PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

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Queensland Government

CARSELDINE VILLAGE STAGE 3

ENGINEERING SERVICES REPORT

AMENDED IN RED

By: Leila Torrens

Date: 7 September 2021

Queensland Government

KN GROUP
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TABLE OF CONTENTS

INTRODUCTION 3

SITE CHARACTERISTICS 4

LAND TOPOGRAPHY AND SITE DRAINAGE 5

EROSION AND SEDIMENT CONTROL 6

INFRASTRUCTURE FOR DEVELOPMENT 6

5.1 ROADWORKS 6

5.2 EARTHWORKS 7

5.3 STORMWATER QUANTITY, FLOOD MANAGEMENT AND QUALITY 7

5.5 STORMWATER DRAINAGE INFRASTRUCTURE 7

5.6 SEWERAGE 8

5.7 WATER RETICULATION 8

5.8 ELECTRICAL, TELECOMMUNICATIONS AND GAS 8

SUMMARY 9

APPENDIX A PLAN OF SUBDIVISION AND ROAD CROSS SECTIONS 10

APPENDIX B CIVIL FUNCTIONALS 11

APPENDIX C DIAL BEFORE YOU DIG (DBYD) 12

APPENDIX D URBAN UTILITIES (UU) 13

APPENDIX E ASBESTOS REMEDIATION STRATEGY AND DISPERSIVE SOIL REPORT 14

APPENDIX F GEO-TECHNICAL 15

APPENDIX G FILLING AND EXCAVATION CODE 16

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INTRODUCTION

KN Group was commissioned by Economic Development Queensland (EDQ) to prepare an engineering services report for the proposed Stage 3A and 3B of Carseldine Village located at 520 Beams Road, Carseldine.

The proposed Stage 3A and 3B development will create a total of 34 new residential allotments (refer to the Appendix A RPS Plan of Subdivision Plan Reference 128180-91).

It should be noted that this Engineering Services Report refers to the development of Stage 3A and 3B of the Carseldine Village development, while other future stages have been considered as part of the engineering planning and design, these future stages will be submitted at a later date with respect to future development applications.

The proposed development is proposed over part of a lot at 520 Beams Road, Carseldine. The site is formally described as part of Lot 1 on SP311781 (referred to as the site from here on in). The site is located within Precinct 1 of the Fitzgibbon Development Scheme (the Development Scheme) which has been ear-marked for development of the Carseldine Village (CV).

The town planning application is in accordance with the existing overall Masterplan Approval granted in December 2018 (EDQ Ref: DEV2018/932/2) and reflects the intent of the approval.

The PDA development application seeks PDA development approval from Economic Development Queensland for:

- Development Permit for Reconfiguring a Lot (Stage 3 of Carseldine Village - 33 residential terrace lots, 1 part-balance lot and new road delivered in two sub-stages)
- Development Permit for a Material Change of Use (Plan of Development for Dwelling Houses)

The proposed development is located within the Brisbane City Council (BCC) local government area with Urban Utilities (UU) the designated retail water authority.

This report identifies civil infrastructure required to service the proposed development. The civil infrastructure identified within this report includes bulk earthworks, roads, stormwater drainage, water and sewer reticulation and other service utilities.

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SITE CHARACTERISTICS

The proposed development is located at 520 Beams Road, Carseldine within the BCC local government area. The proposed development has the real property description of Lot 322 on SP172124 and has a total site area of 44.96 hectares.

The proposed development site is located within Carseldine Village. Stages S (Sports Field) and Stage 1 is nearing construction completion. Stage 3A land consists of mostly grass cover and small to large trees dispersed around the Stage. Stage 3B has been filled close to finished surface levels as part of the Stage 1 works. Refer Figure 1 for locality plan.

The proposed development site is bounded by Beams Road to the north, Cabbage Tree Creek to the south, North Coast Railway to the east and Dorville Road to the west.

The site is currently occupied by QUT Carseldine Campus on state land and is located within the Fitzgibbon Priority Development Area (PDA) under Economic Development Queensland Fitzgibbon Development Scheme (2011).

Figure 1 Locality Plan

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LAND TOPOGRAPHY AND SITE DRAINAGE

Based on detail survey conducted by LandPartners (Refer Figure 2), Stage 3A existing terrain varies between RL12.5 to RL13.50m AHD. Stages 3A will be filled to the range of RL14.0 to RL15.0, total of approximately 7,000m3 to 9,000m3 of select fill will be imported from off site. Stage 3B is currently filled close to final levels and only minor earthworks is predicted.

There is currently existing stormwater infrastructure located within the extent of the proposed development from the previously demolished Carseldine Village, where stormwater runoff generally follows the natural contours in both the existing pre developed and the proposed site developed condition respectively.

Figure 2 Terrain Survey

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EROSION AND SEDIMENT CONTROL

During the construction phase of the development, erosion and sediment control measures will be implemented and maintained. An erosion and sediment control strategy will be created during the Operational Works phase of the development which will recognise the potential risks and control measures will be designed accordingly.

The contractor will prepare an Erosion and Sediment Control Plan (ESCP) certified by an RPEQ or an accredited professional in erosion and sediment control (CPESC) generally in accordance with the following guidelines:

- Urban Stormwater Quality Planning Guidelines, dated 2010, prepared by the former Department of Environment and Heritage Protection; and
- Best Practice Erosion and Sediment Control, dated November 2008, prepared by the International Erosion Control Association Australasia (as amended from time to time).
- State Planning Policy (DILGP, 2017)
- Appendix B (IECA, 2018)
- Complying with the SPP – Technical Note for Government Development Assessment & Compliance Officers (Healthy Land and Water, 2018)

In accordance with the State Planning Policy (DILGP, 2017), Type 1 sediment controls (sediment basins) are designed to achieve 80% hydrologic efficiency (HE) and are deemed to comply. A range of approaches are considered acceptable to achieve compliance with the 80% HE objective, being:

- High Efficiency Sediment (HES) Basins in accordance with IECA (2018);
- Large Traditional Sediment Basins (in accordance with Table 2 of HLW,2018);
- Total Capture – hold all water on site;
- Alternative Innovative Measures; and
- Erosion Control.

The contractor will be required to implement the certified ESCP and maintain a register of inspections and testing results which must be available for review by EDQ or another relevant authority at any time during construction.

INFRASTRUCTURE FOR DEVELOPMENT

5.1 ROADWORKS

The proposed development will feature an internal road network with roads of varying classification, forming a road hierarchy and complying to BCC standards. The road network will provide access to each individual allotment by connecting to the existing Stage 1 and Stage S, including the construction of concrete footpaths. All verge works are to be in accordance with the proposed typical cross-sections for residential streets.

Proposed road and path typology is in accordance with Technical Traffic Memorandum prepared by Cardno, to support Stage 3 of the CV development. Details of the memorandum are provided within Appendix E of RPS Planning Report.

Appendix B demonstrates the proposed road network and hierarchy for the proposed development. The design of roadworks will be in accordance with BCC requirements, Austroads Guidelines and all other relevant standards and specifications.

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5.2 EARTHWORKS

A number of environmental and geo-technical reports have been conducted across the site which will be implemented as required, these include:

- SGS Geotechnical Investigation Report, dated 29th May 2018;
- Golder Asbestos Remediation Strategy during Stormwater Pipe Removal dated 30th September 2020;
- Gallagher Environmental Dispersive Soil Management Plan (DSMP), dated 22nd April 2020; and
- Gallagher Environmental Acid Sulfate Soil (ASS) Review, dated 22nd December 2020.

The above reports can be found in Appendix E and Appendix F of this report.

Localised filling of any minor depressions and gullies within the development will occur in accordance with AS 3798 under Level 1 supervision.

A preliminary bulk earthworks plan has been included in Appendix B. Earthworks will be required to achieve suitable road grades throughout the proposed development site and for finished surface levels in the proposed development to tie into the surrounding land at the boundary of the proposed development site.

5.3 STORMWATER QUANTITY, FLOOD MANAGEMENT AND QUALITY

A Stormwater Technical Memorandum has been prepared by DesignFlow to confirm the stormwater management support the proposed Stage 3 development.

Previous stormwater treatment strategy and flood impact assessments have been assessed and approved as part of previous whole site stormwater modelling, which have been updated through recent stages of development over the site. Specifically, Stage 1 works are currently being completed, including all required water quality treatment and flood mitigation measures.

The Stormwater Management Technical Memorandum is located within Appendix G of RPS Planning report.

5.5 STORMWATER DRAINAGE INFRASTRUCTURE

A complete underground piped stormwater system will be provided as a part of the proposed development. The stormwater system will capture stormwater runoff in gullies and field inlets and convey it through underground infrastructure.

The design of all stormwater infrastructure will be in accordance with Queensland Urban Design Manual (QUDM) and Brisbane City Council (BCC) standard drawings. A preliminary stormwater layout plan is included in Appendix B of this report indicating the proposed layout of stormwater infrastructure for the proposed development.

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5.6 SEWERAGE

The proposed sewer network will be in accordance with the Services Advice Notice dated 15th October 2018 and Urban Utilities Water and Wastewater Analysis dated 15th June 2020, Refer Appendix D for copy of these notices.

The development will be serviced with sewer reticulation by connecting each individual allotment to the proposed gravity sewer mains. The gravity sewerage mains will discharge into an existing 150mm dia sewer located in the south-east corner for Stage 3A and north-east corner for Stage 3B.

A preliminary sewer layout plan has been included in Appendix B which shows the proposed sewer infrastructure to be constructed as part of the proposed development. All sewer infrastructure will be designed in accordance with the SEQ Water Supply and Sewerage Design and Construction Code and UU Design Criteria.

5.7 WATER RETICULATION

The proposed water network will be in accordance with Services Advice Notice dated 15th October 2018 and Urban Utilities Water and Wastewater Analysis dated 15th June 2020, Refer Appendix D for copy of these notices.

New water reticulation mains will be constructed to service the proposed development with potable water. Water reticulation infrastructure associated with Stage 3A and 3B of the development will connect to existing mains located in the Stage 1 and Stage 2.

A preliminary water reticulation layout has been included in Appendix B. All water reticulation will be designed in accordance with the SEQ Water Supply and Sewerage Design and Construction Code and UU Design Criteria.

5.8 ELECTRICAL, TELECOMMUNICATIONS AND GAS

All proposed allotments will be serviced with underground electricity and telecommunication (NBN) services. New infrastructure in relation to these utilities will be constructed as a part of the proposed development to service individual allotments. All electrical, NBN and gas infrastructure will be constructed in accordance with the relevant authorities and service providers. Further information in regards to the services will be provided as a part of the Operational Works application. Refer Appendix C for Dial Before You Dig (DBYD) existing services search.

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SUMMARY

This Engineering Services Report relating to the proposed Carseldine Village Stage 3A and 3B development has demonstrated the following:

- The proposal is for the construction of 33 residential allotments;
- The proposed road network will connect into existing Stage 1 and Stage S;
- Each individual allotment will have direct access to the proposed road network;
- Earthworks will be necessary throughout the proposed development area to satisfy design lot pad levels, road grades and for the installation of underground infrastructure;
- New stormwater infrastructure will be constructed as a part of the new development. Stormwater flows will be conveyed through the proposed development site towards the open space area in the north-east corner of the site;
- New sewerage infrastructure will be constructed to service individual allotments. Gravity sewer mains will connect to existing infrastructure within the site;
- New water reticulation infrastructure will be constructed to service individual allotments. Reticulation mains will connect to existing infrastructure; and
- The information presented in this report demonstrates that the proposed development may be constructed in accordance with the Economic Development Act (2012) relevant standards, guidelines and manuals outlined within the EDQ Engineering Standards PDA Guideline No. 13. with respect to civil engineering matters.

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APPENDIX A PLAN OF SUBDIVISION AND ROAD CROSS SECTIONS

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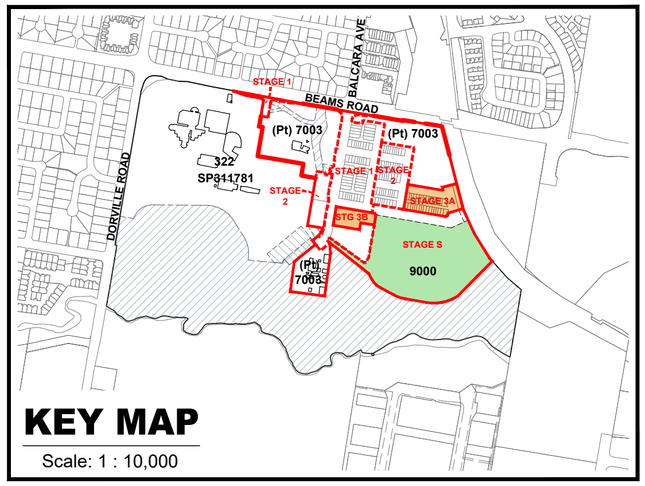


KEY MAP

Scale: 1 : 10,000

Legend

- Site Boundary
- Proposed Stage Boundary
- Existing Access Easements
- Sports Park

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

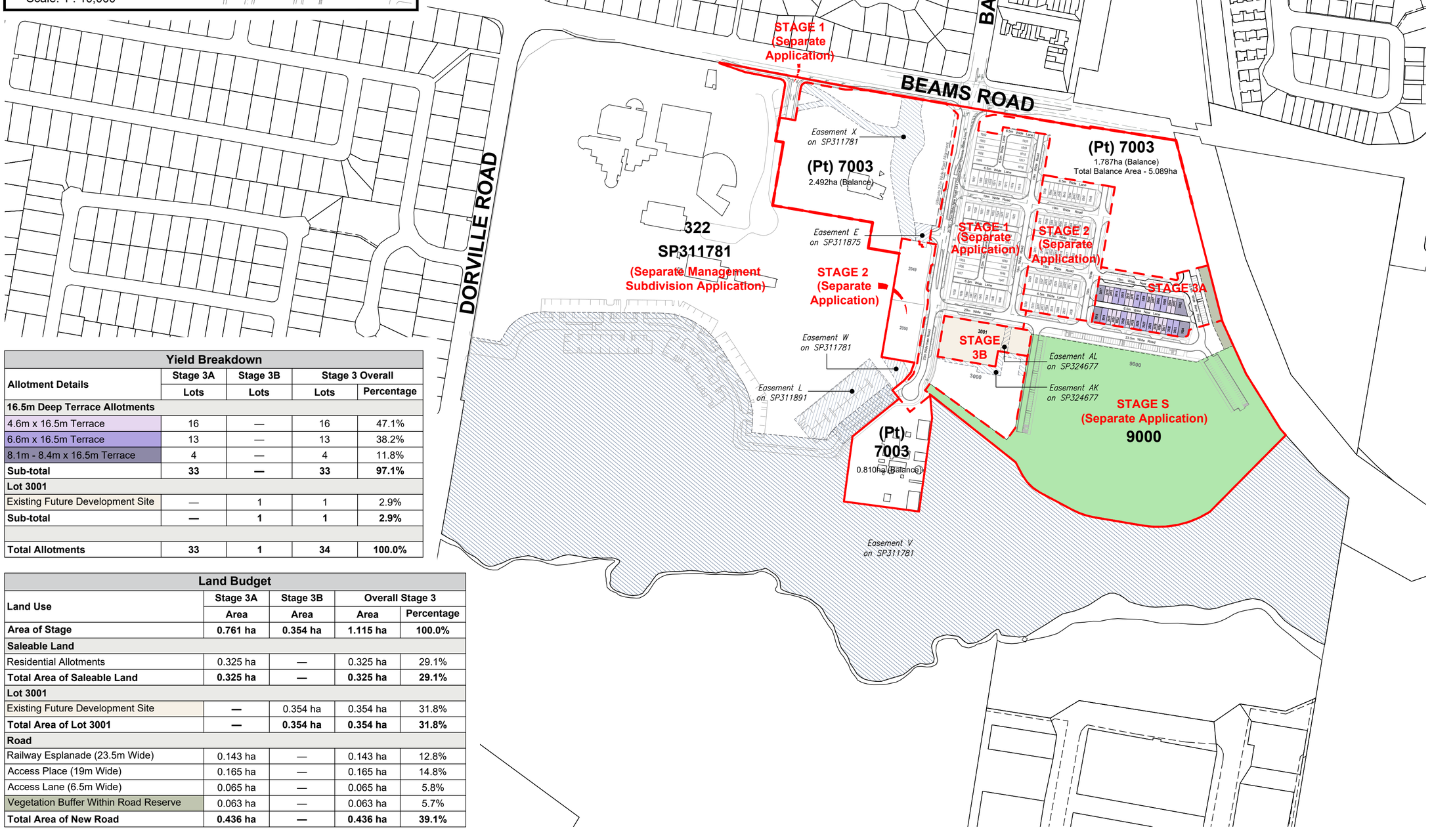
Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 1m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: Registered Survey Plans.
Adjoining information: DCDB.

DRAFT
For Discussion Only



Yield Breakdown				
Allotment Details	**Stage 3A**	**Stage 3B**	**Stage 3 Overall**	
	Lots	**Lots**	**Lots**	**Percentage**
16.5m Deep Terrace Allotments				
4.6m x 16.5m Terrace	16	—	16	47.1%
6.6m x 16.5m Terrace	13	—	13	38.2%
8.1m - 8.4m x 16.5m Terrace	4	—	4	11.8%
Sub-total	**33**	**—**	**33**	**97.1%**
Lot 3001				
Existing Future Development Site	—	1	1	2.9%
Sub-total	**—**	**1**	**1**	**2.9%**
Total Allotments	**33**	**1**	**34**	**100.0%**

Land Budget				
Land Use	**Stage 3A**	**Stage 3B**	**Overall Stage 3**	
	Area	**Area**	**Area**	**Percentage**
Area of Stage	**0.761 ha**	**0.354 ha**	**1.115 ha**	**100.0%**
Saleable Land				
Residential Allotments	0.325 ha	—	0.325 ha	29.1%
Total Area of Saleable Land	**0.325 ha**	**—**	**0.325 ha**	**29.1%**
Lot 3001				
Existing Future Development Site	**—**	0.354 ha	0.354 ha	31.8%
Total Area of Lot 3001	**—**	**0.354 ha**	**0.354 ha**	**31.8%**
Road				
Railway Esplanade (23.5m Wide)	0.143 ha	—	0.143 ha	12.8%
Access Place (19m Wide)	0.165 ha	—	0.165 ha	14.8%
Access Lane (6.5m Wide)	0.065 ha	—	0.065 ha	5.8%
Vegetation Buffer Within Road Reserve	0.063 ha	—	0.063 ha	5.7%
Total Area of New Road	**0.436 ha**	**—**	**0.436 ha**	**39.1%**

0 15 30 45 60 90 1 : 3,000 @ A2

CARSELDINE URBAN VILLAGE

PLAN OF SUBDIVISON STAGE 3 - OVERALL

PLAN REF: 128180 – 91
Rev No: H
DATE: 04 AUGUST 2021
CLIENT: EDQ
DRAWN BY: JC
CHECKED BY: MD

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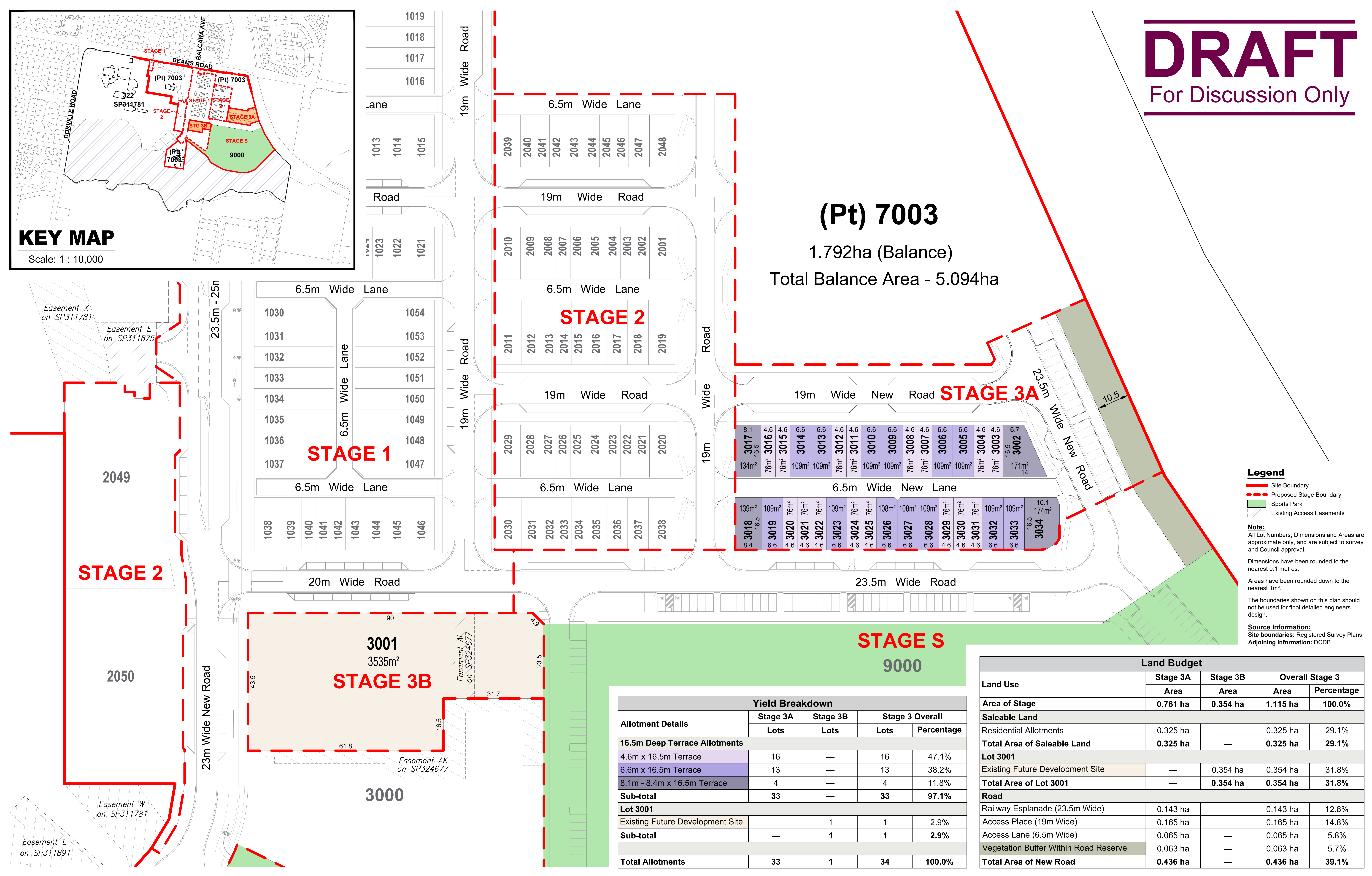

Yield Breakdown

Allotment Details	Stage 3A Lots	Stage 3B Lots	Stage 3 Overall Lots	Stage 3 Overall Percentage
16.5m Deep Terrace Allotments				
4.6m x 16.5m Terrace	16	—	16	47.1%
6.6m x 16.5m Terrace	13	—	13	38.2%
8.1m - 8.4m x 16.5m Terrace	4	—	4	11.8%
Sub-total	**33**	**—**	**33**	**97.1%**
Lot 3001				
Existing Future Development Site	—	1	1	2.9%
Sub-total	**—**	**1**	**1**	**2.9%**
Total Allotments	**33**	**1**	**34**	**100.0%**

Land Budget

Land Use	Stage 3A Area	Stage 3B Area	Overall Stage 3 Area	Overall Stage 3 Percentage
Area of Stage	**0.761 ha**	**0.354 ha**	**1.115 ha**	**100.0%**
Saleable Land				
Residential Allotments	0.325 ha	—	0.325 ha	29.1%
Total Area of Saleable Land	**0.325 ha**	**—**	**0.325 ha**	**29.1%**
Lot 3001				
Existing Future Development Site	—	0.354 ha	0.354 ha	31.8%
Total Area of Lot 3001	**—**	**0.354 ha**	**0.354 ha**	**31.8%**
Road				
Railway Esplanade (23.5m Wide)	0.143 ha	—	0.143 ha	12.8%
Access Place (19m Wide)	0.165 ha	—	0.165 ha	14.8%
Access Lane (6.5m Wide)	0.065 ha	—	0.065 ha	5.8%
Vegetation Buffer Within Road Reserve	0.063 ha	—	0.063 ha	5.7%
Total Area of New Road	**0.436 ha**	**—**	**0.436 ha**	**39.1%**

PLAN REF: 128180 – 92
Rev No: H
DATE: 04 AUGUST 2021
CLIENT: EDQ
DRAWN BY: JC
CHECKED BY: MD

1 : 750 @ A2

CARSELDINE URBAN VILLAGE
PLAN OF SUBDIVISION
STAGE 3A & 3B

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Plan of Development Table

	Terrace Allotment < 99m²		Terrace Allotment 100m² - 201m²	
	Ground Floor	First / Second Floor	Ground Floor	First / Second Floor
Setback Requirements				
Primary Frontage (minimum)	1.5m *	1.0m *	1.5m *	1.0m *
Garage / Carport (minimum)	1.5m	n/a	1.5m	n/a
Rear (minimum)	1.5m	0.0m	1.5m	0.0m
Side				
Built to Boundary (maximum)	0.05m	0.05m	0.05m	0.05m
Mandatory BTB Wall Length (maximum) (% of boundary length)	100%		100%	
Non Built to Boundary (minimum)	0.9m	0.9m	0.9m	0.9m
Corner Lots - Secondary Frontage to Street (minimum)	n/a	n/a	1.2m *	1.2m *
Other Requirements				
Site Cover (maximum)	95%		90%	
Primary Private Open Space Requirements (minimum)	Studio / 1 Bedroom - 5m² (minimum dimension of 1.2m); 2 Bedroom - 9m² (minimum dimension of 2.4m); 3+ Bedroom - 12m² (minimum dimension of 2.4m).			
Street Frontage Landscape Requirements (minimum)	1% of lot area; vertical solution at front entry required.		5% of lot area; minimum 1.5% on ground at Street frontage, vertical solutions encouraged for remaining 3.5%.	

Notes: * 0.0 metres to verandah/balcony

Notes:

General

1. All development is to be undertaken in accordance with the Development Approval.
2. All Class 1A dwellings are mandated to achieve a minimum Silver Final Certification under the Australian *Liveable Housing Design Guidelines*.
3. A home based business up to 50m² is allowed within each dwelling. A gross floor area (GFA) in excess of 50m² will require additional EDQ approval.
4. The relevant Bushfire Report must be considered and mitigation strategies adopted where deemed necessary by the Building Certifier.
5. Carseldine Village does not have a reticulated gas supply. Gas bottles serving a dwelling are strictly prohibited.
6. Refer to *Stage 3 Landscape Plans* for locations and extent of footpaths.
7. High-density Development Easements (HDEs) will be registered by Economic Development Queensland on mandatory built to boundary walls on lots under 250m². HDEs are not shown on this Plan of Development.
8. The minimum building height is two (2) storeys.
9. The maximum building height is three (3) storeys.
10. Ground floor height (finished floor level to ceiling) must be a minimum of 2.7m and subsequent floor heights (finished floor level to ceiling) must be a minimum of 2.55m.

Setbacks

11. Setbacks are as per the Plan of Development Table unless otherwise dimensioned.
12. Setbacks are measured to the wall of the structure.
13. The location of built to boundary walls are indicated on the Plan of Development.
14. Feature end treatment of the built to boundary wall is required where abutting the site boundary at the primary frontage. Feature end treatment to be in a material consistent with materials used on the primary frontage building facade.
15. Where optional built to boundary walls are not adopted, the following applies:
    - side setbacks shall be in accordance with the Plan of Development Table;
    - to provide privacy for residents, only high level linear windows are permitted;
    - EDQ approved solid fencing is installed where providing privacy for residents in their private open space areas, and must positively contribute to the streetscape.
16. Mandatory built to boundary walls must have a maximum setback of 50mm to facilitate a gutter overhang.
17. Where two neighbouring build to boundary walls are not adopted, EDQ approved privacy screening must be erected.

Building Articulation

18. All Primary Frontages must be articulated to provide diversity in building form and respond to the local climate. This must be achieved through the incorporation of three of the following design elements:
    - verandahs / balconies;
    - roof overhangs;
    - window hoods / screens;
    - awnings and/or shade structures that vary the horizontal mass created by the row of terrace houses.
19. All dwellings must include a clearly identifiable and addressed front door. Front door must be visible from the Street. Front door access must not be via a Lane. Sliding doors do not constitute a front door.
20. Front door must be sufficiently sheltered from the elements, preferably utilising the structure of the first floor.
21. Buildings must be designed to ensure the privacy of occupants, but also allow for overlooking of the Street and Lane to promote casual surveillance.
22. Secondary frontages must be orientated to provide casual surveillance of the Street and articulated to reduce the mass of the building. This must be achieved by the incorporation of verandahs / porches or the inclusion of window openings, plus one more of the following design elements:
    - awning and shade structures;
    - variation to roof and building lines;
    - use of varying building materials.
23. Design of dwellings with Secondary frontages to Street must visually 'wrap' around the corner, providing activation of the corner and passive surveillance of the Street through the form of porch/alfresco openings and/or glazing.
24. If provided, privacy screening must be either of solid material (e.g. timber, steel), opaque screens, perforated panels, or trellises that are permanently fixed, and are to have a maximum of 50 per cent openings.
25. Carports and garages are to be compatible with the main building design in terms of height, roof form, detailing, materials and colours.
26. For carports, the facade construction, appearance and treatment must be visually consistent with that of a garage, and must be compatible with the main building design. No prefabricated facades permitted.
27. All building materials must be suitably coloured, stained or painted, including retaining, fences, walls and roofs. Untreated materials, such as zinc coated steel, bare metal, concrete block or masonry panels are not permitted.
28. Dwellings must include landscaping along the Street frontage to reinforce the dwelling entry, and to positively contribute to the streetscape. Turf is prohibited; ground covers are required where turf would typically be installed.
29. Air-conditioners, hot water systems, clothes lines and other household services must be screened and/or located to minimise visual impact to the Street. Services may be visible from the lane, but must be screened.
30. Bin storage is to be provided where identified on the Plan of Development. Bin storage must be screened from the lane, and be visually compatible with the main building design.

Private Open Space

31. Primary private open space must be provided in accordance with the Plan of Development Table. This area may be roofed and take the form of an upper floor balcony or rooftop terrace.
32. Primary private open space must be directly accessible from a living space. There must be adequate space to accommodate a table and chairs, planting and a BBQ. Shade is to be provided to the area by being at least 40% roofed.

On-site Car Parking and Driveways

33. On-site car parking is to be provided in accordance with the following minimum requirements:
    a. Studio, 1 and 2 Bedrooms - 1 space per dwelling;
    b. 3 or more Bedrooms - 2 spaces per dwelling.
34. Tandem parking is prohibited.
35. At least one car park per dwelling must be covered. Carports are permitted.
36. Garages / carports are to be located as indicated on this Plan of Development.
37. Single car garage / carports must achieve a minimum garage door opening of 2.4m when open.
38. Double garages must feature a singular garage door and opening; two separate garage doors are not permitted.
39. Vehicle access to a dwelling is only permitted from a Lane; vehicle access from a Street is prohibited.

Fencing

40. Fencing erected by Economic Development Queensland must not be altered, modified or removed without prior written approval from Economic Development Queensland.
41. Feature fencing identified on the Plan of Development is mandatory.
42. Feature Fencing Type A is to be:
    - 1.8m high good neighbour style capped timber fence with a minimum 10mm gap between slats. Must be painted in Colorbond Woodland Grey.
43. Feature Fencing Type B is to be:
    - 1.5m high lapped and capped timber fence. Must be painted in Colorbond Woodland Grey.
44. Feature fencing must be setback from the front dwelling wall by a minimum of 1.0m, and must not prohibit the ability for the design of the dwelling to visually 'wrap' around the building corner.
45. Fencing to Primary Frontages must be in the form of planter boxes and/or privacy screening for residents, in particular where there is a front open space.
46. Fencing on Lane frontages must be solid fencing and be compatible with the main building design in terms of height, form, detailing, materials and colour.

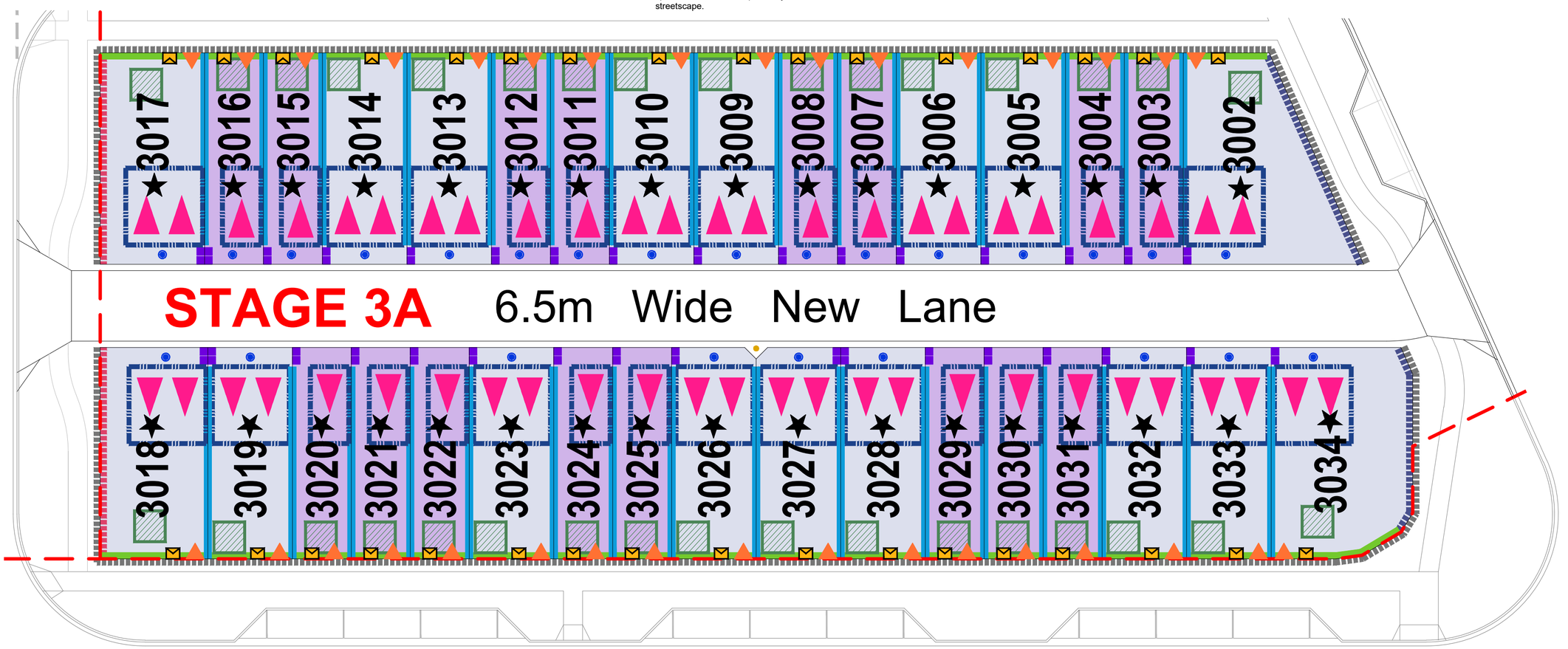
Acoustics

47. The relevant Acoustic Report must be considered and mitigation strategies adopted where deemed necessary by the Building Certifier. Lots 3002 - 3034 are subject to acoustic constraints. Information regarding building form treatments required to habitable rooms to ensure compliance is outlined under the *TTM Acoustic Report*, Section 9. Noise categories for each lot are outlined in Table 11 within the *TTM Acoustic Report*. Associated sound reduction requirements and acceptable forms of construction have been outlined within the *TTM Acoustic Report* (Table 12 and Appendix D) and can also be found within *QDC MP4.4* Schedules 1 and 2.

Definitions

Street - A public road (generally 14m wide or greater) providing vehicle access and services to the wider community and open space.

Lane (or Laneway) - A narrow public road (6.5m wide) providing vehicle access and services to the wider community and open space.



Legend

- Site Boundary
- Proposed Stage Boundary

Allotment Controls

- Mandatory Built to Boundary Wall
- No Vehicle Access
- Primary Frontage
- Feature Fencing Type A
- Feature Fencing Type B
- Indicative Double Garage / Carport Location
- Indicative Single Garage / Carport Location
- Preferred Primary Private Open Space Location
- Indicative Letterbox Location
- Indicative Front Door Location
- Indicative Bin Storage Location
- Proposed Sewer Access Point
- Indicative Proposed Street Light (Within Laneway)
- ★ Acoustic Treatment may be required - refer TTM Acoustic Report

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 1m².

The boundaries shown on this plan should not be used for final detailed engineers design.

PLAN REF: 128180 – 93
Rev No: H
DATE: 04 AUGUST 2021
CLIENT: EDQ
DRAWN BY: JC
CHECKED BY: MD

0 2 4 6 8 10 12 14 **1 : 250 @ A2**

CARSELDINE URBAN VILLAGE
PLAN OF DEVELOPMENT
STAGE 3A - TERRACE ALLOTMENTS

DRAFT
For Discussion Only

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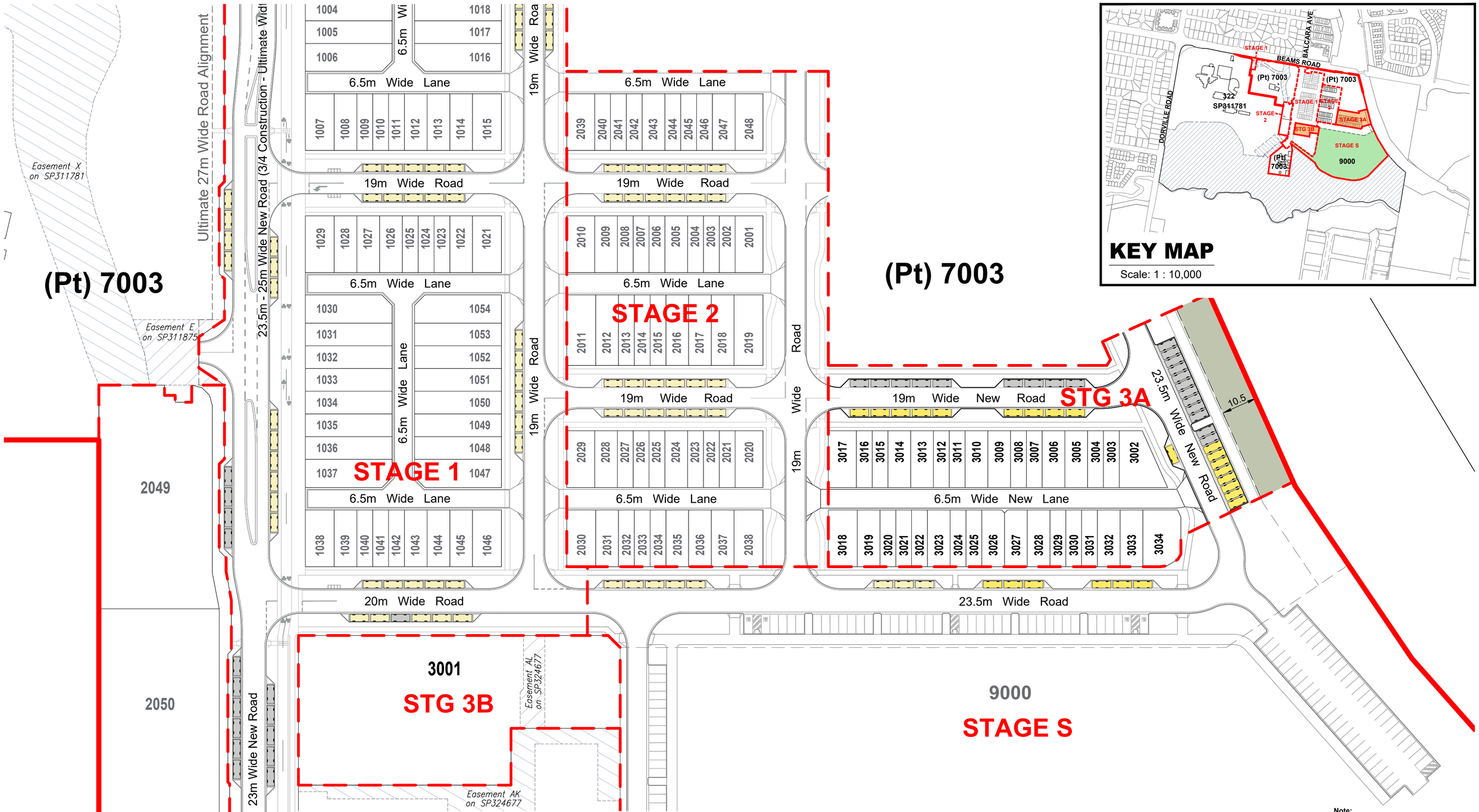
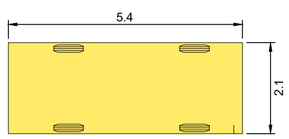


Legend

- Site Boundary
- Stage Boundary
- Existing Access Easements
- Visitor Parking for Stage 3 Dwellings
- Visitor Parking for Stage 1 & 2 Dwellings
- Visitor Parking - Additional Parking

Parking Bay Diagram

Scale 1 : 100



Parking Breakdown - Stage 3

Total Dwellings Stage 3..... 33

Total Visitor Parking Spaces Required Stage 3
(0.75 per dwelling)..... 25
Total Visitor Parking Spaces Provided Stage 3..... 25

Parking Breakdown - Stage 1 - 3 Combined

Total Dwellings Stage 1 - 3.....134

Total Visitor Parking Spaces Required Stage 1 - 3
(0.75 per dwelling) 101
Total Visitor Parking Spaces Provided Stage 1 - 3 104

Additional Visitor Parking 36
** To be utilised as visitor parking for future Stage subdivision(s).*

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 1m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: Registered Survey Plans.
Adjoining information: DCDB.

PLAN REF: 128180 – 94
Rev No: H
DATE: 04 AUGUST 2021
CLIENT: EDQ
DRAWN BY: JC
CHECKED BY: MD

0 10 20 30 40 50 **1 : 750 @ A2**

CARSELDINE URBAN VILLAGE
CAR PARKING ANALYSIS PLAN
STAGE 3

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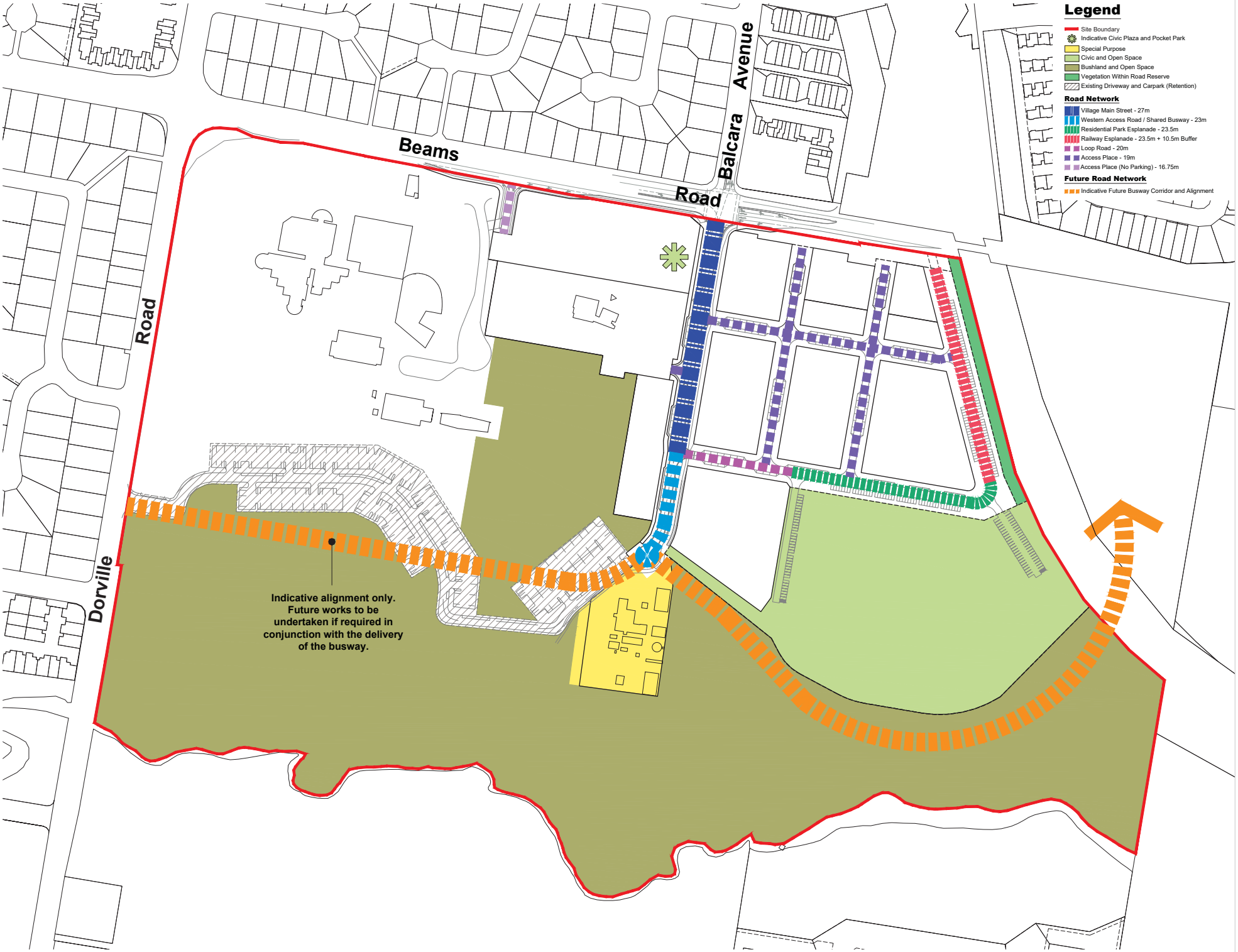

Legend

- Site Boundary
- Indicative Civic Plaza and Pocket Park
- Special Purpose
- Civic and Open Space
- Bushland and Open Space
- Vegetation Within Road Reserve
- Existing Driveway and Carpark (Retention)

Road Network

- Village Main Street - 27m
- Western Access Road / Shared Busway - 23m
- Residential Park Esplanade - 23.5m
- Railway Esplanade - 23.5m + 10.5m Buffer
- Loop Road - 20m
- Access Place - 19m
- Access Place (No Parking) - 16.75m

Future Road Network

- Indicative Future Busway Corridor and Alignment

0 10 20 30 40 50 1:1,500 @ A1

CARSELDINE URBAN VILLAGE
ROAD HIERARCHY PLAN

PLAN REF:	128180 – 38J
DATE:	03 October 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD/DG

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 5m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: Registered Survey Plans.
Adjoining information: DCDB.
Contours: QUT.

