PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2022/1321

Date: 27 February 2023

Queensland Government

CARSELDINE VILLAGE STAGE V

ENGINEERING SERVICES REPORT

KN GROUP

8TH JULY 2022

DOCUMENT REGISTER

VERSION	STATUS	DATE OF ISSUE	AUTHORS	REVIEWERS
0	Draft	27/06/2022	B Kelly	M Shaw
1	Final Issue	8/07/2022	B Kelly	S McDowall

TRANSMISSION REGISTER

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INTRODUCTION

KN Group have been commissioned by Economic Development Queensland – Urban Development (EDQ UD) to prepare an engineering services report for the proposed Stage V of Carseldine Village located at 520 Beams Road, Carseldine.

The proposed Stage V development proposes:

- 3 new commercial lots;
- 1 public plaza lot;
- 1 open space/bushland lot;
- an access easement;
- new road;
- boundary realignment with Lot 322 on SP311781; and
- works in Lot 322 on SP311781 related to earthworks retaining, pedestrian connectivity and stormwater infrastructure.

Refer to the **Appendix A** RPS Plan of Subdivision Plan Reference 128180-123 & 124.

This report addresses the proposed development of Stage V of the Carseldine Village development only however continuity with the masterplan of the overall development has been considered. The proposed commercial lots will be the subject of future development application(s) by third party developers.

The town planning application is in accordance with the existing overall Masterplan Approval (amended) granted in September 2021 (EDQ Ref: DEV2018/932/3) and reflects the intent of the approval.

The PDA development application seeks PDA development approval from the Minister for Economic Development Queensland (MEDQ) for:

- Development Permit for Reconfiguring a Lot (Stage V of Carseldine Village - 3 commercial lots, 1 public plaza lot, 1 open space/bushland lot, an access easement, new road reserve, boundary realignment and works in Lot 322 on SP311781).

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 site is currently unoccupied state land and is located within the Fitzgibbon Priority Development Area (PDA) under Economic Development Queensland Fitzgibbon PDA Development Scheme (2011). Located within Carseldine Village at 520 Beams Road, Carseldine, the site is within the BCC local government catchment.

Within Carseldine Village Stages S (sport and recreation precinct), 1 and 2 have reached construction completion, and Stages 3A, & 4A are close to practical completion. The proposed Stage V development is contained within the western part of Lot 7002 on SP311913, comprising of approximately 2.493 hectares of the total 5.83 hectares.

The larger Carseldine Village development site is bound by Beams Road to the north, Cabbage Tree Creek to the south, North Coast Railway to the east and Dorville Road to the west.

LAND TOPOGRAPHY AND SITE DRAINAGE

Stage V contains the Carseldine Village sales and information centre, C&K child care centre encompassed by bushland and grass cover and an existing private access driveway. The pre-development terrain is relatively varied between approximately RL26.0 to RL13.5 AHD, with the site falling northeast at an approximate grade of 7.0% from southern west boundary.

The proposed stage of works will be filled to the range of RL18 to RL13.5 (excluding the southern batter in proposed Lot V002 down to the proposed road corridor, grading to an approximate invert of RL16.5), with approximately 5,000m^3 of select fill imported from off site into the stage.

Site drainage within the stage will discharge primarily to the proposed road corridor (extension of Meander Street) and be collected by the piped stormwater system, connecting to the existing network on Plaza Place. Existing upstream stormwater constructed as part of previous development works will be adequately tied in as part of the proposed drainage works.

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 to recognise the potential risks and control measures to 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;
- 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); and
- Complying with the SPP – Technical Note for Government Development Assessment & Compliance Officers (Healthy Land and Water, 2018).

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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 the MEDQ or another relevant authority at any time during construction.

INFRASTRUCTURE FOR DEVELOPMENT

5.1 ROADWORKS

The proposed development features a 19m road corridor with a 6m wide access street, intersecting the site linking the existing Beams Road / Meander Street intersection with the existing Plaza Place / Meander Street intersection (NB. both Meander Street intersection stubs were created with Stage 1 works). The road provides potential for direct vehicular and pedestrian access to each individual allotment within the site including sufficient width for future concrete footpaths for pedestrian access, including additional roadside parking to be constructed with the proposed Stage v works. All verge works are to be in accordance with the proposed typical cross-sections for commercial streets.

Proposed road and path typology is in accordance with the Technical Traffic Memorandum prepared by Cardno, to support Stage V of the Carseldine Village development.

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.

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 F and Appendix G of this report.

A further, more detailed geotechnical investigation report has been commissioned by EDQ UD and will be provided to the MEDQ shortly for review.

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Localised filling within the development will occur in accordance with AS 3798 under Level 1 supervision. An assessment of the Brisbane City Council *Brisbane City Plan 2014* Filling and excavation code has been included in Appendix H to demonstrate compliance with relevant requirements.

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 measures proposed to support the proposed Stage V development.

