BLOCK:	**1 (a)**	**SECTION:**	**61 (AR)**	**SUBURB:**	**Strathnairn**
JOB No:	**77356.39**			**DATE:**	**Oct 2021**
CLIENT:	**Calibre Professional Services Pty Ltd**			**REV:**	**0**

Classification Procedures:

Existing Subsurface Conditions: Refer attached test pit log(s) – Pit(s) 1,2,3,4,5 and Drawing 1.

Bulk Earthworks: Controlled fill within the block was placed under Level 1 control as defined in AS 3798:2007.

Laboratory Results: Previous laboratory testing results indicated liquid limit ranging from 22 - 84%, plasticity index ranging from 2 - 60% and linear shrinkage ranging from 0.5 - 15.0%.

Site Classification: Site classification in accordance with AS2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Based on the current soil profile / state, on limited subsurface information, soil reactivity and allowing for variation in the subsoil profile, the soil profile would be equivalent to Class H1* (highly reactive/filled) conditions. The site classification must be reassessed should the subsurface profile change by either cutting or filling and/or if the presence of service trenches, retaining walls or submerged structures are within the zone of influence of the proposed footings. Reference must be made to the comments provided below.

Footing Systems: Reference must be made to AS2870:2011 which indicates footing systems that are appropriate for each site classification. All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Dwelling design must ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of footings. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

Maintenance Guidelines: Reference should be made to the attached CSIRO Sheet BTF 18 'Foundation Maintenance & Footing Performance' to comments about gardens, landscaping and trees on the performance of foundation soils and in particular in respect to maintaining good surface drainage. It notes that minor cracking in most structures is inevitable, and it describes site maintenance practices aimed at minimising foundation movements that can lead to cracking damage.

Comments/ Limitations:

The successful purchaser must make their own interpretations, deductions and conclusions from the information made available and will need to accept full responsibility for such interpretations, deductions and conclusions.

Development specific geotechnical investigations must be undertaken.

Additional topsoils / fill may have been spread subsequent to the investigation.

Site preparation prior to the construction should include removal of all vegetation, topsoil and any uncontrolled fill.

All new fill must be placed under controlled conditions (AS 3798:2007), otherwise Class P conditions would be warranted in those fill areas.

Some variability in subsurface conditions must be anticipated.

Moisture condition of site soils and/or the presence of groundwater may vary considerably from time of investigation compared to at the time of construction. Groundwater seepages are highly likely after heavy or prolonged rain.

Depending on the depth of site cut and trenches, hard rock excavation may be required.

The above site classification is provided on the basis that all building materials/waste and stockpiles are removed from site and have not been spread across the site.

It is recommended that footing excavations be inspected by a geotechnical engineer.

This report must be read in conjunction with the attached "Limitations" and notes "About this Report".

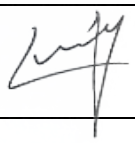
References:

AS 2870:2011, Residential Slabs and Footings, Standards Australia.

AS 3798:2007, Guidelines on Earthworks for Commercial and Residential Developments, Standards Australia.

Attachments:

Limitations & About this Report
Explanatory Notes
Test Pit Log(s) Pit(s) 1,2,3,4,5
Drawing 1



Douglas Partners
Geotechnics / Environment / Groundwater

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Limitations

Douglas Partners (DP) has prepared this report for this project at Stage 2B3, Strathnairn in accordance with DP's proposal CAN190130.P.001.Rev0 dated 31 May 2019 and acceptance received from Calibre Professional Services Pty Ltd dated 30 April 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Calibre Professional Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