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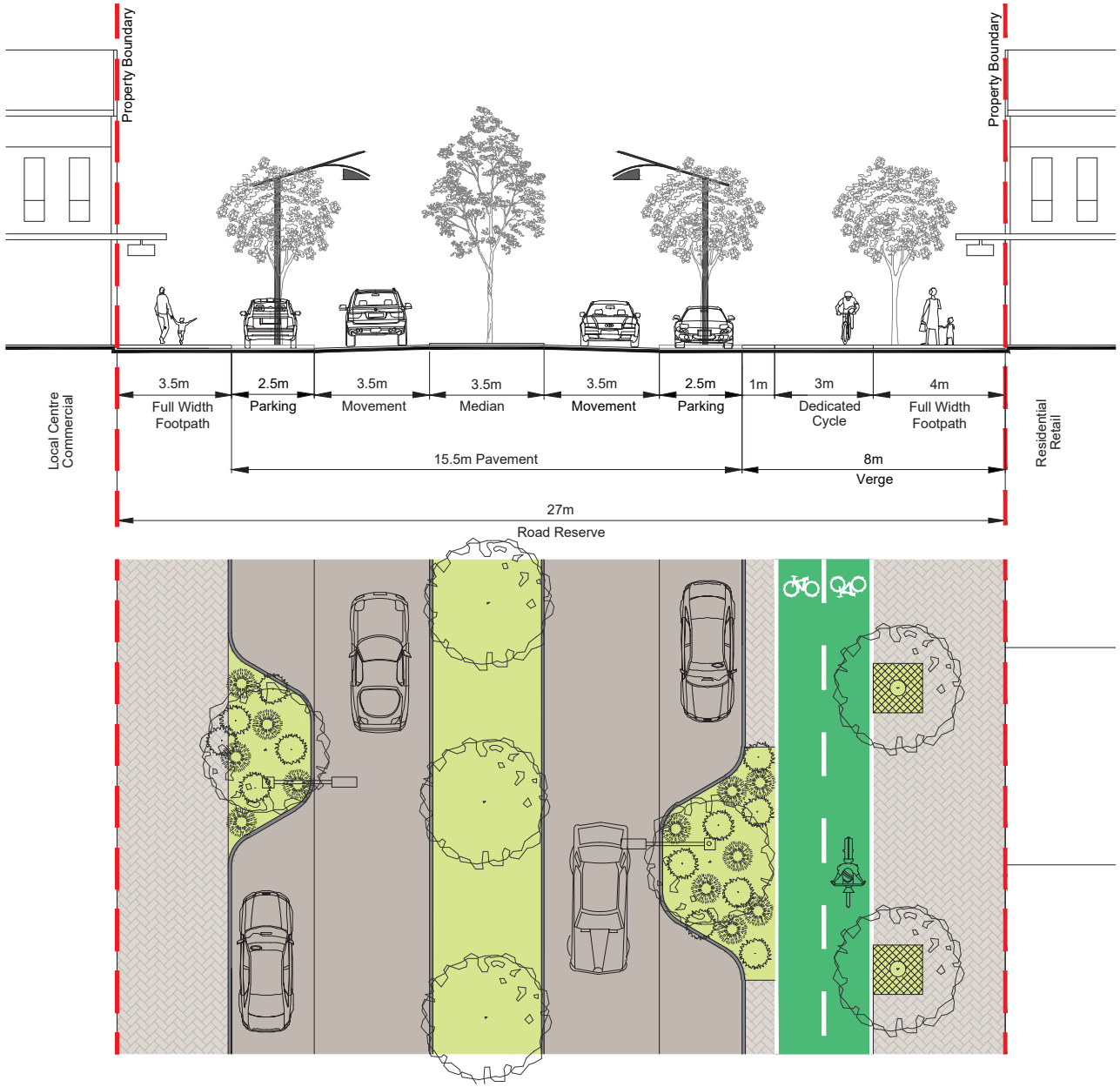
Village Main Street - 27m Wide Road Reserve



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PLAN REF: **128180 – 39D**
DATE: 09 SEPTEMBER 2019
CLIENT: EDQ
DRAWN BY: MD
CHECKED BY: MD / DG

0 2 4 6 8 10 **1 : 200 @ A4**

CARSELDINE URBAN VILLAGE
VILLAGE MAIN STREET
27m WIDE

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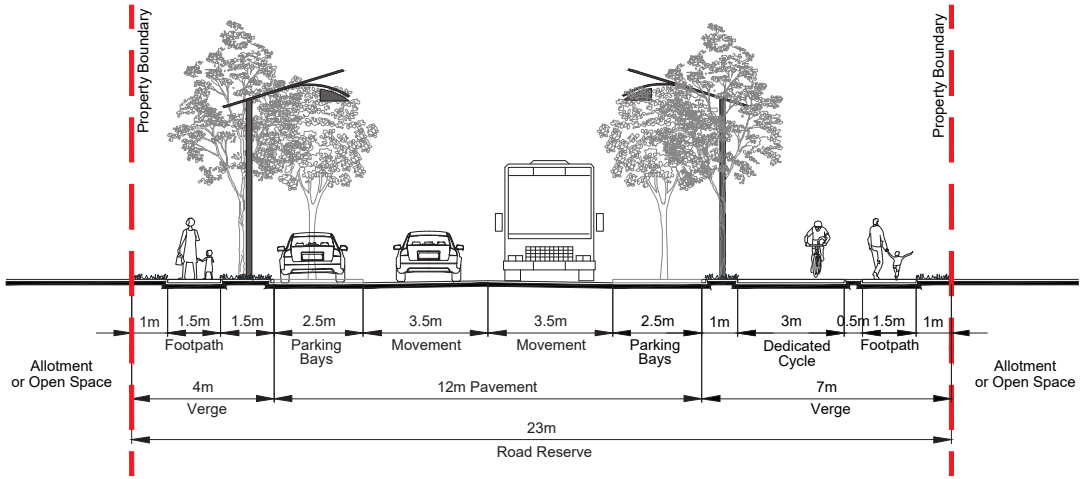
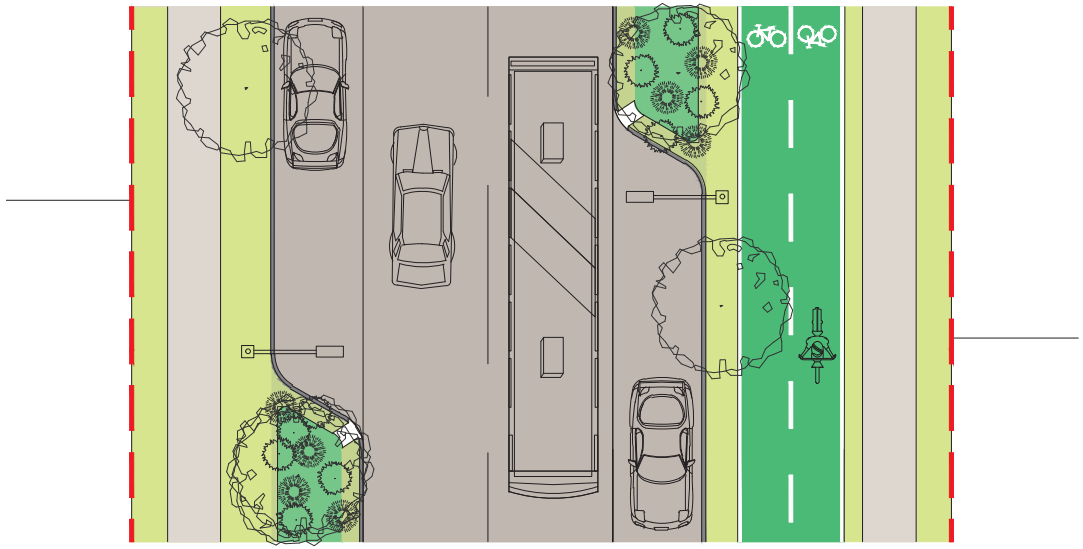
Western Access Road / Shared Busway - 23m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE

WESTERN ACCESS ROAD / SHARED BUSWAY - 23m WIDE

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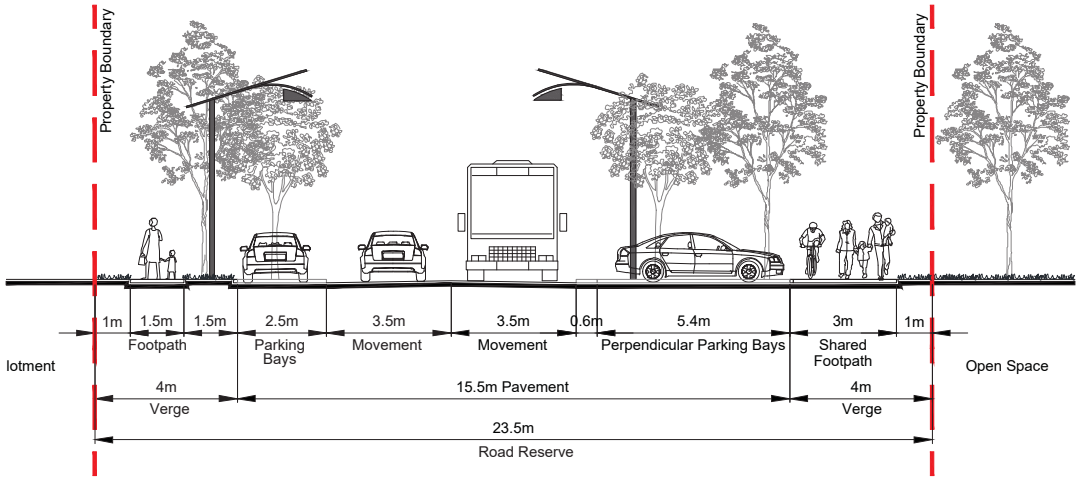
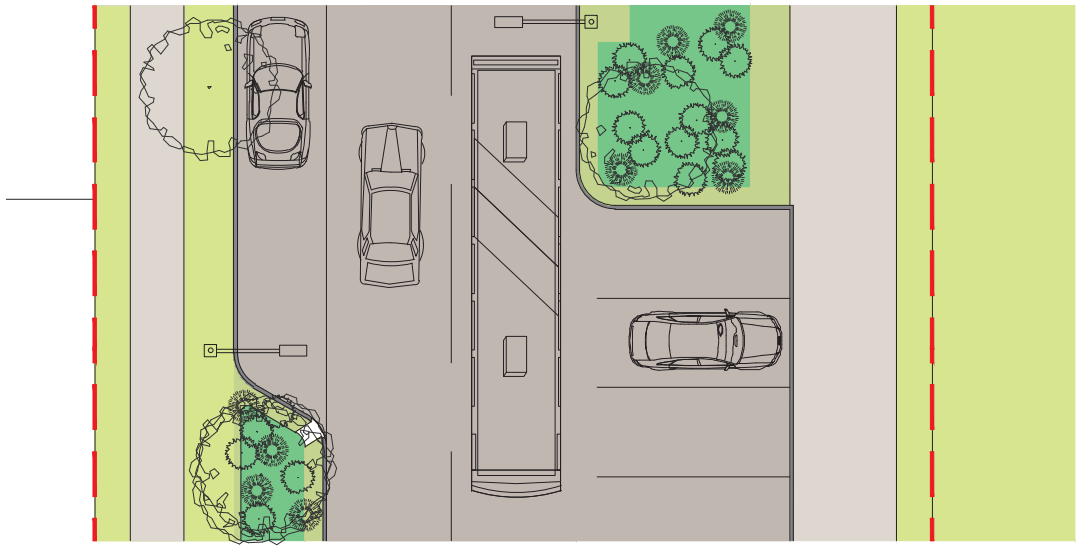
Residential Park Esplanade - 23.5m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE
RESIDENTIAL PARK ESPLANADE
23.5m WIDE

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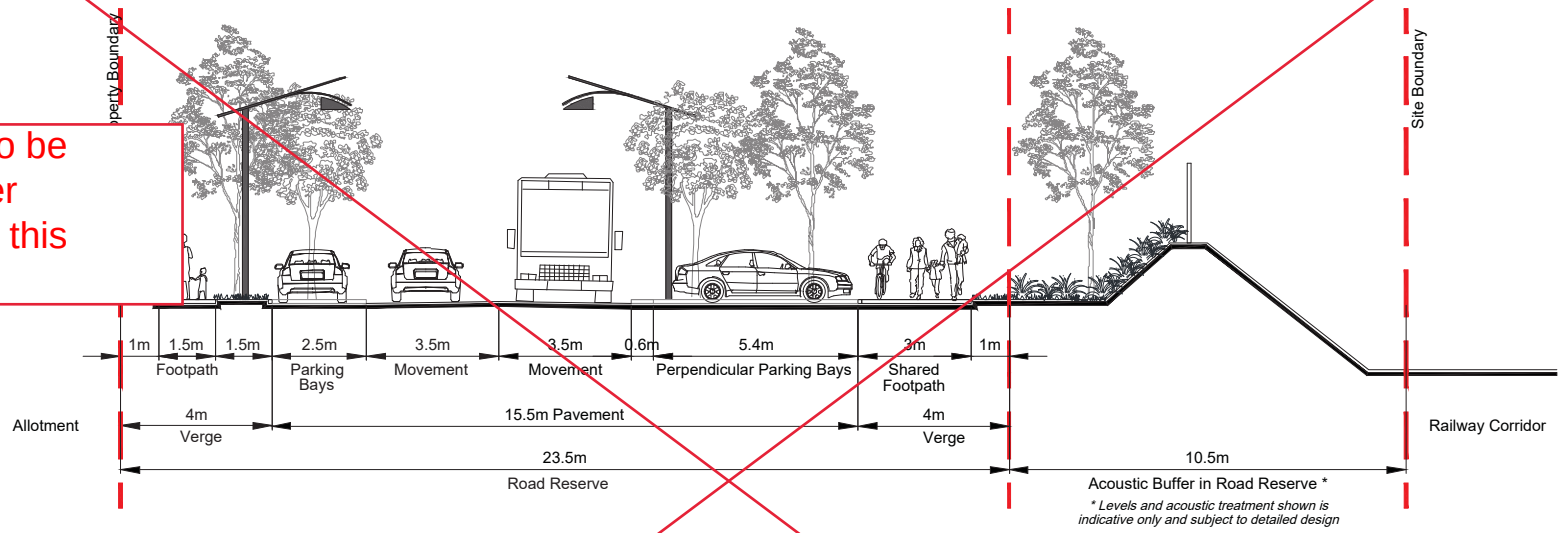
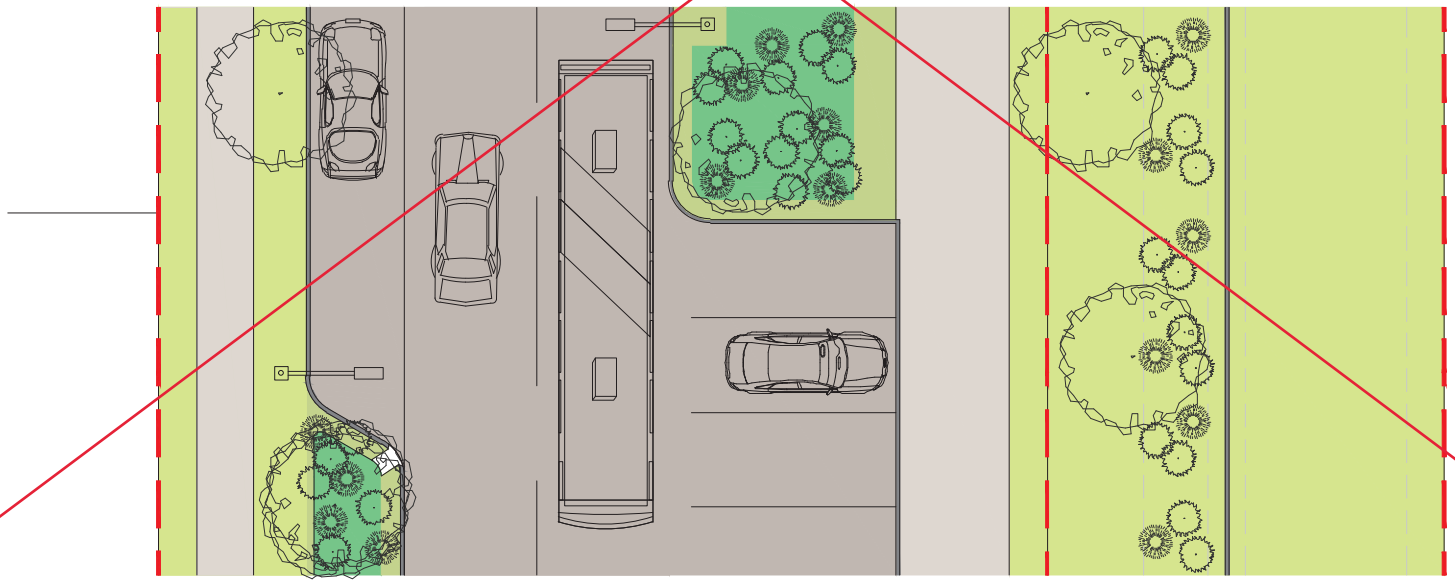
Railway Esplanade - 23.5m + 10.5m Buffer

Cross section to be approved as per Condition 12 of this approval





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
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0 2 4 6 8 10 **1 : 200 @ A4**

CARSELDINE URBAN VILLAGE
RAILWAY ESPLANADE
23.5m WIDE + 10.5m BUFFER

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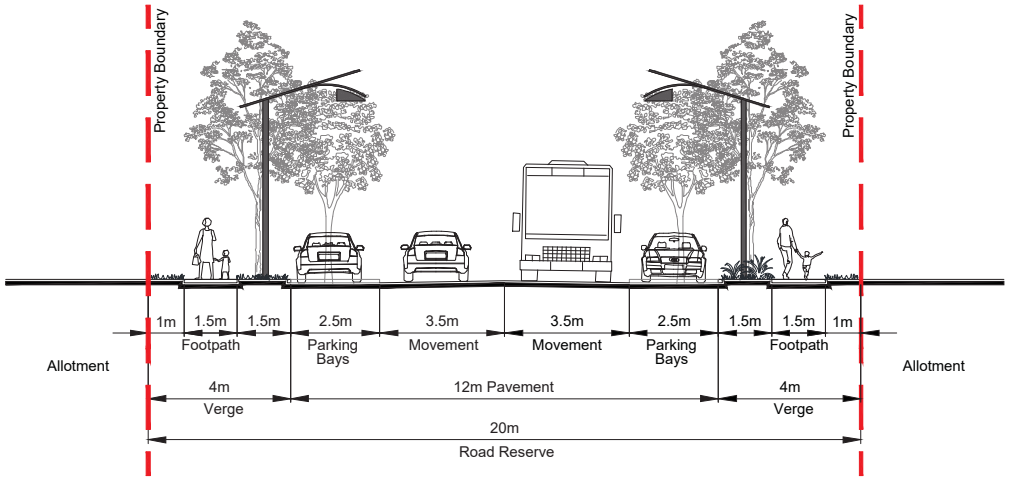
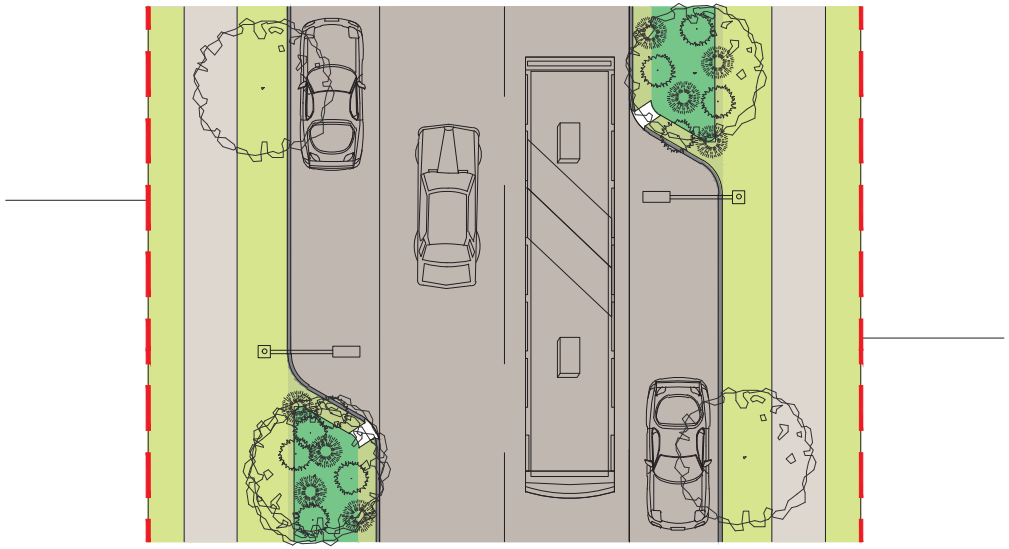
Loop Road - 20m





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PLAN REF: 128180 – 39D
DATE: 09 SEPTEMBER 2019
CLIENT: EDQ
DRAWN BY: MD
CHECKED BY: MD / DG

0 1 2 3 4 5 1 : 150 @ A4

CARSELDINE URBAN VILLAGE
LOOP ROAD
20m WIDE

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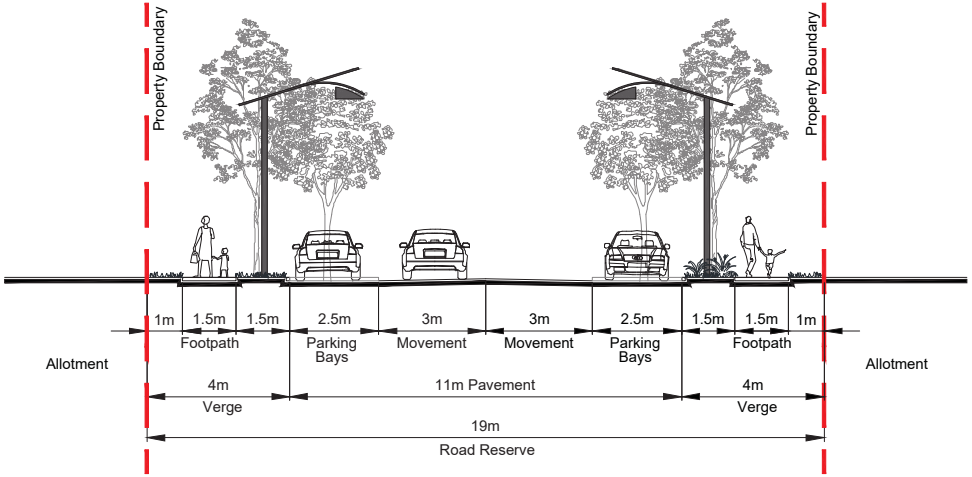
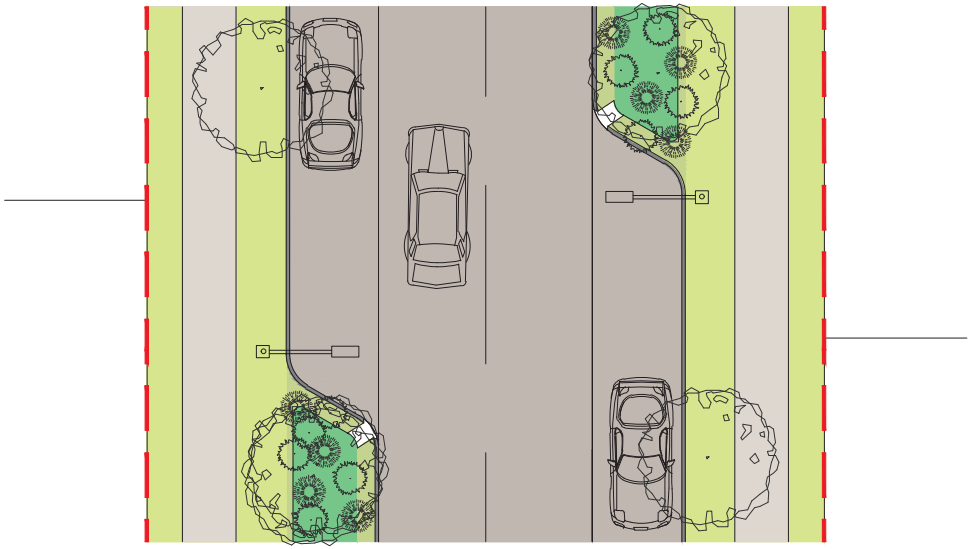
Access Place - 19m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE
ACCESS PLACE
19m WIDE

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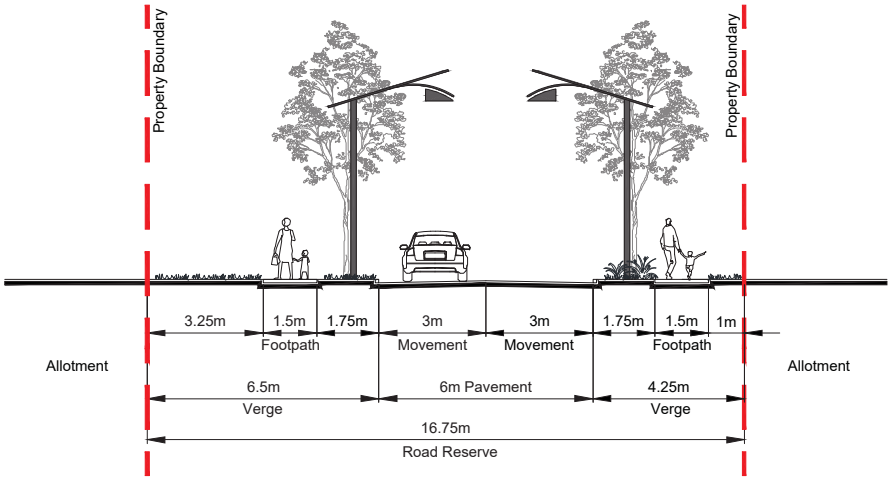
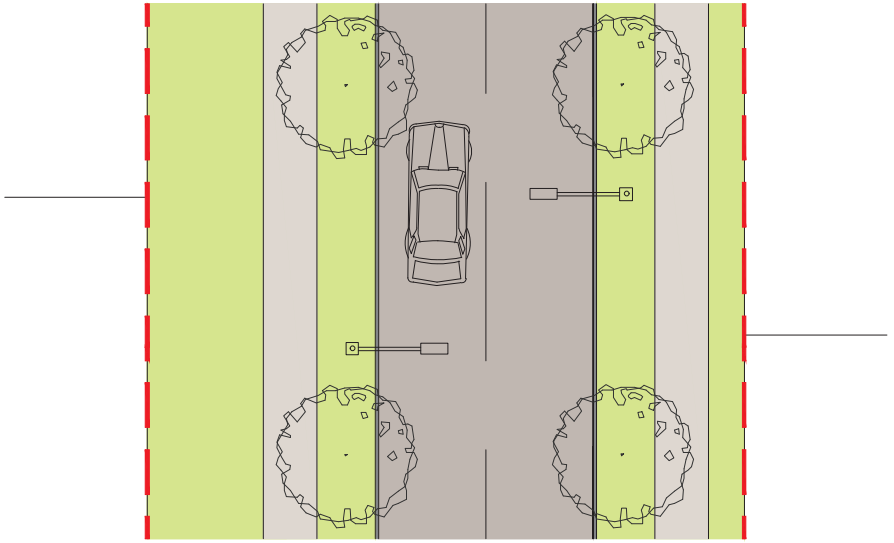
Access Place (No Parking) - 16.75m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE

ACCESS PLACE (NO PARKING)
16.75m WIDE

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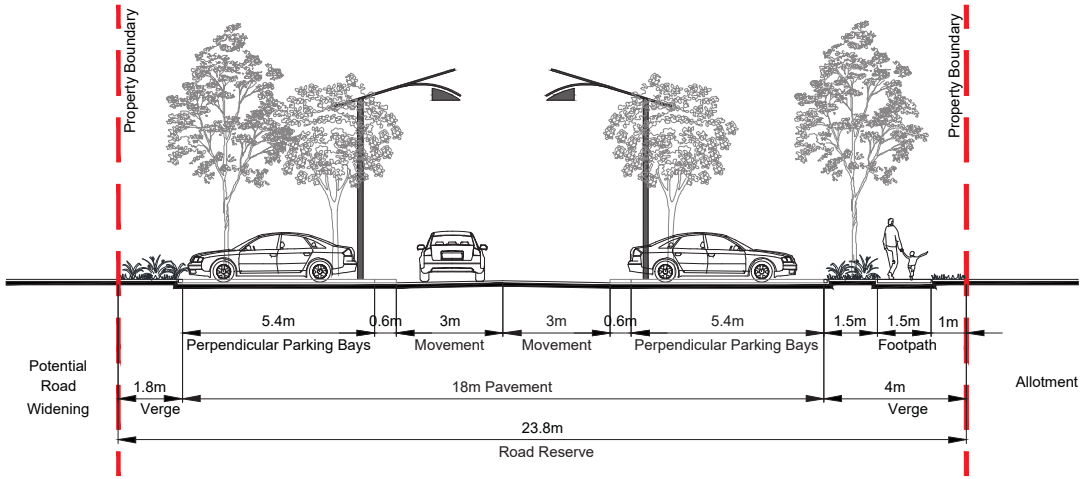
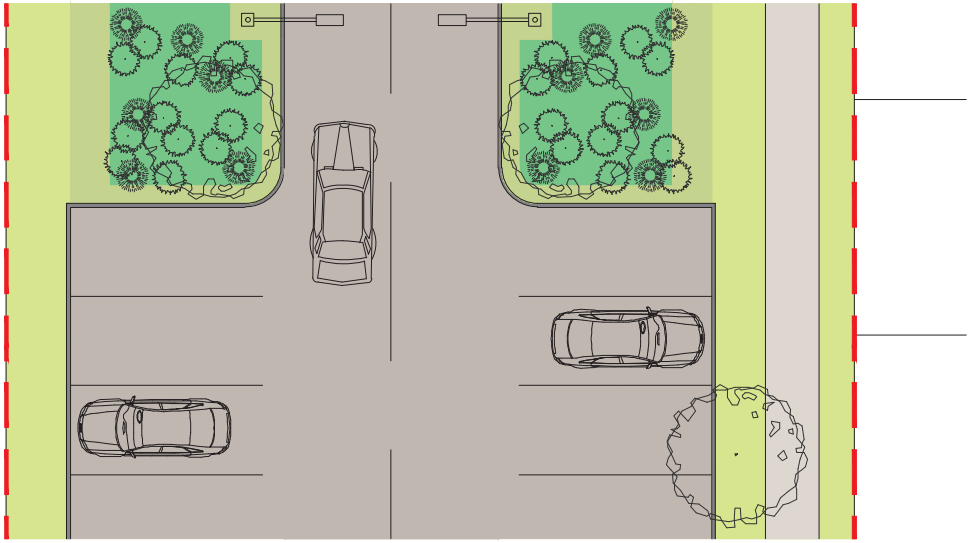
Access Place (Parking) - 23.8m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE
ACCESS PLACE (PARKING)
23.8m WIDE

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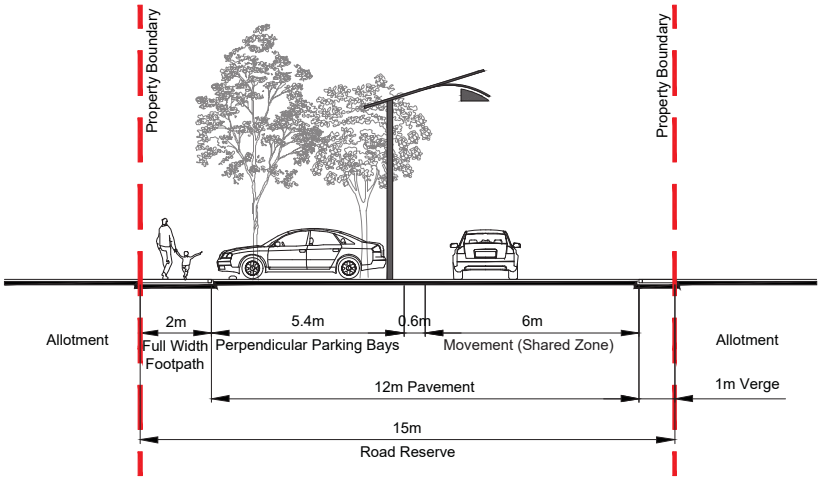
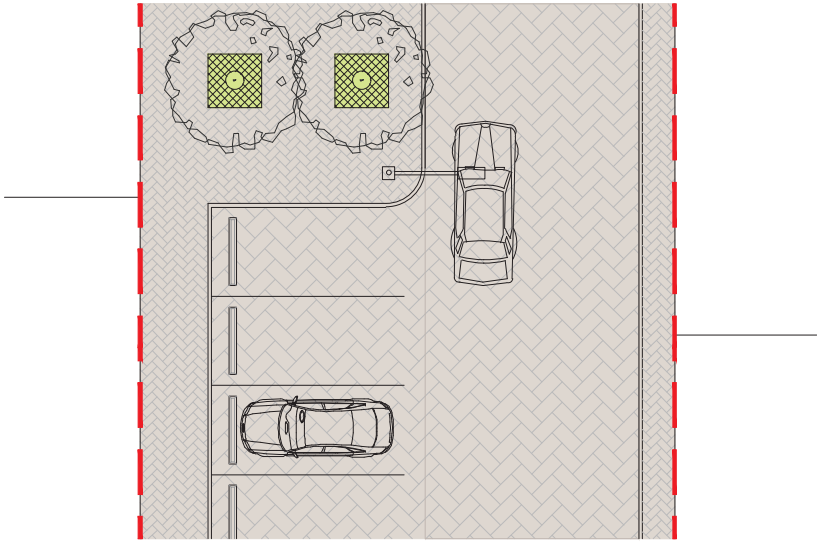
Shared Access Lane (Parking One Side) - 15m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE

SHARED ACCESS LANE (PARKING ONE SIDE) - 15m WIDE

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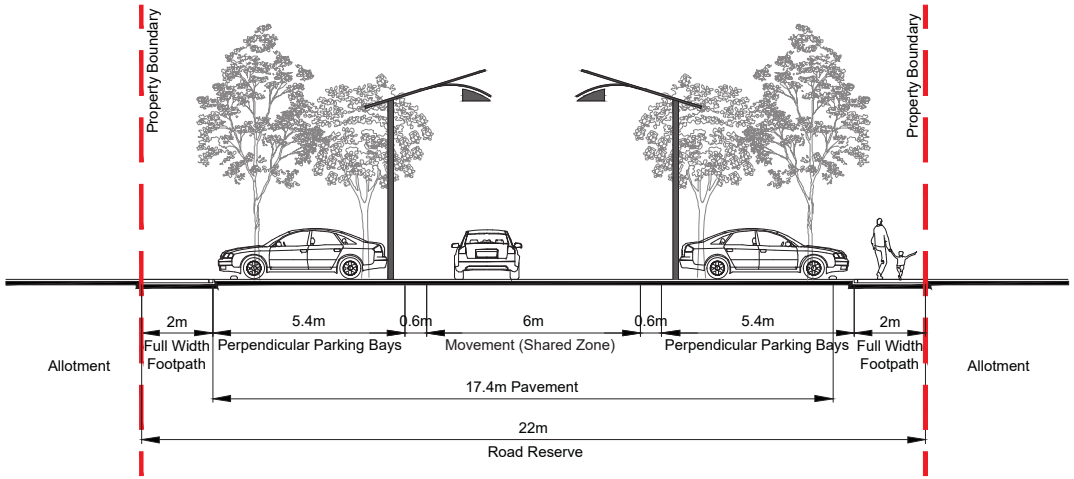
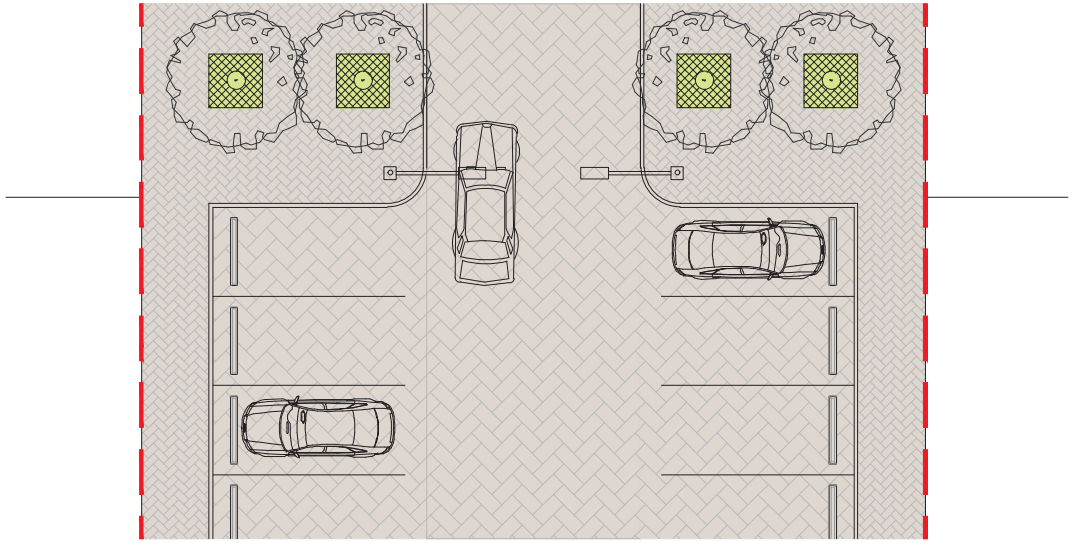
Shared Access Lane (Parking Two Sides) - 22m





Disclaimer: Cross Sections are indicative only and subject to detail design. Location of pavement subject to change through detailed design of landscape and servicing.

PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
CLIENT:	EDQ
DRAWN BY:	MD
CHECKED BY:	MD / DG

0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE

SHARED ACCESS LANE (PARKING TWO SIDES) - 22m WIDE

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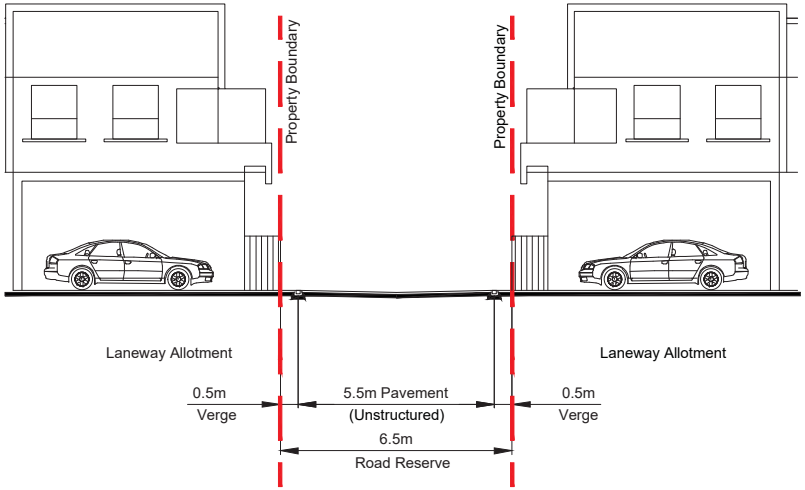
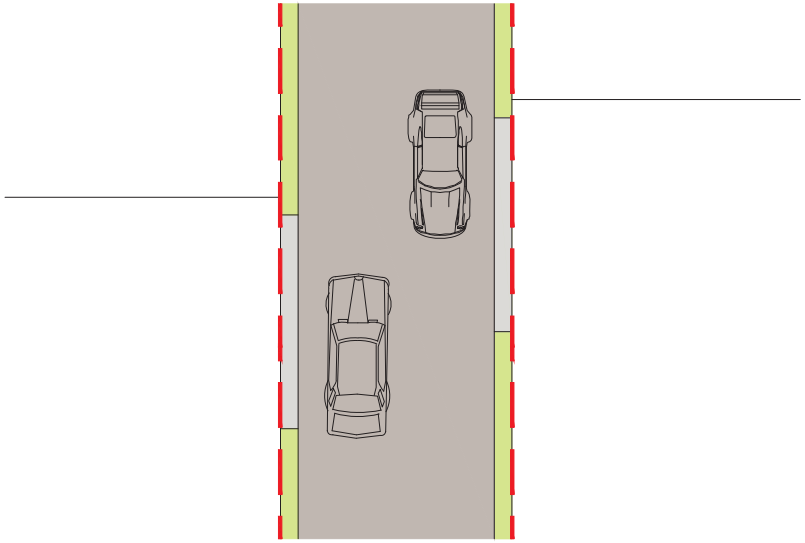
Access Lane - 6.5m





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PLAN REF:	**128180 – 39D**
DATE:	09 SEPTEMBER 2019
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0 1 2 3 4 5 **1 : 150 @ A4**

CARSELDINE URBAN VILLAGE
ACCESS LANE
6.5m WIDE

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APPENDIX B CIVIL FUNCTIONALS

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CARSELDINE VILLAGE

STAGE 3A & LOT 3001
FUNCTIONAL LAYOUTS

PLAN
SCALE 1:2000

DRAWING INDEX

DRAWING NO.	DRAWING TITLE
20-180-100	FUNCTIONAL LAYOUT - LOCALITY PLAN - DRAWING INDEX
20-180-101	FUNCTIONAL LAYOUT - EARTHWORKS PLAN
20-180-102	FUNCTIONAL LAYOUT - ROAD WORKS
20-180-103	FUNCTIONAL LAYOUT - TYPICAL SECTIONS
20-180-104	FUNCTIONAL LAYOUT - STORMWATER
20-180-105	FUNCTIONAL LAYOUT - SEWER
20-180-106	FUNCTIONAL LAYOUT - WATER RETICULATION
20-180-107	FUNCTIONAL LAYOUT - OVERALL SERVICES - STAGE 3A
20-180-108	FUNCTIONAL LAYOUT - OVERALL SERVICES - LOT 3001
20-180-109	FUNCTIONAL LAYOUT - POSSIBLE FLOOR & PAD LEVELS - STAGE 3A

SCALE 20 10 0 20 40 60 80 100 120 140 160 180 200m
1 : 2000 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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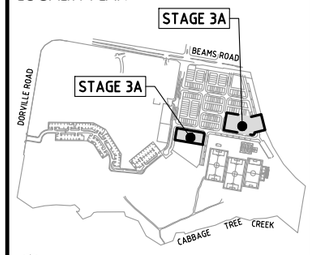
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au

Approved

Drawing Title
FUNCTIONAL LAYOUT
LOCALITY PLAN
DRAWING INDEX

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

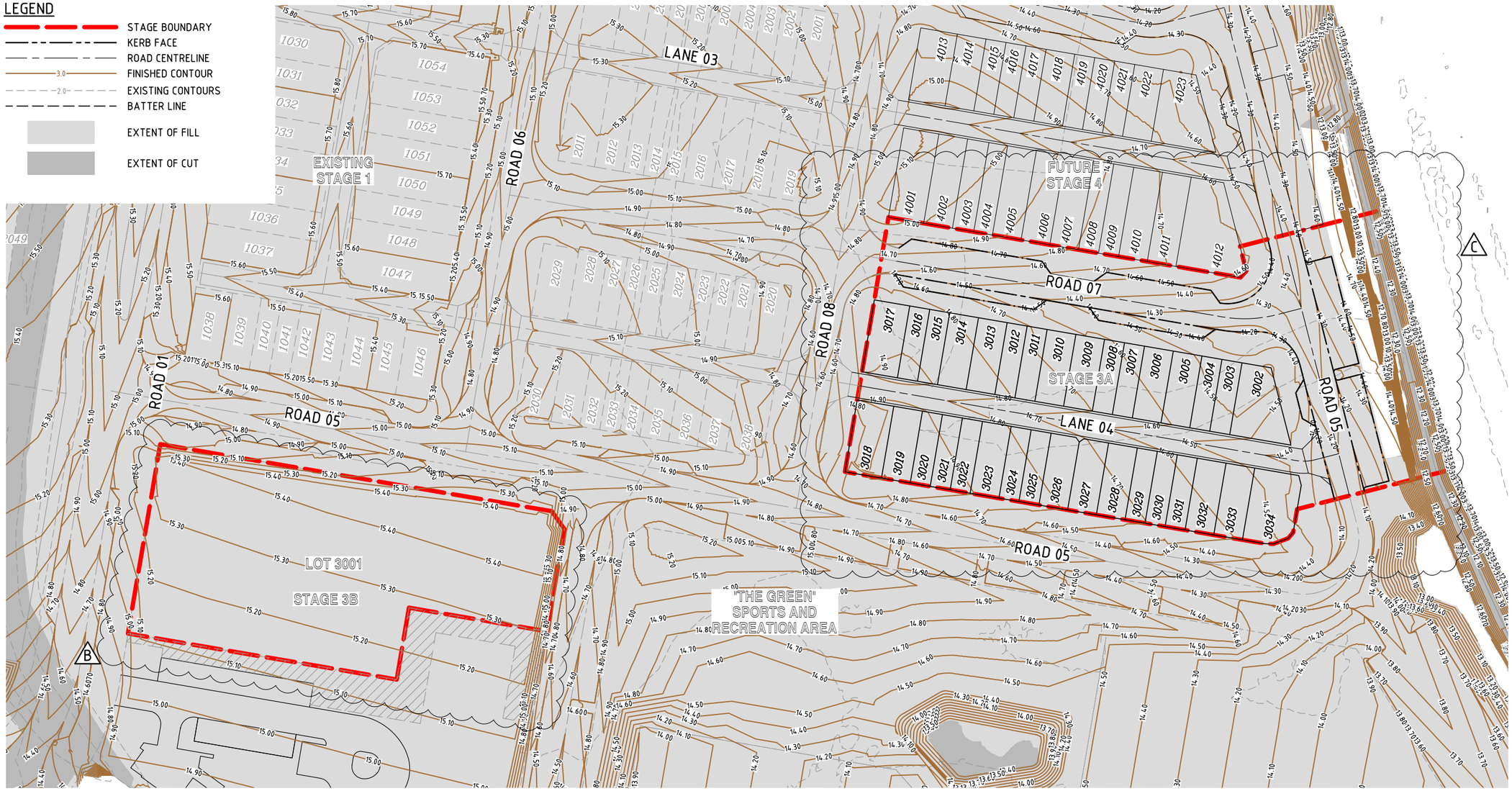
Scale	Sheet
AS SHOWN	1 of 10

	Drawing No	Revision
A1	20-180-FL100	C

C:\Users\ds\AppData\Local\Temp\AcPublish_12\20-180-100-FL-COVER.dwg Plotted by: DS on 16/08/2021 1:05:25 PM

LEGEND

- STAGE BOUNDARY
- KERB FACE
- ROAD CENTRELINE
- 3.0 FINISHED CONTOUR
- 2.0 EXISTING CONTOURS
- BATTER LINE
- EXTENT OF FILL
- EXTENT OF CUT



FUNCTIONAL LAYOUT - EARTHWORK PLAN

SCALE 1:500

SCALE 10 5 0 10 20 30 40 50m

1 : 500 (A1 UNREDUCED)

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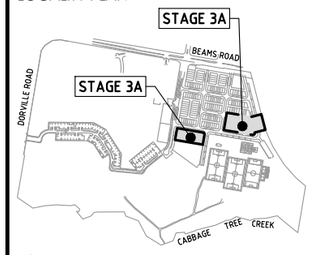
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au

Approved

Drawing Title

FUNCTIONAL LAYOUT
EARTHWORKS PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