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

The Stormwater Management Technical Memorandum is located within 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 for the minor event in gullies and field inlets and convey it through underground infrastructure. Surface water from the major event is directed to the roadway and conveyed off site overland.

Passive irrigation of street trees from stormwater runoff is also proposed and will achieve additional WSUD outcomes in addition to the overall masterplan strategy. Refer the Landscape design drawings prepared by Saunders Havill for further details.

A catch drain, and associated maintenance access driveway is proposed to be constructed immediately south of proposed Lot V002, in Lot 322 on SP311781, to manage stormwater from the upstream catchment. This catch drain is a Phase 2 works component connecting into the Phase 1 component which was constructed with the Stage 2 works.

Concept plans of the catch drain have been prepared and included in Appendix C.

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.

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.

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The development will be serviced with a new sewer reticulation main, connecting to each individual allotment. The gravity sewerage mains will connect to the existing DN160 dia sewer main constructed as part of Stage 1.

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 E for copy of these notices.

A new DN250 water reticulation main will be constructed to service the proposed development with potable water. The proposed watermain will connect into the existing DN300 watermain along Beams Road and the existing DN250 watermain along Plaza place. It will provide connection to all commercial lots within the stage where each individual allotment will be provided individual service connections and meters.

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 D for Dial Before You Dig (DBYD) existing services search.

SUMMARY

This Engineering Services Report relating to the proposed Carseldine Village Stage V development has demonstrated the following:

- The proposal is for the construction of 3 commercial lots, 1 public plaza lot, 1 open space/bushland lot, an access easement, new road reserve, boundary realignment and works in Lot 322 on SP311781;
- The proposed road network will connect into preceding Stages 1, 2, 3A and 4A;
- 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, discharging into the existing piped drainage network.
- Passive irrigation of street trees from stormwater runoff is proposed and will achieve additional WSUD outcomes for the development;
- New sewerage infrastructure will be constructed to service individual allotments. Gravity sewer mains will connect to existing infrastructure constructed as part of Stage 1;

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- New water reticulation infrastructure will be constructed to service individual allotments. Reticulation mains will connect to existing infrastructure constructed as part of Stage 1; 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

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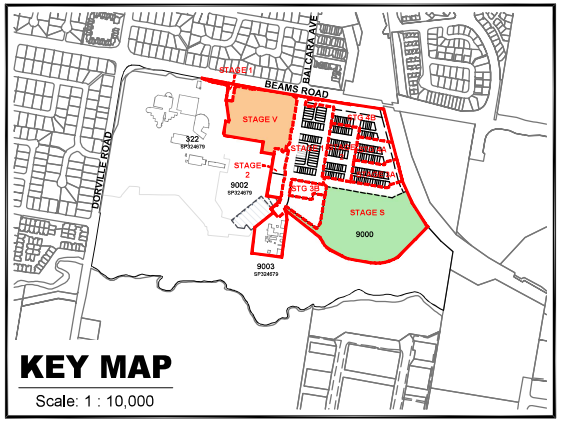
CARSELDINE URBAN VILLAGE

PLAN OF SUBDIVISON STAGE V - OVERALL

PLAN REF: 128180 – 123
Rev No: I
DATE: 26 JULY 2022
CLIENT: EDQ
DRAWN BY: MD
CHECKED BY: MD / DG

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



KEY MAP
Scale: 1 : 10,000

Legend

- Site Boundary
- Proposed Stage Boundary
- Existing Easements
- Proposed Access Easement
- Beams Road Resumption

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.

ULTIMATE VERGE TREATMENTS BY FUTURE DEVELOPER - SUBJECT TO FUTURE DEVELOPMENT APPLICATION

Yield Breakdown		
Allotment Details	**Stage V**	
	Lots	**Percentage**
Non-Residential Allotments		
Mixed Use Allotment (Village Heart)	3	75.0%
Civic Plaza (Privately Owned)	1	25.0%
Total Allotments	**4**	**100.0%**

Land Budget		
Land Use	**Stage V**	
	Area	**Percentage**
Total Stage Area	**2.468 ha**	**100.0%**
Saleable Allotments		
Mixed Use Allotment	1.768 ha	71.6%
Civic Plaza (Privately Owned)	0.118 ha	4.8%
Total Area of Saleable Allotments	**1.886 ha**	**76.4%**
Road		
Beams Road Resumption	0.030 ha	1.2%
Entry Boulevard (Western Verge)	0.038 ha	1.5%
High Street (14.5m - 19m Wide)	0.453 ha	18.4%
Total Area of Road	**0.521 ha**	**21.1%**
Open Space		
Bushland	0.061 ha	2.5%
Total Area of Open Space	**0.061 ha**	**2.5%**