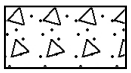
Symbols & Abbreviations

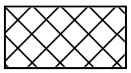
Graphic Symbols for Soil and Rock

General

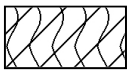

Asphalt

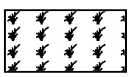

Road base

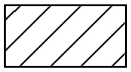

Concrete

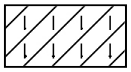

Filling

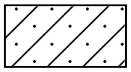
Soils


Topsoil

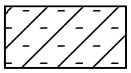

Peat

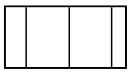

Clay

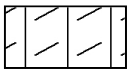

Silty clay

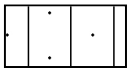

Sandy clay

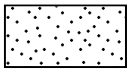

Gravelly clay

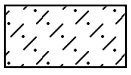

Shaly clay

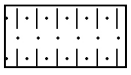

Silt


Clayey silt


Sandy silt

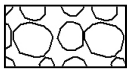

Sand

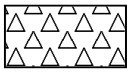

Clayey sand


Silty sand


Gravel

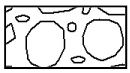

Sandy gravel


Cobbles, boulders

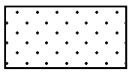

Talus

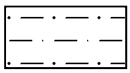
Sedimentary Rocks

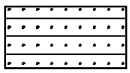

Boulder conglomerate

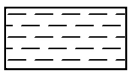

Conglomerate


Conglomeratic sandstone

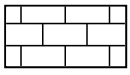

Sandstone


Siltstone

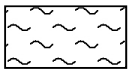

Laminite

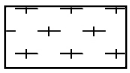

Mudstone, claystone, shale

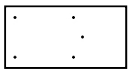

Coal


Limestone

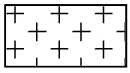
Metamorphic Rocks

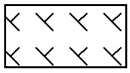

Slate, phyllite, schist

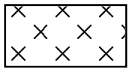

Gneiss

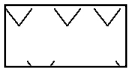

Quartzite

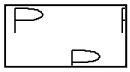
Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 2B3, Strathnairn

SURFACE LEVEL: 578.3 AHD
EASTING: 198116
NORTHING: 610406

PIT No: 1
PROJECT No: 77356.39
DATE: 10/9/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
578	0.15	FILL/Gravelly CLAY (CI): medium plasticity, brown, fine to medium gravel, with fine to coarse grained sand, trace coarse gravel, moist to dry, w<PL, inferred very stiff, FILL							
		FILL/CLAY (CH): high plasticity, brown, trace fine to coarse grained sand and fine gravel, moist to dry, w<PL, very stiff, FILL		D	0.4		pp = 300-350		
	0.6	Sandy SILT (ML): low plasticity, grey, fine to coarse grained sand, dry to moist, w<PL, inferred very stiff							
	0.7	Silty CLAY (CL/CI): low to medium plasticity, orange brown, mottled yellow brown, trace fine to coarse grained sand, moist to dry, w<PL, hard							
577	1			D	1.0		pp >400		1
	1.7	Pit discontinued at 1.7m -limit of investigation							
576	2								2

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 304C CR mini excavator fitted with a 300mm wide bucket

LOGGED: LSDJ

SURVEY DATUM: ACT Stromlo

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface levels and coordinates are approximate only and must not be relied upon

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 2B3, Strathnairn

SURFACE LEVEL: 578.5 AHD
EASTING: 198104
NORTHING: 610385

PIT No: 2
PROJECT No: 77356.39
DATE: 10/9/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
578	0.0	FILL/Silty CLAY (CI): medium plasticity, brown, with fine to medium grained sand, trace fine to medium gravel, moist to dry, w<PL, inferred very stiff, FILL							
	0.3	Sandy SILT (ML): low plasticity, grey, fine to coarse grained sand, dry to moist, w<PL, inferred very stiff							
	0.45	CLAY (CI/CH): medium to high plasticity, orange brown, mottled yellow, trace fine to coarse grained sand and silt, dry to moist, w<PL, hard		D	0.6		pp >400		
	0.7	CLAY (CH): high plasticity, yellow brown, trace fine to medium grained sand, dry to moist, w<PL, hard		D	1.0		pp >400		
577	1.6	Silty CLAY (CL/CI): low to medium plasticity, yellow brown, speckled white grey, trace fine to medium grained sand, dry to moist, w<PL, inferred hard, residual		D	1.7				
	1.75	Pit discontinued at 1.75m -limit of investigation							

RIG: CAT 304C CR mini excavator fitted with a 300mm wide bucket

LOGGED: LSDJ

SURVEY DATUM: ACT Stromlo

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface levels and coordinates are approximate only and must not be relied upon