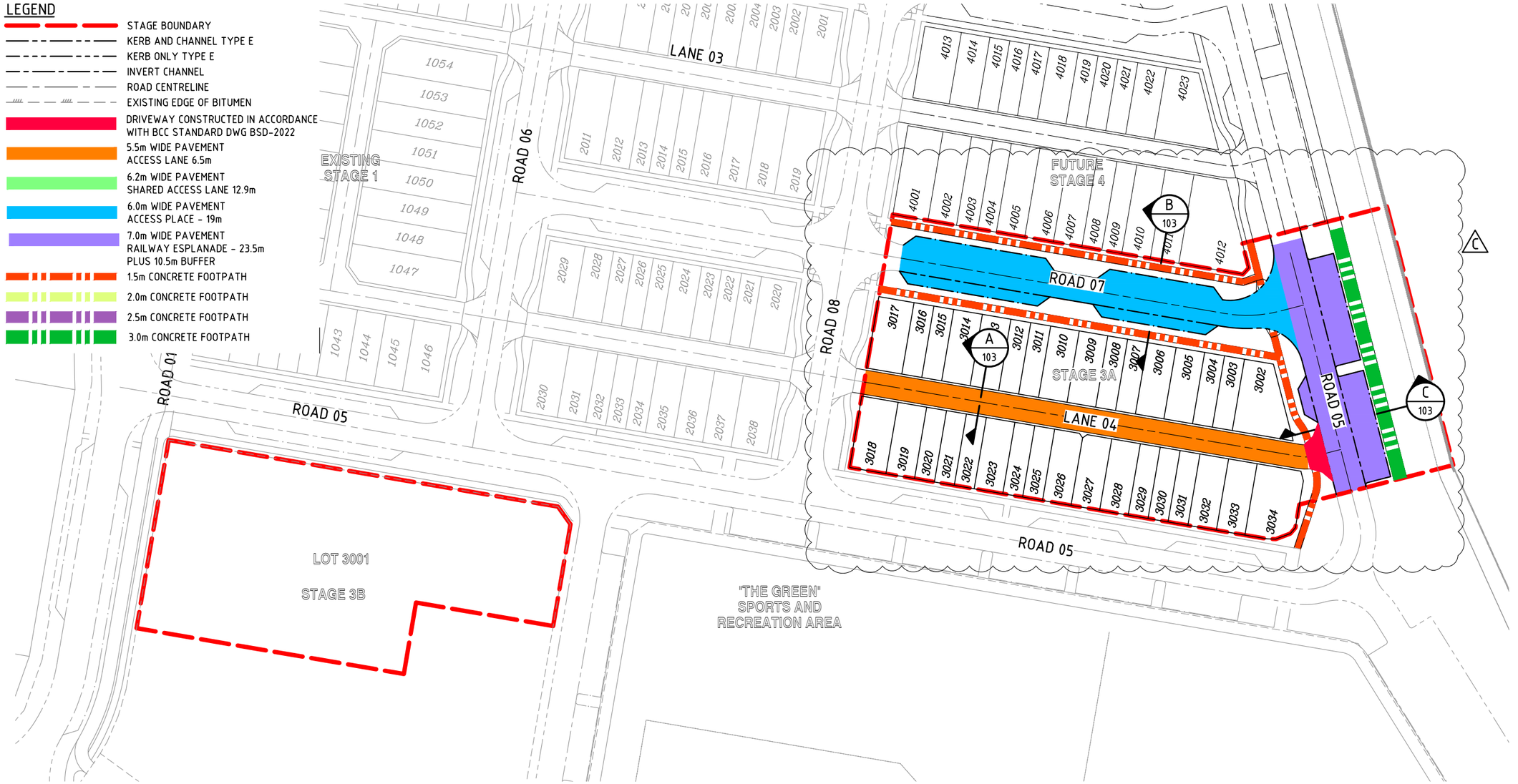
Scale	Sheet
AS SHOWN	2 of 10

A1	Drawing No	Revision
	20-180-FL101	C

M:\2020\20180 Carseldine Village Stage 3\Engineering\Acad\FUNCTIONAL\20-180-101-EW.dwg Plotted by DS on 16/08/2021 1:05:31 PM

LEGEND

- STAGE BOUNDARY
- KERB AND CHANNEL TYPE E
- KERB ONLY TYPE E
- INVERT CHANNEL
- ROAD CENTRELINE
- EXISTING EDGE OF BITUMEN
- DRIVEWAY CONSTRUCTED IN ACCORDANCE WITH BCC STANDARD DWG BSD-2022
- 5.5m WIDE PAVEMENT ACCESS LANE 6.5m
- 6.2m WIDE PAVEMENT SHARED ACCESS LANE 12.9m
- 6.0m WIDE PAVEMENT ACCESS PLACE – 19m
- 7.0m WIDE PAVEMENT RAILWAY ESPLANADE – 23.5m PLUS 10.5m BUFFER
- 1.5m CONCRETE FOOTPATH
- 2.0m CONCRETE FOOTPATH
- 2.5m CONCRETE FOOTPATH
- 3.0m CONCRETE FOOTPATH



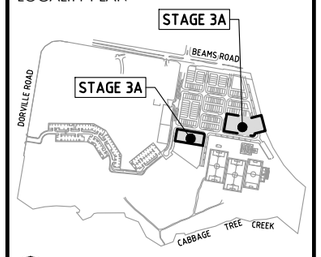
FUNCTIONAL LAYOUT – ROADWORKS PLAN
SCALE 1:500

SCALE 10 5 0 10 20 30 40 50m
1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au

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Drawing Title
FUNCTIONAL LAYOUT
ROAD WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	3 of 10

A1	Drawing No	Revision
	20-180-FL102	C

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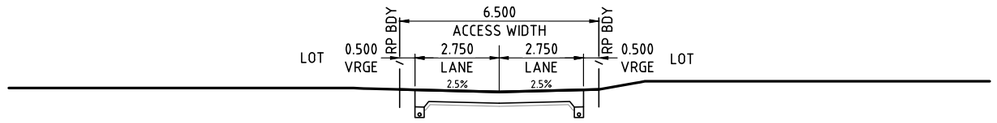
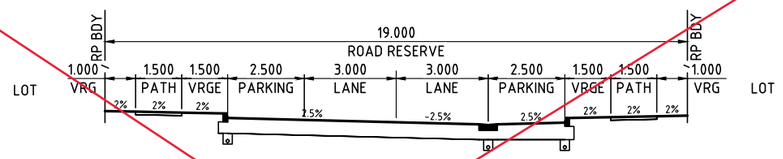
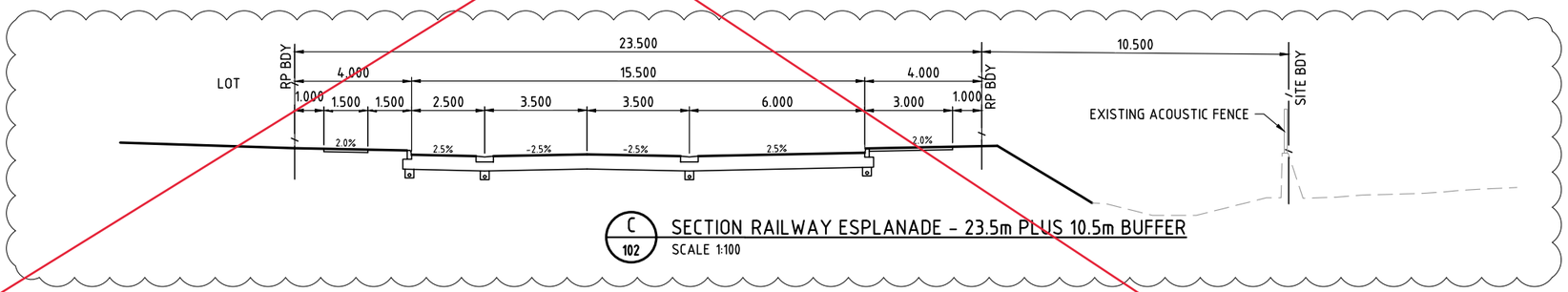


A 102 SECTION ACCESS LANE - 6.5m
SCALE 1:100



B 102 SECTION ACCESS PLACE - 19m
SCALE 1:100



C 102 SECTION RAILWAY ESPLANADE - 23.5m PLUS 10.5m BUFFER
SCALE 1:100

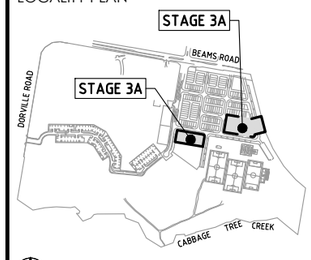
Final cross section to be approved as per Condition 12 of this approval

SCALE 1 0.5 0 1 2 3 4 5 6 7 8 9 10m
1 : 100 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au

Approved

Drawing Title
FUNCTIONAL LAYOUT
TYPICAL SECTIONS

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	4 of 10

	Drawing No	Revision
A1	20-180-FL103	C

M:\2020\20180 Carseldine Village Stage 3\Engineering\Acad\FUNCTIONAL\20-180-102-103-ROAD_LAYOUT.dwg Plotted by: DS on 16/08/2021 1:05:37 PM

LEGEND

- STAGE BOUNDARY
- KERB FACE
- PROPOSED STORMWATER
- EXISTING STORMWATER
- INDICATIVE DRIVEWAY LOCATION

FUNCTIONAL LAYOUT – STORMWATER PLAN

SCALE 1:500

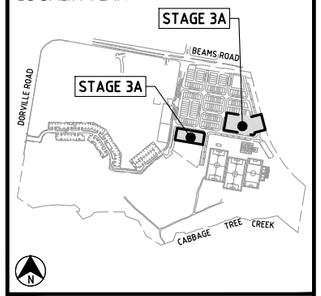
SCALE 10 5 0 10 20 30 40 50m

1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

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ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
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Drawing Title

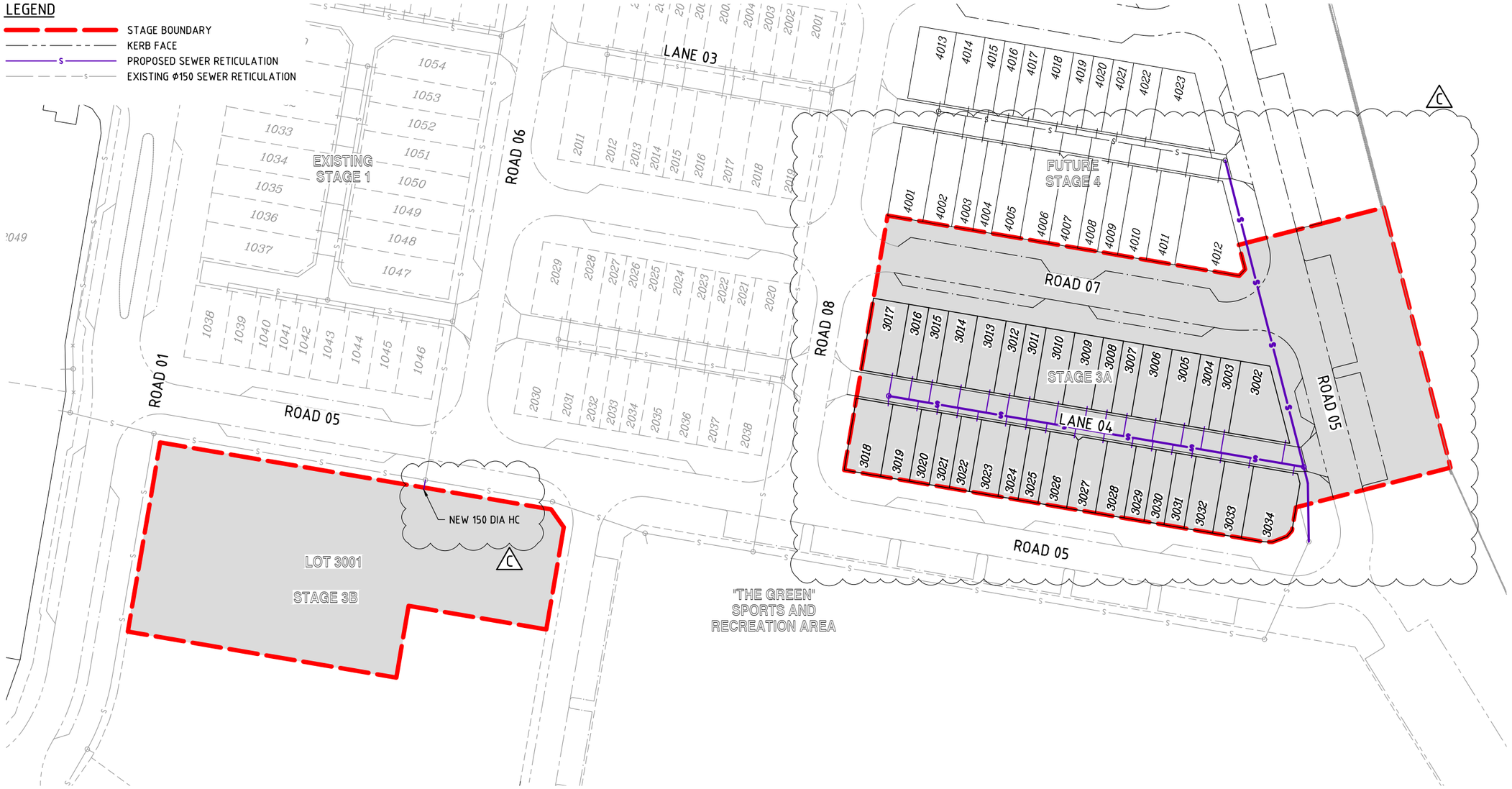
FUNCTIONAL LAYOUT
STORMWATER

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21
Scale: AS SHOWN			Sheet: 5 of 10
A1	Drawing No: 20-180-FL104		Revision: C

M:\2020\20180 Carseldine Village Stage 3\Engineering\Acad\FUNCTIONAL\20-180-104-SW.dwg Plotted by: DS on 16/08/2021 1:05:42 PM

LEGEND

- STAGE BOUNDARY
- KERB FACE
- PROPOSED SEWER RETICULATION
- EXISTING Ø150 SEWER RETICULATION



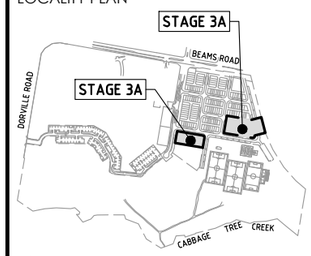
FUNCTIONAL LAYOUT - SEWER PLAN
SCALE 1:500

SCALE 10 5 0 10 20 30 40 50m
1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
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Approved

Drawing Title
FUNCTIONAL LAYOUT
SEWER

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	6 of 10

	Drawing No	Revision
A1	20-180-FL105	C

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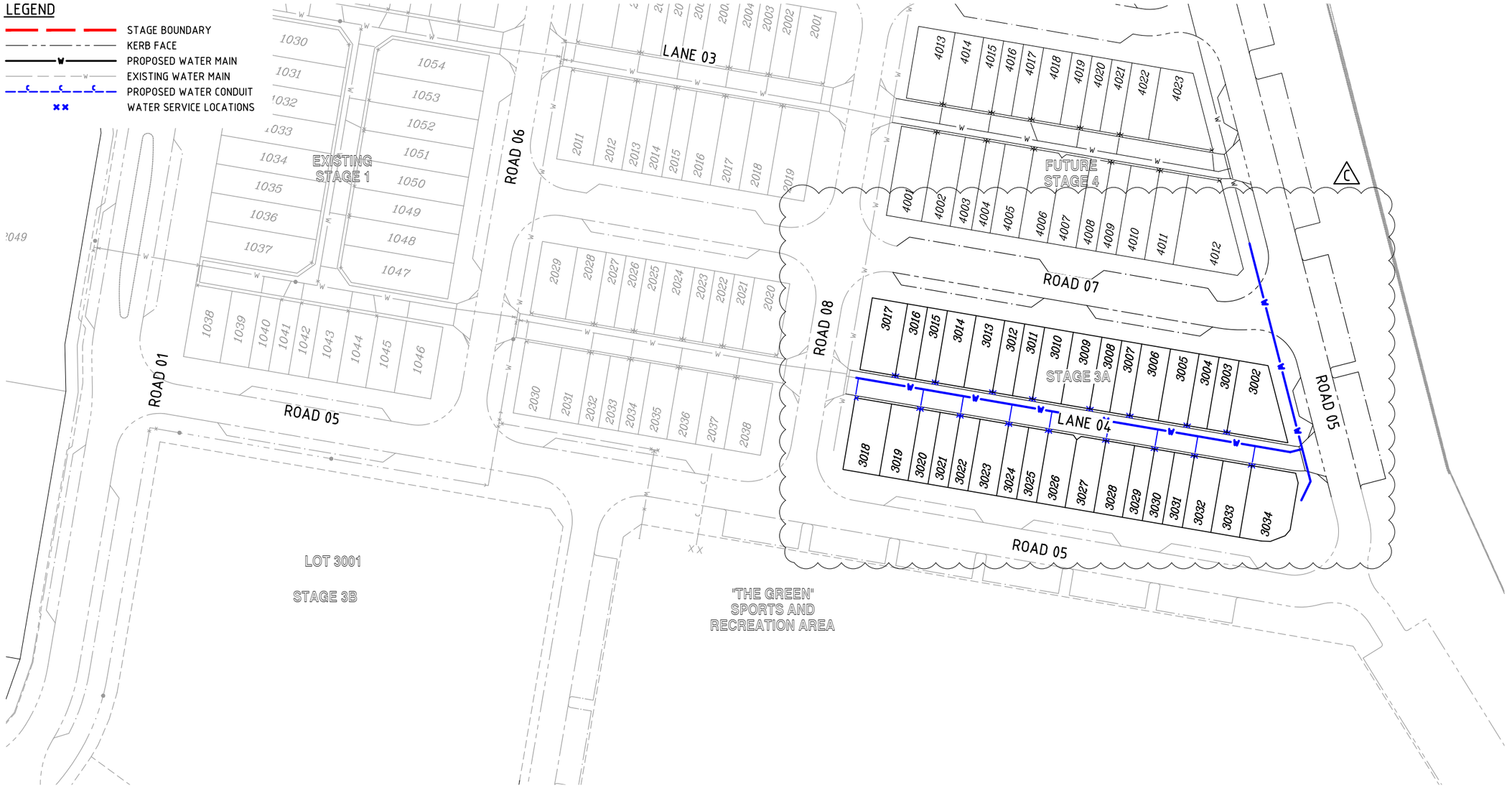
LEGEND

- STAGE BOUNDARY
- KERB FACE
- PROPOSED WATER MAIN
- EXISTING WATER MAIN
- PROPOSED WATER CONDUIT
- WATER SERVICE LOCATIONS



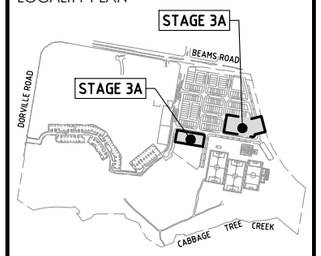
FUNCTIONAL LAYOUT - WATER PLAN
SCALE 1:500

SCALE 10 5 0 10 20 30 40 50m
1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
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Drawing Title
FUNCTIONAL LAYOUT
WATER RETICULATION

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	7 of 10

	Drawing No	Revision
A1	20-180-FL 106	C

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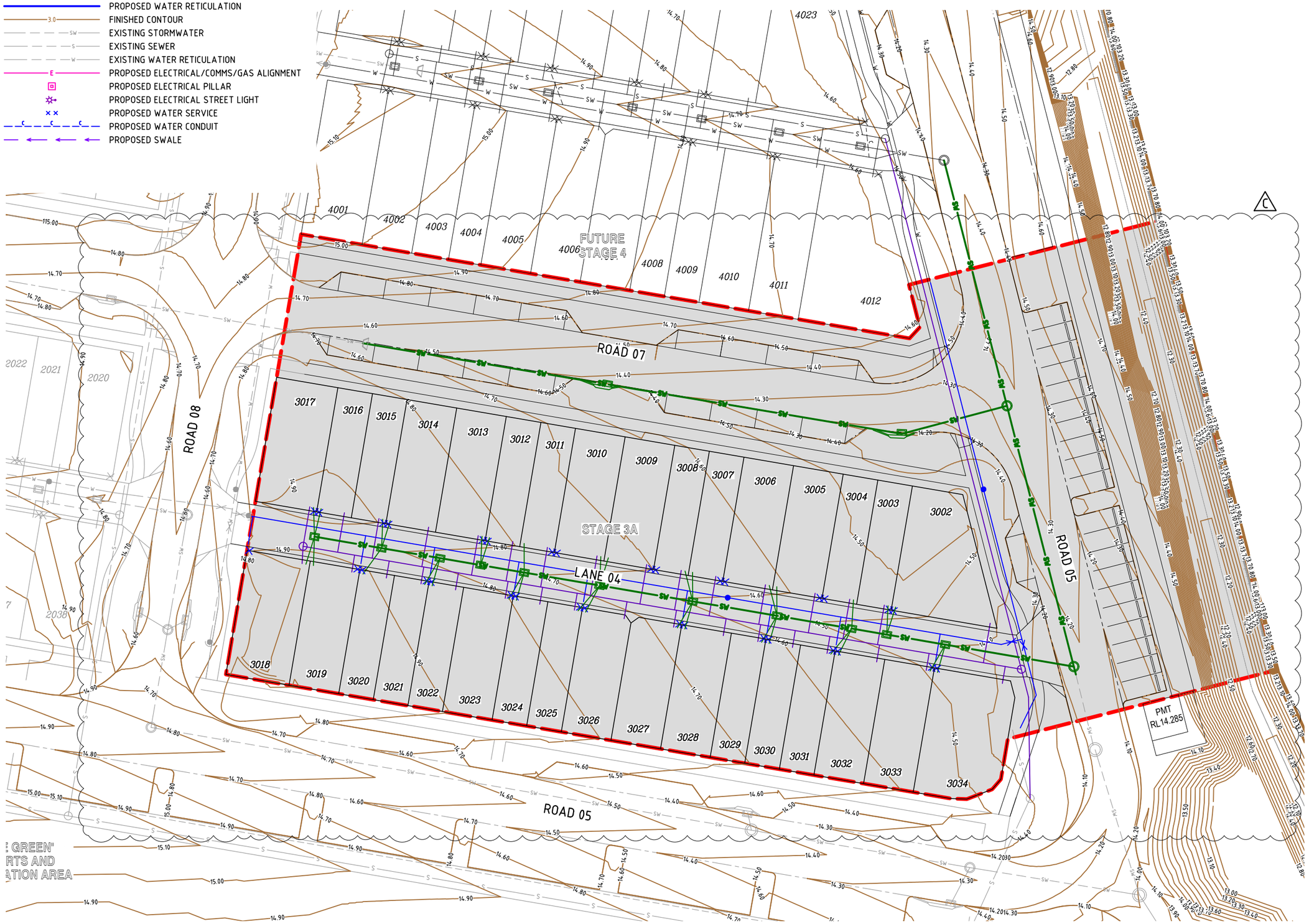
LEGEND

- STAGE BOUNDARY
- KERB FACE
- PROPOSED STORMWATER
- PROPOSED SEWER
- PROPOSED WATER RETICULATION
- FINISHED CONTOUR
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER RETICULATION
- PROPOSED ELECTRICAL/COMMS/GAS ALIGNMENT
- PROPOSED ELECTRICAL PILLAR
- PROPOSED ELECTRICAL STREET LIGHT
- PROPOSED WATER SERVICE
- PROPOSED WATER CONDUIT
- PROPOSED SWALE



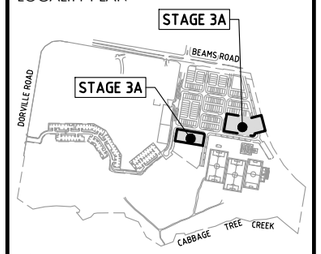
FUNCTIONAL LAYOUT- OVERALL SERVICES PLAN
SCALE 1:250

SCALE 5 0 5 10 15 20 25m
1 : 250 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

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L1, 62 Astor Tce
Spring Hill Q 4000
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Drawing Title
FUNCTIONAL LAYOUT
OVERALL SERVICES
STAGE 3A

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	8 of 10

	Drawing No	Revision
A1	20-180-FL107	C

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LEGEND

- STAGE BOUNDARY
- KERB FACE
- PROPOSED STORMWATER
- PROPOSED SEWER
- PROPOSED WATER RETICULATION
- FINISHED CONTOUR
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER RETICULATION
- PROPOSED ELECTRICAL/COMMS/GAS ALIGNMENT
- PROPOSED ELECTRICAL PILLAR
- PROPOSED ELECTRICAL STREET LIGHT
- PROPOSED WATER SERVICE
- PROPOSED WATER CONDUIT
- PROPOSED SWALE

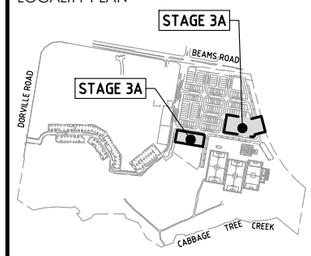
FUNCTIONAL LAYOUT- OVERALL SERVICES PLAN
SCALE 1:250

SCALE 5 0 5 10 15 20 25m
1 : 250 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
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Drawing Title

FUNCTIONAL LAYOUT
OVERALL SERVICES
LOT 3001

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

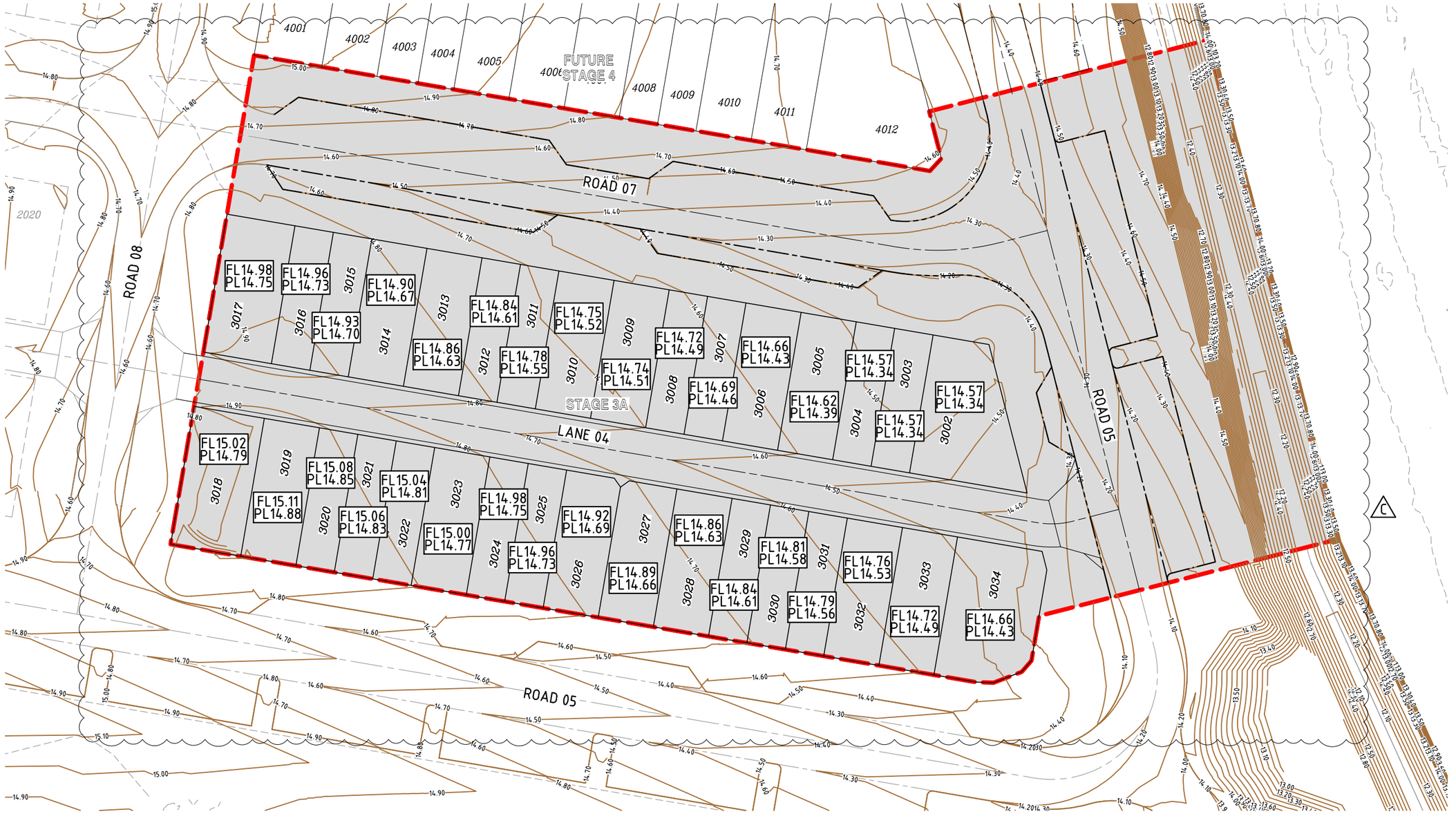
Scale	Sheet
AS SHOWN	8 of 10

	Drawing No	Revision
A1	20-180-FL108	C

M:\2020\20180 Carseldine Village Stage 3\Engineering\Acad\FUNCTIONAL\20-180-107-108-SERV_ALL.dwg Plotted by: DS on 16/08/2021 1:05:58 PM

LEGEND

- STAGE BOUNDARY
- KERB FACE
- ROAD CENTRELINE
- FINISHED CONTOUR
- EXISTING CONTOURS
- BATTER LINE
- PL — POSSIBLE PAD LEVEL
- FL — POSSIBLE FLOOR LEVEL



FUNCTIONAL LAYOUT - PRELIMINARY FLOOR LEVELS

SCALE 1:250

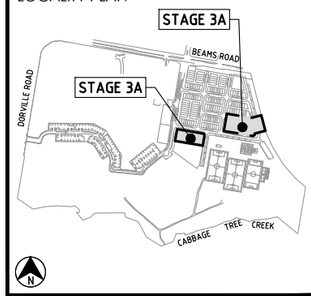
SCALE 5 0 5 10 15 20 25m

1 : 250 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	01.04.2021	RW
B	STAGE 3B TO LOT 3001	16.07.2021	DES
C	STAGE 3A LOTS REVISED	16.08.2021	DES

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE 3

kn group
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au

Approved

Drawing Title

FUNCTIONAL LAYOUT
POSSIBLE FLOOR & PAD LEVELS
STAGE 3A

Drawn	Designed	Checked	Date
RW	JB	MS	APR '21

Scale	Sheet
AS SHOWN	8 of 10

A1	Drawing No	Revision
	20-180-FL109	C

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APPENDIX C DIAL BEFORE YOU DIG (DBYD)

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Spring Hill Qld 4000
07 3017 1900
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Powerlink Queensland
33 Harold Street,
Virginia, Qld, 4014
Phone: (07) 3866 1313
09/02/2021

To: ('Applicant')
KN Group - Mr Mark Shaw
Level 2/71 Grey Street
South Brisbane QLD 4101

Email: mshaw@knpl.com.au **Phone:** 0488 044 500
Fax: Not Supplied **Mobile:** Not Supplied

Sequence No: 106379432
Enquiry Location: 532 Beams Road Carseldine
Enquiry Date: 09/02/2021 14:54

Dear Mr Mark Shaw

Thank you for your enquiry in relation to the Enquiry Location. Queensland Electricity Transmission Corporation Limited ACN 078 849 233 trading as Powerlink Queensland ("Powerlink") respond as follows:

Powerlink's records show that there **ARE** underground cables in the Enquiry Location.

A plan is attached showing the approximate location of Powerlink's assets in the vicinity of the Enquiry Location.

Should our response identify the presence of decommissioned Powerlink assets it should be noted that damage to these assets may result in an environmental hazard . As a precaution, all underground assets should be treated as live, and all necessary precautions should be taken to ensure that the cables are not damaged. Should damage occur, all work in the area surrounding the cables must be ceased immediately and Powerlink called on 07 3266 9410 to report the damage and get further advice.

Proposed works in close proximity to Powerlink's plant must undergo a detailed assessment by Powerlink. Please allow at least four to six weeks (more in complex situations) for Powerlink to process your application.

All work in close proximity to Powerlink's cables must be supervised by a Powerlink-appointed person and can be arranged by contacting Powerlink on (07) 3866 1313 at least seven days in advance.

The attached duty of care guidelines below must be observed at all times.

Yours faithfully,

Colin Langton
General Manager Community and Delivery Services
Powerlink Queensland

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"Duty of Care" for Everyone

Responsibilities When Working in the Vicinity of POWERLINK'S Plant

Everyone has a legal duty of care that must be observed, particularly when working in the vicinity of electrical plant. "Electrical plant" includes underground cables, conduits and other associated underground equipment. It should be noted that the placing or removal of soil by excavation, digging or by any other means is not allowed in a Powerlink-easement without prior written consent from Powerlink. In most cases it is unlikely that consent will be granted.

When discharging this duty of care in relation to Powerlink's plant, the following points must be considered:

1. It is the responsibility of the architect, consulting engineer, developer and head contractor in the project planning stages to design for minimal impact and adequate protection of Powerlink's plant. Powerlink will provide free plans showing the presence of its underground plant to assist.

2. It is the developer or constructor's responsibility to:

    - investigate whether Powerlink's plant is present in a particular location and obtain the most up to date plans available from Powerlink before commencing construction.
    - visually locate Powerlink's plant by hand digging where construction activities may be in close proximity to or interfere with Powerlink's plant.
    - contact Powerlink's Property Services Group on (07) 3866 1313 if Powerlink's plant is wholly or partly affected by planned development and construction activities.

3. As the alignment and boundaries of road ways with other properties (and roads within road ways) frequently change, the alignments and boundaries contained within Powerlink's plans and maps will frequently differ from present alignments and boundaries "on the ground". Accordingly, in every case where it appears that alignments and boundaries have shifted, or new road ways have been added, the constructor should obtain confirmation of the actual position of Powerlink's plant under or along the road ways. The constructor must never rely on statements made by third parties in relation to the position of Powerlink's plant.

Important Points to Note – Please Read

• Plans and details provided by Powerlink are current for one month from the Response Date and should be disposed of by shredding or any other secure disposal method after use.

• Powerlink's plans are diagrams only. They indicate the presence of underground plant in the general vicinity of the Enquiry Location. Exact ground cover and alignments cannot be given with any certainty, as such levels can change over time.

• To avoid damage or injury, Powerlink's plant must be carefully located under the supervision of a Powerlink-appointed person before excavation work or similar activities are undertaken near Powerlink's plant.

• Powerlink, its servants and agents will not be liable for any loss or damage caused or occasioned by the use of plans and or details so supplied to the applicant, its servants and agents, and the applicant agrees to indemnify Powerlink against any claim or demand for any such loss or damage.

• Where work commences prior to obtaining Powerlink's plans, or Powerlink's instructions are not followed, the developer/constructor is responsible for all damages sustained to Powerlink's plant.

• Powerlink reserves all rights to recover compensation for loss or damage caused by interference or damage, including consequential loss and damages to its cable network, or other property.

• All underground conduits and cover slabs must be presumed to contain asbestos. Refer to "Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC: 2018 (2005).]

• PCB (polychlorinated biphenyl) contamination may exist in some cables.

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Remote or On-Site Location Assistance

If requested, Powerlink may provide either remote over –the-phone or on-site location assistance with locating Powerlink's plant. This assistance may include guidance on visually locating and protecting Powerlink plant when excavating. Please note that any markings or pegs placed on the site by Powerlink during any such visit are indications of approximate cable locations only. The constructor is responsible for all hand digging (potholing) to visually locate and expose POWERLINK'S plant**.**

If the constructor is unable to locate Powerlink's plant within five metres of indicative plan locations, they must contact Powerlink's Regional Officer for Local Security for further advice. Contact details are as follows;

Officers for Local Security:

Region name	Contact's name	Telephone number	Mobile number
Southern	Bruce Muhling	(07) 3860 2305	0417 294 210
Central	Jeff Anstey	(07) 4931 2718	0418 785 743
Northern	Steve Cazzulino	(07) 4789 5561	0418 875 137

When working in the vicinity of Powerlink's plant, please observe the following conditions:

Records
The first step before any excavation commences is to obtain records of Powerlink's plant in the vicinity of the work. For new work, records should be obtained during the initial planning and design stage. The records provided by Powerlink must also be made available to all construction groups on site. Where plant information is transferred to plans for the proposed work, care must be exercised to ensure that important detail is not lost in the process.

Location of Cables
Examining the records is not sufficient, as reference points may change from the time of installation. Records must also be validated when working in close proximity to underground plant. The exact location of plant that maybe affected must be confirmed by use of an electronic cable locater followed by careful hand excavation to the level of cover slabs or conduits. Hand excavation must be used in advance of excavators. If doubt exists with respect to interpretation of cable records, Powerlink's Regional Officer for Local Security must be contacted. Refer to the contact details above.

Electrical Cable Covers
Powerlink's cables have underground cable warning tapes installed above the cables with the wording 'high voltage cable' and some may also have additional mechanical protection. Please note that some cables are known to be buried without covers.

Supervision
Any work in close proximity (within cable easement or five metres from the cable) to Powerlink's cables will always require on site supervision arranged by Powerlink.

Proposed works
No placing or removal of soil by excavation, digging or by any other means is allowed in Powerlink's easement without prior specific written consent from Powerlink.

Excavating Near Cables
For all work within five metres of where the plant is shown on Powerlink's plans, the constructor is required to hand dig (pothole) and expose the plant to confirm its exact location before work can commence.

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Excavating Parallel to Cables

If construction work is parallel to Powerlink's cables, then hand digging (potholing) at least every four metres is required to establish the location of all cables to confirm the exact location of Powerlink's plant before work can commence. Generally, no restrictions are placed on excavations parallel to Powerlink's cables to a depth not exceeding that of the cable and the entire excavation is located outside Powerlink's easement. If an excavation exceeds the depth of the cables and is within five metres of the edge of the easement (or within ten metres of the cable) it is likely that the covers or bedding material around the cables or conduits will move, and Powerlink must be contacted. Design for the installation of parallel infrastructure will need to take into account electrical issues, including induction and transferred potential. Please note that cable depths may change suddenly.

Excavating Across Cables

A minimum clearance of 150 mm above, below, and to the sides of cables must be maintained. A standard clearance between services must be maintained as set down by the individual authorities. If the width or depth of the excavation is such that the cable warning tapes are exposed or the cables being unsupported, then Powerlink must be contacted to determine whether the cables should be taken out of service, or whether they need to be protected or supported. In the case of high voltage cables, it is unlikely that Powerlink will be able to take the cables out of service, and is definitely not an option without a lead time of at least 12 months. A cable cover must never be removed without prior specific written approval. A cable cover and the warning tapes may only be replaced under the supervision of a Powerlink officer. Protective cover strips must never be omitted to allow separation between Powerlink's cables and other services.

Directional Boring Near Cables

When boring parallel to cables, it is essential that trial holes are carefully hand dug at regular intervals to validate the actual location of the Powerlink's conduits or cables before using boring machinery. Where it is required to bore across the line of cables, the actual location of the cables must first be proven by hand digging. A trench must be excavated one metre from the side of the cables where the auger will approach to ensure a minimum clearance of 150 mm from cables can be maintained.

Heavy Machinery Operation over Cables

If a heavy "crawler" or "vibration" type machinery is proposed to be operated over the top of cables, detailed engineering plans and supporting information must be submitted to Powerlink for its approval, or otherwise (in writing) prior to any on site work commencing.

Hot Work in Proximity to Exposed POWERLINK'S Plant and Underground Cables

Exposed underground electrical cables must be protected against the effects of heat by shielding or covering cables with a suitable material. Heating of exposed insulation is dangerous and must be avoided at all costs.

Explosives

Before using explosives in the vicinity of POWERLINK'S cables, clearances should be obtained from Powerlink's Design Engineer. If explosives are proposed to be used within 100 metres of cables, an engineering report demonstrating that no damage will be sustained to Powerlink's plant must be provided to Powerlink prior to using such explosives.

Damage Reporting

All damage to Powerlink's cables, conduits and pipes must be reported to Powerlink no matter how insignificant the damage appears to be. Even very minor damage to cable protective coverings can lead to eventual failure of cables through corrosion of metal sheaths and moisture ingress. Some cables contain oil, and damage may result in an oil leak which will seriously impact the performance of the cable and will be treated as an environmental incident. All work in the vicinity of any of Powerlink's plant that has been damaged should cease and the area should be vacated until a clearance to continue work has been obtained from an authorised Powerlink officer.

Please note that high voltage electrical cables, if damaged, can cause serious injury, or fatality. Extreme caution needs to be exercised at all times when working in close proximity to these cables.

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Electricity emergencies all areas or after hours enquiries
24 Hours **1800 353 031**

Plant Solutions and Assistance

If Powerlink's plant location plans or visual location of Powerlink's plant by hand digging reveals that the location of this plant is situated wholly or partly where the developer or constructor plans to work, then Powerlink's Property Services Team must be contacted on (07) 3866 1313 to discuss possible engineering solutions.

If detailed engineering assessment work, plant relocation, or protection works are part of the solution offered by Powerlink, then the cost of this work (the technical assessment and design, as well as the solution implementation cost) is recoverable by Powerlink from the principal developer or constructor. Powerlink will not commence work on the assessment and design until the developer or constructor provide a purchase order for these works. Powerlink will then provide a cost estimate for any proposed solution, and will not commence work on the solution until the developer or constructor provide a purchase order for the cost estimate.

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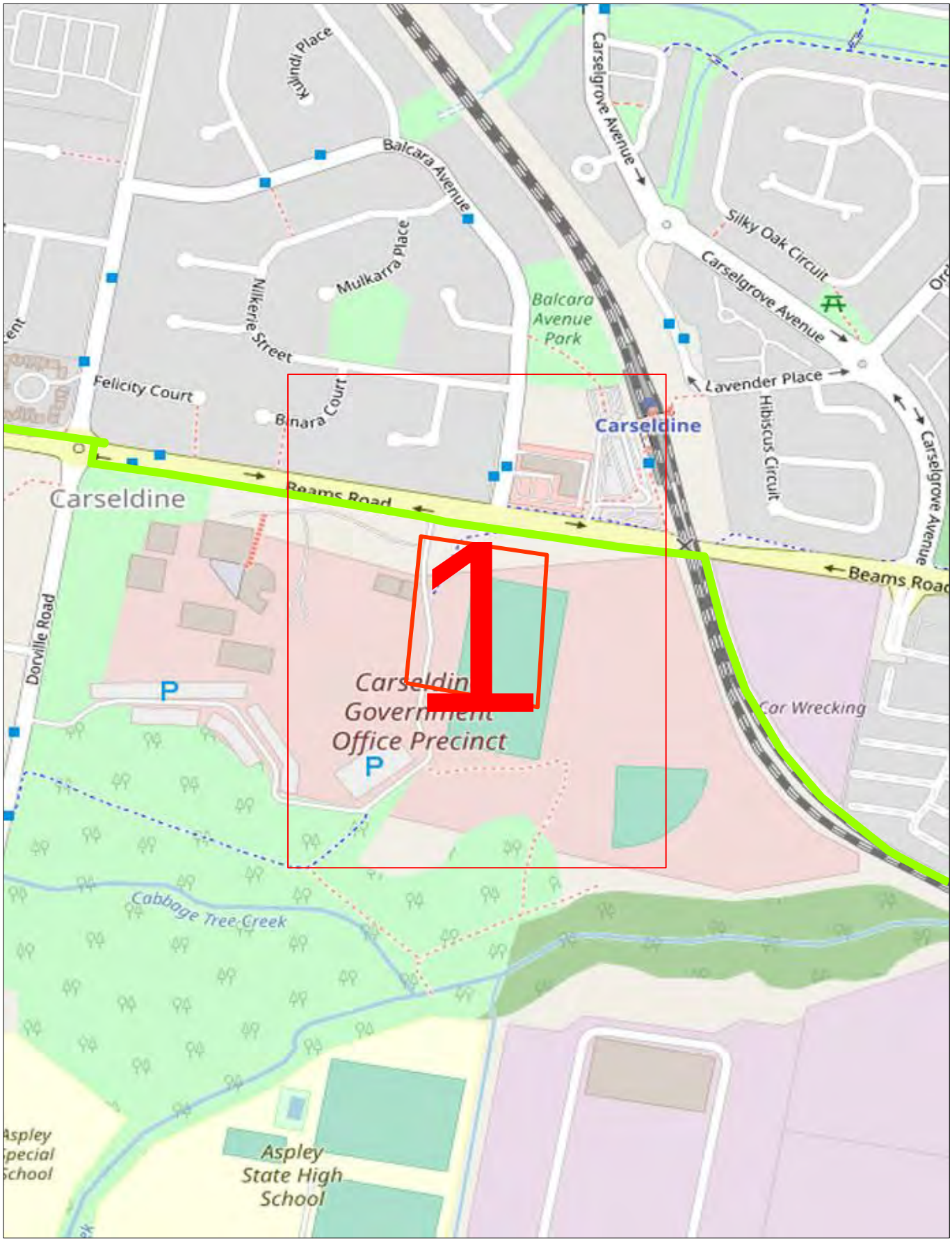
Date: 09/02/2[illegible]

Overview Map

Enquiry No: 106379432
532 Beams Road Carseldine



Powerlink Queensland makes every effort that the information contained on this map is up to date and correct but accepts no responsibility for this information.

The information is provided as a guide only.
For up to date and specific information you should contact our Virginia office on (07) 3866 1313.

N
W
E
S

LEGEND:

0 0.05km

Imagery sourced from Open StreetMaps

1 Detail Map Area		High Voltage Cable	
Powerlink Substation		Pilot Cable	
Other Substation		Optic Fibre	
Possible Comms		Decommissioned	

Affected DBYD Work Area Symbols

Powered by X-Info DBYD

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Date: 09/02/2021

Map 1

Enquiry No: 106379432

532 Beams Road Carseldine

Powerlink Queensland makes every effort that the information contained on this map is up to date and correct but accepts no responsibility for this information.

The information is provided as a guide only. For up to date and specific information you should contact our Virginia office on (07) 3866 1313.