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 2B3, Strathnairn

SURFACE LEVEL: 579 AHD
EASTING: 198144
NORTHING: 610385

PIT No: 3
PROJECT No: 77356.39
DATE: 10/9/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
579		FILL/Gravelly CLAY (CI): medium plasticity, brown, fine to medium gravel, with fine to coarse grained sand and high plasticity clay pockets, trace coarse gravel and cobbles to 200mm in size, moist to dry, w<PL, inferred very stiff, FILL							
	0.6	Sandy SILT (ML): low plasticity, grey, fine to coarse grained sand, dry to moist, w<PL, inferred very stiff		D	0.65				
	0.7	CLAY (CI/CH): medium to high plasticity, orange brown, mottled yellow, trace fine to coarse grained sand and silt, dry to moist, w<PL, inferred very stiff to hard							
	0.9	CLAY (CH): high plasticity, yellow brown, trace fine to medium grained sand, dry to moist, w<PL, very stiff to hard							
578	1			D	1.2		pp = 300-400		1
	1.5	Pit discontinued at 1.5m -limit of investigation							
577	2								2

RIG: CAT 304C CR mini excavator fitted with a 300mm wide bucket

LOGGED: LSDJ

SURVEY DATUM: ACT Stromlo

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface levels and coordinates are approximate only and must not be relied upon

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 2B3, Strathnairn

SURFACE LEVEL: 579 AHD
EASTING: 198165
NORTHING: 610357

PIT No: 4
PROJECT No: 77356.39
DATE: 10/9/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
579	0.1	FILL/Sandy CLAY (CL/CI): low to medium plasticity, grey brown, fine to coarse grained sand, with ironstone nodules to 3mm in size, dry to moist, w<PL, inferred very stiff, FILL							
	0.2	FILL/Silty CLAY (CI/CH): medium to high plasticity, red brown, with ironstone nodules to 5mm in size, dry to moist, w<PL, inferred very stiff to hard, regrade FILL							
		Silty CLAY (CL/CI): low to medium plasticity, yellow brown, trace fine to medium grained sand, dry to moist, w<PL, very stiff		D	0.4		pp = 250-300		
	0.5	CLAY (CH): high plasticity, yellow brown, trace fine to coarse grained sand, dry to moist, w<PL, hard							
578	1			D	1.0		pp >400		1
	1.5	Sandy CLAY (CL/CI): low to medium plasticity, yellow brown, speckled white, fine to coarse grained sand, with silt, dry to moist, w<PL, inferred very stiff, residual		D	1.7				
	1.9	Pit discontinued at 1.9m -limit of investigation							
577	2								2

RIG: CAT 304C CR mini excavator fitted with a 300mm wide bucket

LOGGED: LSDJ

SURVEY DATUM: ACT Stromlo

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface levels and coordinates are approximate only and must not be relied upon

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 2B3, Strathnairn

SURFACE LEVEL: 579.5 AHD
EASTING: 198179
NORTHING: 610395

PIT No: 5
PROJECT No: 77356.39
DATE: 10/9/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
579	0.5	FILL/Gravelly CLAY (CI): medium plasticity, brown, fine to medium gravel, with fine to coarse grained sand, trace coarse gravel, moist, w=PL, inferred stiff to very stiff, FILL		D	0.3				
	0.6	FILL/Sandy CLAY (CH): high plasticity, brown, fine to coarse grained sand, with fine gravel, dry to moist, w<PL, inferred hard, FILL							
		CLAY (CH): high plasticity, yellow brown, trace fine to medium grained sand, dry to moist, w<PL, hard			0.8		pp >400		
578	1.6	GRANODIORITE: fine to coarse grained, brown, dry to moist, very low to low strength, highly weathered, fractured		D	1.8				
	1.9	Pit discontinued at 1.9m -limit of investigation							

RIG: CAT 304C CR mini excavator fitted with a 300mm wide bucket
LOGGED: LSDJ
SURVEY DATUM: ACT Stromlo

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface levels and coordinates are approximate only and must not be relied upon

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Foundation Maintenance and Footing Performance:
A Homeowner's Guide

PUBLISHING

BTF 18-2011 replaces Information Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870-2011, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes

Notes

1. Where controlled fill has been used, the site may be classified A to E according to the type of fill used.
2. Filled sites. Class P is used for sites which include soft fills, such as clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soil subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise.
3. Where deep-seated moisture changes exist on sites at depths of 3 m or greater, further classification is needed for Classes M to E (M-D, H1-D, H2-D and E-D).

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

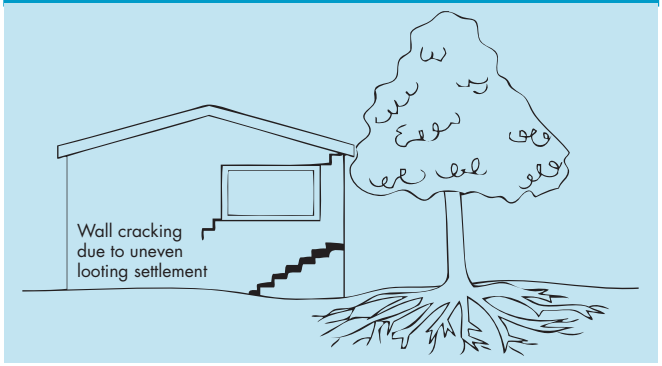
The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Trees can cause shrinkage and damage



Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

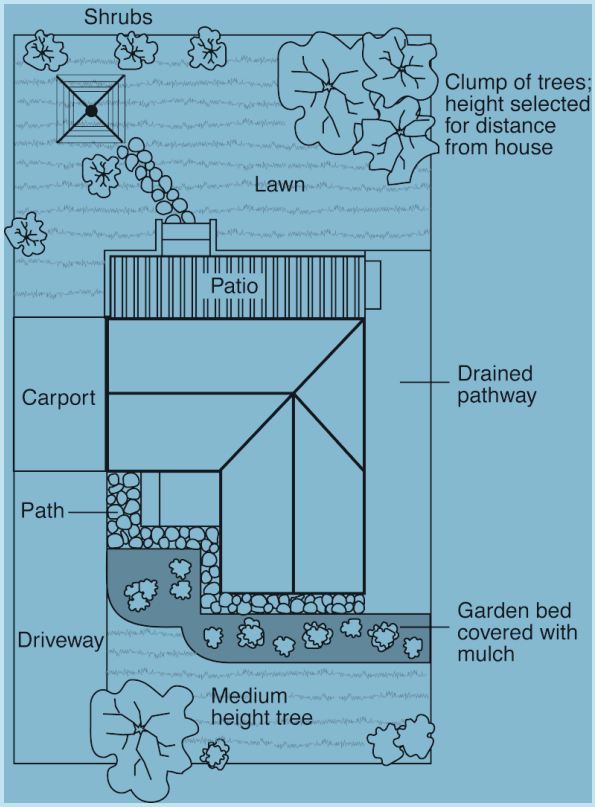
Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4