N W E S

0 0.02km

Imagery sourced from Open StreetMaps

LEGEND:

- Powerlink Substation
- Other Substation
- Possible Comms
- High Voltage Cable
- Pilot Cable
- Optic Fibre
- Decommissioned

Affected DBYD Work Area Symbols

Powered by X-Info DBYD

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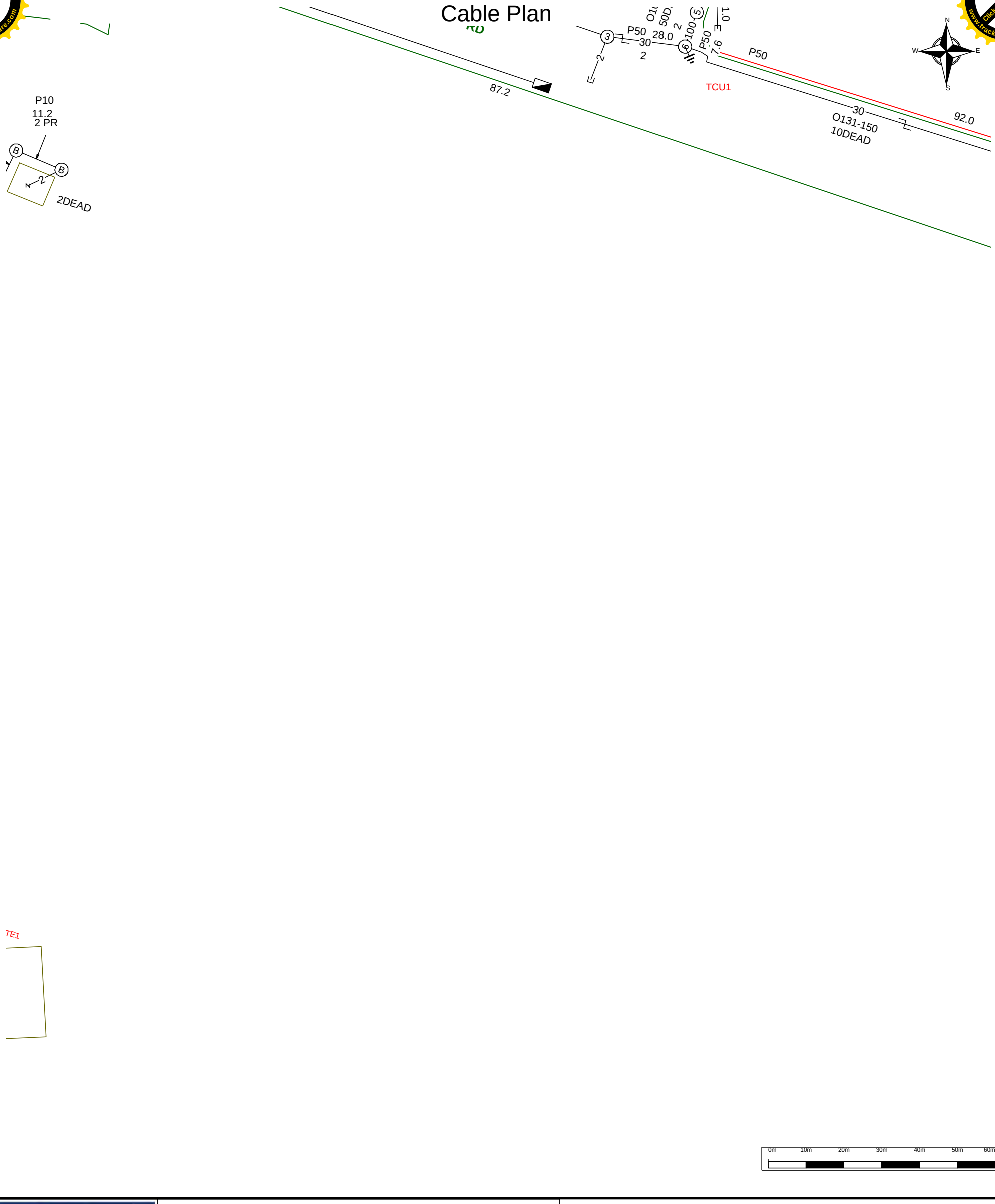
Cable Plan



Telstra	For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)
TELSTRA CORPORATION LIMITED A.C.N. 051 775 556	
Generated On 09/02/2021 15:02:12	Sequence Number: 106379435 CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

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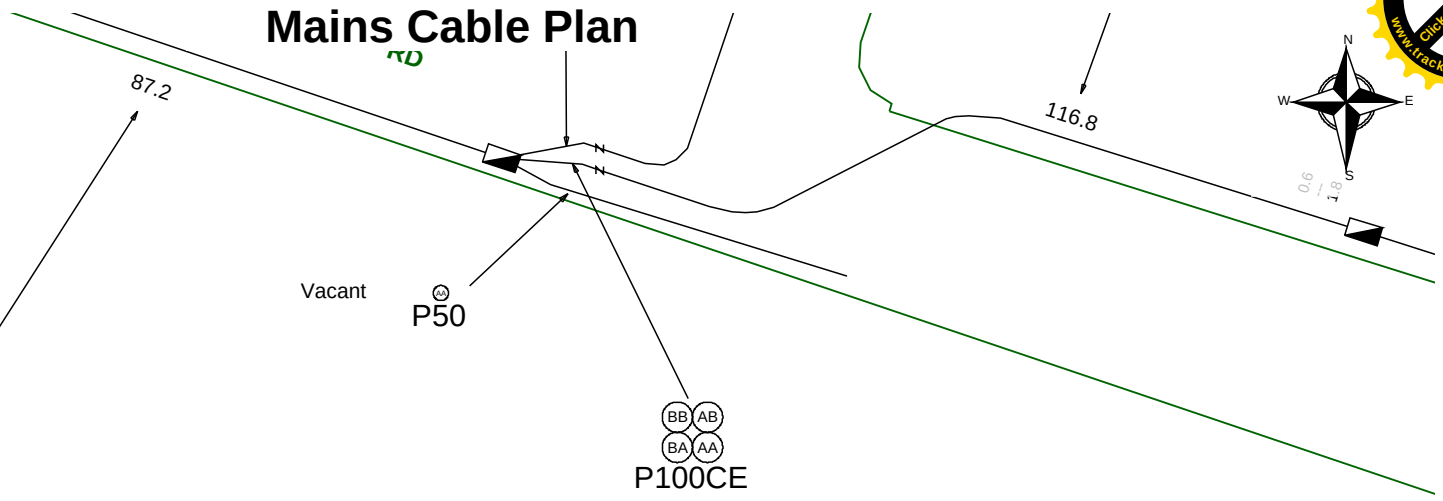
Mains Cable Plan



DB-EX/1-120 120F/- SMOF FNPEHJ/STD (AA)
:M1-100 100 CPIUT (AA)
)7:DB-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
)4:AA-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
ST (AA)
3:M801-1000 200 CPIUT (AB)
3:M601-700 200 CPIUT (AB)
100DEAD
'32 SUBDUCTS (BA)
IX1655 DBOR1 1/2028 (BA1)

-EX/1-120 120F/- SMOF FNPEHJ/STD (AA)
100 100 CPIUT (AA)
-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
(AA)
01-1000 200 CPIUT (AB)
01-700 200 CPIUT (AB)
EAD
UBDUCTS (BA)
55 DBOR1 1/2028 (BA1)

4503:DB-EX/1-120 120F/- SMOF FNPEHJ/STD (AA)
3007:DB-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
3004:AA-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
OC[22mm] (BB)

0m 10m 20m 30m 40m 50m 60m

Telstra

For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

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Sequence Number: 106379435

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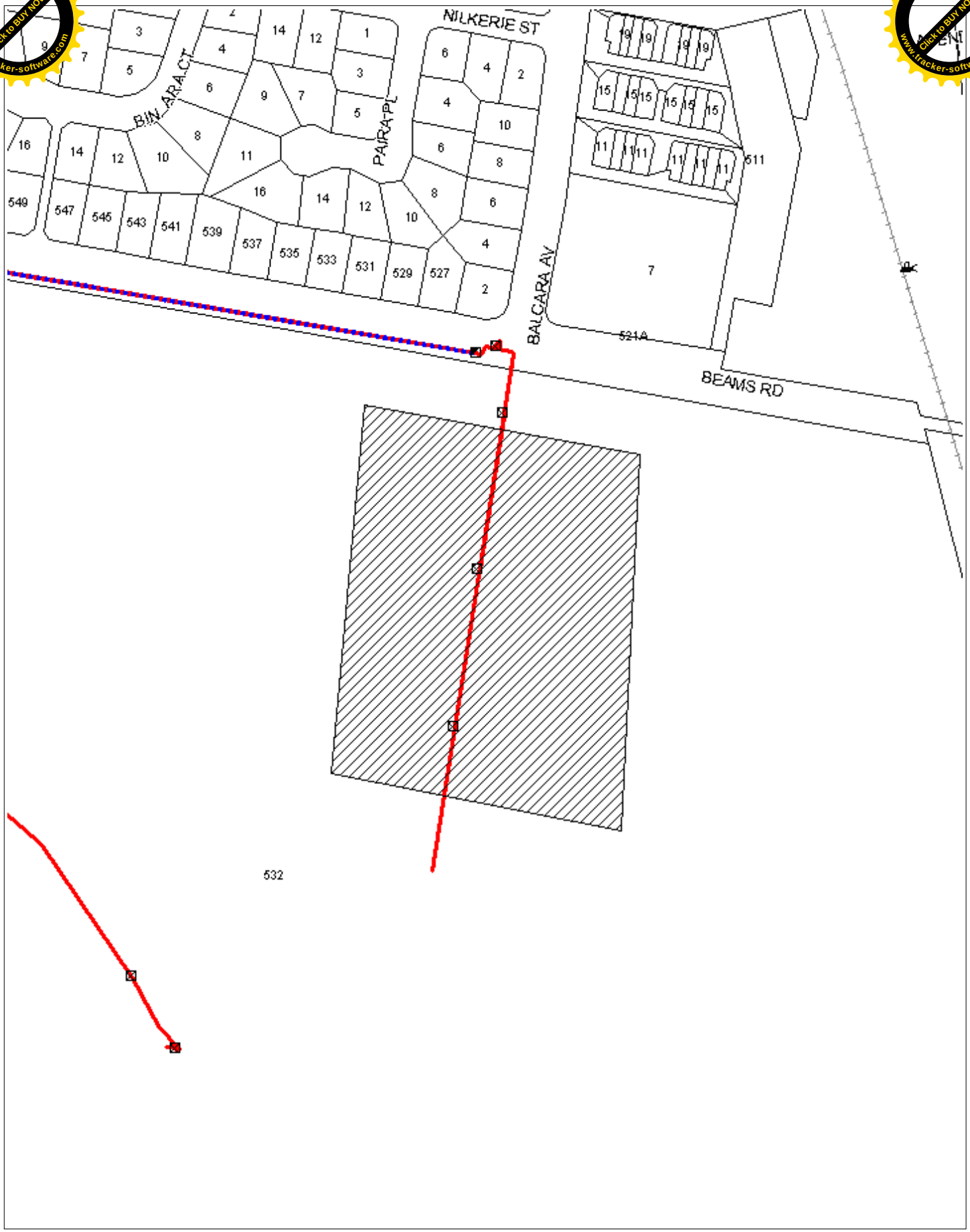

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Optus Plans and information supplied are valid for 30 days from the date of issue. If this timeline has elapsed please raise a new enquiry.

Sequence Number: 106379436

Date Generated: 09/02/2021

For all Optus DBYD plan enquiries –
Email: Fibre.Locations@optus.net.au
For urgent onsite assistance contact 1800 505 777
Optus Limited ACN 052 833 208

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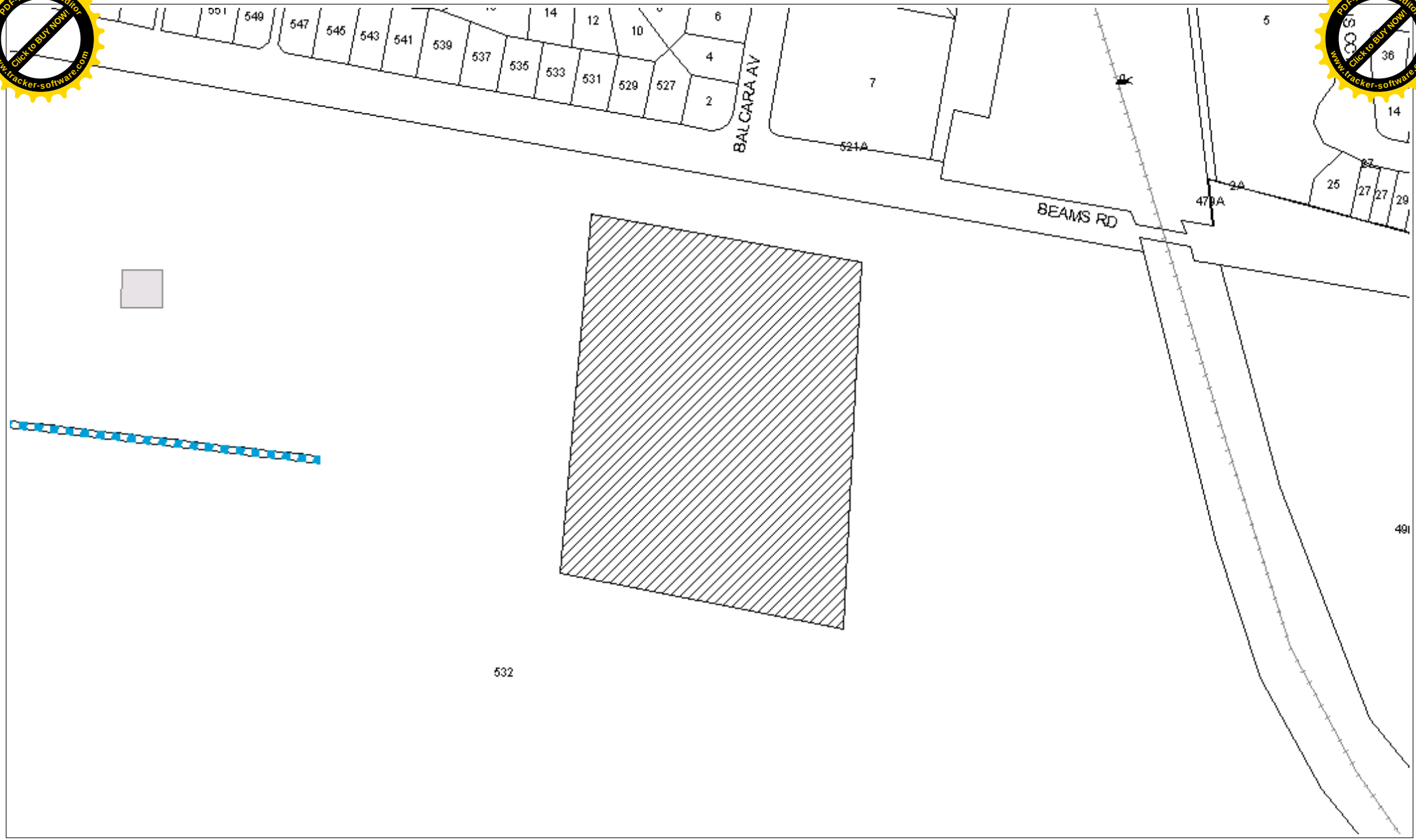

Uecomm

Cable Uecomm Underground

Scale: #INSERT MAP SCALE#

Printed On: 09/02/2021

Sequence Number: 106379436

Location: 532 Beams Road

Job Location
Line
Point
Area

Undergound Asset
Uecomm

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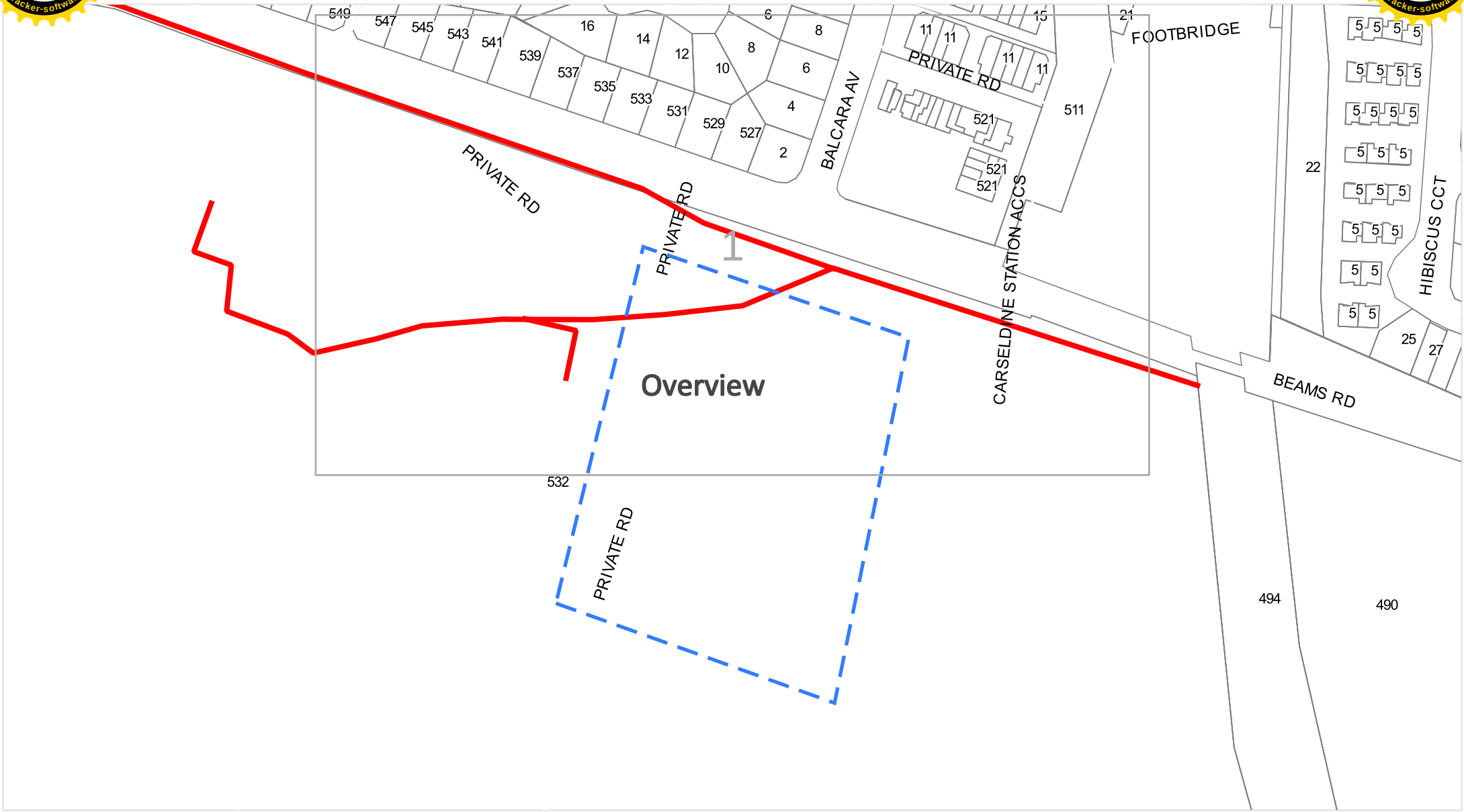
Sequence No: 106379437
Job No: 21045072
Location: 532 Beams Road, Carseldine, QLD 4034



Legend | Scale: 1:2623

N

- Enquiry Area
- AARNet Fibre Optic Assets
- AARNet Power Assets
- Cadastre

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arnet
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nd Research Network

Sequence No: 106379437
Job No: 21045072
Location: 532 Beams Road, Carseldine, QLD 4034

The Essen rst Step

Legend | Scale: 1:1500

N

- Enquiry Area
- AARNet Fibre Optic Assets
- AARNet Power Assets
- Cadastre

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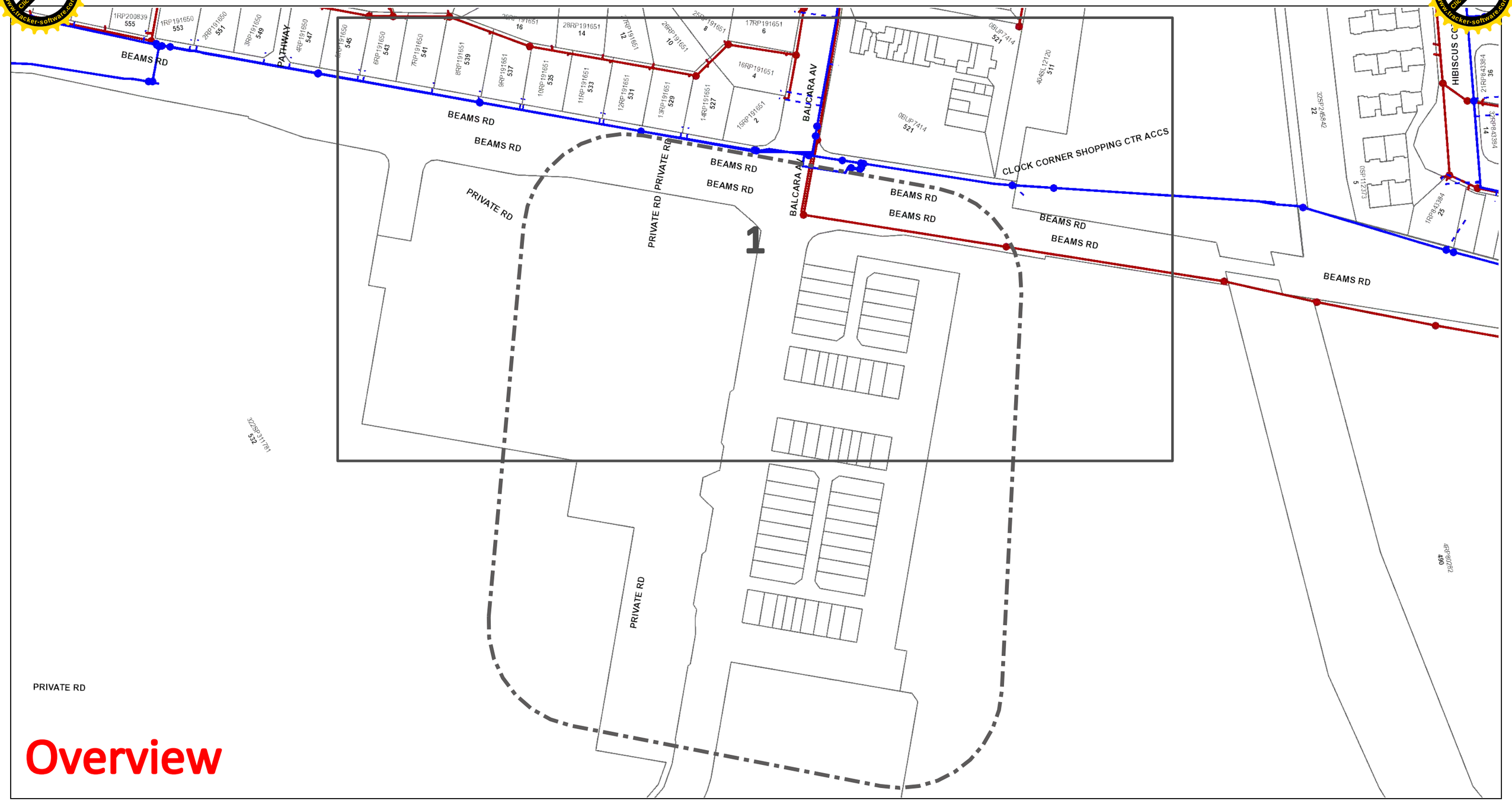
Urban Utilities - Water, Recycled Water and Sewer Infrastructure



Overview

Dial Before You Dig - Urban Utilities Water, Recycled Water and Sewer Infrastructure

DBYD Reference No: 106379439

Date DBYD Ref Received: 09/02/2021

Date DBYD Job to Commence: 10/02/2021

Date DBYD Map Produced: 09/02/2021

This Map is valid for 30 days

Produced By: Urban Utilities

Sewer
- Infrastructure
- Major Infrastructure
- Network Pipelines
- Network Structures

Water
- Infrastructure
- Major Infrastructure
- Network Pipelines
- Network Structures
- Water Service (Indicative only)

N

Map Scale 1:1781

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For further information, please call Urban Utilities on 13 26 57 (8am-6pm weekdays). Faults and emergencies 13 23 64 (24/7).

www.urbanutilities.com.au ABN 86 673 835 011

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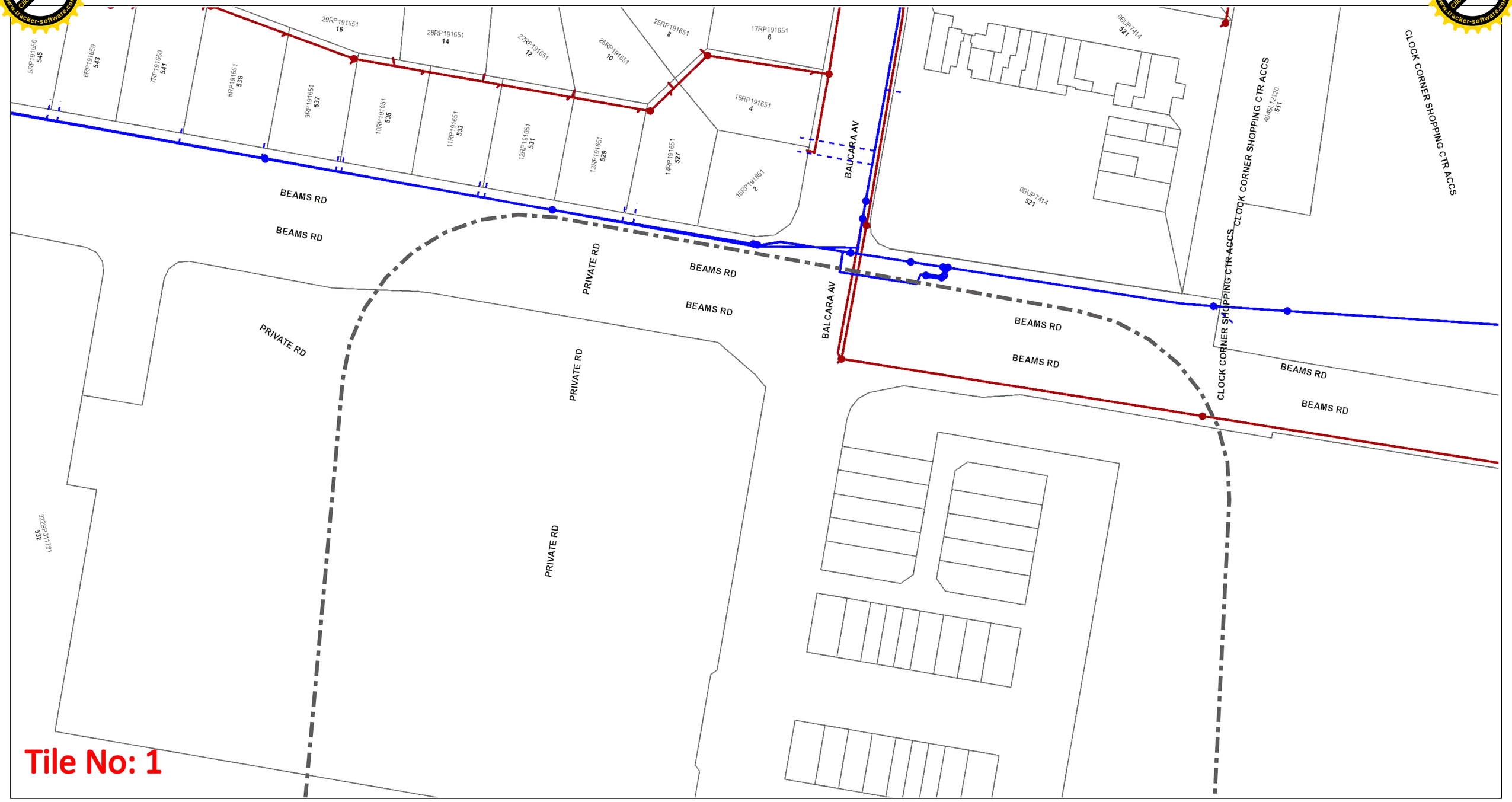
Urban Utilities - Water, Recycled Water and Sewer Infrastructure



Tile No: 1

Dial Before You Dig - Urban Utilities Water, Recycled Water and Sewer Infrastructure

UrbanUtilities

DBYD Reference No: 106379439

Date DBYD Ref Received: 09/02/2021
Date DBYD Job to Commence: 10/02/2021
Date DBYD Map Produced: 09/02/2021

This Map is valid for 30 days

Produced By: Urban Utilities

Sewer
- Infrastructure
- Major Infrastructure
- Network Pipelines
- Network Structures

Water
- Infrastructure
- Major Infrastructure
- Network Pipelines
- Network Structures
- Water Service (Indicative only)

N

Map Scale 1:1000

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For further information, please call Urban Utilities on 13 26 57 (8am-6pm weekdays). Faults and emergencies 13 23 64 (24/7).

www.urbanutilities.com.au

ABN 86 673 835 011

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Job # 21045072
Seq # 106379433
Provider: Brisbane City Council
Telephone: 07 3403 8888

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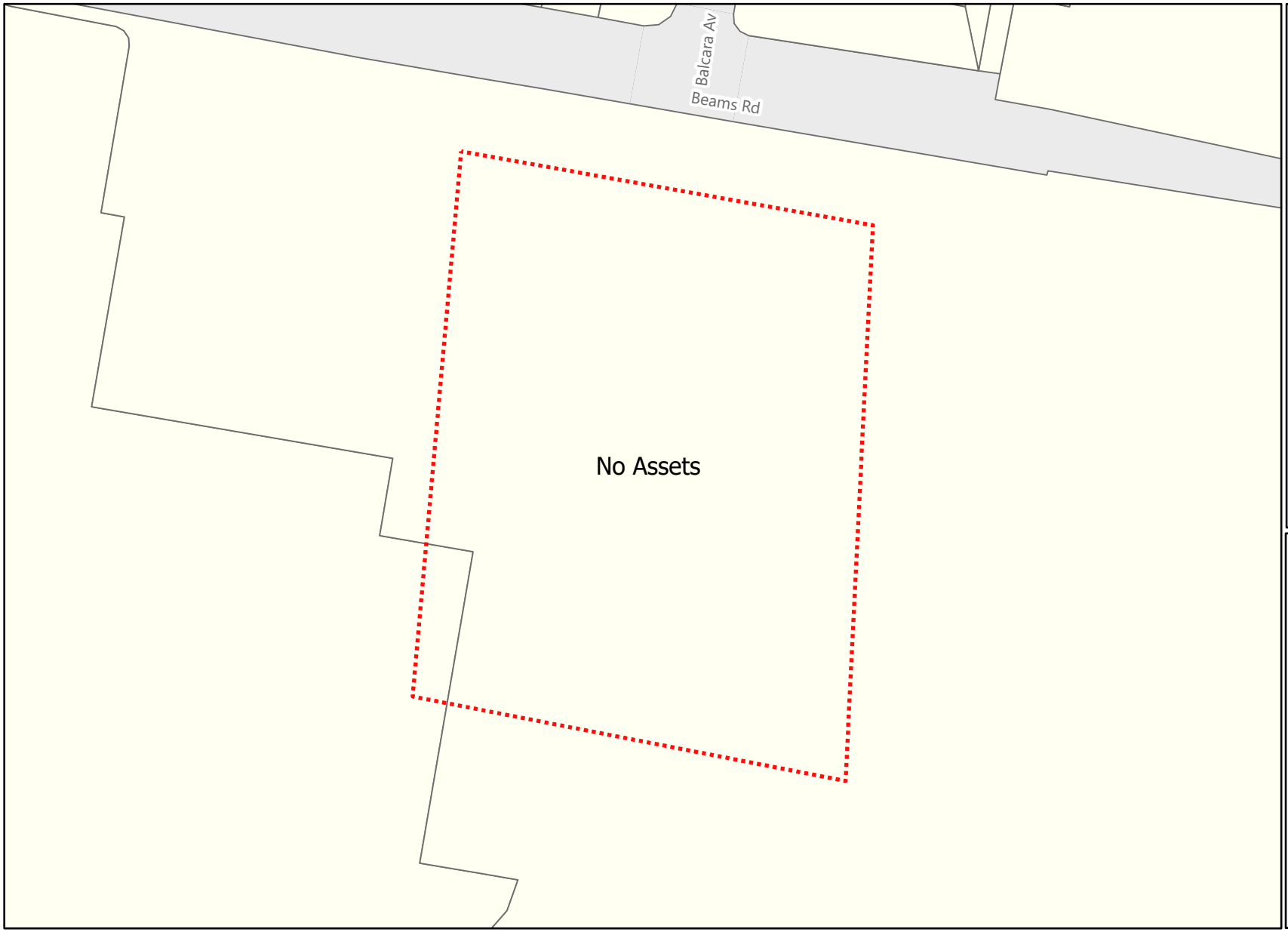

Legend

DBYD Enquiry

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Caution: This map may contain the locations of abandoned underground asbestos pipes. Council gives no warranty to the completeness or accuracy of these records. Appropriate care needs to be taken in all cases.

In an emergency contact Brisbane City Council on 07 3403 8888

Index Sheet

0 20 40 80 m

Scale 1:2,000

N

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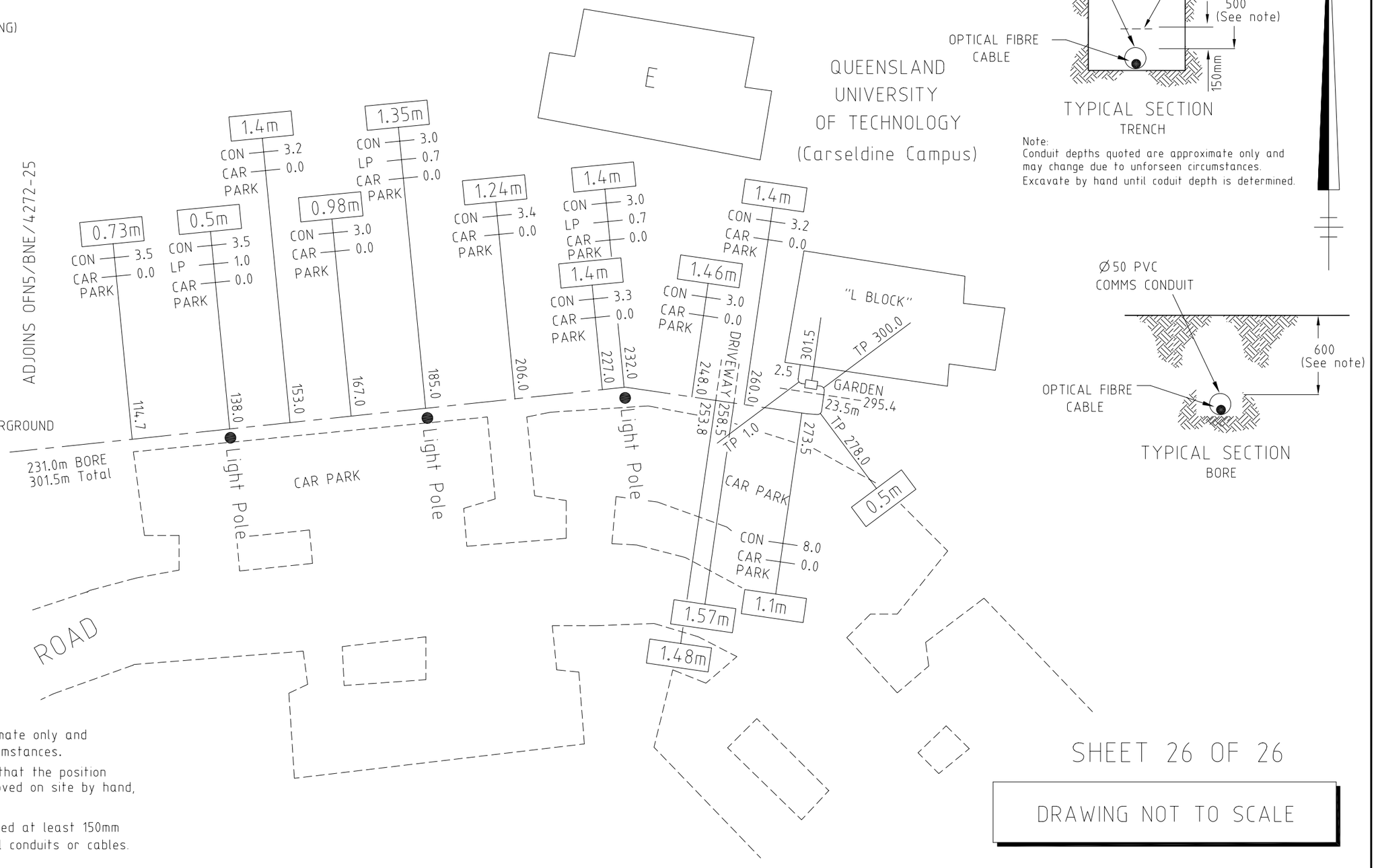
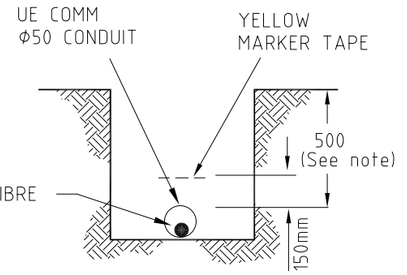
LEGEND

- ELECTRICITY POLE
- FIBRE OPTIC CABLE
- CABLE CONDUIT (TRENCHING)
- CABLE CONDUIT (BORE TUNNELLING)
- EXISTING CONDUIT
- UE P2 PIT
- UE P5 PIT
- UE P6 PIT
- UE P8 PIT
- UE P9 PIT
- BL - BUILDING LINE
- BOK - BACK OF KERB
- CL - CENTRELINE OF CONDUIT
- TP - TURNING POINT OF CONDUIT
- FENCE LINE, FL
- TELSTRA MANHOLE
- T - TELSTRA PIT
- OPTICAL FIBRE JOINT
- JOINT LOOP (m) - POLE / UNDERGROUND
- CABLE HEAD POLE
- 0.6m - CABLE DEPTH





TYPICAL SECTION
TRENCH

Note:
Conduit depths quoted are approximate only and may change due to unforseen circumstances.
Excavate by hand until coduit depth is determined.

TYPICAL SECTION
BORE

ARA Contract Services
K.J. BLAIN SURVEYS
Land Development, Planning
& Surveying Consultants
PH: (07) 3821 2016 FAX: (07) 3821 2253

Note:
1. Conduit depths quoted are approximate only and may change due to unforseen circumstances.
2. In all instances it is recommended that the position of conduits & cables should be proved on site by hand, prior to commencement of works.
3. Yellow marker tape shall be installed at least 150mm above the uppermost surface of all conduits or cables.

SHEET 26 OF 26

DRAWING NOT TO SCALE

REVISION				
DATE	REV.	REVISION DESCRIPTION	CHECKED	APP'D.

CONTACT ARA OFFICER - TONY WILLIAMS / DENNIS GARDNER PH: - 07 3245 7771
PROJECT NUMBER UEC-QLUTB-105
PLAN No. 7405
MELWAY / UBD REF MAP 109 - N18

Uecomm MAKING THE CONNECTION ACN 079 083 195
UECOMM MEL/SYD/QLD

DRAWN KJBS 1/8/03
DESIGN CHECKED
APPROVED

DRG No. OFN5/BNE/4272-26

U/G OPTICAL FIBRE CABLE RUN
QUT CARSELDINE CAMPUS
HAMILTON RD TO DORVILLE RD
CARSELDINE QLD 4034

A3

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Job No 21045072

Phone: 1100
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Caller Details

Contact: Mr Mark Shaw
Company: KN Group
Address: Level 2/71 Grey Street
South Brisbane QLD 4101

Caller Id: 1411846
Mobile: Not Supplied
Email: mshaw@knpl.com.au

Phone: 0488 044 500
Fax: Not Supplied

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.

User Reference: Not Supplied
Working on Behalf of: Private

Enquiry Date:	Start Date:	End Date:
09/02/2021	10/02/2021	17/02/2021

Address:
532 Beams Road
Carseldine QLD 4034

Job Purpose: Excavation
Onsite Activity: Manual Excavation
Location of Workplace: Both
Location in Road: CarriageWay,Footpath,Nature Strip

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:

Your Responsibilities and Duty of Care

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at **www.1100.com.au**
- **For more information on safe excavation practices, visit www.1100.com.au**

Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days.
Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.
** Asset owners highlighted by asterisks ** require that you visit their offices to collect plans.
# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
106379437	AARNet Pty Ltd, Qld	1300275662	NOTIFIED
106379433	Brisbane City Council	0734038888	NOTIFIED
106379434	Energex, Electricity (Qld)	0736645400	NOTIFIED
106379438	NBN Co, Qld	1800626329	NOTIFIED
106379436	Optus and/or Uecomm, Qld	1800505777	NOTIFIED
106379432	Powerlink Qld	0738661313	NOTIFIED
106379435	Telstra QLD, South East	1800653935	NOTIFIED
106379431	TPG Telecom (QLD)	1800786306	NOTIFIED
106379439	Urban Utilities	132364	NOTIFIED

END OF UTILITIES LIST

APPENDIX D URBAN UTILITIES (UU)

Level 1, 62 Astor Terrace
Spring Hill Qld 4000
07 3017 1900
www.kngroup.com.au

Queensland Urban Utilities
GPO Box 2765
BRISBANE QLD 4001
Phone: 07 3432 2200 or 13 26 57
www.urbanutilities.com.au/development-services

15th October 2018

Mal McCann
Calibre Consulting (QLD) Pty Ltd
PO Box 10349 Adelaide Street
Brisbane QLD 4000

Via Email: BrisAdmin@calibreconsulting.co

Dear Applicant,

Queensland Urban Utilities Services Advice Notice

QUU Application Number:	18-SRV-36240
Applicant Name:	Mal McCann Calibre Consulting (QLD) Pty Ltd
Street Address:	532 Beams Road, Carseldine
Real Property Description:	Lot 322 on SP172124

Proposed service connection/alteration/disconnection type:

Drinking water	☑
Non-drinking water	☐
Wastewater	☑

Queensland Urban Utilities provides this Services Advice Notice in response to the request received in September 2018. In accordance with section 99BRAC(3) of the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009,* this Services Advice Notice provides advice about the proposed connection having regard to the connections policy in the Queensland Urban Utilities Water Netserv Plan, the charges and conditions that may apply to the connection and other relevant matters about the connection. All terms used in this Services Advice Notice are defined by reference to the Queensland Urban Utilities Water Netserv Plan.

This Services Advice Notice does not constitute an application for connection, is not an approval to connect to the Queensland Urban Utilities network(s) and does not bind any future Queensland Urban Utilities' decision if the applicant applies for a connection.

Queensland Urban Utilities understands that the proposed development will consist of 178 residential dwellings. As per the request for a Service Advice Notice submitted, a material change of use/reconfiguration of a lot will be applied for as part of this development.

Based on your proposal and discussion with Queensland Urban Utilities officers, the following advice is provided:

ABN 86 673 835 011

Queensland Urban Utilities Services Advice

Infrastructure and Design

The project site is within the [name] Priority Development Area (PDA). Development applications for priority development areas are assessed by Economic Development Queensland (EDQ).

The infrastructure funding framework within each PDA is also typically prescribed and managed by EDQ under an Infrastructure Charges Offset Plan (ICOP). The developer should review the current ICOP and development scheme to understand the broader infrastructure obligations specific to this site.

Note: Developer Services needs to consult internally with Network Operations (as future owners of the assets) and Strategic Planning prior to EDQ finalising the proposed infrastructure layout.

Water

The subject site is located at Aspley Reservoir Gravity water pressure zone.

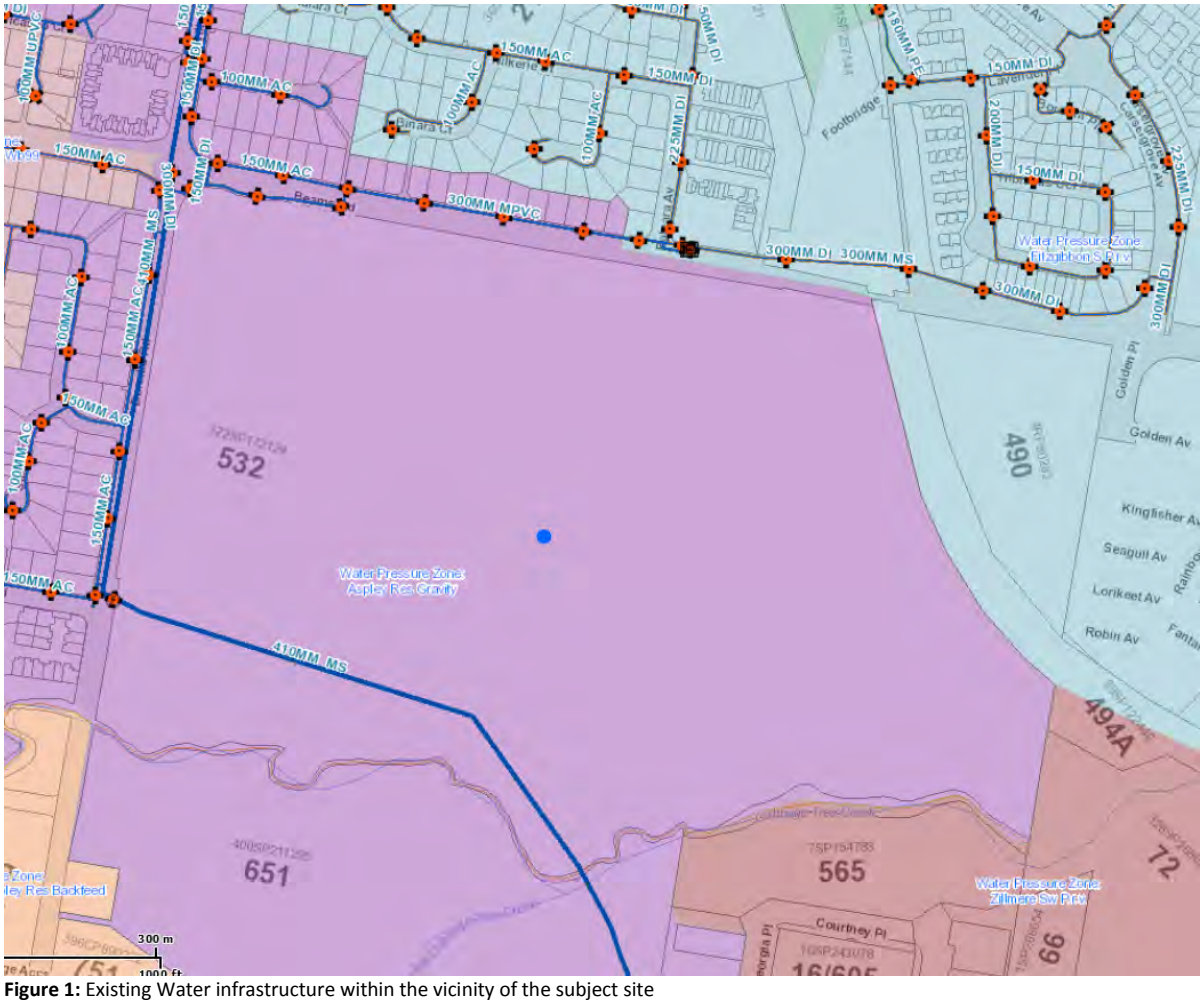

Figure 1: Existing Water infrastructure within the vicinity of the subject site

Calibre Consulting Engineers have proposed to connect the development to the QUU water network at 2 points, as indicated in Attachment 1:

- Point A: On the DN300 MPVC main in Beams Road
- Point B: On the DN150 AC main in Dorville Road

Queensland Urban Utilities does not object to the proposed water service arrangement. Please

ABN 86 673 835 011

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note that:

- Connection point A shall be provided on the western side of gate valve RV436569, to ensure the property is contained within a singular pressure zone.
- Connection Point B shall be provided to the existing DN150 AC water main at the western verge of Dorville Road.

Wastewater

The subject site is currently serviced by connection to the existing DN300 VC trunk sewer at the near side of Beams Road.

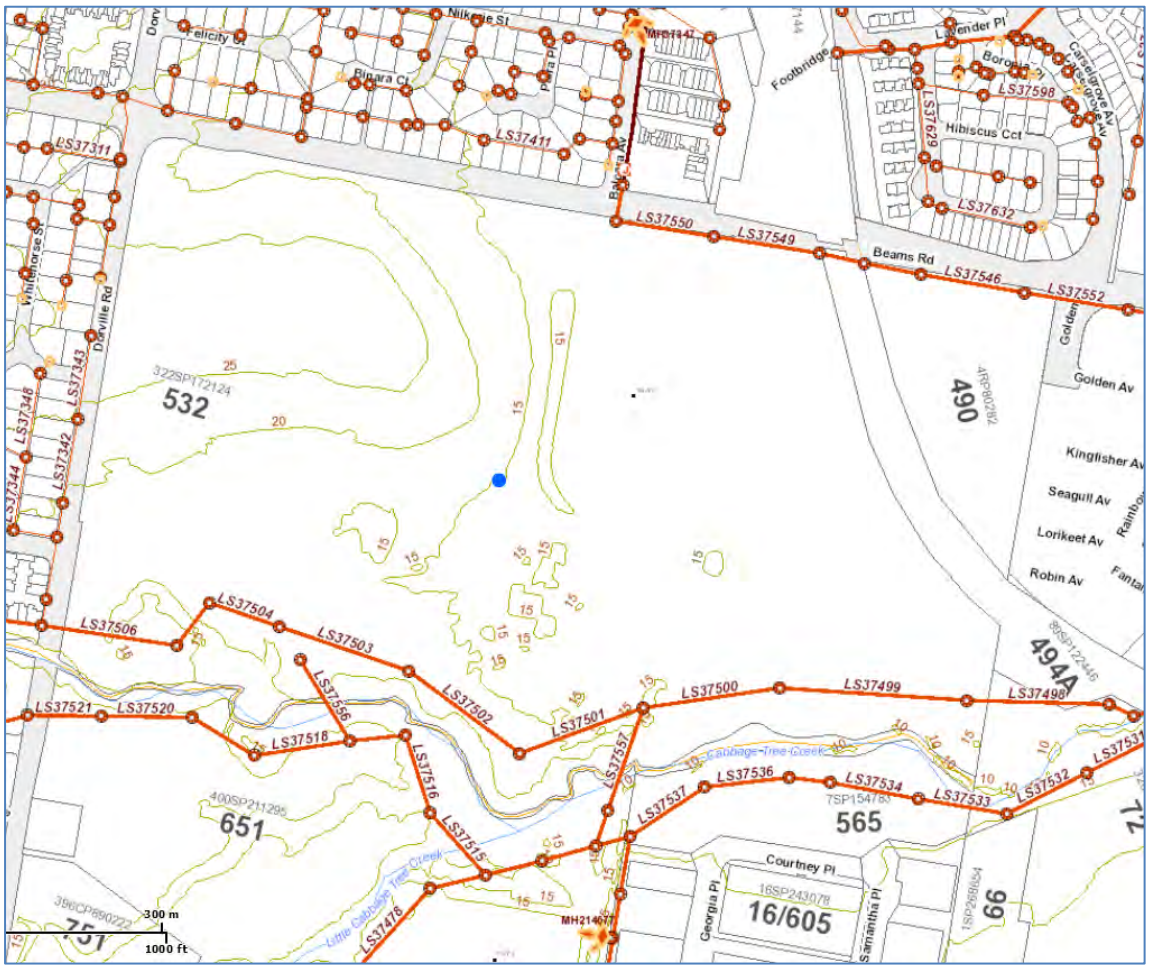

Figure 1: Existing Wastewater infrastructure within the vicinity of the subject site

Calibre Consulting Engineers have proposed to connect the development to the existing DN825 concrete trunk sewer main traversing through the property, along the southern property boundary.