Gardens for a reactive site



extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

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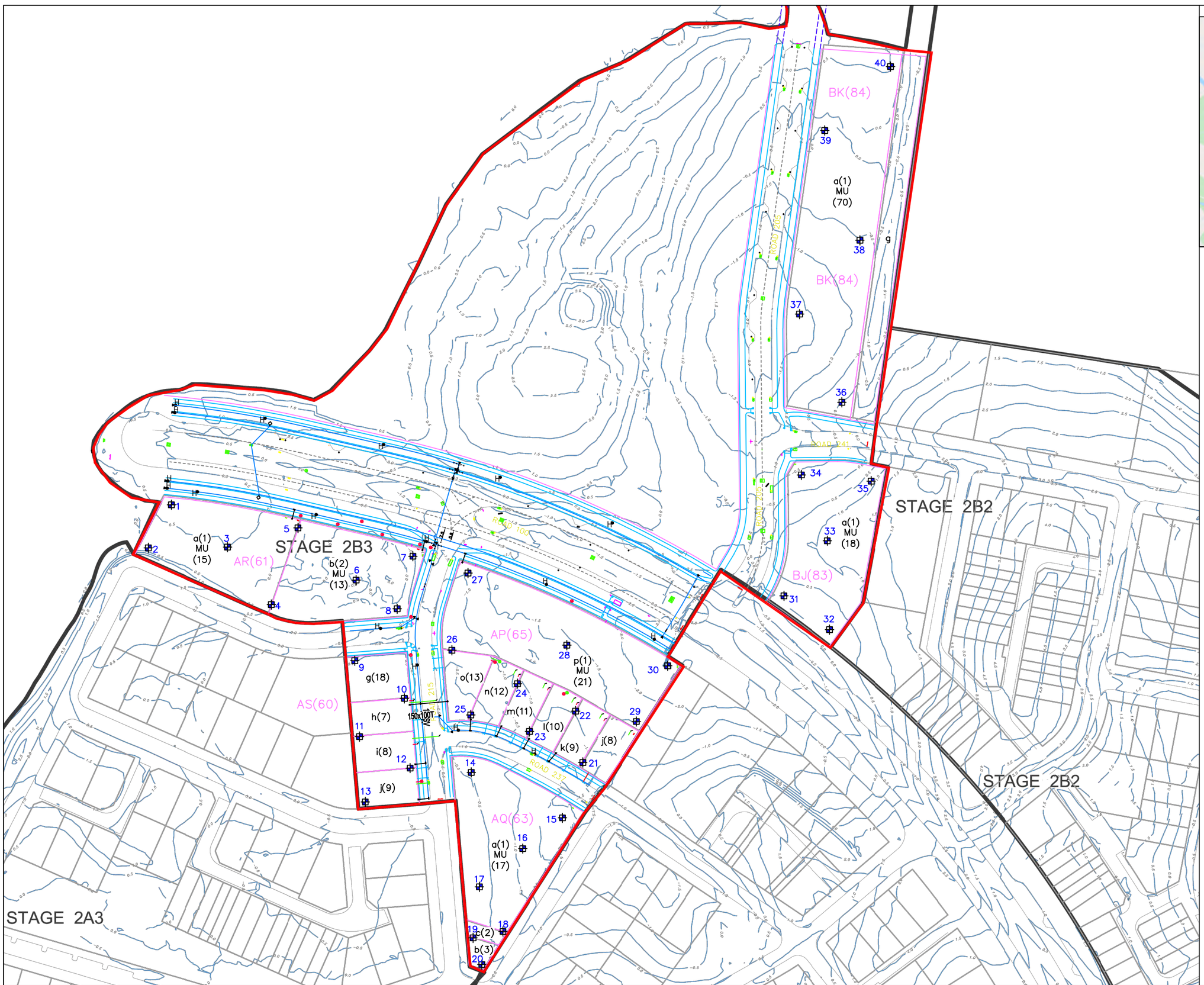

Locality Plan

LEGEND

- Approximate Test Pit Location
- Site Boundary
- 1(a) Block Numbers
- 71(BP) Section Numbers

0 15 30 45 60 75

1:1500 @ A3

Note: Base drawing taken from Calibre Professional Services

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Calibre Professional Services Pty Ltd		TITLE: **Test Pit Location Plan**
OFFICE: Canberra	DRAWN BY: APH	**Proposed Residential Subdivision**
SCALE: As Shown	DATE: 06.09.21	**Strathnairn Stage 2B3, Strathnairn**

PROJECT No: 77356.39
DRAWING No: 1
REVISION: 0

Appendix E

STREET

3.0
3.0
2.0
6.0
3.0
FRONT BOUNDARY
FRONT BOUNDARY
5.5 GARAGE
4.0
3.0
BLOCK 1
SECTION 61
2,923m²
12.0
SIDE BOUNDARY
12.0
FRONT BOUNDARY
STREET

KEY MAP

SITE LOCATION

LEGEND

Block Boundary

BOUNDARY — Boundary Defined by Territory Plan 2023

INDICATIVE BUILDING FOOTPRINTS
(based on min. building setbacks **only** This does not take into account easements, plot ratio or building envelopes)

Lower Floor Level

Upper Floor Levels

MINIMUM BOUNDARY SETBACKS

Residential Zones Technical Specifications
front setbacks: refer to Schedule 1 Table 4
side and rear setbacks: refer to Schedule 2 Table 10

Ground Floor - Unscreened

Upper Floor - Unscreened

Strathnairn Stage 2 EDP
refer to the Belconnen District Specification
Lower floor level - external wall or unscreened element (Excluding Garages/Carports)
Upper floor level (front setbacks) - external wall or unscreened element
Upper floor level (side setbacks) - external wall

All Floor Levels - External Wall (Screened)
refer to the Belconnen District Specification

Articulation Elements (Articulation Zone)
refer to Belconnen District Specification

BLOCK INFORMATION

STAGE	2B3
ZONE	RZ 3
SECTION	61
BLOCK	1
PLOT RATIO	65%
HOUSING TYPE	MULTI UNIT SITE (15)

REV	DRAWN	CHECKED	APPROVED	DATE
B	DZ	DZ	DZ	02/02/24

DO NOT SCALE OFF DRAWINGS. DIMENSIONS ARE IN METRES.

INFORMATION ON THIS PLAN IS TO BE USED AS A GUIDE ONLY FOR THE DESIGN PROCESS. APPROVED EDP PLANNING CONTROLS NEED TO BE CHECKED AGAINST DISTRICT SPECIFICATIONS UPLIFTS. PLANS TO BE READ IN CONJUNCTION WITH THE TERRITORY PLAN ALONG WITH BLOCK DISCLOSURE PLANS AND THE GINNINDERRY DESIGN REQUIREMENTS TO CONFIRM ALL CURRENT CONTROLS PERTAINING TO YOUR BLOCK.

SCALE
1:400 @A3

0 1 2 3 4 5 10 20

Ginninderry

BLOCK PLANNING CONTROLS
BUILDING & SITING CONTROLS PLAN

KEY MAP

SITE LOCATION

LEGEND

Block Boundary

SITE COVERAGE
refer to Residential Zone Policy

PRINCIPLE PRIVATE OPEN SPACE
refer to Belconnen District Specification and Residential Zones Specification

BOUNDARY FENCING

F

Side, Rear and Rear Lane Boundaries
Maximum height 1.8m | Minimum setback 0m (100%) | **Not forward of building line**
refer to EPSDD: Fences and Freestanding Walls Factsheet 2014

Construction and Finish
Inter-allotment fencing to be max 1.8m high timber paling fencing or lapped and capped timber paling fencing.

If Colorbond is used, the profile must be Neetascreen or a mini orb profile colour "Basalt". *refer to Ginninderry Design Requirements*

F C

Optional - Blocks Adjacent to Open Space
Maximum height 1.8m | Minimum setback 0m (100%)
refer to Fencing Controls Plan

F C

Mandatory Central Boulevard, Courtyard Walls and Fencing
Maximum height: PPOS screen 1.5m | otherwise 1.2m
Minimum setback: 50% @ 0m | 50% @ 1.0m
refer to Fencing Controls Plan

Construction and Finish
Front Courtyard walls and fencing forward of the building line (where permitted) must be a combination of solid and semi-transparent elements that are constructed of the following:

- *masonry or stonework;*
- *dressed hardwood timber; or*
- *powder-coated aluminium.*
- *Openings to be a minimum of 10mm.*

refer to Fencing Control Plan and Ginninderry Design Requirements

Return Boundary Fencing to Building Line or Side Fence

BLOCK INFORMATION

STAGE	2B3
ZONE	RZ 3
SECTION	61
BLOCK	1
PLOT RATIO	65%
HOUSING TYPE	MULTI UNIT SITE (15)

REV	DRAWN	CHECKED	APPROVED	DATE
B	DZ	DZ	DZ	07/02/24

DO NOT SCALE OFF DRAWINGS. DIMENSIONS ARE IN METRES.

INFORMATION ON THIS PLAN IS TO BE USED AS A GUIDE ONLY FOR THE DESIGN PROCESS. APPROVED EDP PLANNING CONTROLS NEED TO BE CHECKED AGAINST DISTRICT SPECIFICATIONS UPLIFTS. PLANS TO BE READ IN CONJUNCTION WITH THE TERRITORY PLAN ALONG WITH BLOCK DISCLOSURE PLANS AND THE GINNINDERRY DESIGN REQUIREMENTS TO CONFIRM ALL CURRENT CONTROLS PERTAINING TO YOUR BLOCK.

Services
Refer to Block Disclosure Plan for location of service access to this block. Proposed Fencing and Courtyard Walls to integrate service ties and meters.