Queensland Urban Utilities does not object to the proposed water service arrangement. Please note that, connection shall be provided to a reticulation manhole in parallel to the existing manhole (MH37144) on the trunk main.

Note that the infrastructure required for the proposed development is to be provided in accordance with QUU requirements, including but not limited to the *SEQ Water Supply and Sewerage Design and Construction Code* (SEQ WS&S D&C Code, 2013), or current equivalent.

Network Demand and Capacity

Water

ABN 86 673 835 011

An assessment of the water supply available at the site, including computational hydraulic modelling of the network under peak demand and fire flow conditions, has been completed.

The analysis assumes a Peak Hour Demand of 4.8 L/s (corresponding to the details of the proposed development).

The assessment indicates that the existing water supply network at the vicinity of subject site has sufficient capacity to service the proposed development in accordance with the *SEQ Water Supply and Sewerage Design and Construction Code, 2013 (SEQ WS&S D&C Code).* The reticulated water supply network proposed within the development should be designed and sized in accordance with the SEQ Code Design Criteria.

Indicative flow and pressure advice for the two proposed connection points on existing DN300 MPVC main in Beams Road and DN150 asbestos cement main in Dorville Road is provided in Table 1, below.

Table 1: Indicative Flow and Pressure Advice

Assumed Connection Main	Estimated RL Connection (m AHD)	Hydraulic Grade Line (m AHD)			Pressure (kPa) [1]		
		0 L/s	10 L/s	20 L/s	0 L/s	10 L/s	20 L/s
Point A – on DN300 MPVC main in Beams Road (constructed in 2015)	13.89	65.4	65.3	64.9	505	504	501
Point B – on DN150 AC main in Dorville Road (constructed in 1985)	22.18	65.4	65.2	64.8	424	422	418

Notes: [1] Modelled pressure in supply main, relative to the estimated connection RL (m AHD).

[2] Designers are required to adjust the Hydraulic Grade Line/Pressure model results for site/building RL differences and calculate the extra hydraulic losses from point of connection with the main.

[3] Field performance of cast iron spun (or cement) lined mains can be variable. Field testing to ascertain actual pressure drops may be advisable.

[4] Indicative flow and pressure results assume a background demand of 2/3 Peak Hour has been applied throughout the network.

Disclaimer

Information provided by Queensland Urban Utilities is based on hydraulic modelling ("Hydraulic Modelling Information"). Model results are for the anticipated performance. ***The Hydraulic Modelling Information has not been verified by field measurements and may be inaccurate due to field conditions.***

As such, users relying on Hydraulic Modelling Information do so at their own risk and should make their own independent investigations to verify model outputs.

The Hydraulic Modelling Information does not state nor imply a guaranteed level of service. Designers are referred to Queensland Urban Utilities' Customer Charter and Customer Service Standards for facility hydraulic service considerations. ***Queensland Urban Utilities does not provide a service of minimum flows and pressures to private fire-fighting systems.***

Due to changing operational circumstances, pressure and flows delivered to a service may vary. Designers are advised to make adequate provisions within the fire system installation for the pressure, flow and reliability requirements, for the life of the system.

A hydraulic assessment of the sewerage network servicing the site under peak wet weather flow conditions has been completed.

The analysis assumes a Peak Wet Weather Flow from the development of 6.0 L/s (corresponding to the details of the proposed development).

The assessment indicates that the localised gravity mains at the vicinity of the subject site have sufficient capacity to service the proposed development.

ABN 86 673 835 011

Land and Easements

Sewer Main in Private Properties

Please refer to following link for easement requirements:
http://www.urbanutilities.com.au/development-services/our-services/building

Water Main in Private Properties

Please refer to table 5.2 and clause 5.4.4 of *SEQ WS&S D&C Code* for easement requirements.

Infrastructure Charges (as at 1 July 2018)

Infrastructure Charges will be levied in accordance with the Queensland Urban Utilities' Water Netserv Plan (Part A) Charges Schedule applicable at the time the water approval application is lodged.

Further information is available at the following website:
https://www.urbanutilities.com.au/development-services/help-and-advice/water-netserv-plan

Trade Waste

A Trade Waste Approval is not required for the proposed development based on the information supplied by the applicant.

Connection Application Process

A formal assessment as to whether your application qualifies as a Standard Connection, Minor Works Approval, or Major Works Approval will be resolved on application for a Water Approval. For the purposes of preliminary advice, and based on the information provided, it is expected that the following applications will be required to assess the ability to connect to Queensland Urban Utilities networks:

1. Network and/or Property Service Connection – Major Works

The Water Approval will require connection works to be undertaken. You will be able to choose which consultants and contractors to appoint to design and construct the works, including live works (in most cases) and then maintain the works for a specified period (usually 12 months) in accordance with the conditions stated in your Water Approval.

Please note that the information provided within this section is subject to the specific aspects of the development and water application.

Fees and Charges

Queensland Urban Utilities fees and charges are stated in the Queensland Urban Utilities' Water Netserv Plan (Part A) Charges Schedule. The fees and charges that are likely to be associated with these applications are outlined below:

1. Application Phase

Base Application Fee – Network (1-10 lots) $609 (per application for each service)
Fast-track application process (up to 10 lots only) $2,436 (per application for each service)
Technical Report Review Fee $602 (per report)

2. Design, Construction and Maintenance Phases

Design Approval Fee (reticulation)

Property Service Connection Fee $2,128 (per connection / disconnection / alteration)
Network Connection Type A (1–10 lots) $1,520 (per application for each service)

ABN 86 673 835 011

Re-checking Amended Plans Fee
Re-checking Amended Plans Fee $602 per plan

Works Inspection Fee (reticulation)
Works Inspection Fee Type A $365 (per inspection)
Works Re-inspection Fee Type A $547 (per inspection)

Notes:
1. The customer may incur additional fees and charges during the approval and works phase, including but not limited to, fees levied by the RPEQ and construction contractor, fees associated with the provision of maintenance / uncompleted works bond(s), re-checking amended plans fees, re-inspection of works fees and infrastructure agreement preparation fees;
2. The above estimates are indicative only and are subject to review of the detailed application upon lodgement; and
3. Please refer to the QUU *Water Netserv Plan* - for further details / clarifications on Fees and Charges.

Time Frames for Assessment

Connection Assessments (for applications other than Standard Connection)
To be completed within 20 business days of receipt of Properly Made Connection Application (including payment of the relevant assessment fee), or within a further 20 business days of receipt of requested information (unless extended by agreement).

Design Phase
Typically for an application classified as **major works**, the assessment of the design phase is to be completed within 20 business days of receipt of all designs.

This Services Advice Notice is current for a period of two (2) years from the date of issue. Should you wish to proceed with applying for a service connection please lodge your application via Queensland Urban Utilities Development Services Online Lodgement Portal at **http://www.urbanutilities.com.au/development-services**. Please include your Services Advice Notice reference number in your application.

Queensland Urban Utilities may, at its discretion, provide a reduced fee for a service connection application based on this Services Advice Notice if your application is received within 12 months of the date of issue and is substantially in accordance with the proposal upon which this advice was issued.

If you have any questions in relation to this Service Advice Notice, please do not hesitate to contact your account manager, Vindy Hapuarachchi on 07 3855 6251 or vindy.hapuarachchi@urbanutilities.com.au.

Alternatively, please email DCMTenquiries@urbanutilities.com.au.

Yours sincerely

Toby Turner
Senior Engineer
Queensland Urban Utilities

ABN 86 673 835 011

Urban Utilities
GPO Box 2765
BRISBANE QLD 4001
Phone: 07 3432 2200 or 13 26 57
www.urbanutilities.com.au/development-services

15th June 2020

Department of Housing & Public Works
C/- Calibre Consulting (QLD) Pty Ltd
PO Box 10349 Adelaide Street
Brisbane QLD 4000

Via Email: BrisAdmin@calibreconsulting.co

Dear Applicant,

Urban Utilities Water Reticulation Analysis

UU Application Number:	20-SRV-46159
Applicant Name:	Department of Housing & Public Works C/- Calibre Consulting (QLD) Pty Ltd
Street Address:	532 Beams Road, Carseldine
Real Property Description:	Lot 322 on SP172124

Proposed service connection/alteration/disconnection type:

Drinking water	☑
Non-drinking water	☐
Wastewater	☑

Urban Utilities provides this Services Advice Notice in response to the request received on 02/06/2020. In accordance with section 99BRAC(3) of the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009,* this Services Advice Notice provides advice about the proposed connection having regard to the connections policy in the Urban Utilities Water Netserv Plan, the charges and conditions that may apply to the connection and other relevant matters about the connection. All terms used in this Services Advice Notice are defined by reference to the Urban Utilities Water Netserv Plan.

This Services Advice Notice does not constitute an application for connection, is not an approval to connect to the Urban Utilities network(s) and does not bind any future Urban Utilities' decision if the applicant applies for a connection.

Urban Utilities understands that the proposed development will consist of 5 stages of residential development including a total of 601 residential multiple dwellings and 3 stages of non-residential development including 7,400 m^2 GFA. As per the request for a Service Advice Notice submitted, a material change of use/reconfiguration of a lot will be applied for as part of this development.

Based on your proposal and discussion with Urban Utilities officers, the following advice is provided:

ABN 86 673 835 011

Urban Utilities Services Advice

Background

Objective

Calibre Consulting Pty Ltd requested Urban Utilities to prepare a Water and Wastewater Network Analysis Report for the proposed mixed-use development at 532 Beams Road, Carseldine.

The proposed development is located at Brisbane City Council local government area. The site is bounded by Beams Road at north, Dorville Road at west, QR railway corridor at east and Cabbage Tree Creek at south. The proposed development consists of 5 stages of residential development including a total of 601 residential multiple dwellings and 3 stages of non-residential development including 7400 m^2 GFA.

This report includes a review of the necessary water and wastewater network configuration and summarises the modelling assessment undertaken for the proposed development.

Water Supply

The development site is located at the Aspley Reservoir Gravity Water Pressure Zone. A map of existing infrastructure is provided in Figure 1.

Figure 1 – Development site and surrounding water supply network

Multiple water mains (300mm MPVC /300mm DI/ 150mm AC) in Beams Road and a 150mm AC water main in Dorville Road are available at the vicinity of the site.

The applicant has proposed to service the development from the existing 300 MPVC main in Beams Road. The proposed water layout plan is provided in **Appendix 1**.

ABN 86 673 835 011

Wastewater:
A 825mm dia trunk sewer main at the western property boundary, a 225mm VC main in Dorville Road and 225mm/ 300mm VC mains in Beams Road are available at the vicinity of the subject site, as indicated in **Figure 2**.

As per the natural ground topography, the proposed development area drains towards the existing 825mm dia. trunk sewer main (Cabbage Tree Creek Main sewer) in S5 catchment.

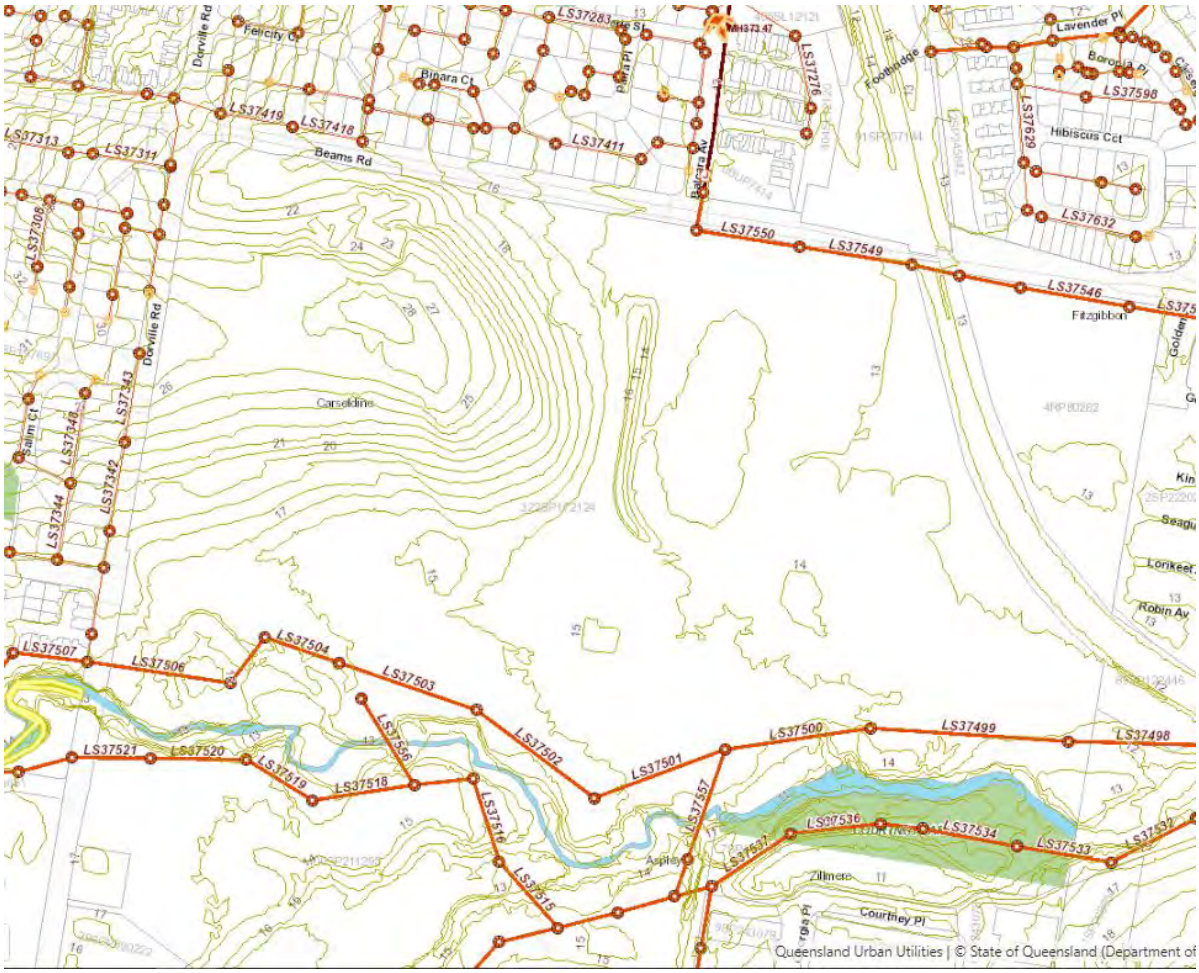

Figure 2 – Development site and surrounding Sewer network

The applicant has proposed to connect the development to the 825mm dia trunk sewer main at the western property boundary. The proposed wastewater layout plan is provided in **Appendix 1**.

Design Criteria

Development Yield

The proposed development has 601 Residential multiple dwellings and 7400 m2 GFA of Non-Residential space.

Equivalent Persons

The equivalent person (EP) rating of the development site was calculated based on development density factors outlined in Table A4.1, Brisbane City Planning Scheme Development Density of the SEQ WS&S D&C Code (Version 2.0 - February 2020).

The total EP in all stages of the development is calculated as 1,164.1 approximately. A summary of staging and EP calculation is provided below in **Table 1**.

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Table 1: Summary of Staging and EP

Residential	Terrace	Apartments	Retirement	Total No: of dwellings	EP
Stage 1	79		150	229	435.1
Stage 2	45			45	85.5
Stage 3	57	100		157	298.3
Stage 4	20	142		162	307.8
Stage V		8		8	15.2
Sub Total	**201**	**250**	**150**	**601**	**1141.9**
Non-Residential	m2 GFA				EP
Stages 3, 4 & V	7400				**22.2**
Total					**1164.1**

Water Demands

The water supply network Design Criteria (outlined in Table 4.1 of the SEQ WS&S D&C Code (Version 2.0 - February 2020) were used to determine the development's respective demands.

- Average Day Demand (AD): 230 L/EP/day
- Non-Revenue Water (NRW): 30 L/EP/day
- Peak Day Demand (PD)**:** 2.0 x AD
- Peak Hour Demand (PH)**:** 4.0 x AD

Based on above criteria, the water demand corresponding to the total EP (1164.1) is as follows:

- Average Day Demand (AD): 3.2 L/s
- Peak Day Demand (PD): 6.4 L/s
- Peak Hour Demand (PH): 12.8 L/s

Water Supply Network Firefighting Capacity

The SEQ Code Design Criteria requires provision of firefighting capacity of 25 L/s for greenfield low-density residential areas, 30 L/s for Commercial areas and 60 L/s for high density residential areas.

Considering this is a mixed-use development, 60 L/s firefighting demand was considered with a background demand of 2/3 of residential Peak Hour Demand (PH).

Sewerage Loading

The Sewerage network Design Criteria (outlined in Table 10 of the SEQ WS&S D&C Code (Version 2.0 - February 2020) were used to determine the development's respective sewerage loading.

- Average Dry Weather Flow (ADWF) = 210 L/EP/Day
- Peak Wet Weather Flow (PWWF) = 5 x ADWF

The sewerage loading corresponding to the total EP (1164.1) is as follows:

- Average Dry Weather Flow (ADWF) = 2.83 L/s
- Peak Wet Weather Flow (PWWF) = 14.2 L/s

ABN 86 673 835 011

Water Network Analysis

The existing and proposed water supply network performance was compared to the following guidelines from the SEQ WS&S D&C Code (Version 2.0 - February 2020)

- **Minimum pressure:** Under Peak Hour demands, the residual pressure in the water supply network servicing existing and proposed customers should not fall below 22 metres.
- **Maximum pressure:** A maximum service pressure of 55 metres is permitted.
- **Maximum Velocity:** 2.5 m/s
- **Maximum Allowable Head loss:** 5m/km (<=DN150), 3m/km (>DN150)
- **Firefighting capacity:** Under the identified fire flow event, with a background demand of two-thirds (2/3) Peak Hour, the minimum residual pressure at the flowing hydrant shall be 12 m, with a minimum pressure head of 6 m maintained through the water supply zone.

Existing network configuration

The proposed development site is located in the Aspley Reservoir Gravity Water Pressure Zone, which is serviced by Aspley Reservoir.
Reservoir details:

- Bottom water level (BWL): 63.09m AHD
- Top water level (TWL): 73.52m AHD

A 1060mm trunk main from Aspley Reservoir is supplying this area, branching off into a 910mm MSC trunk main in Pie Street, a 600mm MSC/ 410mm MS main in Kirby Road, which is supplying the 300mm MS main in Dorville Rd and 300mm DI/MPVC main in Beams Road.

Water Connection Points

The applicant has proposed to service the development from the existing 300 MPVC water main in Beams Road. Two connections from the development are proposed to this water main. As indicated in **Appendix 1**, Connection 1 is proposed at the boundary between 2 pressure zones (Aspley Res Gravity Pressure Zone and Bracken Ridge Reservoir pressure zone). Connection 2 is at the Aspley Res Gravity Pressure Zone (Refer to Figure 1). Since both connections must be at the same pressure zone, Connection 1 must be provided at the western side of Gate valve RV436569.

Water Main Sizing

The existing 300 MPVC water main in Beams Road has sufficient capacity to service the development.

Urban Utilities approved water main sizing is provided in **Appendix 1.** As indicated in Appendix 1, the 180mm diameter main should continue between Points A to B and B to C.

Note that the water infrastructure required for the proposed development is to be provided in accordance with Urban Utilities' requirements, including but not limited to the SEQ Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code - Version 2.0 - February 2020), or current equivalent.

Sewer Network Analysis

Capacity assessment

The existing 825mm Cabbage Tree Creek main sewer has sufficient capacity to service the development.

The pipe sizing provided in **Appendix 1** have sufficient capacity to service the development. Please

ABN 86 673 835 011

note that the minimum grades are required for all sewer mains within the development.

Note that the wastewater infrastructure required for the proposed development is to be provided in accordance with Urban Utilities' requirements, including but not limited to the SEQ Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code - Version 2.0 - February 2020), or current equivalent.

This Services Advice Notice is current for a period of two (2) years from the date of issue. Should you wish to proceed with applying for a service connection please lodge your application via Urban Utilities Development Services Online Lodgement Portal at **http://www.urbanutilities.com.au/development-services**. Please include your Services Advice Notice reference number in your application.

Urban Utilities may, at its discretion, provide a reduced fee for a service connection application based on this Services Advice Notice if your application is received within 12 months of the date of issue and is substantially in accordance with the proposal upon which this advice was issued.

If you have any questions in relation to this Service Advice Notice, please do not hesitate to contact your account manager, Vindy Hapuarachchi, on 07 3855 6251 or vindy.hapuarachchi@urbanutilities.com.au.

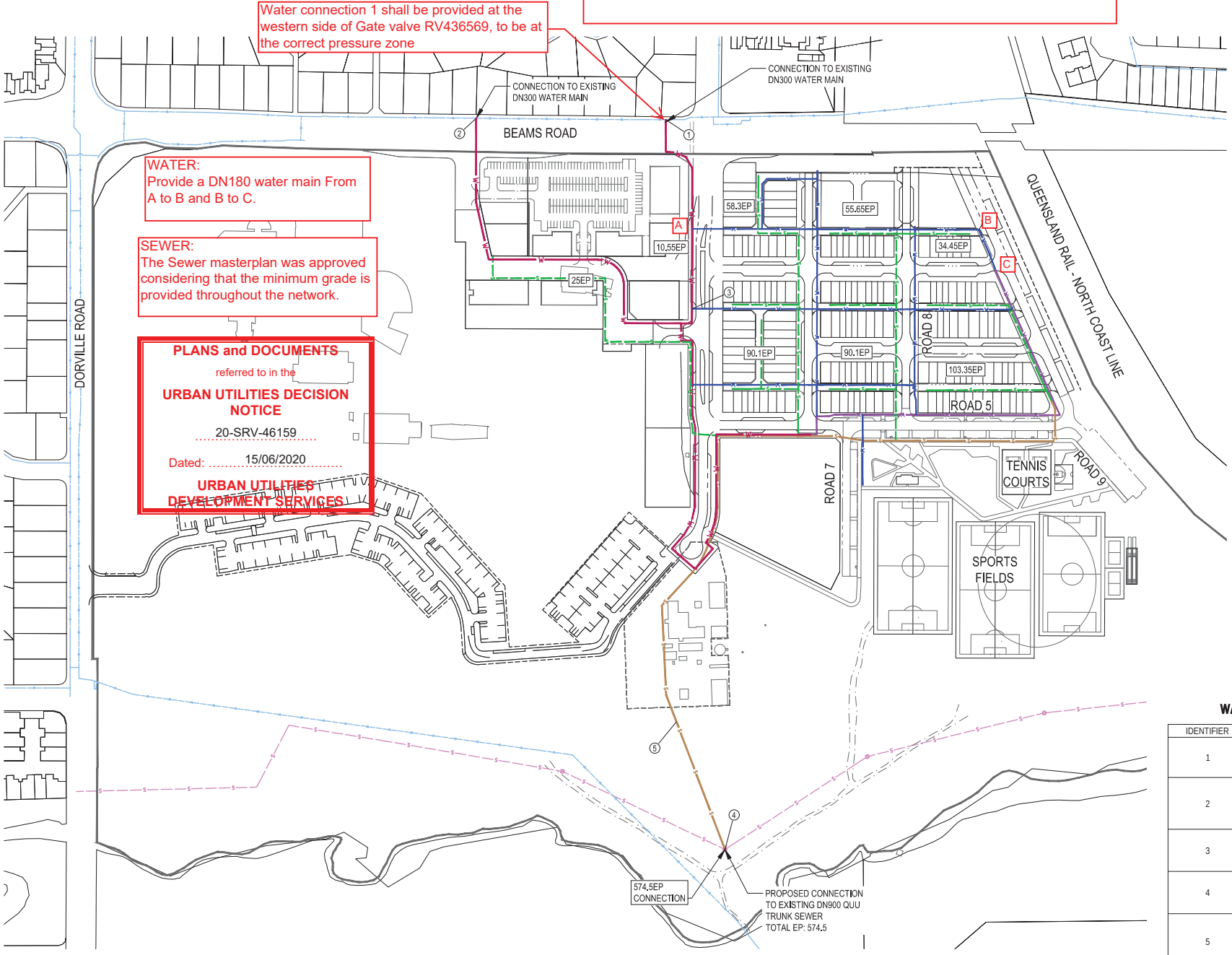
Alternatively, please email DCMTenquiries@urbanutilities.com.au.

Yours sincerely

Sajid Imam Syed
Development Assessment Team Leader
Urban Utilities

ABN 86 673 835 011

20-SRV-46159 - APPENDIX 1 - WATER & SEWER MAIN SIZING PLAN



LEGEND

- EXISTING QUU WATER MAIN
- PROPOSED DN125 WATER MAIN
- PROPOSED DN180 WATER MAIN
- PROPOSED DN250 WATER MAIN
- EXISTING QUU WASTEWATER MAIN
- PROPOSED DN160 WASTEWATER MAIN
- PROPOSED DN250 WASTEWATER MAIN
- CADASTRE

NOTES:

1. ALL EXISTING SERVICES TO BE CONFIRMED ON SITE
2. REFER LANDSCAPE DRAWINGS FOR WATER FEED DETAILS & LOCATIONS
3. FOR EP DEMAND DETAILS REFER TO CALIBRE ENGINEERING SERVICES REPORT 15-003002-WER02

NOTE

NOTWITHSTANDING THAT EXISTING SERVICES MAY OR MAY NOT BE SHOWN ON THE PROJECT DRAWINGS, NO RESPONSIBILITY IS TAKEN BY THE SUPERINTENDENT OR THE PRINCIPAL FOR THIS INFORMATION WHICH HAS BEEN SUPPLIED BY OTHERS. THE DETAILS ARE PROVIDED FOR INFORMATION ONLY. THE CONTRACTOR SHALL ASCERTAIN THE POSITION OF ANY UNDERGROUND SERVICES IN THIS AREA AND SHALL BE RESPONSIBLE FOR MAKING GOOD ANY DAMAGE THERETO.

WATER AND WASTEWATER INFRASTRUCTURE

IDENTIFIER	DESCRIPTION
1	CONNECTION TO EXISTING DN300 QUU WATER MAIN IN BEAMS ROAD
2	CONNECTION EXISTING DN300 QUU WATER MAIN IN BEAMS ROAD
3	NEW INTERNAL WATER NETWORK CONSISTING OF A COMBINATION OF DN200, DN150 AND DN100 WATER MAINS
4	CONNECTION TO EXISTING DN900 QUU TRUNK WASTEWATER MAIN ADJACENT CABBAGE TREE CREEK
5	NEW INTERNAL WASTEWATER NETWORK CONSISTING OF A COMBINATION OF DN225 AND DN150 WASTEWATER MAINS

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	06.08.18	ISSUE FOR APPROVAL	JG	JG
2	27.05.20	PLAN LAYOUT AMENDED	CHC	DC
3				
4				
5				
6				
7				
8				

DRAWN CHECK

DESIGN CHECK

STATUS: FOR CONSTRUCTION

APPROVED: DANIEL COLLINS RPEQ 18631

FOR & ON BEHALF OF CALIBRE CONSULTING (QLD) PTY LTD

SCALE: 1:1500 / 1:3000 — 30 20 10 0 30 60m — A1 / A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

© calibregroup.com

PROJECT: CARSELDINE URBAN VILLAGE STAGE S

DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.

DRAWING TITLE: WATER AND SEWER MASTERPLAN

PROJECT No.	DRAWING No.	REVISION
15-003002	910	2

APPENDIX E ASBESTOS REMEDIATION STRATEGY AND DISPERSIVE SOIL REPORT

Level 1, 62 Astor Terrace
Spring Hill Qld 4000
07 3017 1900
www.kngroup.com.au

GOLDER

REPORT

Asbestos Remediation Strategy during Stormwater Pipe Removal

Carseldine Urban Village Stages 1 to 4

Submitted to:

Department of State Development, Manufacturing, Infrastructure and Planning
Attn: Richard Bender
Level 14, 1 William Street
Brisbane QLD 4000

Submitted by:

Golder Associates Pty Ltd
147 Coronation Drive, Milton, Queensland 4064, Australia

+61 7 3721 5400

20146719-001-R-Rev0

30 September 2020

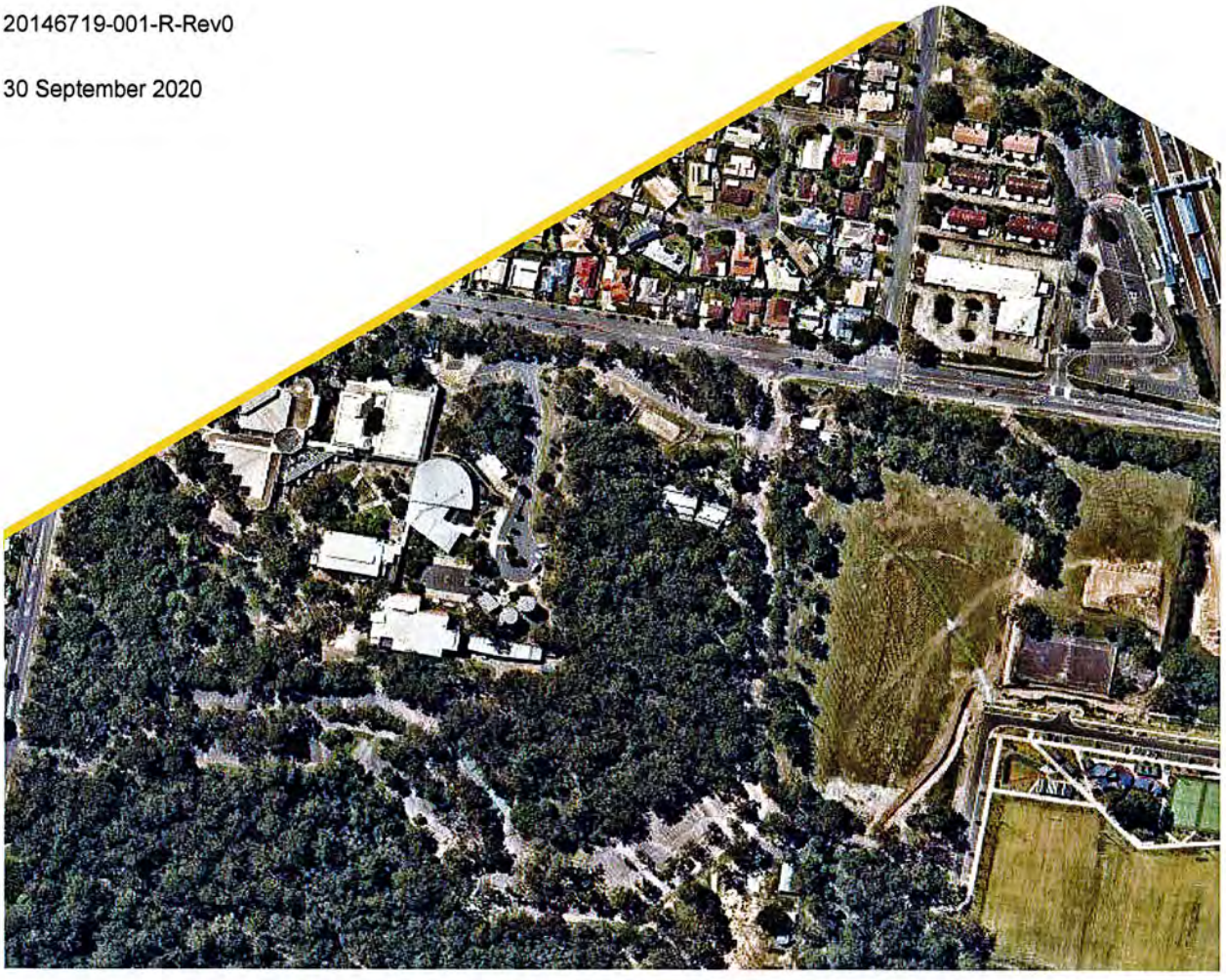


Table of Contents

1.0 INTRODUCTION **1**

1.1 Objective 1

2.0 SITE LOCATION AND BACKGROUND INFORMATION **2**

3.0 LEGISLATIVE CONTEXT AND SCREENING LEVELS **3**

4.0 REMEDIATION STRATEGY **4**

4.1 Methodology 4

4.2 Transport and Disposal of Contaminated Soil 5

4.3 Supervision and Validation 5

4.4 Validation Reporting 5

4.5 Unexpected Contamination 5

5.0 REFERENCES **6**

6.0 IMPORTANT INFORMATION **6**

TABLES

Table 1: Site Particulars 2

APPENDICES

APPENDIX A
Approximate Location of Redundant Stormwater Pipe to be Removed

APPENDIX B
Laboratory Certificate

APPENDIX C
Important Information

1.0 INTRODUCTION

The Minister for Economic development Queensland (EDQ) engaged Golder Associates Pty Ltd (Golder) to prepare a remediation strategy for the removal of a redundant asbestos stormwater pipe and adjacent contaminated soil within the Carseldine Urban Village (the site), located at the Corner of Beams and Dorville Road, Carseldine, QLD 4034.

Previous investigations have identified the presence of an asbestos containing material (ACM) stormwater pipe that, based on the site redevelopment project, has resulted redundant. More recently, during the initial phase of removal of this pipe, fragments of ACM were identified in the packing fill underneath the pipe. The same situation is inferred to be present across the other pipe sections to be removed during Stages 1 to 4 within the Carseldine Urban Village.

Indicative dates for removal of the redundant stormwater pipe across the whole site and a plan showing the location of the works (**APPENDIX A**) were provided by EDQ. This information indicates the need for removal of:

- 630 m of pipe during Stage 1 commencing late June or early July 2020.
- 219 m of pipe during Stage 2 commencing November 2020.
- 93 m of pipe during Stage 3 commencing during the middle of 2021.
- 230 m of pipe during Stage 4 commencing in early 2022.

Golder understands that the works will be supervised by the licensed asbestos contractor McMahon Service Australia Pty Ltd (McMahon Services), engaged by the Principal Contractor Shadforth Civil Contractors (Shadforth). Golder has been engaged by EDQ as contaminated land consultant and Ian Kluckow will be acting as Suitable Qualified Person (SQP), in line with previous stages of remediation undertaken at the site.

This document presents an outline strategy for remediation works and is not a detailed technical specification.

1.1 Objective

The objective of the this document is to provide a remediation strategy to be followed by the contractors and Golder allowing, at the end of the works, the preparation of a validation report and SQP declaration indicating that the site is suitable for the intended land use.

2.0 SITE LOCATION AND BACKGROUND INFORMATION

Golder understands that the broader precinct (Lot 1 on plan SP311781) has historically and is currently being utilised for various activities including tertiary education buildings (former Queensland University of Technology campus), a childcare centre, sporting fields, commercial and government operations.

Lot 1 occupies an area of approximately 15.73 hectares (ha), with the redundant stormwater pipe extending over approximately 1.2 km across Stages 1 to 4.

Table 1: Site Particulars

Topic	Data	Source
Property Address	Corner Beams and Dorville Road, 532 Beams Road, Carseldine, QLD 4034	Google Maps
Lot and Plan Number	Lot 1 on SP311781	Nearmap 15 July 2020
Central Coordinates	502471.64 m E; 6974745.90 m S Zone 56J (GDA 94)	Google Earth
Surrounding Land Use and Occupants	■ North: Beams Road, retail and residential properties ■ East: Playing fields and busway (under development), commercial car wrecking yard, and residential housing. ■ South: Cabbage Tree Creek (Tighgum), Aspley State High School, commercial and industrial precinct, and residential housing. ■ West: Transport and Main Roads, Aspley Special School, retirement community, residential housing.	Site observations and Google Earth

On 6 July 2020 visual observations of ACM were identified during the preliminary excavation of a redundant stormwater concrete pipe within the Stage 1 construction area. The known asbestos contamination relates to packing beneath a redundant concrete stormwater pipe (**Plate 1** and **Plate 2**).

Two samples were collected, one of the suspected ACM fragment (S01_0607) and another from the surrounding soil within the excavation (S02_0607). The results of the laboratory analysis confirmed the fragment to contain chrysotile asbestos, and no asbestos was detected within the soil sample at the reporting limit of 0.0001%w/w. The laboratory documentation is provided in **APPENDIX B**.

With the exception of ACM, no other visible or olfactory evidence of contamination was identified during the works.

Plate 1: Redundant Stormwater Pipe within Stage 1

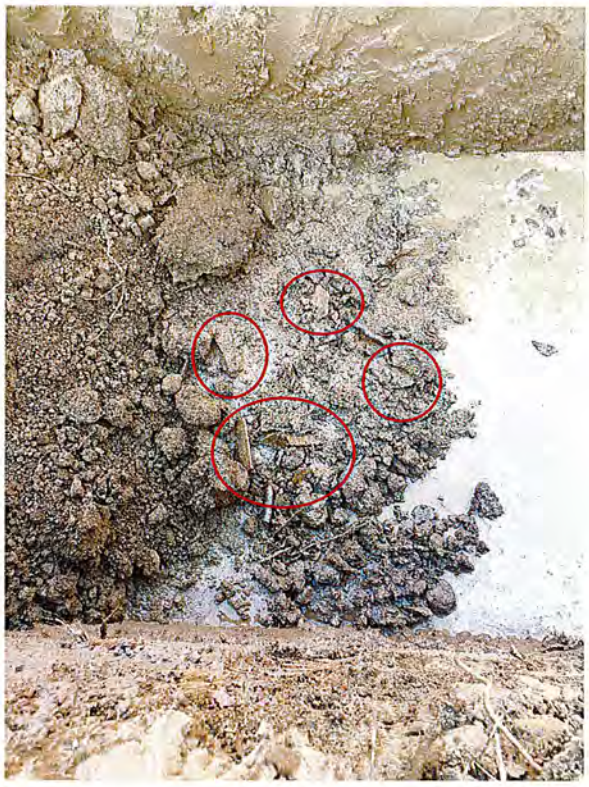


Plate 2: Observed ACM Fragments Post-Excavation

3.0 LEGISLATIVE CONTEXT AND SCREENING LEVELS

The proposed remediation works are to be undertaken in general accordance with the following:

- Work Health and Safety Act 2011.
- The ASC National Environment Protection (Assessment of Site Contamination) Measure (NEPM), 1999 (as amended in 2013).
- Department of Health, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, 2009.
- Australian Standard 4482.1-2005, Guide to the investigation and sampling of sites with potentially contaminated soil, part 1: non-volatile.
- Internal Golder standard operation procedures.

The Health Screening Levels (HSL) for asbestos contamination in soil from NEPM 2013 will be adopted for the assessment of risk to human health. In light of the proposed land use for residential townhouse and retirement village, Residential A and B HSLs have been selected.

Daily asbestos air monitoring results will be screened against the air-quality exposure limit of 0.01 fibres per millilitre (f/ml) as endorsed by enHealth (2005).

4.0 REMEDIATION STRATEGY

4.1 Methodology

The overarching outcome for the remediation is to remove asbestos contamination along the redundant stormwater pipe alignment across Stages 1 to 4. The approximate location of the stormwater pipe subdivided for each Stage of works is presented in **APPENDIX A**.

The remediation strategy to be applied for all Stages of works is informed by the WA DOH, 2009 guidelines and includes the following tasks, grouped by responsible party.

The Contractor

1) Preparation and submission of site-specific Health, Safety and Environment documents, an Asbestos Removal Control Plan and Form 65 - Notification of licensed asbestos removal work.
2) Full-time attendance of a Class A – Asbestos Removal Licensed Supervisor.
3) Preparation and use of personnel and/or vehicle decontamination area(s).
4) Set up and delineation of an exclusion zone during excavation works.
5) Remediation of ACM via excavation, loading and disposal to a licensed landfill. The approximate area of works is identified in **APPENDIX A.** This task will include:
    a. Each section concrete ACM stormwater pipe will be excavated/removed (preferably entire unbroken section), cleaned to ensure no asbestos sheets are still adhered to its surface, and stockpiled.
    b. Stockpiles of concrete will be given a clearance by the Licensed Supervisor prior to loading into trucks for disposal.
    c. The nominal depth of soil excavation is 0.20 m below the base of the stormwater pipe as it is likely the soil surrounding the pipe is impacted. The actual depth of the excavation will be determined by the Licensed Supervisor during the remediation works.
    d. The ACM contaminated soil will be excavated and ideally placed directly into awaiting body trucks or temporarily stockpile until load out into receiving trucks. Where suspected ACM is encountered on the boundary of the expected excavation area, the excavation zone will be extended until no further visual evidence of ACM contamination is identified.
    e. Background air monitoring for asbestos fibres will be completed during all disruptive earthwork activities to provide assurance to on-site operators and nearby sensitive receptors.
    f. Remediation of additional or unexpected contamination.
    g. If required, supply and place plastic under and over contaminated stockpiles at the end of each shift for the duration of testing works.
6) Preparation and submission of a completion report including waste tracking documentation.

Golder

7) The preparation of a site-specific health, Safety and Environment Plan (HaSEP).
8) Site attendance to observe the remediation works.
9) Collection of validation soil samples obtained from the base and walls of the excavation completed by the Contractor.

10) Collection of validation soil samples in areas where contaminated soil stockpiles have been stored before loading onto trucks and from decontamination areas.

11) Laboratory testing, assessment and preparation of a summary validation report.

12) Preparation of an SQP Declaration.

4.2 Transport and Disposal of Contaminated Soil

Soil contaminated by ACM and the ACM pipe will be transported off site for disposal to a licensed landfill by the Contractor. Transport will be in accordance with relevant legislative guidelines and by appropriately licensed personnel.

All trucks will have to be loaded with a layer of clean soil placed on top of the asbestos impacted soil or encapsulated by spraying PVA glue on the surface of the soil in the trucks prior to departure.

Vehicles transporting contaminated soil on registered roadways must be appropriately registered and licensed for the intended activities, with those licences and applicable information provided both prior to works and within a completion report.

4.3 Supervision and Validation

Supervision and validation of the works will be completed by Golder on behalf of the Department. Visual validation of all works will be completed. In addition, laboratory validation will be undertaken post excavation including:

- Base and sides (where present) of excavations with soil samples collected on a 20 m grid on the base of the excavation and every 20 m along the walls of the excavation.
- Base of contaminated material stockpiles areas on a 20 m grid.
- Gravel access road and haulage tracks with samples collected every 25 m.
- Remediation contractors' personnel and plant decontamination areas with samples collected on a 20 m grid or a minimum of 2 samples.

4.4 Validation Reporting

Preparation of an asbestos remediation validation report for Stages 1 to 4 summarising the excavation works, soil laboratory analysis for ACM and air monitoring (completed by the principal contractor).

4.5 Unexpected Contamination

Unexpected contamination identified during excavation works will have to be recorded, assessed by the SQP and where appropriate remediated using the methods described above.

5.0 REFERENCES

a) Australian Standard 4482.1-2005, Guide to the investigation and sampling of sites with potentially contaminated soil, part 1: non-volatile

b) The ASC National Environment Protection (Assessment of Site Contamination) Measure (NEPM), 1999 (as amended in 2013).

c) Department of Health, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2009.

d) enHealth, 2005. Management of asbestos in the non-occupational environment 2005, enHealth Council.

e) Work Health and Safety Act 2011.

6.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled - "Important Information Relating to this Report", which is included in **APPENDIX C** of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

Signature Page

Golder Associates Pty Ltd

Sarah Duarte
Senior Environmental Scientist

Michele Stella
Principal Environmental Engineer

BV/MS/bv

A.B.N. 64 006 107 857

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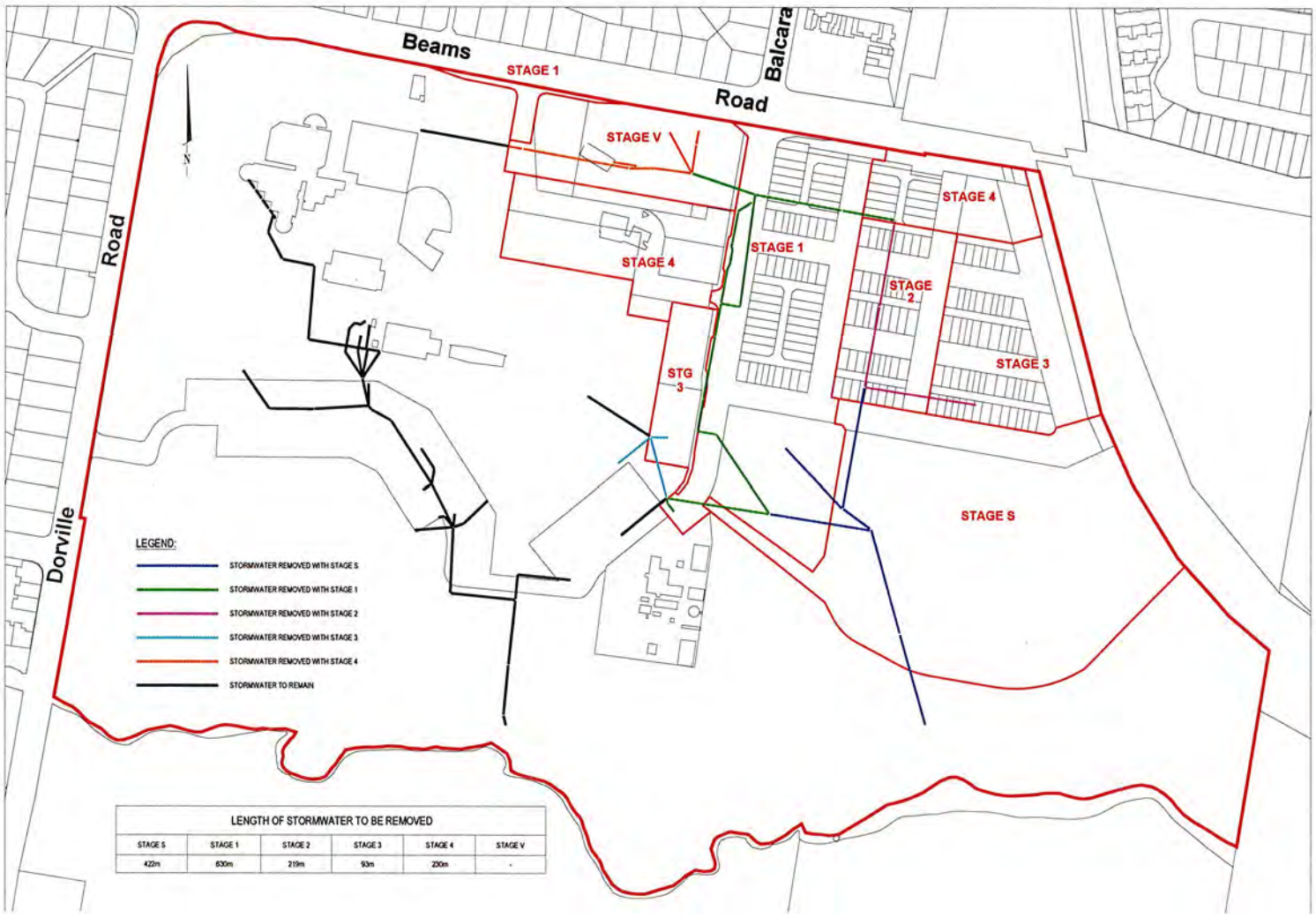
https://golderassociates.sharepoint.com/sites/131136/shared documents/deliverables/001 remediation strategy/20146719-001-r-rev0 - cuv acm rem strategy sw pipe.docx

APPENDIX A

Approximate Location of Redundant Stormwater Pipe to be Removed



LENGTH OF STORMWATER TO BE REMOVED					
STAGE S	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE V
422m	630m	219m	93m	230m	-

APPENDIX B

Laboratory Certificate

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Golder Associates Pty Ltd
147 Coronation Dve
Milton
QLD 4064

Attention:	Michele Stella
Report	729834-AID
Project Name	CUV SOIL TESTING
Project ID	20146719
Received Date	Jul 06, 2020
Date Reported	Jul 07, 2020

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Project Name	CUV SOIL TESTING
Project ID	20146719
Date Sampled	Jul 06, 2020
Report	729834-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
S01_0607	20-JI07869	Jul 06, 2020	Approximate Sample 88g / 120X70X5mm Sample consisted of: Brown fibre cement fragment	Chrysotile asbestos detected.
S02_0607	20-JI07870	Jul 06, 2020	Approximate Sample 409g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Jul 06, 2020	Indefinite
Asbestos - LTM-ASB-8020	Sydney	Jul 06, 2020	Indefinite

eurofins | Environment Testing

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Project Name:	CUV SOIL TESTING		
Project ID:	20146719		

Received:	Jul 6, 2020 11:15 AM		
Due:	Jul 7, 2020		
Priority:	1 Day		
Contact Name:	Michele Stella		

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Asbestos - WA guidelines	Asbestos Absence /Presence
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	S01_0607	Jul 06, 2020	8:30AM	Building Materials	B20-JI07869		X
2	S02_0607	Jul 06, 2020	8:30AM	Soil	B20-JI07870	X	
Test Counts						1	1

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to "non-bonded / friable".
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

B20-JI07870: Sample received was less than the nominal 500mL as recommended in Section 4.10 of the NEPM Schedule B1 - Guideline on Investigation Levels for Soil and Groundwater.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Chamath JHM Annakkage	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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APPENDIX C

Important Information

The document ("Report") to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd ("Golder") subject to the important limitations and other qualifications set out below.

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At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

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Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

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Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification

golder.com

Gallagher Environmental

Dispersive Soil Management Plan (DSMP): Carseldine Urban Village: Stages 1- 4 & Stage V

Client: Economic Development Queensland
C/- Calibre Group

Report No: GE20.025.R1

Date: 22nd April 2020

CPESC ENVIROCERT

ENVIRONMENT INSTITUTE OF AUSTRALIA AND NEW ZEALAND

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DOCUMENT CONTROL

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Job No.	GE20.025
Document No:	GE20.025.R1.doc
Title:	Dispersive Soil Management Plan (DSMP): Carseldine Urban Village Stages 1 – 4 & Stage V
Project Manager:	Glen Gallagher
Qualifications:	BScApp(EnvSc)(Hons) MEIANZ CPESC
Client:	C/- Calibre Group
Client Contact:	Mr. Daniel Collins
Synopsis:	A detailed DSMP providing site-specific management protocols for the construction phase of the development.

REVISION & CHECKING HISTORY

Revision Number	Date	Issued by	Signature
Original	22 April 2020	G Gallagher	G M Gallagher

DISTRIBUTION

Destination	Revision		
	Original	-	-
Calibre Group	1		
GE Database	1		

LIMITATIONS

This report has been prepared for the sole use of the client and the client's immediate representatives and agents. Third parties (excluding regulatory agencies assessing an application in relation to the purpose) shall not rely on this report. It is fundamental in the application of this report that the report, including appendices, is read in its entirety and fully understood. Please contact Gallagher Environmental for additional explanation if any of the report content is not fully understood.

This report is not a guarantee that the site conditions will behave in accordance with the interpretation set out herein, but rather our opinion as to the correct interpretations based on the results of desktop review, site investigations, in situ testing and/or laboratory testing in accordance with generally accepted consulting practice. To the best of our knowledge, information contained in this report is accurate at the date of issue. The interpretation of scientific data, however, often involves both professional and subjective judgments. As such, interpretation is open to error. In addition, site conditions are subject to change in a limited time and there remains a risk that the site conditions will differ from these interpretations. Gallagher Environmental waives all responsibility for loss or damage where information provided by the Client (including third parties) used in the preparation of this report was inaccurate or in error.

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TABLE OF CONTENTS

1. Introduction **4**

1.1 DSMP Overview 4
1.2 Scope of Study 4
1.3 Objectives 4
1.4 DSMP Amendments 5

2. Methodology **6**

3. Site Description & Physical Characteristics **7**

3.1 General Overview 7
3.2 Slopes & Drainage 7
3.3 Geology 7
3.4 Detailed Site Inspection 8
3.5 Soil Profiles 9
3.5.1 Dermosols *9*

4. Laboratory Results **10**

4.1 Discussion 12
4.1.1 Emerson Class Tests *12*
4.1.2 Soil pH *12*
4.1.3 Soil Salinity *12*
4.1.4 Soil Sodicity (ESP) *13*
4.2 Overall Soil Dispersion Risk 14
4.2.1 Topsoil (0 – 150mm below natural NSL) *14*
4.2.2 Subsoil (>150mm below natural NSL) *14*

5. Dispersive Soil Management Plan **15**

6. DSMP Certification **17**

APPENDIX A: BORELOGS

APPENDIX B: LABORATORY RESULTS

1. INTRODUCTION

1.1 DSMP Overview

Gallagher Environmental (GE) was commissioned C/- Calibre Group to prepare a Dispersive Soil Management Plan (DSMP) for the proposed 'Carseldine Urban Village – Stages 1 – 4 & Stage V' development located at Beams Road, Carseldine.

The purpose of the assessment is to define the overall soil dispersion risk of the site soils and to provide appropriate management principles where required in order to ensure that earthworks do not cause land degradation, and to mitigate effects on the built environment from soil dispersion as a consequence of soil disturbance.

The report is divided into sections describing: the physical characteristics of the site; a review of detailed laboratory results, an assessment of the soil dispersion potential, and where required, subsequent management strategies to be employed during the construction phase of the development.

1.2 Scope of Study

The scope of the study included:

- The logging, sampling and laboratory analysis of samples recovered from five (5) boreholes and additional grab samples for the purposes of soil dispersion hazard testing;
- A detailed site inspection of the proposed development area by qualified GE staff;
- The detailed interpretation and analysis of the data obtained and comment on relevant recommendations.

Furthermore, the investigation, field and laboratory testing and interpretation were carried out in general accordance with the following documents and standards:

- 'Implementation Guideline No. 28 Dispersive Soils Management' (ICC, 2016);
- Best Practice Erosion & Sediment Control - Books 1, 2 & 3 (IECA, 2008);
- Australian Soil & Land Survey Field Handbook (McDonald et. al., 1998);
- AS1289 Testing of Soils for Engineering Purposes; and
- Australian Soil Classification (Isbell, 2016).

1.3 Objectives

The specific objectives of the assessment were as follows:

- To undertake field survey and establish the soil types within the investigation area;
- To define the overall soil dispersion hazard of the site soils using desktop, field and laboratory analysis; and
- To provide specific strategies for the management of dispersive soils during the construction phase of the development and for inclusion with bulk earthwork/engineering and ESC plans, where required.

1.4 DSMP Amendments

The DSMP is a flexible document that shall be modified in the event that site conditions change significantly from those considered within the DSMP and as site knowledge and site construction and engineering experience allows.

In the event that a monitoring program detects a notable failure to achieve the required DSMP objectives, the source of the failure shall be appropriately investigated, including engagement of a suitably-qualified professional (e.g. CPESC; RPEQ) where required, and the DSMP suitably modified to ensure incidents do not recur.

2. METHODOLOGY

A detailed field inspection was undertaken by a qualified Environmental Scientist on 7.04.20 and a total of five (5) boreholes drilled within the site area using solid flight hand auger equipment. Sampling from all examined profiles was undertaken within each major soil horizon (i.e. texture change) encountered and bore logging undertaken in accordance with the Australian Soil Classification (ASC, 2016). In addition, four (4) samples were taken from existing soil stockpiles on-site. The site plan detailing the sampling locations is provided in Drawing No. GE20.025.D1.

Laboratory analysis was subsequently undertaken on representative samples in order to define soil dispersion potential and soil electro-chemistry in accordance with the following Australian Standards:

- Emerson Class Number in accordance with AS1289 3.8.1; and
- pH and Electrical Conductivity (Raymont & Lyons, 2010).

Table 2.1 Testing Regime

Testing Regime	Number of tests
Soil Profile Assessment	5 profiles + 4 grab samples
Emerson Class	14
Soil pH	14
Soil Electrical Conductivity (EC)	14
Exchangeable Sodium Percentage (ESP)	2

Qualified GE staff undertook Emerson Class, pH and Electrical Conductivity testing on representative samples.

Two (2) representative samples were dispatched to ALS Laboratories, Stafford, Brisbane for the additional chemical analysis, including ESP. The laboratory certificates are contained in Appendix B.

3. SITE DESCRIPTION & PHYSICAL CHARACTERISTICS

3.1 General Overview

The site is located within the former QUT Carseldine Campus and contains several multi-storey buildings and sporting fields. The proposed residential and mixed-use development is approximately 11ha and shall include extensive cut to fill bulk earthworks, the construction of an internal road network and the installation of services (e.g. stormwater; sewer).

3.2 Slopes & Drainage

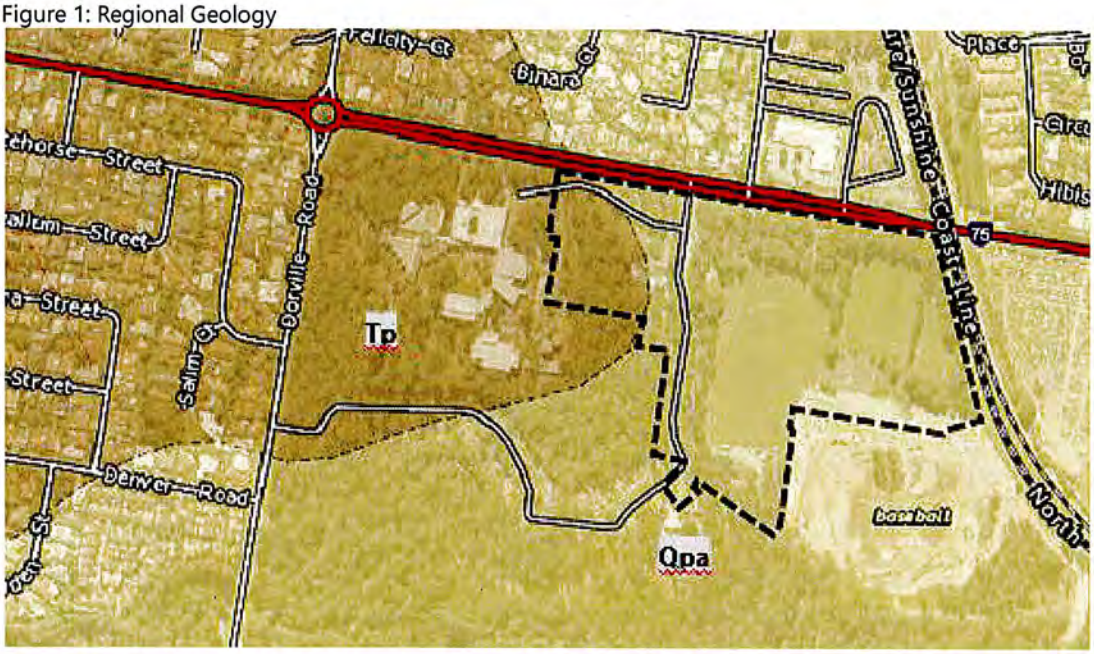
In accordance with the *'Australian Soil & Land Survey Field Handbook (1998)'*, the majority of the contains a flat to very gently inclined topography with slope magnitudes predominantly ranging between approximately 0% and 1%. However steeper slopes are located within the far western portion of the site, incusing slopes in the 5 – 15% range. The majority of the site grades towards the east and southeast of the development site.

3.3 Geology

Based on the Department of Mines 1:100,000 geological series maps, the site contains two (2) lithologies, detailed as follows and also displayed in Figure 1 below: :

- Qpa -'Quaternary (Pleistocene) Alluvial Plains' consisting of ' clay, silt, sand, gravel'; and
- Tp -'Petrie Formation' that comprises 'mudstone, shale, sandstone, oilshale and minor pebble/cobble conglomerate ' dating to Tertiary Period;

Figure 1: Regional Geology



3.4 Detailed Site Inspection

A site inspection was undertaken by GE staff on 8.04.20 in order to examine the site soils and investigate any areas of active erosion, or evidence of dispersive soils. The site inspection of the general areas of the site revealed a stable, generally non-eroded land surface with intact topsoil cover and moderate to profuse grass surface cover (refer Plate 1 & 2).

Plate 1: Stable land surface of the general site areas (i.e. intact topsoil cover)

Plate 2: Stable land surface of the general site areas (i.e. intact topsoil cover)

3.5 Soil Profiles

According to the ASRIS soil database, the development area is situated in the Dermosol soil order, in accordance with the Australian Soil Classification (ASC, 2016). Based on the GE field and laboratory assessment, the site confirmed the presence of Dermosols. For reference purposes, the general soil dispersion likelihood of the various soil orders contained within the Australian Soil Classification (ASC, 2016) is shown in Table 3.1 below.

Table 3.1 General Soil Dispersion Risk of ASC Soil Orders

ASC Soil Order	Soil Horizon	General Soil Dispersion Likelihood
Sodosol	A (topsoil)	Low
	B (subsoil)	Very High
Dermosol	**A (topsoil)**	**Low**
	B (subsoil)	**Low - Moderate**
Hydrosol	A (topsoil)	Low - Moderate
	B (subsoil)	Low - Moderate
Vertosol (sedimentary/alluvial)	A (topsoil)	Moderate
	B (subsoil)	Moderate - High
Vertosol (basalt)	A (topsoil)	Very Low
	B (subsoil)	Low
Kurosol	A (topsoil)	Very Low
	B (subsoil)	Low - Moderate
Chromosol	A (topsoil)	Very Low
	B (subsoil)	Low - Moderate
Kandosol / Tenosol / Rudosol / Podosol	A (topsoil)	Very Low
	B (subsoil)	Low

A brief description of the characteristics of the identified soil orders are also given below and bore logs are included in Appendix A.

3.5.1 Dermosols

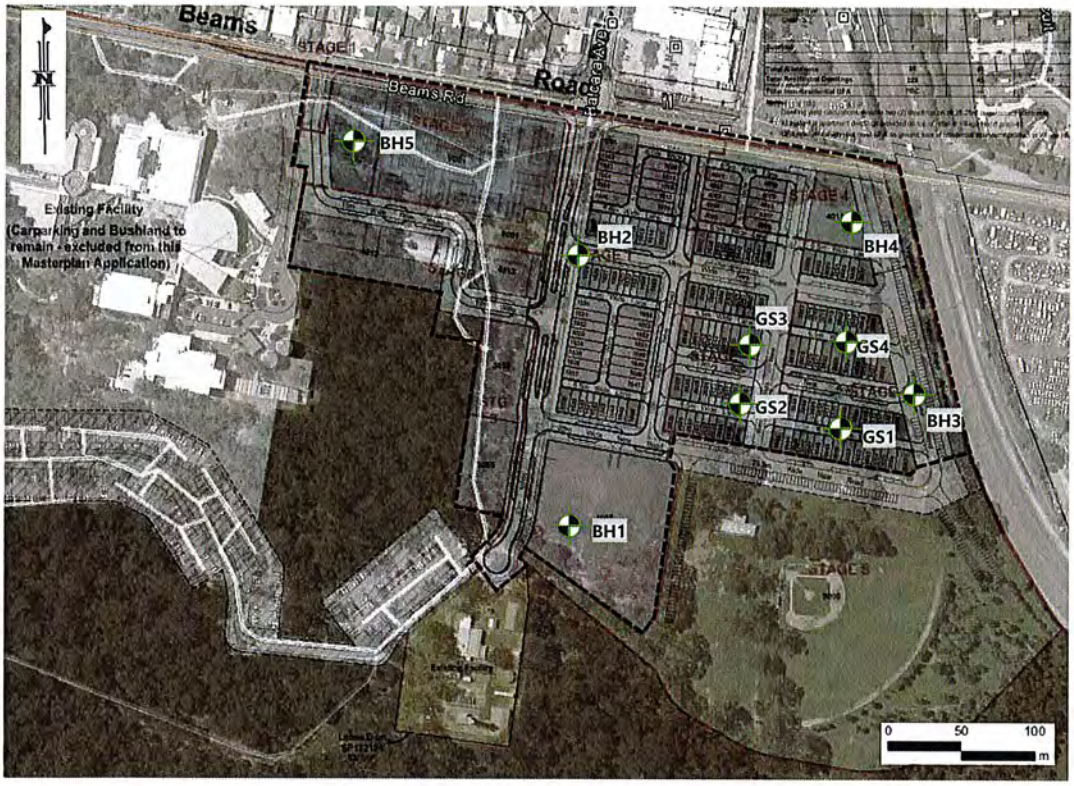
Dermosols are soils that do not exhibit a clear or abrupt textural B horizon and also exhibits a structure grade in the B2 horizon that is greater than weak. These soils were associated with all boreholes and were generally characterised by a sandy loam to sandy clay loam A1 horizon overlying a clay loam to light clay B2 horizon.

4. LABORATORY RESULTS

Laboratory results undertaken in order to define soil dispersion potential are shown in the following table and discussed in the following sections. The laboratory certificates are attached in Appendix B.

Table 4.1 Dispersion Hazard Test Results

Soil Type	Sample #	Emerson Class	pH	ECe (dS/m)	ESP (%)	Interpretation
A Horizon (topsoil)	BH1 – 0.0m	7	5.6	0.3		Moderately Acidic pH Non-saline Non-sodic Emerson Class: – Very Low Risk **Overall Very Low Dispersion Risk**
	BH2 – 0.0m	7	5.5	0.4	4.9	
	BH3 – 0.0m	7	5.4	0.3		
	BH4 – 0.0m	7	5.6	0.5		
	BH5 – 0.0m	7	5.9	0.7		
B Horizon (subsoils)	BH1 – 0.7m	5	5.7	0.5		Moderately Acidic pH Non-saline Non-sodic Emerson Class: Low Risk **Overall Low Dispersion Risk**
	BH2 – 0.7m	6	5.9	0.5		
	BH3 – 0.8m	5	5.7	0.3	4.3	
	BH4 – 0.6m	5	5.7	0.3		
	BH5 – 0.5m	5	5.8	0.4		
Stockpiles (subsoils)	GS1	5	5.5	0.5		
	GS2	5	5.6	0.2		
	GS2	6	5.9	0.4		
	GS4	5	5.6	0.3		



Key - Subsoils

- Emerson Class 1 or 2 – High to Very High Risk
- Emerson Class 3 – Moderate Risk
- Emerson Class ≥4 – Very Low to Low Risk

Gallagher Environmental
Soil Water Environment
ABN 56 493 696 583
59 Cremorne Rd Kedron Qld 4031
glen@genviro.com.au

TITLE: Borehole/Sampling Locations			DRAWING NO: GE20.025.D1
JOB LOCATION: Carseldine Urban Village – Stages 1 – 4 & Stage V			SCALE: As Shown
CLIENT: C/- Calibre Group	DATE: 22.04.20	DRAWN: GMG	SIGNED: GLEN GALLAGHER CPESC NO: 3244

4.1 Discussion

4.1.1 Emerson Class Tests

An Emerson number of 1 indicates a strongly dispersive soil, an Emerson number of 2 indicates a high risk of significant soil dispersion; an Emerson number of 3 indicates a moderate risk of significant soil dispersion (but low risk of tunneling); whilst an Emerson number ranging between 4 and 8 indicates a soil with low to negligible dispersion tendencies.

Emerson Class testing undertaken on five (5) topsoil (i.e. A horizon) samples revealed Class 7 characteristics indicating a very low soil dispersion risk.

Emerson Class testing undertaken on nine (9) subsoil (i.e. B horizon) samples revealed Class 5– 6 characteristics indicating a low soil dispersion risk. These results are also not considered to exhibit any significant risk of sub-surface tunneling.

4.1.2 Soil pH

Soil pH is a secondary indicator in the estimation of soil dispersion hazard; where significantly alkaline pH values (e.g. pH >8.0) can indicate a higher risk of soil sodicity and subsequent soil dispersion. Conversely, strongly acidic samples (i.e. pH <5.5) can indicate high bio-available aluminum that can help counter-act soil dispersion tendencies of sodium ions in the soil.

The obtained topsoil (i.e. A horizon) pH values of 5.4 – 5.9 (median of 5.6) and subsoil pH values of 5.5 – 5.9 (median of 5.7) are indicative of generally moderately acidic pH levels which do not indicate any significant increase or decrease in relative soil dispersion risk.

4.1.3 Soil Salinity

Soil salinity reflects the relationship between landscape hydrology, geology, soil properties and vegetation. Soil salinity is also secondary indicator in the estimation of soil dispersion hazard.

Soils with mildly saline values (or relatively higher values to comparison soils) can sometimes indicate higher levels of sodium and therefore can indicate a higher risk of soil sodicity and subsequent soil dispersion.

Conversely, significantly high salinity levels have a mitigating effect on soil dispersion, as the actual soil dispersion risk is determined by the relative balance of sodium in relation to chloride levels within saline soils. Saline soils can often be sodic, but these soils will not show indicators of sodicity. The salts in the soil prevent dispersion of soil particles in high enough concentrations. If this salt level falls below the requirement for soil stability even a small amount of sodium can produce adverse effects. A combination of high sodium levels and low salt will produce extremely poor physical conditions in soils.

Soils that exhibit an EC_E <4 mS/cm are considered to be non-saline. The soil salinity classes are shown in Table 4.2 below.

Table 4.2: Salinity classes of soils (after Richards, 1954)

Class		EC_e (dS/m)	Comments
Non-saline	None	<2	Salinity effects mostly negligible
	Slight	2 – 4	Yields of very sensitive crops may be affected
Saline	Moderate	4 – 8	Yields of many crops affected
	Very	8 – 16	Only tolerant crops yield satisfactorily
	High	>16	Only a few very tolerant crops yield satisfactorily

The calculated EC_e (saturated) values for the topsoil and subsoil materials ranged between 0.3 – 0.7 dS/m (median of 0.4 dS/m) indicating that these materials are non-saline and would not receive significant benefit from flocculation due to inherent salinity levels.

4.1.4 Soil Sodicity (ESP)

Soil Sodicity is a measure of exchangeable sodium in relation to other exchangeable cations. It is expressed as the Exchangeable Sodium Percentage (ESP). The common problems that may be encountered with sodic soils are synonymous with dispersive soils: lower hydraulic conductivity (i.e. water logging), higher susceptibility to tunnel erosion and severe gully erosion, poor aeration and reduction in plant-available water capacity and poor leaching (i.e. accumulation of salts).

The tendency for dispersion usually increases with increasing ESP. Sodic soil layers (ESP ≥6) may disperse and strongly sodic soils (ESP ≥15) usually do. The Australian sodicity classifications are provided in Table 4.3 below:

Table 4.3: Sodicity classes of soils

Sodicity Classification	ESP (%)
Non-sodic	≤6
Sodic	6 – 15
Strongly sodic	> 15

Source: DPI (1993)

The Exchangeable Sodium Percentage (ESP) of the representative topsoil and subsoil samples were 4.9% and 4.3% respectively, indicating non-sodic soils.

4.2 Overall Soil Dispersion Risk

On the basis of the site inspection, investigated soil profiles and detailed laboratory results, it is considered that the soil dispersion risk and subsequent management requirements for the proposed development can be defined as follows:

4.2.1 Topsoil (0 – 150mm below natural NSL) – Very Low Risk

It is considered that the topsoil materials exhibit an overall *very low* soil dispersion risk and shall not require specific soil amelioration to mitigate soil dispersion risk during the construction phase.

However, all topsoil materials used in landscaping/stabilisation areas shall be suitably ameliorated where required (e.g. fertiliser) to promote optimum grass establishment. As per standard practice, all landscaping/stabilisation areas shall be monitored for suitable strike/cover to ensure compliance with the site ESCP requirements and on-maintenance requirements.

4.2.2 Subsoil (>150mm below natural NSL) – Low Risk

It is considered that the subsoil materials exhibit an overall *low* dispersion risk and are also not considered to exhibit a significant risk of sub-surface tunneling. Consequently, these materials shall not require specific soil amelioration (e.g. gypsum treatment) during the construction phase to mitigate soil dispersion risk.

As per standard practice, all disturbed subsoils shall require soil compaction to the project geotechnical requirements and all subsoils exposed during the construction phase shall be covered with hardstand or non-dispersive topsoil materials and appropriately revegetated in accordance with a Landscape Management Plan (or similar).

5. DISPERSIVE SOIL MANAGEMENT PLAN

Responsibility	Civil Contractor; Developer

Operational Policy	• To mitigate the incidence of infrastructure damage and environmental harm resulting from tunnel and subsurface erosion. • To ensure the appropriate management of water quality in order to avoid impacts on the downstream environment.
Performance Criteria	All areas of landscaping/rehabilitation shall attain suitable grass strike/cover to ensure compliance with the site ESCP requirements and on-maintenance requirements. All fill materials shall be suitably compacted to geotechnical requirements.
Implementation Strategy	**Topsoil Materials** 1. A high level of care shall be required during delineation of the site topsoil and subsoil materials in areas of subsoil dispersion risk and in order to ensure the soil texture of stripped topsoil materials in all areas is of suitable texture (i.e. clay content <35%). 2. Topsoil shall be stripped prior to bulk earthworks within the immediate construction stages and shall be stockpiled and shaped in a free draining condition to avoid long-term soil saturation. 3. All topsoils materials used in landscaping/stabilisation shall be suitably ameliorated where required (e.g. fertiliser) to promote grass establishment. 4. All landscaping/stabilisation areas shall be visually monitored for suitable strike/cover to ensure compliance with the site ESCP requirements and on-maintenance requirements. **Subsoil Materials** ***General*** 1. All exposed subsoil materials during earthwork activities shall be covered with hardstand or topsoil materials to a minimum depth of 150mm and appropriately revegetated in accordance with a Landscape Management Plan (or similar). 2. All excavated subsoil materials used for site fill shall be adequately compacted to an appropriate Geotechnical Specification – with a minimum 95% compaction requirement in accordance with AS3798 and subsequently verified to project-specific geotechnical requirements. ***Trench Excavations*** 3. All excavated and backfilled materials associated with service excavations shall be adequately compacted to an appropriate Geotechnical Specification – with a minimum 95% compaction requirement in accordance with AS3798 and subsequently verified to project-specific geotechnical requirements.

<table>
<tr><td></td><td>Import Materials

4. Any import soil materials (fill or topsoil) shall be verified non-dispersive soils, as confirmed and appropriately documented by the supplier.

5. In the absence of the above, all import soil materials shall be tested and verified by a suitably qualified and experienced Environmental Consultant. If soil amelioration is required for import materials, an addendum DSMP Report shall be prepared by a suitably qualified and experienced Environmental Consultant.</td></tr>
<tr><td>Monitoring Requirements</td><td>Topsoil Materials

Topsoil materials ameliorated to promote revegetation/rehabilitation shall undergo testing at the following testing rates, with interpretation and recommendations provided from a qualified Environmental Consultant:

<table><tr><th>Material</th><th>Parameter</th><th>Validation Testing Frequency</th></tr><tr><td>Topsoil
(A horizon)</td><td>Soil pH;
Macro-nutrients
(N, P, K, Ca, Mg, S)</td><td>One (1) composite sample per development phase</td></tr></table></td></tr>
<tr><td>Reporting Requirements</td><td>All soil test results shall be made available to the Superintendent and Statutory Authorities upon request.</td></tr>
<tr><td>Incident Identification</td><td>Topsoil validation test results not meeting the specified criteria.

Failure to adhere to the prescribed treatment methods as stated above.

Evidence of sub-surface tunnelling/erosion.</td></tr>
<tr><td>Contingency Procedures</td><td>Review of control measures in consultation with Environmental Consultant.

The re-application of topsoil ameliorants in consultation with the Environmental Consultant.

The use of modified sand blocks/barriers or shrouds in trench excavations.</td></tr>
<tr><td>ESCP Integration</td><td>The soil dispersion results presented in the DSMP shall be utilised/considered to develop the Erosion and Sediment Control Plan (ESCP).</td></tr>
</table>

6. DSMP CERTIFICATION

This DSMP assessment has been prepared by Glen Gallagher, Environmental (Soil & Water) Scientist and Certified Professional in Erosion & Sediment Control (CPESC) No. 8346.

Please feel free to contact Gallagher Environmental on 0438 724 929 or glen@genviro.com.au for any queries or if further elaboration is required.

Yours faithfully,

Glen Gallagher BScApp(Env Sc)(Hons) MEIANZ CPESC
Principal | Gallagher Environmental

APPENDIX A:
BORE LOGS

Gallagher Environmental
Soil Water Environment

PROFILE: BH1

CLIENT :	C/- CALIBRE GROUP	ELEVATION :	-
ADDRESS :	BEAMS RD	DEPTH :	0.8m NSL
SUBURB:	CARSELDINE	BIT TYPE:	-
JOB NO :	GE20.025	DRILLER :	GG
DATE :	8.04.20	LOGGER :	GG

ASC CLASSIFICATION:
DERMOSOLS

Depth (m NSL)	Depth (m AHD)	Groundwater	Graphic Log	SOIL /ROCK MATERIAL DESCRIPTION	Moisture	DCP (blows)	Emerson Class
0				**SANDY LOAM** - greyish brown, occ organics *- gradual change to:*	D		7
0.5				**CLAY LOAM** grey & orange, mod. structure	D		5
1.0				Observation Terminated			
1.5							

Steady Level Groundwater Groundwater During Drilling

Gallagher Environmental
Soil Water Environment

PROFILE: BH2

CLIENT :	C/- CALIBRE GROUP	ELEVATION :	-
ADDRESS :	BEAMS RD	DEPTH : 0.8m NSL	
SUBURB:	CARSELDINE	BIT TYPE: -	
JOB NO :	GE20.025	DRILLER : GG	
DATE :	8.04.20	LOGGER : GG	

ASC CLASSIFICATION:
DERMOSOLS

Depth (m NSL)	Depth (m AHD)	Groundwater	Graphic Log	SOIL /ROCK MATERIAL DESCRIPTION	Moisture	DCP (blows)	Emerson Class
0				**SANDY LOAM** - greyish brown, occ organics *- gradual change to:*	D		7
0.5				**SANDY LIGHT CLAY** grey & orange, mod. structure	D		6
1.0				Observation Terminated			
1.5							

Steady Level Groundwater Groundwater During Drilling

Gallagher Environmental
Soil Water Environment

PROFILE: BH3

CLIENT :	C/- CALIBRE GROUP	ELEVATION :	-
ADDRESS :	BEAMS RD	DEPTH :	0.8m NSL
SUBURB:	CARSELDINE	BIT TYPE:	-
JOB NO :	GE20.025	DRILLER :	GG
DATE :	8.04.20	LOGGER :	GG

Depth (m NSL)	Depth (m AHD)	Groundwater	Graphic Log	ASC CLASSIFICATION: DERMOSOLS SOIL /ROCK MATERIAL DESCRIPTION	Moisture	DCP (blows)	Emerson Class
0				**LOAM** - greyish brown, occ organics *- gradual change to:*	D		7
0.5				**CLAY LOAM** grey & orange, mod. structure	D		5
1.0				Observation Terminated			
1.5							

Steady Level Groundwater Groundwater During Drilling

Gallagher Environmental
Soil Water Environment

PROFILE: BH4

CLIENT :	C/- CALIBRE GROUP	ELEVATION :	-
ADDRESS :	BEAMS RD	DEPTH :	0.7m NSL
SUBURB:	CARSELDINE	BIT TYPE:	-
JOB NO :	GE20.025	DRILLER :	GG
DATE :	8.04.20	LOGGER :	GG

Depth (m NSL)	Depth (m AHD)	Groundwater	Graphic Log	ASC CLASSIFICATION: DERMOSOLS SOIL /ROCK MATERIAL DESCRIPTION	Moisture	DCP (blows)	Emerson Class
0				**LOAM** - greyish brown, occ organics *- gradual change to:*	D		7
0.5				**CLAY LOAM** grey & red/orange, mod. structure	D		5
				Observation Terminated			
1.0							
1.5							

Steady Level Groundwater Groundwater During Drilling

Gallagher Environmental
Soil Water Environment

PROFILE: BH5

CLIENT :	C/- CALIBRE GROUP	ELEVATION :	-
ADDRESS :	BEAMS RD	DEPTH :	0.7m NSL
SUBURB:	CARSELDINE	BIT TYPE:	-
JOB NO :	GE20.025	DRILLER :	GG
DATE :	8.04.20	LOGGER :	GG

ASC CLASSIFICATION:
DERMOSOLS

Depth (m NSL)	Depth (m AHD)	Groundwater	Graphic Log	SOIL /ROCK MATERIAL DESCRIPTION	Moisture	DCP (blows)	Emerson Class
0				**SANDY CLAY LOAM** - greyish brown, occ organics - *gradual change to:*	D		7
				CLAY LOAM SANDY grey & red/orange, mod. structure	D		
0.5							5
				Observation Terminated			
1.0							
1.5							

Steady Level Groundwater Groundwater During Drilling

APPENDIX B:
LABORATORY RESULTS

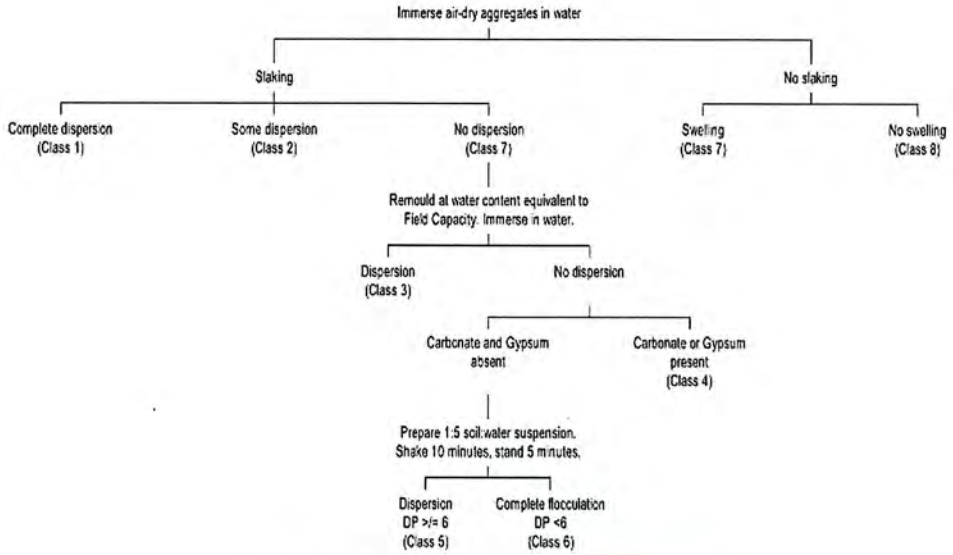
Gallagher Environmental
Soil Water Environment

CLIENT : C/- CALIBRE GROUP
ADDRESS : BEAMS RD CARSELDINE
JOB NO : GE20.025
TEST DATE: 10.04.20
WATER: DISTILLED

Emerson Class Test Certificate

(Method: AS1289 3.8.1)

Figure 1. Determining the Emerson Class Number of Aggregates



Sample	Emerson Class
BH1: 0.0m	7
BH2: 0.0m	7
BH3: 0.0m	7
BH4: 0.0m	7
BH5: 0.0m	7
BH1: 0.7m	5
BH2: 0.7m	5
BH3: 0.8m	6
BH4: 0.6m	5
BH5: 0.5m	5
GS1	5
GS2	5
GS3	6
GS4	5

CERTIFIED PROFESSIONAL SOIL SCIENTIST CPESC

GM Gallagher

Glen Gallagher CPESC No. 8346

Gallagher Environmental
Soil Water Environment

CLIENT : C/- CALIBRE GROUP
ADDRESS : BEAMS RD CARSELDINE
JOB NO : GE20.025
TEST DATE: 10.04.20
WATER: DISTILLED

pH & Electrical Conductivity (EC)
Test Certificate

(Soil Chemical Methods - Rayment & Lyons, 2010)

Sample	$pH_{1:5}$	$EC_{1:5}$ (dS/m)	Texture Factor	Estimated Ece
BH1: 0.0m	5.6	0.02	14	0.3
BH2: 0.0m	5.5	0.03	14	0.4
BH3: 0.0m	5.4	0.02	14	0.3
BH4: 0.0m	5.6	0.04	14	0.5
BH5: 0.0m	5.9	0.05	14	0.7
BH1: 0.7m	5.7	0.05	9	0.5
BH2: 0.7m	5.9	0.06	8	0.5
BH3: 0.8m	5.7	0.03	9	0.3
BH4: 0.6m	5.7	0.03	9	0.3
BH5: 0.5m	5.8	0.04	9	0.4
GS1	5.5	0.05	9	0.5
GS2	5.6	0.02	8	0.2
GS3	5.9	0.04	9	0.4
GS4	5.6	0.03	9	0.3

CPESC

Glen Gallagher CPESC No. 8346

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2009892**	Page	: 1 of 3
Client	: **GALLAGHER ENVIRONMENTAL**	Laboratory	: Environmental Division Brisbane
Contact	: MR GLEN GALLAGHER	Contact	: Customer Services EB
Address	: 59 CREMORNE ROAD KEDRON BRISBANE QUEENSLAND 4031	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: 20/025 CARSELDINE VILLAGE	Date Samples Received	: 08-Apr-2020 15:40
Order number	: ----	Date Analysis Commenced	: 14-Apr-2020
C-O-C number	: ----	Issue Date	: 20-Apr-2020 08:56
Sampler	: GLEN GALLAGHER		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of Exchangeable Aluminium and Exchange Acidity in soils when performed under ALS Method ED005.
- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED007 (Exchangeable Cations by ICP-AES): Unable to calculate Magnesium/Potassium Ratio for some samples as required Exchangeable Magnesium and/or Potassium results are less than the limit of reporting.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH2 0.0m	BH3 0.8m	---	---	---
			Client sampling date / time	08-Apr-2020 00:00	08-Apr-2020 00:00	---	---	---
Compound	CAS Number	LOR	Unit	EB2009892-001	EB2009892-002	-------	-------	-------
				Result	Result	---	---	---
EA002: pH 1:5 (Soils)								
pH Value	---	0.1	pH Unit	5.4	5.7	---	---	---
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	---	1	µS/cm	30	22	---	---	---
ED005: Exchange Acidity								
ø Exchange Acidity	---	0.1	meq/100g	0.4	1.0	---	---	---
ø Exchangeable Aluminium	---	0.1	meq/100g	0.3	0.7	---	---	---
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	2.0	<0.1	---	---	---
Exchangeable Magnesium	---	0.1	meq/100g	1.5	2.1	---	---	---
Exchangeable Potassium	---	0.1	meq/100g	0.2	<0.1	---	---	---
Exchangeable Sodium	---	0.1	meq/100g	0.2	0.3	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g	4.4	7.6	---	---	---
Exchangeable Sodium Percent	---	0.1	%	4.9	4.3	---	---	---
Calcium/Magnesium Ratio	---	0.1	-	1.3	<0.1	---	---	---
Magnesium/Potassium Ratio	---	0.1	-	6.6	---	---	---	---

Our Ref: GE20.025.L2

Date: 22nd December 2020

KN Group Pty Ltd
Via email: mark@kngroup.com.au

Attention: Mr. Mark Shaw

Dear Mark,

RE: TECHNICAL MEMORANDUM - ACID SULFATE SOIL (ASS) REVIEW FOR PROPOSED 'CARSELDINE URBAN VILLAGE STAGES 2 – 4 & V' DEVELOPMENT

Introduction & Background

Gallagher Environmental (GE) was commissioned by KN Group Pty Ltd to provide an acid sulfate soil (ASS) review of the proposed 'Carseldine Urban Village Stages 2 - 4 & V' development located at Beams Road, Carseldine.

Acid Sulfate Soil Mapping

According to the Department of Environment & Heritage Protection (DEHP) 'Special Acid Soil Maps', the proposed development area has negligible probability of ASS occurrence. The nearest indication of ASS is associated with two (2) tributaries located to the north-east of the development with 'low probability of ASS occurrence'.

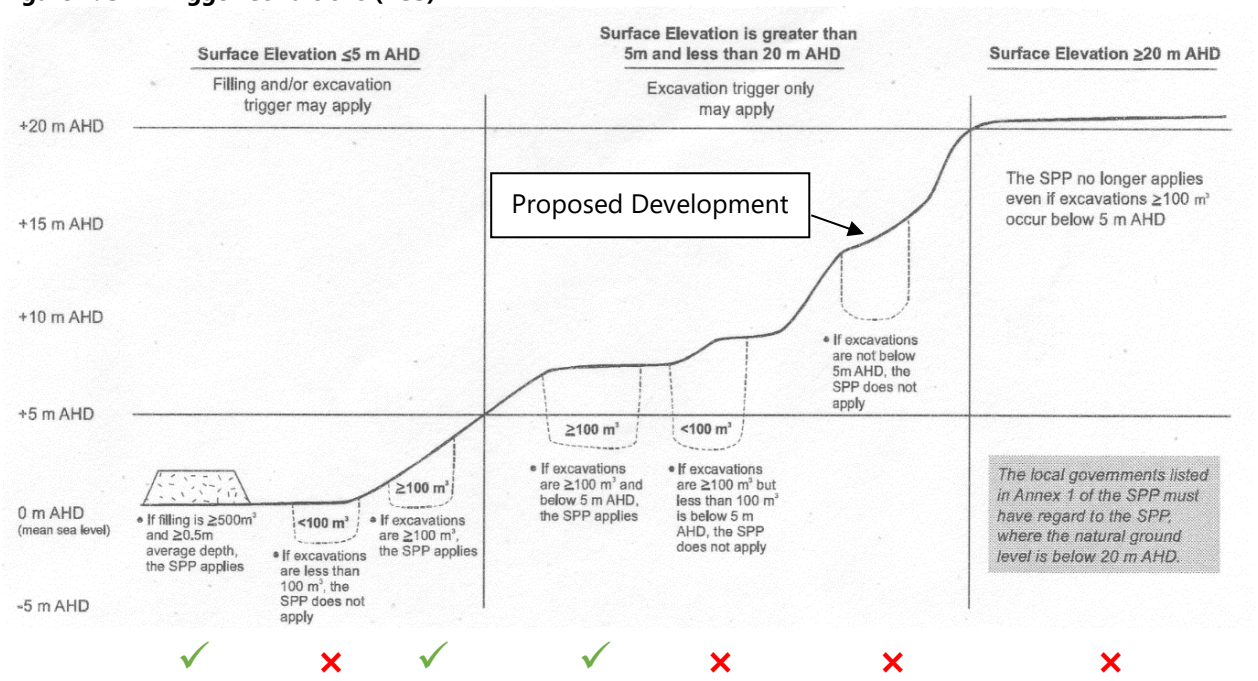
Plate 1: DEHP Acid Sulfate Soil Mapping

State Planning Policy (SPP)

The *State Planning Policy (2017)* and *State Planning Policy (SPP) State Interest Guideline "Water Quality" – Policy 9 (2016)* applies to all soil or sediment at or below 5m AHD (where the natural ground level is below 20m AHD), where the development would result in:

- The excavation of ≥100m^3 of soil or sediment situated below 5m AHD; or
- Filling of land situated below 5m AHD that involves ≥500m^3 of fill material with an average depth of ≥0.5m.

Figure 1: SPP Trigger Conditions (ASS)



Proposed Development

In accordance with design information supplied by KN Group, it is understood that the relevant proposed earthworks are summarised as follows:

- The majority of the proposed development area is essentially flat at approximately 13 - 14m AHD, with more elevated areas up to 26m AHD situated in the far western area of the proposed development.
- The proposed maximum (i.e. topographically lowest) invert level associated with the proposed earthworks is **11.0m AHD**, within the proposed sewer.

Therefore, no soil material at or below 5m AHD will be intercepted during the proposed construction and therefore the SPP is not invoked for the development. Consequently, the proposed development is considered free of any ASS disturbance and shall not require an Acid Sulfate Soil Management Plan (ASSMP) in accordance with the State Planning Policy (SPP) (2017) and QASSIT Soil Management Guidelines (2014).

For reference, acid sulfate soil (ASS) materials develop within former marine and estuarine sediments that were deposited as sea levels rose above the residual soil landscape during the Holocene Epoch (circa ~6500 years ago), and to a lesser extent, the Pleistocene Epoch (circa ~125,00 years ago). The relative sea levels during both these geological periods dictate the elevation (AHD) that ASS materials can generally be found: at or below 5m AHD, as adopted within the framework of the SPP, however more commonly below 2-3m AHD in coastal south-east Queensland.

We trust this is acceptable. Please feel free to contact me on 0438 724 929 or glen@genviro.com.au if you require further elaboration or wish to discuss anything further.

Yours faithfully,

Glen Gallagher BScApp(Env Sc)(Hons) MEIANZ CPESC
Principal Environmental Scientist | Gallagher Environmental

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This report has been prepared for the sole use of the client and the client's immediate representatives and agents. Third parties (excluding regulatory agencies assessing an application in relation to the purpose) shall not rely on this report. It is fundamental in the application of this report that the full report is read in its entirety and fully understood. Please contact Gallagher Environmental for additional explanation if any of the report content is not fully understood.

To the best of our knowledge, information contained in this report is accurate at the date of issue and in accordance with generally accepted consulting practice. The interpretation of scientific data, however, often involves both professional and subjective judgments including extrapolation of data. As such, interpretation is open to error. In addition, site conditions are subject to change in a limited time and there remains a risk that the site conditions will differ from these interpretations. Gallagher Environmental waives all responsibility for loss or damage where information provided by the Client (including third parties) used in the preparation of this report was inaccurate or in error. This report should be retained as a complete document and should not be copied in part, divided or altered in any way.

APPENDIX F GEO-TECHNICAL

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EOTECHNICAL INVESTIGATION REPORT

ECONOMIC DEVELOPMENT QUEENSLAND

CARSELDINE URBAN VILLAGE, BEAMS ROAD, CARSELDINE – PHASE 2

SGS/17/E184B

29 MAY 2018

DOCUMENT CONTROL SHEET

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Project Manager:	Robert Maxwell
Author:	Christopher Kosiek
Client:	Economic Development Queensland
Client Contact:	C/o: Calibre Consulting
Synopsis:	Phase 2 geotechnical investigation for proposed Urban Village off Beams Road, Carseldine.