SCALE
1:400 @A3

0 1 2 3 4 5 10 20

Ginninderry

BLOCK PLANNING CONTROLS
FENCING CONTROLS PLAN

Strathnairn Housing Development Requirements Application Form

Design Application Form

Please fill in and submit to designs@ginninderry.com
(A Design re-submission administration fee will apply after the 1st approval)

Property details

Block/ Section	
Block size	

Purchaser details

Name	
Phone	
Mobile	
Email	

Designer details

Name	
Company	
Phone	
Mobile	
Email	

Builder details

Name	
Company	
Phone	
Mobile	
Email	

Contact us:
E: designs@ginninderry.com
P: 1800 316 900

Required documentation:

☐ **1. Site plan @ 1:200**

- Overall Building Footprint with setback dimensions to the boundaries
- North point site contours
- Services and Easements
- Location of all AC, HWS, RWT, Solar Battery, Fan units, clothes lines
- Extent of retaining walls
- Location and dimensions of (PPOS)
- Finished floor levels for the house and garage
- Area schedule of the dwelling including block size / POS / PPOS / all GFA / Garage / carports / hardstands

☐ **2. Sediment and Erosion Control Plan @ 1:200**

☐ **3. Floor Plans @ 1:100**

- Fully dimensioned floor plan for each level
- Show all room names
- All internal walls / doors
- Finished levels
- Area schedule

☐ **4. Elevations @ 1:100**

- North / South / East / West
- NGL & FGL
- FFL / FCL
- Roof Pitch
- Extent of Cut and Fill

☐ **5. Sections @ 1:100**

- Section A-A
- Section B-B
- NGL & FGL
- All structure / internal walls
- Extent of Cut and Fill and retaining walls

☐ **6. Roof Plan @ 1:100**

- Roof pitches
- Eaves depths
- Solar panel location
- Roof material & colour

☐ **7. Landscape / Fencing Plan @ 1:200**

- All side and rear fencing (refer to PCP's for each block)
- All courtyard walls
- Mail box type, material and location
- Extent of all retaining walls
- Area schedule of soft planting zone / canopy cover / paved or non-permeable areas

☐ **8. External Colours and Finishes Schedule**

- Front façades @ 1:100
- Identify all front façade materials and colours
- Schedule or a table specification and image of proposed materials (if alternate from the pre-approved finishes)

☐ **9. NatHERS EER Certificate**

- NatHERS energy efficiency rating report and certificate generated by NatHERS approved software package
- NatHERS stamped plans

☐ **10. Sustainability Schedule**

External Colours and Finishes Schedule

Please tick the boxes below

Roof Tiles – Monier

Atura	☐ Mist Grey	☐ Saltspray	☐ Seashell	☐ Wildrice
Horizon	☐ Mist Grey	☐ Saltspray	☐ Seashell	☐ Wildrice

Roof Tiles – Lutum

Vogue	☐ Quartz	☐ Cotton
Contour	☐ Quartz	☐ Cotton
Slimline	☐ Quartz	☐ Cotton

Roof Tiles – Bristile

Prestige	☐ Silver Gum	☐ Aspen		
Classic	☐ Alabaster	☐ Linen	☐ Silver Gum	☐ Aspen, Vanilla
Planum	☐ Turron	☐ Ghost White		

Metal Roof – Colorbond

☐ Basalt	☐ Dune	☐ Evening Haze	☐ Gully	☐ Windspray
☐ Jasper	☐ Shale Grey	☐ Surfmist	☐ Wallaby	☐ Paperbark
☐ Dover White	☐ Southerly	☐ Bluegum		

Fence Colour - Colorbond

Side and Rear Boundary Fencing

☐ Jasper

Fence Infill Panel / Street Facing Fencing - Colorbond

☐ Basalt	☐ Dune	☐ Evening Haze	☐ Gully	☐ Windspray
☐ Jasper	☐ Shale Grey	☐ Surfmist	☐ Wallaby	☐ Ultra Silver
☐ Precious Silver	☐ Silver Medalist			

Garage Doors

☐ Basalt	☐ Dune	☐ Evening Haze	☐ Gully	☐ Windspray	
☐ Jasper	☐ Shale Grey	☐ Surfmist	☐ Wallaby	☐ Ultra Silver	
☐ Precious Silver	☐ Silver Medalist	☐ Blushed Teak	☐ Classic Cedar	☐ Iron Bark	☐ Kwila
☐ Merbau	☐ Silky Oak	☐ Weathered Timber	☐ Western Red Cedar		