REVISION AND CHECKING HISTORY

Revision Number	Date	Checked by	Issued by
0	29/05/2018	R Maxwell	C Kosiek

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LIMITATIONS

This report has been prepared for the sole use of the client and the client's immediate representatives and agents. It is fundamental in the application of this report that the report, including appendices, is read in its entirety and fully understood. Please contact SGS Australia Pty Ltd (Lawnton Office) for additional explanation if any of the report content is not fully understood.

This report is not a guarantee that the site ground conditions will behave in accordance with the interpretation set out herein, but rather our opinion as to the correct interpretations based on the results of site investigations, in situ testing and/or laboratory testing in accordance with generally accepted consulting practice. To the best of our knowledge, information contained in this report is accurate at the date of issue. The interpretation of scientific data, however, often involves both professional and subjective judgments. As such, interpretation is open to error. In addition, site conditions are subject to change in a limited time and there remains a risk that the site ground conditions will differ from these interpretations.

SUMMARY

The following section provides a summary of the Phase 2 geotechnical investigation carried out for the proposed Urban Village development at 152-158 Beams Road, Carseldine. This summary must be read in conjunction with the report and appendices.

1.	Typical Soil Profiles	-	Topsoil varying in depth to 100mm overlying surface silty sands
		-	Overlying silty and sandy clays of stiff to hard consistency and medium dense to dense clayey sands.
		-	Uncontrolled fill associated with playing fields, tennis/basketball courts and fill bund adjacent to the central road.
2.	Rock	-	A deeply weathered sandstone profile associated with the Petrie Formation may be encountered during earthworks.
2.	Groundwater	-	No groundwater was encountered during the Phase 2 investigation
		-	Groundwater seepage was encountered in the Phase 1 investigation and may develop in the more permeable layers after rainfall or adjacent other sources of water ingress.
		-	Seepage may develop elsewhere, forming perched water in the more permeable layers or adjacent to other sources of moisture ingress.
4.	Reactivity	-	Natural profile Y_s range 20mm to 50mm (Moderate to highly (M to H1) reactivity)
		-	Surface movements may increase by up to 60% post earthworks
5.	CBR values	-	CBR values ranged from 3.0% to 9%
6.	Site Issues/Problems	-	Numerous trees across site potentially creating abnormal moisture conditions and **'P'** site classifications.
		-	Presence of uncontrolled fill in the vicinity of playing fields, tennis/basketball courts, mounds, roadway and ancillary structures/shelters observed at the time of the investigation.
		-	Near surface silty sands susceptible to moisture and loss of strength.

TABLE OF CONTENTS

1 INTRODUCTION 1
2 INVESTIGATION PROCEDURE 1
3 INVESTIGATION RESULTS 2
3.1 Site Description 2
3.2 Regional Geology 3
3.3 Subsurface Profile 3
3.4 Groundwater 3
3.5 Laboratory Test Results 4
4 ENGINEERING CONSIDERATIONS 4
4.1 Reactivity and Indicative Site Classification 4
4.2 Effects of Vegetation 5
4.3 Foundations 5
4.4 Pavements 6
4.5 Earthworks 6
4.5.1 Topsoil Depths 6
4.5.2 Unsuitable material 6
4.5.3 Excavation Characteristics 7
5 COMMENTS AND LIMITATIONS 7

LIST OF TABLES

Table 1 Summary of Soil Profiles 3
Table 2 Summary of Laboratory Geotechnical Test Results 4
Table 3 Preliminary Bearing Capacity Parameters 5
Table 4 CBR and Modulus of Reactivity 6

LIST OF APPENDICES

APPENDIX A: Notes Relating to this Report A
APPENDIX B: Site Plan – Borehole Locations B
APPENDIX C: Borehole Records, Sampling and Insitu Test Results C
APPENDIX D: Laboratory Test Results D
APPENDIX E: Site Photographs E
APPENDIX F: Earthworks Notes F
APPENDIX G: Standard CBR Notes and Performance Warnings G

All appendices should be carefully read in conjunction with this report

1 INTRODUCTION

This report presents the results and interpretations of the Phase 2 geotechnical investigation carried out by SGS Australia for the proposed Urban Village development off Beams Road, Carseldine.

The investigation was commissioned by Dan Collins of Calibre Consulting acting on behalf of Economic Development Queensland and was carried out in general accordance with the SGS proposal (SGS/17P/E184-Phase 2) dated 8 May 2018.

It is understood that the proposed project will comprise a multi-staged development including road construction, sporting fields, recreation areas, bioretention basins and future 3-5 storey commercial and residential buildings.

SGS Australia has previously undertaken the Phase 1 geotechnical investigation focusing on the proposed bioretention basins and sporting complex / recreation areas of the proposed development.

The aim of the Phase 2 investigation was to assess the remaining areas of the development with particular focus on proposed roadways and commercial/residential building areas. The Phase 2 geotechnical report is intended to provide supplementary information and should be read in conjunction with the Phase 1 report.

The scope in terms of number and position of boreholes was nominated by Calibre Consulting in correspondence dated 8 May 2018.

The investigation and interpretation of results was carried out in general accordance with the following reference materials:

- AS 1726 "Geotechnical Site Investigations"
- AS 1289 "Testing of Soils for Engineering Purposes"
- AS 2870 "Residential Slabs and Footings"
- AS 2159 "Piling – Design and Installation"
- AS 3798 "Guidelines on earthworks for commercial and residential developments"

Relevant definitions and detailed site investigation procedures are provided in Appendix A.

2 INVESTIGATION PROCEDURE

The investigation was carried out on 14 May 2018 and comprised the following stages:

a) Site investigation in accordance with AS 1726 “Geotechnical Site Investigations”

* Drilling of nine (9) boreholes to various target depths of 6.0m (borehole locations are shown on the site sketch in Appendix B).
* Soil classification by qualified and experienced technician.
* Sampling of representative soils for laboratory analysis.
* Dynamic cone penetrometer (DCP) testing adjacent each borehole in order to assess the relative density and strength consistency of the subsurface soils.
* Pocket penetrometer (PP) in undisturbed samples to estimate the undrained shear strength (Cu).
* Site and landform mapping by a suitably qualified Geotechnical Engineer.

b) Laboratory testing in accordance with AS 1289 “Testing of Soils for Engineering Purposes” (where applicable)

* Shrink/swell index to allow ground surface movement predictions.
* Moisture/density relationship (standard compaction) and 4-day soaked CBR for preliminary pavement design.

3 INVESTIGATION RESULTS

3.1 SITE DESCRIPTION

The site is located within the former QUT Carseldine Campus, off Beams Road, Carseldine. The northern boundary of the site is bound by Beams Road, the western boundary by Dorville Road, the southern boundary by Cabbage Tree Creek and the eastern boundary by the Petrie Rail line.

Several existing multi storey buildings and car parks are located in the north western portion of the site and are currently occupied by the Queensland Department of Transport and Main Roads, with adjacent sporting grounds located in the lower eastern half of the site, open for public use.

The site topography typically falls from the north west at the corner of Beams and Dorville Roads towards the south east and generally levelling to the eastern sporting grounds. Bushland generally occupies the area along southern boundary and adjacent to Cabbage Tree Creek.

The site of the proposed urban village development shall be situated within the lower south eastern portion of the property in the location of the sporting grounds, as shown in Figure 1 below.

Figure 1 Location Plan

The majority of the site investigated during Phase 2 was occupied by two (2) playing grassed fields and a section of land occupied by a stormwater basin and internal roadways.

Surface drainage conditions across the site were reasonable with runoff controlled by a system of above and below ground stormwater drains. The stormwater basin adjacent the Beams Road entrance was bound by block retaining walls.

A large bund was observed adjacent to the western side of the sporting field (highlighted in orange above). The bund is approximately 2m in height and is assumed to be uncontrolled fill.

Tennis/netball/basketball courts with sealed surfaces were observed on the site. It is likely the courts were constructed by cut to fill earthworks and it is assumed all associated fill is uncontrolled.

Site photographs are provided in Appendix C of this report.

3.2 REGIONAL GEOLOGY

The regional geology as described by the Department of Mines 1:100,000 Geological Series Map for Brisbane (Sheet 9543) is as follows:

Site Geological Areas:	Upper North Western Area (Cnr Beams/Dorville Rd)	Lower Eastern Area (Sporting Fields)
Geological Unit / Rock Name:	Tp – Petrie Formation	Qpa – Alluvial Plains
Age:	Tertiary Period	Quaternary (Pleistocene) Period
Lithology:	Mudstone, shale, sandstone, oilshale, minor pebble and cobble conglomerate	Sand, silt, clay, gravel.
Additional Features:	Ferrunginised mottled and kaolinized rocks; Deep weathering profile.	

3.3 SUBSURFACE PROFILE

The natural soil profiles encountered in the boreholes were generally consistent with the regional geology and typically comprised high plasticity, stiff (or stronger) silty clays overlying sandy clays and clayey sands to the borehole termination depth.

Placed topsoil (fill) was noted in the boreholes and deeper fill was encountered in boreholes BH02-B, BH06-B, and BH07-B. In the absence of any compaction control documentation, the fill is assumed to be uncontrolled. There is a high probability that additional uncontrolled fill will be present across the site associated with the sporting fields, mounds, roadway and ancillary structures observed at the time of the investigation.

Detailed soil profiles are provided in the Engineering Borehole Logs in Appendix C and a summary of the borehole data is provided in the following table.

Table 1 Summary of Soil Profiles

B/hole No.	Topsoil (mm)	Fill (m)	Natural Ground			
			Silty CLAY		Clayey SAND	
			Stiff	Very Stiff	Medium Dense	Dense
BH01-B	90	0.0 – 0.1	0.1 – 0.7	0.7 – 1.7		1.7 – 6.0
BH02-B	90	0.0 – 1.8	1.8 – 3.1		3.1 – 6.0	
BH03-B	90	0.0 – 0.1		0.3 – 2.9	0.1 – 0.3 2.9 – 6.0	
BH04-B	100		0.1 – 1.6	1.6 – 2.2		2.2 – 6.0
BH05-B	100		0.1 – 1.1			1.1 – 6.0
BH06-B	90	0.0 – 0.5		0.5 – 2.7		2.7 – 6.0
BH07-B	100	0.0 – 0.3	0.3 – 0.5	0.5 – 6.0		
BH08-B	85	0.0 – 0.1	0.1 – 0.5	0.5 – 6.0		
BH09-B	90		1.1 – 4.1	0.3 – 1.1 4.1 – 6.0	0.1 – 0.3	

3.4 GROUNDWATER

Groundwater was not encountered in the boreholes at the time of the investigation however, seepage may develop forming perched water in the more permeable layers during/following extended wet weather periods or adjacent to other sources of moisture ingress (e.g. leaking services or irrigation systems).

3.5 LABORATORY TEST RESULTS

Laboratory testing was carried out on selected samples taken from the site. Test reports are provided in Appendix D and results are summarised in the following table.

Table 2 Summary of Laboratory Geotechnical Test Results

B/hole No.	Depth (m)	Moisture/Density Relationship (Standard)		Soaked CBR	Shrink-Swell Index
		MDD (t/m^3)	**OMC (%)**	**CBR (%)**	
BH01-B	0.2 – 1.0	1.75	17.6	7	
BH05-B	0.2 – 0.8	1.80	15.8	9	
BH09-B	0.3 – 1.0	1.69	19.2	3.0	
BH01-B	0.3				1.3
BH05-B	0.5				0.9
BH08-B	0.5				3.8

Moisture/Density Relationship: MDD – Maximum Dry Density, OMC – Optimum Moisture Content

4 ENGINEERING CONSIDERATIONS

4.1 REACTIVITY AND INDICATIVE SITE CLASSIFICATION

The predicted surface movement (Ys) that could occur on this site has been assessed in accordance with the methodology provided in AS 2870 "Residential Slabs and Footings".

It is understood that ultimately, standard residential buildings as described in AS 2870 will be constructed on the site, post subdivision development. It is therefore assessed that AS 2870 methodology and derived parameters would apply to this site for the purpose of providing preliminary reactivity and indicative site classification details.

Reactivity testing was undertaken on three samples taken at various depths across the site. Shrink-Swell Index Values (Iss) ranged from 0.9 to 3.8. Based on limited testing, it appears that the dark grey coloured silty clays exhibited a higher shrink/swell index value.

Considering a natural (pre earthworks)1.8m soil moisture change profile, the following would apply.

Existing Profile		
	Mean Iss (mm)	Maximum Iss (mm)
Predicted Surface Movement	20 -30	45 - 55
Equivalent Reactivity	Moderate	High (H1)

Consideration must be given to the effect that cut to fill earthwork operations will have on the soil profiles. The following table provides surface movement predictions considering a full 1.8m controlled filled profile at various shrink/swell index values.

1.8m Controlled Fill Profile			
	Iss= 1.0	**Iss= 2.0**	**Iss= 3.8**
Predicted Surface Movement	20 – 30	40 – 50	70 – 80
Equivalent Reactivity	Moderate	High (H1)	Extreme

Based on the observed soil profiles at the borehole locations it would be expected that the majority of the sites would fall within the moderate to high classification range.

The above reactivity parameters not consider the potential effects of trees (if applicable) and site outcomes post earthworks (refer to Section 4.2) .

4.2 EFFECTS OF VEGETATION

Trees can affect building foundation performance in reactive clay soils by removing soil moisture, which induces volume change (shrinkage) in the soil.

The effect of trees on a site classification (and subsequent footing design and performance) is assessed based on:

- the site soil reactivity;
- the distance between trees and the closest point to the dwelling; and
- the mature height of the trees.

The potential mature height of a particular tree species can vary with the condition of the tree, climate, soil types, drainage and other site-specific variables.

As part of the development civil design process careful consideration shall be given to the location and selection of any retained vegetation. Vegetation left in close proximity to proposed (or possible) building envelope locations may result in P site classifications at individual building application stage.

Any tree removal prior to building construction must also consider potential surface heave (rebound) associated with the re-establishment of soil moisture equilibrium conditions. This removal of trees will be pertinent across large portions of this development due to the presence of dense vegetation where it is expected that some thinning or complete removal will be required. Site classifiers and footing design engineers should consider the effects of this tree removal when assessing the individual allotments.

4.3 FOUNDATIONS

The type and depth of foundation system for the proposed structures will be dependent on the magnitude of structural loading, tolerance of the structures to movement (from both load induced settlement and shrink-swell movement) and the subsurface geotechnical conditions. The following table provides preliminary geotechnical strength parameters for both shallow (strip) and piled foundation alternatives.

Table 3 Preliminary Bearing Capacity Parameters

Material	Cu	Pad Footings		Strip Footings		Piled Foundations	
		q_u	q_a	q_u	q_a	f_b	f_s
Uncontrolled Fill	-	NR	NR	NR	NR	NR	NC
Controlled Fill(1)	75	450	150	375	125	600	30
NATURAL Silty SAND / SILT(2)	-	NR	NR	NR	NR	NR	NC
NATURAL Stiff Silty/Sandy CLAY and Medium Dense Clayey SAND	50	300	100	250	80	400	20
NATURAL Very Stiff (or stronger) Silty/Sandy CLAY and Dense Clayey SAND	100	600	200	510	170	800	40

(1) Based on the fill complying completely with the requirements in AS3798 and being placed under Level 1 conditions to 98% SDDR.

(2) *Silty Sand and Silt is not considered suitable founding material as it is subject to loss of strength when disturbed and/or moisture affected.*

where:

Cu = Estimated undrained shear strength (kPa)
q_u = Ultimate base bearing pressure – high level strip footings (kPa)
q_a = Allowable base bearing pressure (FOS = 3) – high level pad/strip footing (kPa)
f_b = Ultimate base bearing pressure – piles minimum 1.5m and 2.5 pile diameters deep (kPa)
f_s = Ultimate shaft adhesion/friction (adhesion factor (α) = 0.4) (kPa)
NR = Not recommended for founding
NC = Not considered in shaft adhesion / friction

4.4 PAVEMENTS

The California Bearing Ratio (CBR) value represents the "strength" of the material when nominally compacted to 100% Standard Dry Density Ratio (SDDR) at the Optimum Moisture Content (OMC) and soaked for four (4) days. It should be noted that the CBR value is simply an index of strength at that particular density and moisture condition. The same material at a different density and moisture condition is likely to yield a lower or higher CBR value depending on the density and moisture circumstances existing at the time of testing. The modulus of subgrade reaction is derived from the CBR value based on published correlations.

Laboratory testing was carried out on representative material types sampled across the site. The CBR results ranged from 3.0 to 9. Due to the variability of results across the site, it is recommended the following assumed worst-case CBR value be used in preliminary pavement design.

Table 4 CBR and Modulus of Reactivity

Material Type	Soaked CBR Value (%)	Modulus of Subgrade Reaction k (kPa/mm)
(CH) Silty CLAY	3.0	27

Further soaked CBR testing will be required when bulk earthworks have been completed and the subgrade material has been exposed to determine final soil type boundaries representing the CBR values.

NOTES:

- Use of the above values (in preliminary design) assumes that the subgrade will be compacted uniformly to a minimum SDDR of 100% and that the pavement will be well drained during construction and in-service.
- The attached "CBR Standard Notes and Performance Warnings" (Appendix F) must be considered and implemented during the design and construction phases as appropriate.

4.5 EARTHWORKS

Reference should be made to the Phase 1 geotechnical report for earthworks procedures and recommendations. The following sections of this report should be read in conjunction with the previously issued report.

4.5.1 TOPSOIL DEPTHS

Topsoil depths within the boreholes ranged from 85mm to 100mm across the site. A nominal topsoil stripping depth of 90mm is considered applicable. It is expected deeper topsoil depths may be encountered in the gullies and low-lying areas.

4.5.2 UNSUITABLE MATERIAL

Uncontrolled fill was identified in the large bund, on the tennis/netball/basketball court platforms and in areas on the playing fields. Additional uncontrolled fill may be present on the site. Consequently, It is strongly recommended to have the Geotechnical Inspection and Testing Authority (GITA) onsite at the time of topsoil stripping to identify any uncontrolled fill and instruct on any necessary ground preparation works.

Furthermore, soft, moisture effected material and uncontrolled fill may be encountered in the existing stormwater basin adjacent to the existing Beams Road entrance. This area will require treatment (removal of unsuitable material and/or moisture conditioning) prior to filling.

All uncontrolled fill and temporary unsuitable material should be removed to a sound natural base and stockpiled to assess suitability for reuse as structural fill.

4.5.3 EXCAVATION CHARACTERISTICS

The soil encountered in the borehole should be readily excavated by small to medium sized plant.

No groundwater was encountered within the boreholes for Phase 2 however, the development of seepage may be possible in the more permeable layers as identified in the Phase 1 investigation. Allowance should be made for dewatering of excavations if applicable.

5 COMMENTS AND LIMITATIONS

The development and any associated infrastructure should be designed to accommodate for the ground conditions reported and which otherwise may be encountered during construction.

The geotechnical parameters given in this report should be considered as preliminary only and subject to confirming inspections, and potentially additional testing by an experienced geotechnical professional at the construction stage. SGS offer inspection services and it is recommended that the client and their agents and contractors avail themselves of these services.

The interpretation of geotechnical reports and the preferred or proposed engineering outcomes are often compromised by the non-continuity of geotechnical consultants on a project. In addition, there is an inherent potential for a conflict of interest and therefore increased potential for inappropriate administration of the geotechnical specification when the GITA is commissioned by the contractor.

For these reasons, it is strongly recommended that:

1. SGS be commissioned as the Geotechnical Engineering Consultant and the GITA for all geotechnical related activities associated with this project; and
2. The Geotechnical Engineering Consultant and the GITA are commission independently of the contractor.

SGS cannot accept any responsibility for any interpretations and/or application of the contents of this report by any other Geotechnical Engineering Consultant or GITA.

SGS AUSTRALIA PTY LTD

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SGS.17.E184B- Phase 2 Report.docx

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APPENDIX A: NOTES RELATING TO THIS REPORT

INTRODUCTION

The following notes are intended to complement the report and assist the reader in interpreting the report in regard to investigation procedures, definitions, terminology and limitations. Not all notes are necessarily relevant to this report.

The ground exhibits a variety of properties and characteristics which vary from place to place and can also change with time, weather patterns, changes in vegetation and human interaction. A geotechnical investigation puts into practice accepted methods and procedures to gather data relevant to the site and the proposed development. This report may contain such data obtained from drilling, excavation, inspection, sampling and testing. If so, the data are directly relevant to the ground at the place and time of the actual test sites. The client should be aware that in some cases soil conditions can change dramatically over short distances therefore conditions other than those represented in this report may occur on the site.

SITE INVESTIGATION PROCEDURES

a) Subsurface Investigations

Borehole/test locations are generally located to gain maximum coverage over the site giving consideration to contrasting topography. However, on occasions existing structures or other access restrictions do not permit ideal borehole locations.

Subsurface investigations may be carried out using one or more of the following methods:

- Test Pits: Test pits can be excavated by power equipment (backhoe, excavator etc) or in some cases by hand. Hand excavated test pits are usually limited to a maximum depth of about 1m.

- Hand Auger: Hand auger equipment is normally only used where drill rig access is unavailable. Hand auger refusal may occur on materials which could have otherwise been drilled if drill rig access was available.

- Drill Rig: Spiral Flight Auger: Spiral flight auger drilling is more economical and is usually adopted if ground conditions are suitable. Samples are returned to the surface by the flights or may otherwise be taken from the base of the borehole. Various drill bits may be attached to the auger during drilling. The depth of refusal of the different bit types can provide a useful indication of the strength of the material.

- Drill Rig Wash Drilling: Wash drilling is normally used below the water table when collapsing soils are encountered. Steel casing is pushed to support the collapsing soil and water is pumped through the drill rods to advance the borehole. The rods are withdrawn to allow sampling and testing at the base of the borehole.

b) Insitu Testing

- Dynamic Cone Penetrometer: The Dynamic Cone Penetrometer (DCP) test is carried out using a cone of 20mm diameter with a 30˚ tapered tip attached to steel rods of smaller diameter. The cone is driven by a 9kg hammer falling 510mm and results are recorded in blows per 100mm penetration. DCP test results can be used to estimate bearing capacity and insitu California Bearing Ratio. The test procedure is described in Australian Standard AS1289 6.3.2.

- Standard Penetration Test: The Standard Penetration Test (SPT) is carried out using a standard split steel tube sampler driven by a 63.5kg mass falling 760mm. Results are recorded in number of blows per 150mm penetration for a maximum depth of 450mm. The SPT "N" value is the sum of the blows for the 2nd and 3rd 150mm increments. The first 150mm is referred to as the seating penetration. In cases where the number of blows per 150mm exceeds 20, the result is recorded as 20/penetration (mm) and the 'N' value determined by linear interpolation. The SPT N value can be used to estimate allowable bearing pressure for foundations. The test procedure is detailed in Australian Standard AS1289 6.3.1.

- Pocket Penetrometer: The Pocket Penetrometer (PP) is used on undisturbed samples as a relatively simple and economical method of estimating the unconfined compressive strength of clay soils. The cohesive (undrained) shear strength (Cu) is generally taken as 0.5 of the PP value.

c) Sampling

The type and frequency of sampling and testing on a site is dependent on several issues including:

* number and depth of boreholes
* variability of soil types and conditions
* type and magnitude of the development

- Undisturbed Samples: Undisturbed samples are taken by pushing a thin walled steel tube, 50mm diameter (U50) into cohesive soils. U50 samples are necessary for laboratory testing such as shrink-swell index, consolidation, shear strength etc.

- Disturbed Samples: Disturbed samples (D) are taken from drill augers, hand auger or open test pits. Disturbed samples are generally used for laboratory testing such as Atterberg Limits, Moisture Content, California Bearing Ratio, Particle Size Distribution etc.

d) Site Description

Underground Services: If underground services (sewer, stormwater etc) were observed during the site investigation, a record of the observation will usually be made on the site description notes included in this report. It should be noted however that our commission **does not** typically extend to locating underground services.

As underground services can potentially affect a structure in the vicinity, it is important that any underground services are located and considered in the development of the site.

- Site Sketch: The site sketch is intended only as a general pictorial of relative locations of boreholes and site features. Any dimensions, slope directions, magnitudes, feature orientation, north point, etc are approximate and should be used as a guide only.

e) Soil and Rock Descriptions

Soil and rock descriptions contained in this report are in general accordance with Appendix A2 and A3 of AS1726 'Geotechnical Site Investigations". Details of the soil profiles provided in the Engineering Borehole Logs are based on visual descriptions of the soils and rock on site. Some soil descriptions may differ marginally from the format as described in AS1726, but this will in no way affect the results of this investigation.

- Controlled Fill: Controlled fill as described in this report refers to:

(1) sand fill up to 0.8m deep and non-sand fill up to 0.4m deep which has been placed in layers not more than 150mm thick and compacted with mechanical compaction equipment.

or

(2) fill which has been supervised and tested and for which a statement has been provided certifying compliance with Table 5.1 of AS3798 "Guidelines on Earthworks for Residential and Commercial Developments". The statement of compliance can only be provided by the Geotechnical Testing Authority under a Level 1 commission as defined in Appendix B of AS3798

and

(3) subject to the results of this investigation verifying the quality of the fill.

- Uncontrolled Fill: Uncontrolled fill is described as any fill not meeting the requirements of controlled fill as defined above.

SITE CLASSIFICATION

Site Classification as defined in AS2870 "Residential Slabs and Footings" is divided into various classes depending on the y_s (predicted surface movement) and other relevant ground conditions.

The classes are:

CLASS	SOIL TYPE	y_s (mm)
A	stable (sand or rock)	
S	slightly reactive clay	$0 < y_s \leq 20$
M	moderately reactive clay	$20 < y_s \leq 40$
H1	highly reactive clay	$40 < y_s \leq 60$
H2	(very) highly reactive clay	$60 < y_s \leq 75$
E	extremely reactive clay	$y_s > 75$
P	problem	

Problem Site: Problem sites include those which are filled, have soft and/or collapsing soils, have soils subject to erosion, subject to abnormal moisture conditions, have bearing pressure < 100kPa and any other sites which do not otherwise comply with class A, S, M, H or E requirements.

- Effect of Trees: Trees can have a significant drying effect resulting in abnormal moisture conditions of the soils in the vicinity of the tree(s). On reactive clay sites, this can have the effect of dramatically increasing the predicted surface movement (y_s) within the zone of influence of the tree(s). Past, present and future trees all potentially affect the site classification and subsequent footing and slab design. When it is known that large trees have been removed from a site, the site classifier or footing design engineer should be advised of the size, location and date of removal, so that appropriate consideration can be given to the footing design.

As recommended, and in accordance with AS2870, our preferred option for determination of Instability Index is by a combination of the shrink-swell index and identification of the soil profile. In some cases where shrink-swell index testing is not practicable, soil classification testing (Atterberg Limits and Particle Size Distribution) may have been used.

Values used in determination of the y_s value were:

* soil profiles - refer borehole logs
* shrinkage index - refer laboratory results
* extreme suction change - 1.2pF
* depth of suction change - 1.5 to 2.3
* cracked zone - 0.5Hs (zero for reactive clay on controlled filled sites < 5 years old)
* α cracked zone - 1.0
* α uncracked zone - $2.0 - z/5$

where z = depth from ground surface to the centroid of the layer under consideration.

Provision of y_s values and/or site classification is intended for use in residential applications only. Where this information has been provided in non-residential cases it is done so as supplementary information only and may not be suitable for application to AS2870 design principles.

EARTHWORKS

All earthworks should be carried out in strict accordance with the full requirements of Australian Standard AS 3798 "Guidelines on Earthworks for Commercial and Residential Developments". If local authority requirements apply to the earthworks and differ from AS 3798 the more stringent requirements should be adopted. Unless approved, the following materials are generally not suitable for use as structural filling:

* Organic Soils - topsoils, severely root affected soils and peat
* Materials which may be contaminated with toxic substances through past site usages.
* Filling which contains wood, metal, plastic, boulders and other deleterious materials.
* Any other materials which have deleterious engineering properties.

Any earthworks carried out after the site investigation will change the findings of the report. Particular care and consideration should be given to the site reactivity and classification which is likely to change with cutting and/or filling of the site.

On cut-and-fill sloping sites the fill shall be controlled and extend a minimum of 1m past the edge of any construction areas. Embankment slopes shall be protected from erosion and be not steeper than two horizontal to one vertical. The suitability of any such embankments shall be verified by an experienced geotechnical engineer prior to construction.

GROUNDWATER

Groundwater levels (where encountered) are provided on the borelog sheets.

Generally, groundwater or seepage tends to travel in the more permeable layers over less permeable materials (ie. along sand/clay interfaces, fill/natural interfaces, etc.) and in joints of rock.

Bulk earthworks (ie. cut/fill or fill operations) should not be carried out during wet periods and should be delayed sufficiently to ensure the moisture content of the materials approximates the optimum moisture content for compaction.

Should footing excavation commence during or following an extended wet period and where the soil profile comprises sandy soils or sandy soils overlying clays, the surface sands will tend to collapse during trench excavations requiring temporary shoring and the construction of a sump area from which groundwater can be pumped. Under no circumstances should softening of foundation soils be allowed to occur.

It is advised that a test pit be excavated to assess ground conditions prior to commencing trench excavations or earthworks if prevailing weather conditions are poor.

SITE MANAGEMENT

The short and long term serviceability of the development is largely dependent upon a responsible approach by the developer, builder and the owner/occupant towards drainage, landscaping and vegetation. The following basic requirements apply to most developments.

* Surface Drainage
  Site preparations should include provision for slopes of no less than 1 vertical in 20 horizontal away from structures for a distance of at least 2m where possible. Spoon drains and catch drains should be constructed where necessary to direct surface drainage away from the structure.
* Landscaping
  Landscaping should be planned to ensure excessive watering and/or water ponding areas do not occur. Landscaping areas should be considered in the design of site drainage systems.
* Vegetation
  To reduce (but not eliminate) the possibility of damage to structural elements, trees should be restricted to a distance of no closer than 1.5 times the mature height from the structure.

A more extensive discussion on site management is contained in the CSIRO document "Guides to Home Owners on Foundation Maintenance and Footing Performance" and its recommendations should be followed in full.

THE REPORT

This report was compiled in accordance with the relevant standards, sound geotechnical practices and general market requirements as appropriate.

Unless instructed otherwise, this investigation and report does not address the following issues:

* Existing and/or proposed mining influence
* Slope stability
* Specific site drainage requirements and potential effects
* Contamination and/or hazardous materials on the site
* Specific effects of post investigative works on the site
* Existing underground services

The client should understand that whilst our investigation and report has been conducted within appropriate guidelines and with suitable diligence to accurately determine the ground conditions, on occasion, construction (earthworks/excavations) may indicate ground conditions differing from those shown in this report. Should this occur, SGS, should be advised immediately for further advice.

The work undertaken and reported is intended for the sole use of the client named on this report for the specific purpose of determining the parameters necessary for the design and construction of the development outlined. It may not contain sufficient information for other purposes. It is intended that this report will provide advice on geotechnical and related issues only and that SGS **will not** accept any responsibility for any structural design which does not fully consider and correctly apply the findings of this report.

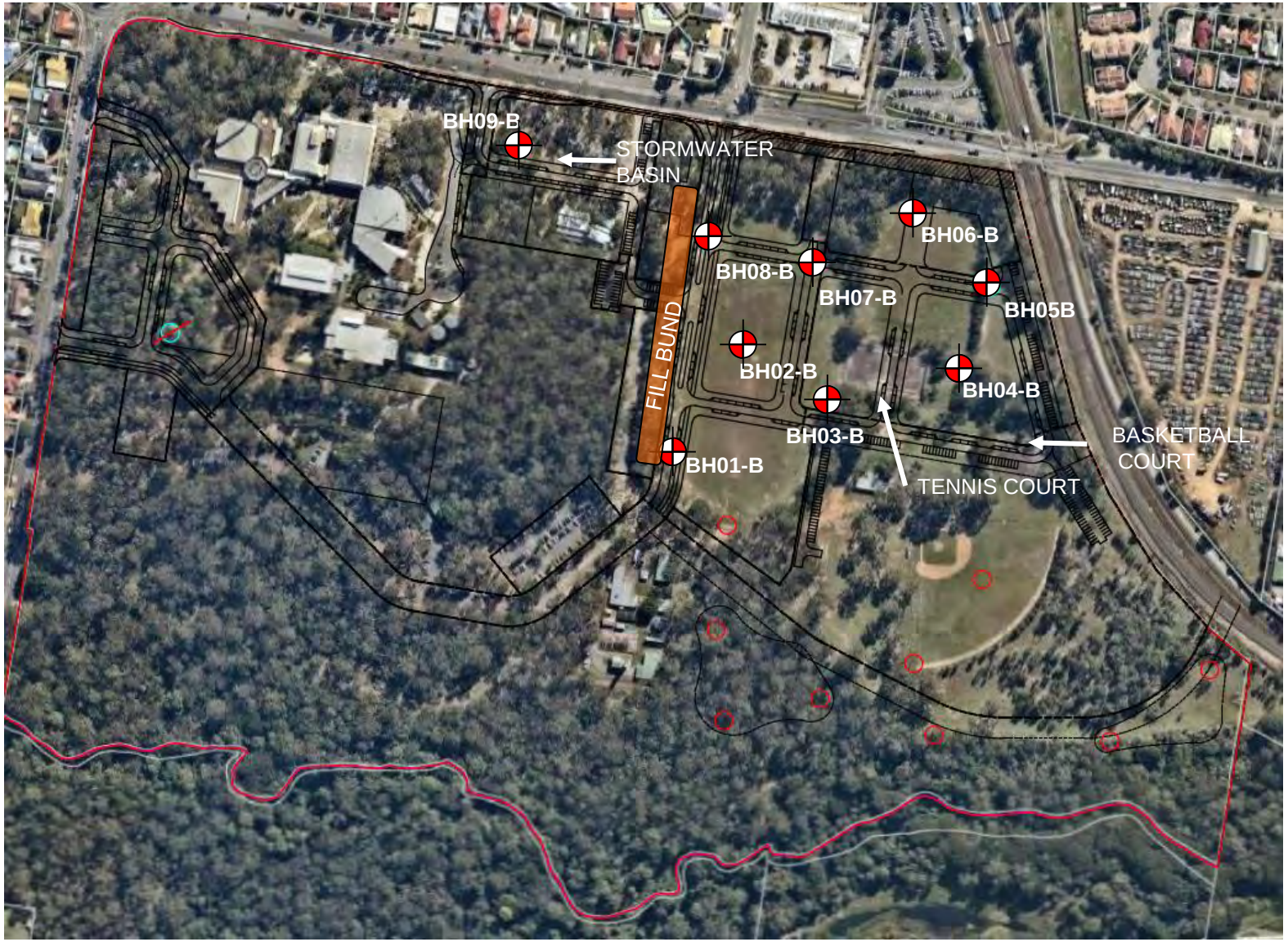
It is important for the client to understand that long term serviceability of the structure will require all the findings of this report to be considered and undertaken. No responsibility will be accepted where these are not put into effect prior to commencement or in conjunction with construction as required.

Any bearing capacity parameters provided in the report must be considered as preliminary only and should be confirmed by an experienced geotechnical engineer during construction.

INSPECTIONS

SGS provides inspection services for any geotechnical issues in relation to this report. We encourage the client, their designers and contractors, to make use of this service to verify the findings of the report, particularly if there is any doubt regarding the ground conditions being encountered during construction.

APPENDIX B: SITE PLAN – BOREHOLE LOCATIONS



Base plan supplied by Calibre consulting

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ABN 44 000 964 278
Unit 1/ 18 Leanne Crescent
Lawnton, QLD 4501
t +61 (7) 3481 9444
www.sgs.com

TITLE: SITE PLAN – PHASE 2 IVNESTIGATION			DRAWING NO.: SGS.17.E184B.SP01
JOB LOCATION: **Carseldine Village**			SCALE: SCALE NOT SHOWN
CLIENT: Economic Development QLD	DATE: 14.05.18	DRAWN: CK	SIZE: A4

APPENDIX C: BOREHOLE RECORDS, SAMPLING AND INSITU TEST RESULTS

Engineering and Environmental Consultants
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AU.IND.Lawnton@sgs.com

BOREHOLE LOG

BOREHOLE NO.: ***BH 01***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502626.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974733.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	FILL - Silty SAND, fine grained, dark grey, 90mm topsoil	M	L				
		3					CH	NATURAL - Silty CLAY, high plasticity, pale grey mottled orange	M	St				
		4												
		3										U_{50}	PP=450kPa	
		3											REC=210mm	
		2												
		3												
		4					CH	Silty CLAY, high plasticity, pale grey mottled orange	M	VSt				
		5												
		5		1										
							SC	Clayey SAND, fine to medium grained, yellow, orange	M	D				
				2										
												D		
				3										
				4										
				5										
				6										

End of BH 01 at 6m

Engineering and Environmental Consultants
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BOREHOLE LOG

BOREHOLE NO.: ***BH 02***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502675.00 **Surface R.L.:**
Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974818.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	FILL - Silty SAND, fine to medium grained, dark grey, 90mm topsoil	M	L				
		3					CH	FILL - Silty CLAY, high plasticity, red, grey, trace of fine to medium sized gravel	M	St		D		
		4												
		4												
		4												
		3												
		3												
		4												
		4												
		6		1			SC	FILL - Clayey SAND, fine to coarse grained, brown, grey, with fine to medium sized gravel	M	MD				
		8										D		
		9												
		8												
		6												
		7												
		7												
		7												
		6												
		4					CH	NATURAL - Silty CLAY, high plasticity, dark grey mottled red, orange	M	VSt				
		4		2										
		4												
		4												
		5												
		5												
		6												
												U_{50}	PP>600kPa REC=150mm	
				3										
							SC	Clayey SAND, fine to coarse grained, orange, grey, yellow	M	MD				
				4										
				5										
				6										

End of BH 02 at 6m

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BOREHOLE LOG

BOREHOLE NO.: ***BH 03***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502737.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974760.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	FILL - Silty SAND, fine to medium grained, dark grey, 90mm topsoil	M	L				
		3					SC	NATURAL - Clayey SAND, fine to medium grained, grey, orange	M	MD				
		3												
		4					CH	Silty CLAY, high plasticity, pale grey mottled orange, yellow	M	VSt				
		4												
		4												
		4												
		5												
		4												
		4		1										
				2			CI	Sandy CLAY, medium plasticity, grey mottled orange, fine to medium grained		VSt				
				3			SC	Clayey SAND, fine to medium grained, grey mottled orange	M	MD				
				4										
				5										
				6										

End of BH 03 at 6m

Engineering and Environmental Consultants
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BOREHOLE LOG

BOREHOLE NO.: ***BH 04***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502849.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974798.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	1					SM	NATURAL - Silty SAND, fine to medium grained, dark grey, 100mm topsoil	M	VL				
		2					CH	Silty CLAY, high plasticity, grey mottled orange	M	St				
		2												
		3												
		4												
		4												
		5												
		4												
		5												
		6		1										
							CI	Sandy CLAY, medium plasticity, grey mottled orange	M	VSt				
				2										
							SC	Clayey SAND, fine to medium grained, grey mottled orange	M	D				
				3										
				4										
				5										
				6										

End of BH 04 at 6m

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BOREHOLE LOG

BOREHOLE NO.: ***BH 05***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502880.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974869.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	1					SM	NATURAL - Silty SAND, dark grey, fine to medium grained, 100mm topsoil	M	VL				
		2					CH	Silty CLAY, high plasticity, pale grey mottled orange, yellow	M	St				
		3												
		2												
		3										D	PP>600kPa	
		3										U_{50}	REC=200mm	
		4												
		4												
		5												
		6		1										
							SC	Clayey SAND, fine to medium grained, grey mottled orange	D-M	D				
				2			SC	Clayey SAND, fine to medium grained, red mottled orange and grey	D	D				
				3										
				4										
				5										
				6										

End of BH 05 at 6m

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BOREHOLE LOG

BOREHOLE NO.: ***BH 06***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***15.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***15.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502848.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974798.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	FILL - Silty SAND, fine to medium grained, dark grey, 90mm topsoil	M	L				
		4					CH	FILL - Silty CLAY, high plasticity, red, grey, brown	M	VSt				
		4												
		4												
		4												
		3					SM	NATURAL - Silty SAND, fine grained, grey-brown	M	MD				
		3												
		4					CH	Silty CLAY, high plasticity, pale grey mottled yellow, orange	M	VSt				
		4												
		5		1										
				2			CI	Sandy CLAY, medium to high plasticity, grey mottled orange, fine to coarse grained sand	M	VSt				
				3			SC	Clayey SAND, fine to coarse grained, grey mottled orange, red	M	MD				
				4										
				5										
				6										

End of BH 06 at 6m

Engineering and Environmental Consultants
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BOREHOLE LOG

BOREHOLE NO.: ***BH 07***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502744.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974894.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	3					SM	FILL - Silty SAND, fine to medium grained, dark grey, 90mm topsoil	M	MD				
		4					CH	FILL - Silty CLAY, high plasticity, grey, red, yellow	M	VSt				
		4												
		3					CH	NATURAL - Silty CLAY, high plasticity, grey mottled yellow, orange	M	St				
		3												
		4					CH	Silty CLAY, high plasticity, pale grey mottled yellow, orange	M	VSt				
		4												
		4												
		5												
		4		1										
				2			CH	Silty CLAY, high plasticity, pale pale grey mottled yellow, orange	M	VSt				
				3										
				4										
				5										
				6										

End of BH 07 at 6m

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BOREHOLE LOG

BOREHOLE NO.: ***BH 08***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 502650.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974889.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	FILL - Silty SAND, fine to medium grained, dark grey, 85mm topsoil	M	L				
		2					CH	NATURAL - Silty CLAY, high plasticity, grey mottled red, orange	M	St				
		3												
		4												
		3												
		4					CH	Silty CLAY, high plasticity, dark grey mottled red, orange	M	VSt		U_{50}	PP=380kPa REC=150mm	
		4												
		4												
		5												
		5		1										
				2										
				3			CH	Silty CLAY, high plasticity, pale grey mottled orange and red,	M	VSt		U_{50}	PP=280-500kPa REC=300mm	
				4								U_{50}	PP=320kPa REC=370mm	
				5										
				6										

End of BH 08 at 6m

Engineering and Environmental Consultants
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BOREHOLE LOG

BOREHOLE NO.: ***BH 09***
SHEET: 1 OF 1

CLIENT:	***ECONOMIC DEVELOPMENT QLD***	DATE COMMENCED:	***14.5.2016***
PROJECT:	***GEOTECHNICAL INVESTIGATION***	DATE COMPLETED:	***14.5.2016***
LOCATION:	***CARSELDINE VILLAGE, BEAMS RD, CARSELDINE***	LOGGED BY:	***J.SIPPEL***
JOB NUMBER:	***SGS/17/E184B***	CHECKED BY:	***C KOSIEK***

Drill Contractor: SGS AUSTRALIA **Bore Size:** 100mm **Hole Angle:** -90° **Easting:** 5002500.00 **Surface R.L.:**

Drill Model: DTS 05 **Drill Fluid:** - **Bearing:** **Northing:** 6974973.00 **Datum:** 56J

Method	Casing	DCP	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Field Records / Comments	Water
SA/TC	Open Hole	2					SM	NATURAL - Silty SAND, fine to medium grained, dark grey, 90mm topsoil	L	M				
		3					SC	Clayey SAND, fine to medium grained, brown, orange, grey	MD	M				
		4					CI	Sandy CLAY, medium plasticity, grey-brown mottled orange, red, fine to medium grained sand	VSt	M				
		4												
		5												
		5										U_{50}	PP>600kPa REC=120mm	
		6												
		5												
		6												
		6		1										
							CH	Silty CLAY, high plasticity, pale grey mottled orange	St	M				
												U_{50}	PP=310kPa REC=350mm	
				2										
				3										
				4										
							CH	Silty CLAY, high plasticity, pale grey mottled yellow	VSt	M				
												U_{50}	PP=390kPa REC=400mm	
				5										
				6										

End of BH 09 at 6m

SOIL CLASSIFICATION

CLASSIFICATION METHOD

The soils are classified based on Australian Standard AS 1726, Geotechnical Site Investigation Code and in accordance with the Unified Soil Classification (USC). Typically, the descriptions include classification group, soil name, grain size, plasticity, structure, colour, moisture, consistency, secondary components and other relevant information.

CLASSIFICATION GROUP

First and/or Second letter

Letter	Definition
G	Gravel
S	Sand
M	Silt
C	Clay
O	Organic
Pt	Peat

Second Letter

Letter	Definition
P	Poorly graded
W	Well Graded
H	High Plasticity
I	Medium Plasticity
L	Low Plasticity

SOIL TYPES

Major Divisions			Size (mm)
Coarse Grained	Boulders		>200
	Cobbles		63 – 200
	Gravel	coarse	19 – 63
		medium	6.7 – 19
		fine	2.36 – 6.7
	Sand	coarse	0.6 – 2.36
		medium	0.21 – 0.6
		fine	0.075 – 0.21
Fine Grained	Silt		0.002 – 0.075
	Clay		<0.002
	Peat		N/A – Peat and other highly organic soils

COMPOSITE SOIL TYPES

Most natural soils are a mixture of basic soil types. The primary soil is described and modified by secondary constituents as follows:

Fine Grained Soil		Coarse Grained Soil	
% Coarse grained	**Modifier**	**% Fine grained**	**Modifier**
≤ 15	Omit or use 'trace'	≤ 5	Omit or use 'trace'
15 – 30	Describe as 'with sand/gravel'	5 – 12	Describe as 'with clay/silt'
>30	Prefix soil as sandy/gravely	>12	Prefix soil as 'silty/clayey'

COHESIVE SOIL DESCRIPTION

Plasticity

Descriptive Terms	Liquid Limit (%)	
	CLAY	SILT
Low plasticity	≤ 35	≤ 50
Medium plasticity	> 35 ≤ 50	N/A
High plasticity	> 50	> 50

Consistency

Term	Undrained Strength C_U(kPa)	Field Guide
Very Soft (VS)	≤ 12	Exudes between the fingers when squeezed in hand
Soft (S)	12 – 25	Can be moulded by light finger pressure
Firm (F)	25 – 50	Can be moulded by strong finger pressure
Stiff (St)	50 – 100	Cannot be moulded by fingers.
Very Stiff (VSt)	100 – 200	Can be indented by thumb nail.
Hard (H)	≥ 200	Can be indented with difficulty by thumb nail.

NON-COHESIVE SOIL DESCRIPTIONS

Particle size distribution

- Well graded – a good representation of all particle sizes.
- Poorly graded – an excess or deficiency of one or more intermediate particle sizes.
- Gap graded – an absence of one or more intermediate particle sizes.
- Uniform – essentially of one particle size.

Particle Shape

- Equidimensional particles may be described as ***rounded, sub-rounded, sub-angular, or angular.***
- Two dimensional particles with third dimension small by comparison may be described as ***flaky or platy.***
- One dimensional particles with the other two dimensions small by comparison may be described as ***elongated.***

Consistency

TERM	DENSITY INDEX (%)	SPT N VALUE	DCP (Blows/100mm)
Very Loose (VL)	≤ 35	0 – 4	0 – 1
Loose (L)	15 – 35	4 – 10	1 – 3
Medium Dense (MD)	35 – 65	10 – 30	4 – 8
Dense (D)	65 – 85	30 – 50	9 – 15
Very Dense (VD)	> 85	> 50	> 15

MOISTURE CONDITION

Dry (D)	Cohesive soils; hard, friable or powdery, well dry of plastic limit. Granular soils; Cohesionless and free-running.
Moist (M)	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet (W)	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water form on hands when handling. Granular soils tend to cohere.