Façade Colours Walls / Render / Cladding

☐ Basalt	☐ Cove	☐ Dune	☐ Evening Haze	☐ Gully	☐ Windspray
☐ Jasper	☐ Natural Pearl	☐ Shale Grey	☐ Surfmist	☐ Wallaby	☐ Ultra Silver
☐ Precious Silver	☐ Silver Medalist	☐ Beige Royal	☐ Braid	☐ Cru	☐ Lexicon
☐ Light Rice	☐ Linseed	☐ Natural White	☐ Oyster Linen	☐ Terrace White	☐ Toffee Fingers
☐ Tuft	☐ Warm Neutral				

Bricks – Austral

La Paloma	☐ Miro						
Urban One	☐ Silver	☐ Chiffon	☐ Pepper		
Wilderness Design	☐ Silver Birch	☐ Blue Gum	☐ Blackbutt		
Everyday Life	☐ Engage	☐ Freedom	☐ Leisure		
Whitsunday Range	☐ Brampton	☐ Orpheus			
San Selmo Smoked	☐ Grey Cashmere (F.O.)	☐ Cloudy Silver (F.O.)	☐ Opaque Slate (F.O.)	☐ Wild Storm (F.O.)
Metallix	☐ Quartz	☐ Platinum	☐ Titanium	☐ Cuprum
	☐ Bronze	☐ Gun Metal Blue			
Park Lane	☐ Biltmore	☐ Dorchester	☐ Mayfair		
	☐ Westminster	☐ Chesterfield (F.O.)			

F.O. Feature area only

Bricks – PGH

Alfresco	☐ Vino	☐ Chocolatto	☐ Truffle	☐ Espresso
	☐ Urban Blue			
Dry Pressed Architectural	☐ Bennelong Blue	☐ Bradfield Bronze		
	☐ Macquarie Blend	☐ Tinto Cream	☐ Silver Shadow	
	☐ McKinlay Brown	☐ Monash Grey		
Dark and Stormy	☐ Monsoon	☐ Thunder	☐ Whirlwind	☐ Zephyr
Foundations	☐ Gravel	☐ Stone		
Highlands	☐ Blackheath	☐ Leura (F.O.)		
Manhattan	☐ Chelsea (F.O.)	☐ East Hampton (F.O.)	☐ Tribeca (F.O.)	
Metallic	☐ Nickel Flash	☐ Pewter	☐ Blue Steel Flash	
Morada	☐ Blanco	☐ Ceniza	☐ Nero (F.O.)	☐ Gris
Opaline	☐ Tourmaline	☐ Garnet	☐ Tiger Eye	
Pure Linens	☐ Cinders & Soot	☐ Flannel Grey	☐ Pebble Creek	☐ Whispering White
Smooth	☐ Mineral	☐ Volcanic	☐ Cream	☐ Pearl Grey
	☐ Brown	☐ Terracota	☐ Choc Tan	☐ Copper Glow
	☐ Black & Tan			
Urban Essence	☐ Melbourne Blue (F.O.)	☐ Storm (F.O.)		
Velour	☐ Terracota	☐ Cream	☐ Pearl Grey	☐ Red
	☐ Brown	☐ Choc Tan	☐ Mineral	☐ Volcanic

Additional Colours & Finishes - Subject to Approval

Please include brand, specification, profile and colour of proposed materials, sample photos/swatches should also be provided.

Cladding	
Retaining Walls	
Courtyard Walls	
Mailbox	
Feature Material	

F.O. Feature area only

Sustainability Schedule

Minimum Requirements as per element 2.0 Efficient Home Design

Solar PV Array

Size (kW)	
Home Energy Management System	**Evergen** **Reposit (battery only)**

Inverter:

Brand	
Model No.	

Battery (optional):

Brand	
Size (kWh)	

Hot Water System:

	Solar **Heat Pump**
Brand	
Model No.	

Air Conditioning System (if installed):

	RCAC **Other, please specify**
Brand	
Indoor Model No.	
Outdoor Model No.	

Rainwater Tank:

Size (L)	
	Connected to at least a toilet, laundry cold water and external taps

Water Fixtures note:

Please complete or provide equivalent selection list (must clearly show star rating)

Note: Specification sheets, builders inclusions lists sheets or contract excerpts will not be accepted.

Water Fixtures:

Room	Type	Model	Flow Rate	Star Rating
Eg. Kitchen	**Eg.** Sink mixer	**Eg.** Clark6310	**Eg.** 5L/min	**Eg.** 4 Star


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