SOIL ORIGIN

Weathered Soils

Residual Soil	Soil developed on extremely weathered rock

Transported Soils

Aeolian	Deposited by wind.
Alluvium	Deposited by streams and rivers.
Colluvium	Deposited on slopes (transported downslope by gravity).
Lacustrine	Deposited by lakes.
Marine	Deposited in ocean basins, beaches and estuarine (tidal river)

Fill

Controlled Fill	Fill that has been placed under controlled conditions and certified by a Geotechnical Testing Authority
Uncontrolled Fill	Fill that does not comply with controlled fill requirements

TYPICAL REPRESENTATION AND TERMS

			USC	General Description
GRAVEL	Clean Gravels (Little or no Fines)		GW	Well graded gravels and gravel/sand mixtures
			GP	Poorly graded gravels and gravel/sand mixtures
	Gravel with Fines		GM	Silty Gravels, gravel/sand/silt mixtures
			GC	Clayey Gravels, gravel/sand/clay mixtures
SANDS	Clean Sands (Little or no Fines)		SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly/sand mixtures
	Sands with Fines		SM	Silty sands
			SC	Clayey Sands
SILTS and CLAYS	Liquid Limit >50%		MH	High plasticity inorganic silts, silt mixtures
			CH	High plasticity inorganic clays, clay mixtures
			OH	High plasticity organic clays and silts
	Liquid Limit ≤ 35		ML	Low plasticity inorganic silts, silt mixtures
			CL	Low plasticity inorganic clays, clay mixtures
			OL	Low plasticity organic clays and silts
HIGHLY ORGANIC			PT	Peat, Humus, Swamp Soils with high organics
FILL				Fill

SYMBOLS AND ABBREVIATIONS

Drilling methods

SA	Solid Flight Auger
HS	Hollow Stem Auger
WB	Wash Boring
NMLC	Triple tube rotary core drilling
HA	Hand Auger
PHA	Hydraulic powered hand auger
CPT	Cone Penetrometer Testing

Drilling Bits and Attachments

TC	Tungsten Carbide bit
V	V bit
RR	Rock Roller (tricone)
BB	Blade Bit

Excavation Attachments

GP	General Purpose toothed bucket
Ba	Batter Bucket
TT	Tiger Teeth
RB	Hydraulic rock breaker
ST	Single Tine

Sampling and Testing

SPT	Standard Penetrometer Testing
N	SPT Blow Count
DCP	Dynamic Cone Penetrometer Testing
SV	Shear Vane Test
U50	Undisturbed 50mm tube sample
D	Disturbed Sample
W	Water Sample
PP	Pocket Penetrometer
Rec	Length of sample recovered
R	Refusal
RQD	Rock Quality Designation
PL	Point Load Test
A	Point Load Test (axial)
D	Point Load Test (diametral)
L	Point Load Test (irregular Lump)
BH	Borehole
TP	Test Pit

Water/Moisture

D	Dry
M	Moist
W	Wet
▶	First noted depth of water ground water inflow
▼	Steady Water Level

Soil Properties

C_u	Undrained Shear Strength
C’	Effective Shear Stress
Φu	Angle of friction – Undrained
Φ'	Angle of friction – Drained
γ	Unit Weight
G_s	Specific Gravity
MC	Moisture Content
LL	Liquid Limit
PL	Plastic Limit
PI	Plasticity Index
WPI	Weighted Plasticity Index
LS	Linear Shrinkage
PSD	Particle Size Distribution
D_n	n% of particles smaller than specified diameter
k	Hydraulic Conductivity
M_v	Coefficient of Volume Compressibility
C_α	Coefficient of Secondary Compression
C_c	Compression Index
C_v	Coefficient of consolidation
OCR	Over Consolidation Ratio
e	Void Ratio
n	Porosity
E	Elastic Modulus
CBR	California Bearing Ratio
UCS	Unconfined Compressive Strength
Is(50)	Point Load Strength Index
MDR	Moisture Density Relationship
DD	Dry Density
WD	Wet Density
MDD	Maximum Dry Density
OMC	Optimum Moisture Content
SDDR	Standard (compactive effort) dry density ratio
DOS	Degree of Saturation
APD	Apparent Particle Density
Y_s	Characteristic Surface Movement
Iss	Shrink/Swell Index
H_s	Depth of design soil suction change
H_t	Maximum drying depth close to a tree
σ	Total stress
σ'	Effective stress
u	Pore Water Pressure

Foundation Design

q_u	Ultimate soil bearing capacity (shallow foundations)
q_a	Allowable soil bearing capacity (shallow foundations)
f_s	Ultimate shaft friction (piled foundations)
f_b	Ultimate base bearing pressure (piled foundations)
R_{dg}	Ultimate geotechnical strength (Compression)
R_{ug}	Ultimate geotechnical strength (Uplift)
ϕ_g	Geotechnical Strength Reduction Factor
f'_c	Design characteristic strength of concrete

Standards and Specifications

AS	Australian Standards
MRD	Department of Transport and Main Roads
MRS	Main Roads Specification
MRTS	Main Roads Technical Specification
ISO	International Organization for Standardization

Miscellaneous

CTB	Cement treated base
RSS	Reinforced soil structure
CFA	Continuous flight auger
CH	Chainage

APPENDIX D: LABORATORY TEST RESULTS

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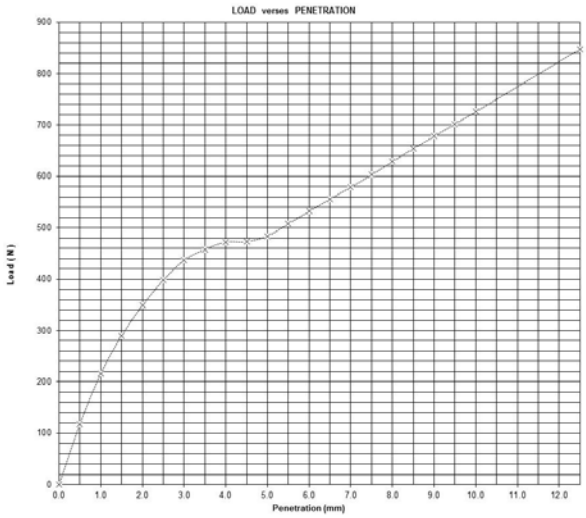
SGS Australia Pty Ltd
Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	24/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1403
Lab:	Lawnton Laboratory	Sample ID:	BH09 (300 - 1000)

CALIFORNIA BEARING RATIO

AS1289.6.1.1 (Soaked)

Sample Description:	(CH) CLAY - Brown
Date Sampled:	16/05/2018
Moisture Content Method:	AS1289.2.1.1
Sampling Method:	AS1289.1.2.1 cl 6.5.3 in-situ power auger
Compactive Effort Used:	AS1289.5.1.1 Standard Compaction
Test Type:	SOAKED
Retained on 19.0mm (%):	0
Retained Material Excluded:	Yes



	RESULT	RATIO (%)
TARGET RESULTS		
Moisture Content (%):	19.2	100.0
Dry Density (t/m3):	1.69	100.0
PLACEMENT RESULTS		
Moisture Content (%):	19.7	102.5
Dry Density (t/m3):	1.68	99.0
AFTER SOAKING RESULTS		
Moisture Content (%):	22.4	116.5
Dry Density (t/m3):	1.64	97.0
AFTER PENETRATION RESULTS		
Moisture Content of Top (%):	22.9	119.5
SOAKING DETAILS		
Soaking Period (days):	4	
Surcharge Applied (kg):	4.5	
Swell (%):	2.0	
CBR RESULTS		
Correction Applied (mm):	0.0	
CBR bearing ratio @ 2.5mm (%):	3.0	
CBR bearing ratio @ 5.0mm (%):	2.5	
CBR VALUE (%):	**3.0**	**@ 2.5mm Penetration**

Authorised Signatory: (Dave Gregson) Date: 28/05/2018

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Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	17/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1404
Lab:	Lawnton Laboratory	Sample ID:	BH01 0.3

Shrink-Swell Index

AS 1289.7.1.1 Undisturbed

Sample Data

Sample Type:	U50
Depth (m):	0.3
Borehole Number:	1
Sample Description:	(CI) Sandy CLAY, Brown mottled Grey

SWELL TEST

Initial Moisture Content (%):	16.6
Final Moisture Content (%):	19.0
Total Swell (%):	0.99

SHRINKAGE TEST

Moisture Content (%):	19.0
Shrinkage (%):	1.8

SHRINK - SWELL

INDEX (Iss):	**1.3**
Estimated Inert Inclusions (%):	1
Extent of Crumbling:	Nil
Extent of Cracking:	Nil

Note: Sampled by SGS Australia Pty Ltd according to AS1289.1.3.1 (3.1.3.2)

Authorised Signatory: (Stephen Bird) Date: 28/05/2018

Site No.: 4984
Cert No.: 18-LT-1404-Z300
Form No.RP-AU-INDCMT-TE-Z300 V10.0

Client Address: 1/18 Leanne Crescent Lawnton Qld 4501

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Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	17/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1405
Lab:	Lawnton Laboratory	Sample ID:	BH05 0.5

Shrink-Swell Index

AS 1289.7.1.1 Undisturbed

Sample Data

Sample Type:	U50
Depth (m):	0.5
Borehole Number:	5
Sample Description:	(CI) Sandy CLAY, Brown mottled Grey, Yellow, Red

SWELL TEST

Initial Moisture Content (%):	18.3
Final Moisture Content (%):	20.2
Total Swell (%):	0.17

SHRINKAGE TEST

Moisture Content (%):	18.6
Shrinkage (%):	1.5

SHRINK - SWELL

INDEX (Iss):	**0.9**

Estimated Inert Inclusions (%):	1
Extent of Crumbling:	Nil
Extent of Cracking:	Low

Note: Sampled by SGS Australia Pty Ltd according to AS1289.1.3.1 (3.1.3.2)

Authorised Signatory: (Stephen Bird) Date: 28/05/2018

Site No.: 4984
Cert No.: 18-LT-1405-Z300
Form No.RP-AU-INDCMT-TE-Z300 V10.0

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Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	17/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1406
Lab:	Lawnton Laboratory	Sample ID:	BH08 0.5

Shrink-Swell Index

AS 1289.7.1.1 Undisturbed

Sample Data

Sample Type:	U50
Depth (m):	0.5
Borehole Number:	8
Sample Description:	(CH) CLAY, Brown mottled red, yellow

SWELL TEST

Initial Moisture Content (%):	28.2
Final Moisture Content (%):	31.2
Total Swell (%):	0.78

SHRINKAGE TEST

Moisture Content (%):	28.5
Shrinkage (%):	6.5

SHRINK - SWELL

INDEX (Iss):	**3.8**
Estimated Inert Inclusions (%):	5
Extent of Crumbling:	Nil
Extent of Cracking:	Low

Note: Sampled by SGS Australia Pty Ltd according to AS1289.1.3.1 (3.1.3.2)

Authorised Signatory: (Stephen Bird) Date: 28/05/2018

Site No.: 4984
Cert No.: 18-LT-1406-Z300
Form No.RP-AU-INDCMT-TE-Z300 V10.0

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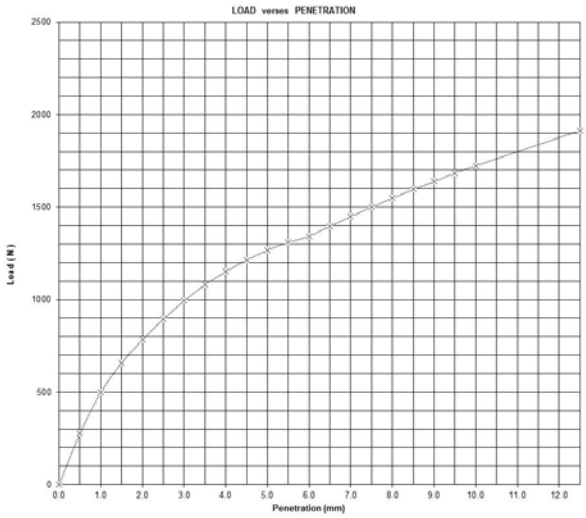
Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	24/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1401
Lab:	Lawnton Laboratory	Sample ID:	BH01 (200 - 1000)

CALIFORNIA BEARING RATIO

AS1289.6.1.1 (Soaked)

Sample Description:	(CI-CH) Sandy CLAY - Brown
Date Sampled:	14/05/2018
Moisture Content Method:	AS1289.2.1.1
Sampling Method:	AS1289.1.2.1 cl 6.5.3 in-situ power auger
Compactive Effort Used:	AS1289.5.1.1 Standard Compaction
Test Type:	SOAKED
Retained on 19.0mm (%):	0
Retained Material Excluded:	Yes



	RESULT	RATIO (%)
TARGET RESULTS		
Moisture Content (%):	17.6	100.0
Dry Density (t/m3):	1.75	100.0
PLACEMENT RESULTS		
Moisture Content (%):	17.3	98.0
Dry Density (t/m3):	1.76	100.0
AFTER SOAKING RESULTS		
Moisture Content (%):	18.9	107.5
Dry Density (t/m3):	1.74	99.5
AFTER PENETRATION RESULTS		
Moisture Content of Top (%):	19.7	112.0
SOAKING DETAILS		
Soaking Period (days):	4	
Surcharge Applied (kg):	4.5	
Swell (%):	1.0	
CBR RESULTS		
Correction Applied (mm):	0.0	
CBR bearing ratio @ 2.5mm (%):	7	
CBR bearing ratio @ 5.0mm (%):	6	
CBR VALUE (%):	**7**	**@ 2.5mm Penetration**

Authorised Signatory: (Dave Gregson) Date: 28/05/2018

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Lawnton Laboratory
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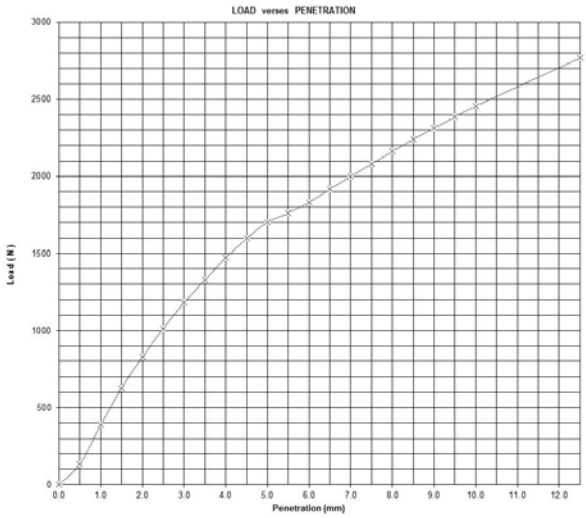
Lawnton QLD 4501
AUSTRALIA

Client:	SGS Australia Pty Ltd (Engineering & Environmental 5105.426)	Client Job No:	
Project:	SGS/17/184B	Order No:	
Location:	Beams Road, Carseldine	Tested Date:	24/05/2018
SGS Job Number:	18-55-376	Sample No:	18-LT-1402
Lab:	Lawnton Laboratory	Sample ID:	BH05 (200 - 800)

CALIFORNIA BEARING RATIO

AS1289.6.1.1 (Soaked)

Sample Description:	(CI) Sandy CLAY - Brown
Date Sampled:	16/05/2018
Moisture Content Method:	AS1289.2.1.1
Sampling Method:	AS1289.1.2.1 cl 6.5.3 in-situ power auger
Compactive Effort Used:	AS1289.5.1.1 Standard Compaction
Test Type:	SOAKED
Retained on 19.0mm (%):	0
Retained Material Excluded:	Yes



	RESULT	RATIO (%)
TARGET RESULTS		
Moisture Content (%):	15.8	100.0
Dry Density (t/m3):	1.80	100.0
PLACEMENT RESULTS		
Moisture Content (%):	15.8	100.0
Dry Density (t/m3):	1.79	99.5
AFTER SOAKING RESULTS		
Moisture Content (%):	18.1	114.5
Dry Density (t/m3):	1.78	99.0
AFTER PENETRATION RESULTS		
Moisture Content of Top (%):	18.5	117.5
SOAKING DETAILS		
Soaking Period (days):	4	
Surcharge Applied (kg):	4.5	
Swell (%):	1.0	
CBR RESULTS		
Correction Applied (mm):	0.2	
CBR bearing ratio @ 2.5mm (%):	8	
CBR bearing ratio @ 5.0mm (%):	9	
CBR VALUE (%):	**9**	**@5.0mm Penetration**

Authorised Signatory: (Dave Gregson) Date: 28/05/2018

Accreditation No.: 2418
Accredited for compliance with ISO/IEC 17025 - Testing

Client Address: 1/18 Leanne Crescent Lawnton Qld 4501

Site No.: 4984
Cert No.: 18-LT-1402-S500_auto
Form No.RP-AU-INDCMT-TE-S500_AUTO V5.0

APPENDIX E: SITE PHOTOGRAPHS

Photos taken facing west over playing fields with uncontrolled fill batter in background

Photos taken facing north-east overlooking existing stormwater basin and Beams Road entrance

Photos facing north-east overlooking lower playing field and basketball courts

APPENDIX F: EARTHWORKS NOTES

PROJECT: LEVEL 1 EARTHWORKS CONTROL

These instructions apply to this project unless otherwise addressed in the job specifications or subsequently by the superintendent.

(A) PRIOR TO FILLING

(1) Topsoil and organic matter must be stripped to the nominated depth from the proposed cut and fill areas.

(2) The superintendent or GTA should be notified if the required stripping exceeds the nominated depth.

(3) Any existing (uncontrolled) fill must be either removed or investigated, approved and documented.

(4) The stripped natural surface (fill foundation) must be inspected, proof rolled and approved.

(5) Any unsound areas are subject to supplementary site instructions (in general, the fill foundation is subject to the same compaction requirements as the fill). The practice of "bridging" over soft, unstable and wet fill foundation is generally not acceptable.

(B) FILLING

(6) If necessary, the fill material must be moisture conditioned as required.

a) Too wet - dry fill to within a moisture range that the specified density can be achieved and the fill area is not deflecting (surface heaving) under construction traffic to the detriment of the fill in general.

b) Too dry - moisten the fill to within a moisture range that the specified density can be achieved.

c) The fill should be mixed to ensure reasonably uniform distribution of the moisture.

(7) Remove excessive vegetation (sticks, stumps, etc.) as required.

(8) Place fill in layers generally not exceeding 200mm thick and compact to specification (larger or more efficient compaction equipment may enable the placement of thicker fill layers).

(9) The fill must be tested at the rate of:

a) Minimum of one (1) test every 2nd layer (each 400mm lift)

b) Minimum of one (1) test/500m^3 of fill - large scale project

c) Minimum of one (1) test/200m^3 of fill - small scale project

or as directed by the GTA or superintendent

(10) Areas represented by a failed test must be reworked and retested and a positive result obtained prior to placing additional fill.

(11) Where fill abuts against sloping ground, benches should be cut in the ground generally to a depth of 200mm to 300mm.

(12) Fill should be placed in near horizontal layers of uniform thickness deposited systematically across the fill area.

(13) If topsoil is stockpiled adjacent to the fill area, care should be taken to ensure that structural fill does not encroach into the stockpile area.

(14) The maximum particle size of rocks within the layer after compaction should not exceed two-thirds of the compacted layer thickness.

(15) Equipment and haul roads should be selected to avoid the overloading (and development of surface heaving) of the fill areas.

(16) If the filling programme is interrupted (eg. by rainfall periods), the interrupted surface must be inspected and assessed prior to placing additional fill (i.e. in accordance with “(A)”.

PROJECT: LEVEL 1 EARTHWORKS CONTROL

These notes apply to this project unless otherwise instructed by the project superintendent.

(A) TEST PROCEDURES

Test procedures to be used on the site will be selected from the following:

- AS1289 5.1.1 Dry Density/Moisture Content Relationship (Standard Compaction)
- AS1289 5.2.1 Dry Density/Moisture Content Relationship (Modified Compaction)
- AS1289 5.3.1 Determination of the Field Density of a Soil (Sand Replacement)
- AS1289 5.4.1 Dry Density Ratio, Moisture Variation and Moisture Ratio
- AS1289 5.5.1 Determination of the Minimum and Maximum Dry Density of a Cohesionless Material
- AS1289 5.6.1 Density Index for a Cohesionless Material
- AS1289 5.7.1 Hilf Density Ratio and Moisture Variation
- AS1289 5.8.1 Determination of the Field Density of a Soil (Nuclear Gauge)

(B) CONTRACTORS RESPONSIBILITIES

Construction/Compaction Equipment
Careful consideration should be given to the selection of compaction equipment and the proportion of compaction equipment to incoming fill quantities. The plant should be capable of compacting all of the fill area including its edges, batters, irregular surfaces and junctions with the natural ground.

Construction Equipment Operators
It is the responsibility of the contractor to ensure that operators are adequately trained in the basic standard practices and requirements of earthwork construction (eg. rolling patterns, benching, appropriate layer thicknesses, etc.).

Notification of Filling
The Geotechnical Testing Authority relies on the Contractor, Constructor or Superintendent to advise when the filling operation will commence, or re-commence following delay periods. Level 1 certification cannot be given for fill placed without the knowledge of the Geotechnical Testing Authority.

Specification Compliance
Regardless of the role of the Geotechnical Testing Authority, the contractor is responsible for complying with all aspects of the specification including the quality, placement methods and compaction of the fill.

(C) UNSUITABLE MATERIALS

In relation to structural filling, unsuitable materials may be termed either “unsuitable” or “temporary unsuitable”.

1) Unsuitable

Unless otherwise approved by the superintendent, the following materials are not suitable for forming any part of structural filling. At the direction of the superintendent, unsuitable materials should either be removed to spoil or used in non-structural areas (eg. park areas, footpaths, etc.).

- organic soils - topsoils, severely root affected soils and peat
- materials which may be contaminated with toxic substances through past site usages
- filling which contains wood, metal, plastic, boulders and other deleterious materials
- any other materials which have deleterious engineering properties

2) Temporary Unsuitable

“Temporary unsuitable” refers to materials which are deemed unsuitable for use as structural fill in the present condition but may be rectified for subsequent use by some form of treatment.

Typical examples of temporary unsuitable materials and appropriate treatments are shown below:

Temporary Unsuitable Material	Possible Remedial Treatment
Material too wet	Spread and Dry
Excessive oversize	Screen/remove oversize
Excessive organics (sticks/stumps)	Remove sticks/stumps

(D) REACTIVE CLAYS

Soil reactivity is a term which refers to the volume change (shrinking and swelling) of clay soils undergoing moisture change. Reactive clay soils swell when wetted up and shrink when dried out. This characteristic is measured in the laboratory and used extensively for residential site classification and footing design. The following issues should be considered.

1) The site classification of a lot is not only affected by filling of the lot but also by the reactivity characteristics of the soils used to fill the lot.

2) Clay soils placed in a new environment (fill) will, over a period, adjust to equilibrium conditions (moisture and density). Clay soils which are over dried and over compacted (beyond equilibrium conditions) may result in a fill area with a high swell potential.

   A Modified Compaction specification will often necessitate the drying of clay soils well beyond the equilibrium conditions to meet the specification requirements. In temperate climates, the Standard Compaction Optimum Moisture Content is more likely to approximate the equilibrium moisture content (AS 3798 - 2007 Clause 5.3).

(E) SANDY SOILS (SILTY SANDS AND CLAYEY SANDS)

Sandy soils are generally prone to loss of strength and stability (heaving under load) as the moisture content approaches the standard optimum moisture content. The condition generally worsens as the moisture content increases above the optimum moisture content. This condition can develop and be evident on fill areas that may otherwise comply with the density requirement. As a general rule, the moisture content should be maintained approximately 1% to 3% dry of the optimum moisture content (standard compaction).

(F) TOPSOILING

Spreading of topsoil in excessive quantities over controlled fill may reduce the likelihood of a site being re-classified from a 'P' site. As a general rule, topsoil depth should be restricted to about 100mm in proposed building areas.

(G) COMPACTION STANDARDS

Unless otherwise notified, the compaction standard specified by the local authority will be adopted as the density acceptance/rejection criteria.

(H) CONTROLLED FILL ACCEPTANCE/REJECTION CRITERIA

Any combination of the following issues may influence an acceptance/rejection instruction on a section of fill presented for testing.

- density testing
- load testing - deflection/surface heaving
- quality of fill - organics/deleterious materials
- consistency of compaction

(I) EXCLUSIONS

Unless specifically requested Level 1 compaction control does not address the following issues:

- slope stability
- reactive soils
- soft natural soils and/or pre-existing (uncontrolled) fill on the site outside of the nominated controlled fill area
- soils which may be contaminated with toxic substances
- backfill to service trenches, subsequent to the controlled fill commission or when not included in the controlled fill commission
- site drainage
- topsoil placed subsequent to completion of controlled filling
- where the filling exceeds 5m, advice from a geotechnical professional should be sought

APPENDIX G: STANDARD CBR NOTES AND PERFORMANCE WARNINGS

SAMPLING

At the time of sampling, earthworks had not been carried out and the proposed subgrade had not been exposed.

As the subgrade was not exposed, and could not be viewed at the time of sampling, some of the samples may not be representative of predominant or worst case soil types.

Soil type boundaries (representing the soaked CBR samples) should be established when bulk earthworks is completed and the proposed subgrade is exposed.

Sampling frequency/location was in accordance with the instruction received from our client.

Unless otherwise instructed, samples are generally recovered from the zone of extreme pavement thickness, i.e. 00 - 500mm below design subgrade level.

TESTING

Testing was carried out in accordance with A.S. 1289 "Methods of Testing Soils for Engineering Purposes", A.S. 1289 6.1.1.

The test specimen was nominally placed at the Optimum Moisture Content and to the expected required density of the subgrade.

In accordance with the test procedure, the test specimen was soaked for a period of four (4) days with a surcharge mass of 4.5kg. This surcharge mass is approximately equivalent to the pressure applied by a 2.0 T/m^3 insitu density pavement thickness of 150mm (Refer to A.S. 1289 6.1.1, Figure 7 for full minimum pavement thickness requirements).

The minimum pavement thickness should be at least equivalent to the pavement thickness represented by the surcharge mass, refer to AS1289.6.1.1, Figure 7 for full minimum pavement thickness requirements

Test method A.S. 1289 6.1.1 allows for any +19.0mm material to be replaced in the test portion by –19.0mm + 4.75mm material. Unless otherwise instructed by our client, +19.0mm material will be excluded from the test portion.

PERFORMANCE WARNINGS

Sandy Soils (Sands, Silty Sands and Clayey Sands)

Sandy soils are generally prone to loss of strength, reduced insitu C.B.R. and stability (heaving under load) as the moisture content approaches the standard compaction optimum moisture content. The condition generally worsens proportionally with increasing moisture content (above the optimum moisture content).

The C.B.R. value obtained on the laboratory test specimen is only representative of the material at the nominated density and moisture content.

Serviceable drainage, both surface and sub-surface (side drains) and uniform conforming density is critical to the sound performance of sandy subgrades. Provided that this is achieved, the subgrade insitu C.B.R. value should approximate the laboratory C.B.R. value for the representative soil types.

Seepage zones are common in sandy soils, particularly following rainfall periods. Wet sandy soils and seepage within the depth zone affected by loading (eg. by construction traffic) can be highly detrimental to the trafficability, workability and performance on subgrades and road pavements.

The permeability of compacted Silty and Clayey Sand subgrades is generally low, ensuring good serviceability provided that the sub-surface drainage is adequate.

Clayey Soils (Clays, Sandy Clays and Silty Clays)

Clay soils generally have very low permeability and as a result, construction and performance problems associated with wet weather are usually confined to the exposed surface of the subgrade. However, workability problems can occur in poorly drained areas or after prolonged wet periods.

The C.B.R. value obtained on the laboratory test specimen is generally representative of the material in "the worst case", after four (4) days of continuous soaking. Most clay soils are reactive, to varying extents and swell when exposed to water. As a general rule, increasing swell is proportional to the decreasing C.B.R. value on most clay soils. Dry "baked out" clay subgrades can produce insitu C.B.R. values far in excess of the laboratory Soaked C.B.R. value.

Excessive drying and compaction of clay subgrades can be detrimental to the long term performance to some pavements. Upon wetting up to the "equilibrium moisture" some clay subgrades can swell resulting in deformation and weakening to the pavement.

CONSTRUCTION

Care should be taken when backfilling services (sewer/stormwater etc.) in the pavement area to ensure that materials in the top 500mm of backfill is not of lesser C.B.R. than the C.B.R. representing that section of pavement.

Should additional earthworks of any kind be carried out after the soil boundaries have been established, the boundaries may become invalid and should be re-confirmed.

APPENDIX G FILLING AND EXCAVATION CODE

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FILLING & EXCAVATION CODE

PERFORMANCE CRITERIA AND ACCEPTABLE SOLUTIONS

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P01 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**A01** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: a. 2.5m in a zone in the Industry zones category; b. 1m in all other zones, or if adjoining a sensitive zone.	9	**S01** No retaining walls are proposed.	
P02 Development of a retaining wall proposed as result of filling or excavation: a. Is designed and constructed to be fit for purpose; b. Does not impact adversely on significant vegetation; c. Is capable of easy maintenance Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with the Building Regulation. Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	**A02.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: a. is wholly contained within the site; b. if the total height to be retained is greater than 1m, then: i. the retaining wall at the property boundary is no greater than 1m above the ground level; ii. all further terracing from the 1m high boundary retaining wall is 1 vertical unit:1 horizontal unit; iii. the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas	9	**S02.1** All retaining walls, if provided, will be entirely contained within the site.	
	A02.2 Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland.	NA	**S02.2** The retaining walls, if provided over 1m will ensure that protection to significant vegetation in accordance with the structures standards in the Infrastructure design planning scheme policies.	

Solution: 9 = Acceptable Solution
A/S = Alternative Solution
N/A= Not Applicable to this Proposal

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
	A02.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary.	9	**S02.3** The retaining wall, if provided, finish will be presented to the adjoining land free of maintenance.	
	A02.4 Development for filling only uses clean fill that does not include any construction rubble or debris.	9	**S02.4** Clean fill will be used for any on site filling.	
P03 Development ensures that a rock anchor is designed and constructed to be fit for purpose	**A03** Development ensures that a rock anchor: a. is constructed in accordance with the standards in the Infrastructure design planning scheme policy; b. where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owner	9	**S03** No rock anchors are proposed.	
P04 Development protects all services and public utilities.	**A04** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	9	**S04** The alteration or relocation of services and public utilities will be in accordance with the service authority requirements.	
P05 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**A05** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	9	**S05** All drainage will be directed to the lawful point of discharge in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy. Refer to Stormwater Management Plan prepared by Design Flow for the stormwater strategy	

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A/S = Alternative Solution
N/A= Not Applicable to this Proposal

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P06 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	**A06** No acceptable outcome is prescribed.	NA	**S06** No open drainage is proposed as part of the development.	
P07 Development for filling or excavation: a. does not degrade water quality or adversely affect environmental values in receiving waters; b. ensures site sediment and erosion control standards are best practice.	**A07.1** Development for filling or excavation provides water quality treatment that complies with the Stormwater drainage section of the Infrastructure design planning scheme policy.	9	**S07.1** Proposed filling or excavation complies with the **Stormwater Management Code** and the **Infrastructure Design Planning Scheme Policy**.	
	A07.2 Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	9	**S07.2** Proposed filling or excavation complies with the Sediment Control Standards within Council's **Infrastructure Design Planning Scheme Policy**. Refer to Stormwater Management plan prepared by Design Flow for the stormwater strategy	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P08 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**A08.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site.	9	**S08.1** Construction and demolition works will occur during work times in accordance with the relevant planning scheme policies and guidelines. A Construction Management Plan will be provided by the contractor prior to commencement of site works.	
	A08.2 Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	9	**S08.2** Filling or excavation activities will be undertaken between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays or as agreed by Brisbane City Council.	
P09 Development ensures that vibration generated by the filling or excavation operation does not exceed the vibration criteria in Table 9.4.3.3.D, Table 9.4.3.3.E, Table 9.4.3.3.F and Table 9.4.3.3.G. Note—A noise management report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	**A09** Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	9	**S09** Filling or excavation will be undertaken using methods which do not cause a ground-borne vibration beyond the boundary of the site.	
P010 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**A010** Development ensures that heavy trucks hauling material to and from the site: a. occur for a maximum of 3 weeks; b. use a major road to access the site; c. only use a minor road for the shortest-most- direct route that has the least amount of environmental nuisance if there is no major road alternative.	9	**S010** Haulage of material will be undertaken with consideration to the local environment with appropriate mitigation measures implemented to prevent nuisance. The routes used for transportation of earthworks will be approved with Council prior to commencement of construction.	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P011 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**A011** Development does not involve: a. excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b. filling with material containing a contaminant.	NA	**S011** The site is not on the Environmental Management Register or Contaminated Land Register.	
P012 Development provides for: a. landscaping for water conservation purposes; b. water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; c. stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	**A012.1** Development provides landscaping which is designed using the standards in the Landscape design guidelines for water conservation planning scheme policy.	9	**S012.1** See Urbis landscape Schematic Design and response to Landscape Code.	
	A012.2 Development ensures that the design and requirements for irrigation are in compliance with the standards in Landscape design guidelines for water conservation planning scheme policy.	9	**S012.2** There is no irrigation proposed for the development.	
	A012.3 Development provides areas of pavement, turf and mulched garden beds which are drained. Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	9	**S012.3** Areas of pavement, turf and mulched garden beds are drained through the provision of stormwater connections.	

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A/S = Alternative Solution
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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P01 Development provides roads, pavement, edging and landscaping which: a. are designed and constructed in accordance with the road hierarchy; b. provide for safe travel for pedestrians, cyclists and vehicles; c. provide access to properties for all modes; d. provide utilities; e. provide high levels of aesthetics and amenity, improved liveability and future growth; f. provide for the amelioration of noise and other pollution; g. provide a high-quality streetscape; h. provide a low-maintenance asset with a minimal whole-of-life cost. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**A01** Development provides roads and associated pavement, edging and landscaping which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	9	**S01** The development will provide roads and associated pavement, edging and landscaping designed in accordance with the Infrastructure Design Planning Scheme Policy.	
P02 Development provides road pavement surfaces which: a. are well designed and constructed; b. durable enough to carry the wheel loads of the intended types and numbers of travelling and parked vehicles; c. (ensures the safe passage of vehicles, pedestrians and cyclists, the discharge of stormwater run-off and the preservation of all-weather access; d. allows for reasonable travel comfort.	**A02** Development provides road pavement surfaces which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	9	**S02** The development will provide road pavement surfaces which are designed and constructed in compliance with the Infrastructure Design Planning Scheme.	

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A/S = Alternative Solution
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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P03 Development provides a pavement edge which is designed and constructed to: a. control vehicle movements by delineating the carriageway for all users; b. provide for people with disabilities by allowing safe passage of wheelchairs and other mobility aids.	**A03** Development provides pavement edges which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	9	**S03** The development will provide road pavement edges in accordance with the Infrastructure Design Planning Scheme. Any damage to road verge during site construction activities, including damage to the kerb and channel, will be rectified to its existing condition.	
P04 Development provides verges which are designed and constructed to: a. provide safe access for pedestrians clear of obstructions and access areas for vehicles onto properties; b. provide a sufficient area for public utility c. services; d. be maintainable by the Council.	**A04** Development provides verges which are designed and constructed in compliance with the road corridor design and streetscape locality advice standards in the Infrastructure design planning scheme policy.	9	**S04** If provided, verges will be designed and constructed in accordance with the Infrastructure Design Planning Scheme Policy. Safe pedestrian access and sufficient area for public utility services provided. Verges will be maintainable by Council.	
P05 Development provides a lane or laneway identified in a neighbourhood plan which: a. allows equitable access for all modes; b. is safe and secure; (c) has 24-hour access; c. is a low-speed shared zone environment; d. has a high-quality streetscape.	**A05** Development provides a lane or laneway identified in a neighbourhood plan which is embellished in compliance with the streetscape locality advice standards in the Infrastructure design planning scheme policy.	9	**S05** If provided, lane or laneway will be designed in accordance with the Infrastructure Design Planning Scheme Policy.	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P06 Development of an existing premises provides at the frontage to the site, if not already provided, the following infrastructure to an appropriate urban standard: a. an effective, high-quality paved roadway; b. an effective, high-quality roadway kerb and channel; c. safe, high-quality vehicle crossings over channels and verges; d. safe, accessible, high-quality verges compatible and integrated with the surrounding environment; e. safe vehicle access to the site that enables ingress and egress in a forward gear; f. provision of and required alterations to public utilities; g. effective drainage; h. appropriate conduits to facilitate the provision of required street-lighting systems and traffic signals.	**A06** Development of an existing premises provides at the frontage of the site, if not already existing, the following infrastructure to the standard that would have applied if the development involved new premises as stated in the road corridor design standards in the Infrastructure design planning scheme policy: a. concrete kerb and channel; b. forming and grading to verges; c. crossings over channels and verges; (d) a constructed bikeway; d. a constructed verge or reconstruction of any damaged verge; e. construction of the carriageway; f. payment of costs for required alterations to public utility mains, services or installations; g. construction of and required alterations to public utility mains, h. services or installations; i. drainage works; j. installation of electrical conduits.	9	**S06** All surrounding roads are currently in good condition. No external road works are required. High-quality verges proposed which integrate with existing environment. Safe vehicular access proposed.	
P07 Development provides both cycle and walking routes which: a. are located, designed and constructed to their network classification (where applicable); b. provide safe and attractive travel routes for pedestrians and cyclists for commuter and recreational purposes; c. provide safe and comfortable access to properties for pedestrians and cyclists; d. incorporate water sensitive urban design e. into stormwater drainage; (e) provide for utilities; f. provide for a high level of aesthetics and amenity, improved liveability and future growth;	**A07** Development provides cycle and walking routes which are located, designed and constructed in compliance with the road corridor design and off- road pathway design standards in the Infrastructure design planning scheme policy.	9	**S07** Existing cycle and walking routes are to be maintained on road and verge.	

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g. are a low-maintenance asset with a minimal whole-of-life cost; h. minimise the clearing of significant native vegetation. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.				
P08 Development provides refuse and recycling collection, separation and storage facilities that are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised.	**A08.1** Development provides refuse and recycling collection and storage facilities in accordance with the Refuse planning scheme policy.	9	**S08.1** Refuse and recycling collection and storage will be as per Cardno Traffic assessment.	
	A08.2 Development ensures that refuse and recycling collection and storage location and design do not have any adverse impact including odour, noise or visual impacts on the amenity of land uses within or adjoining the development. Note—Refer to the Refuse planning scheme policy for further guidance.	9	**S08.2** Refuse and recycling collection and storage will be as per Cardno Traffic assessment.	
P09 Development ensures that: a. land used for an urban purpose is serviced adequately with regard to water supply and waste disposal; b. (the water supply meets the stated standard of service for the intended use and fire-fighting purposes.	**A09.1** Development ensures that the reticulated water and sewerage distribution system for all services is in place before the first use is commenced.	9	**S09.1** The development has allocations for sewer and water networks to service the development yield in accordance with UU requirements.	
	A09.2 Development provides the lot with reticulated water supply and sewerage to a standard acceptable to the distributor–retailer.	9	**S09.2** Refer to S09.1.	

Solution: 9 = Acceptable Solution
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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P010 Development provides public utilities and street lighting which are the best current or Alternative technology and facilitate accessibility, easy maintenance, minimal whole-of-life costs, and minimal adverse environmental impacts.	**A010.1** Development provides public utilities and street lighting which are located and aligned to: a. avoid significant native vegetation and areas Identified within the Biodiversity areas overlay map; b. minimise earthworks; c. avoid crossing waterways, waterway corridors and wetlands or if a crossing is unavoidable, tunnel- boring techniques are used to minimise disturbance, and a disturbed area is reinstated and restored on completion of the work. Note—Guidance on the restoration of habitat is included in the Biodiversity areas planning scheme policy.	9	**S010.1** Provision of public utilities and street lighting will be determined at detailed design stage and incorporated as required.	
	A010.2 Development provides compatible public utility services and street-lighting services which are co-located in common trenching for underground services.	9	**S010.2** Determined at detailed design stage and incorporated as required. Common public utility trenching will be implemented where practicable.	
	A010.2 Development provides public utilities and street lighting which are designed and constructed in compliance with the public utilities standards in the Infrastructure design planning scheme policy.	9	**S010.3** Provision of public utilities and street lighting will be determined at detailed design stage and incorporated as required. They will be designed and constructed in compliance with the prescribed standards.	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS1	COMMENTS	COUNCIL USE ONLY
P011 Development ensures that land used for urban purposes is serviced adequately with telecommunications and energy supply.	**A011** Development provides land with the following services to the standards of the approved supplier: a. electricity; b. telecommunications services; c. gas service where practicable.	9	**S011** Electrical and telecommunication services are available to service the site. Electrical and telecommunication servicing will be provided in Accordance with Council requirements and agreements with the relevant service providers. Detailed design will be undertaken during the Operational Works stage.	
P012 Development ensures that major public projects promote the provision of affordable, high-bandwidth telecommunications services throughout the city.	**A012** Development provides conduits which are provided in all major Council and government works projects to enable the future provision of fibre optic cabling, if: a. the additional expense is unlikely to be prohibitive; or b. further major work is unlikely or disruption would be a major concern, such as where there is a limited capacity road; or c. there is a clear gap in the telecommunications network; or d. there is a clear gap in the bandwidth available to the area. Editor's note—An accurate, digital 'as built' three-dimensional location plan is to be supplied for all infrastructure provided in a road.	9	**S012** The proposed development will be designed to provide for future telecommunications services and providers, in accordance with the relevant Building Codes and Australian Standards.	
P013 Development provides public art identified in a neighbourhood plan or park concept plan which: a. is provided commensurate with the status and scale of the proposed development; b. is sited and designed: i. as an integrated part of the project design; ii. as conceptually relevant to the context of iii. to reflect and respond to the cultural values of the community; iv. to promote local character in a planned and informed manner.	**A013** Development provides public art identified in a neighbourhood plan or park concept plan which is sited and designed in compliance with the public art standards in the Infrastructure design planning scheme policy.	NA	**S013** No public art is proposed at the development.	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS1	COMMENTS	COUNCIL USE ONLY
P014 Development provides signage of buildings and spaces which promote legibility to help users find their way.	**A014** Development provides public signage: a. at public transport interchanges and stops, key destinations, public spaces, pedestrian linkages and b. at entries to centre developments; c. which details the location of the key destinations, public spaces and pedestrian linkages in the vicinity, the services available within the development and where they are located. Editor's note—Signage is to be in accordance with Local Law Number 1 (Control of Advertisements Local Law).	9	**S014** Signage requirements to be addressed at detailed design stage.	
P015 Development that provides community facilities which form part of the development is functional, safe, low maintenance, and fit for purpose.	**A015** Development that provides community facilities which form part of the development is designed in compliance with the community facilities standards in the Infrastructure design planning scheme policy.	NA	**S015** No community facilities to be provided at development.	
P016 Development provides public toilets which: a. are required as part of a community facility or park; b. are located, designed and constructed to be: i. safe; ii. durable; iii. resistant to vandalism; iv. able to service expected demand; v. fit for purpose.	**A016** Development that provides public toilets is designed and constructed in compliance with the public toilets standards in the Infrastructure design planning scheme policy.	9	**S016** No public toilets are proposed.	

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PERFORMANCE CRITERIA	**ACCEPTABLE SOLUTIONS**	**SOLUTIONS1**	**COMMENTS**	**COUNCIL USE ONLY**
P017 Development provides bridges, tunnels, elevated structures and water access structures that are designed and constructed using proven methods, materials and technology to provide for: a. safe movement of intended users; b. an attractive appearance appropriate to the general surroundings and any adjacent structures; c. functionality and easy maintenance; d. minimal whole-of-life cost; e. longevity; f. current and future services. Note—All bridges and elevated and associated elements must be designed and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**A017** tunnels, elevated structures and water access structures is designed and constructed in compliance with the standards in the Infrastructure design planning scheme policy.	NA	**S017** No bridges, tunnels, elevated structures and water access structures are proposed.	
P018 Development provides culverts which are designed and constructed using proven methods, materials and technology to provide for: a. safety; b. an attractive appearance appropriate to the general surroundings; c. functionality and easy maintenance; d. minimal whole-of-life cost; e. longevity; f. future widening; g. current and future services; h. minimal adverse impacts, such as increase in water levels or flow velocities, and significant change of flood patterns. Note—All culverts and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards	**A018** Development that provides culverts is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	NA	**S018** No culverts are proposed.	

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PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS1	COMMENTS	COUNCIL USE ONLY
P019 Development provides batters, retaining walls, and seawalls and river walls which are designed and constructed using proven methods, materials and technology to provide for: a. safety; b. an attractive appearance appropriate to the surrounding area; c. easy maintenance; d. minimal whole-of-life cost; (e) longevity; e. minimal water seepage. Note—All retaining walls and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards. If for development with a gross floor area greater than 1,000m2	**A019** Development that provides batters, retaining walls, seawalls and river walls is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	9	**S019** Batters and retaining walls if applicable will be suitably designed and certified by an approved RPEQ at the detailed design stage.	
P020 Development ensures that construction is managed so that use of public spaces and movement on pedestrian, cyclist and other traffic routes is not unreasonably disrupted and existing landscaping is adequately protected from short- and long-term impacts. Note—The preparation of a construction management plan can assist in demonstrating achievement of this performance outcome. Note—The Transport, access, parking and servicing planning scheme policy provides advice on the management of vehicle parking and deliveries during construction.	**A020** Development ensures that during construction: a. the ongoing use of adjoining and surrounding parks and public spaces, such as malls and outdoor dining, is not compromised; b. adjoining and surrounding landscaping is protected from damage; c. safe, legible, efficient and sufficient pedestrian, cyclist and vehicular accessibility and connectivity to the wider network are maintained.	9	**S020** Construction operations will be managed in accordance with the relevant planning scheme policies and guidelines. A Construction Management Plan will be provided by the contractor prior to commencement of site works.	

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P021 Development ensures that construction and demolition activities are guided by measures that prevent or minimise adverse impacts including sleep disturbance at a sensitive use, due to noise and dust, including dust from construction vehicles entering and leaving the site. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**A021.1** Development ensures that demolition and construction: a. only occur between 6:30am and 6:30pm Monday to Saturday, excluding public holidays; b. do not occur over periods greater than 6 months.	9	**S021.1** Construction and demolition works will occur during work times in accordance with the relevant planning scheme policies and guidelines. A Construction Management Plan will be provided prior to commencement of site works.	
	A021.2 Development including construction and demolition does not release dust emissions beyond the boundary of the site.	9	**S021.2** Appropriate dust suppression will be provided for the duration of construction and demolition works in accordance with the relevant planning scheme policies and guidelines. A Construction Management Plan will be provided prior to commencement of site works.	
	A021.3 Development construction and demolition does not involve asbestos- containing materials.	9	**S021.3** Asbestos is not expected to exist on the site. If found to occur it will be removed in accordance with the appropriate handling and removal procedures prior to demolition works commencing.	
P022 Development ensures that: a. construction and demolition do not result in damage to surrounding property as a result of vibration; b. vibration levels achieve the vibration criteria in Table 9.4.4.3.B, Table 9.4.4.3.C, Table 9.4.4.3.D and Table 9.4.4.3.E. Note—A vibration impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance	**A022** Development ensures that the nature and scale of construction and demolition do not generate noticeable levels of vibration	9	**S022** Construction operations are not expected to result in vibration levels that can damage surrounding properties. Vibration from site works will be managed in accordance with the relevant planning scheme policies and guidelines. A Construction Management Plan will be provided prior to commencement of site works.	

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