BALCARA AVENUE
BEAMS ROAD
DORVILLE ROAD
STAGE 1 (Separate Application)
V001
STAGE V
V002
V003
9001
9005
Proposed Access Easement (1980m²)
322
SP324679
STAGE 2 (Separate Application)
(Separate Management Subdivision Application)
9002
SP324679
Easement L on SP311891
STG 3B (Separate Application)
STG 4B (Separate Application)
STAGE 1 (Separate Application)
STAGE 2 (Separate Application)
STG 4A (Separate Application)
STAGE 3A (Separate Application)
STAGE S (Separate Application)
9000
9003
SP324679

URBAN DESIGN
Level 4 HQ South
520 Wickham Street
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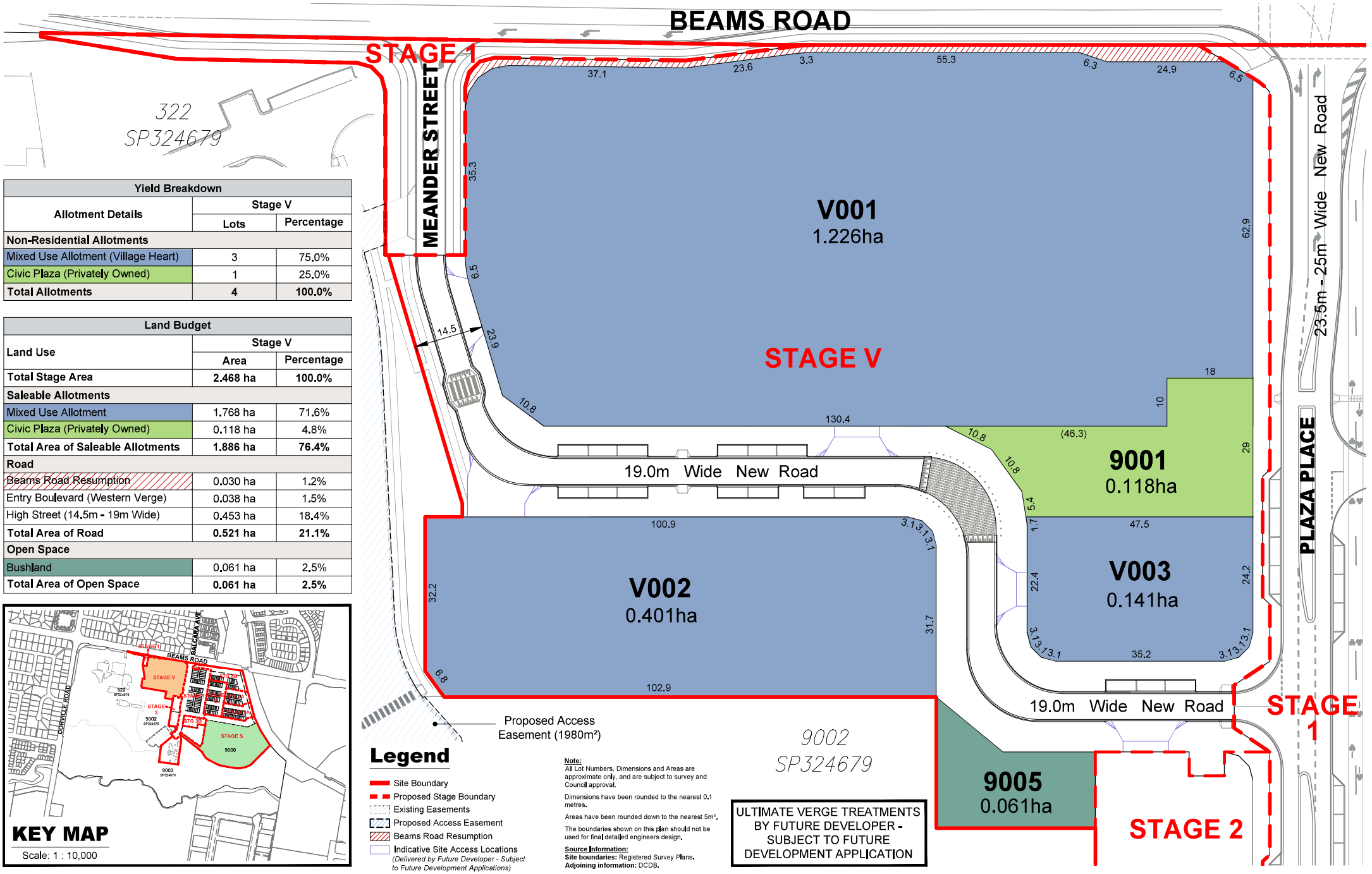
Fortitude Valley QLD 4006
T +61 7 3539 9500
W rpsgroup.com



Yield Breakdown		
Allotment Details	Stage V	
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Total Area of Road	**0.521 ha**	**21.1%**
Open Space		
Bushland	0.061 ha	2.5%
Total Area of Open Space	**0.061 ha**	**2.5%**

KEY MAP

Scale: 1 : 10,000

Legend

- Site Boundary
- Proposed Stage Boundary
- Existing Easements
- Proposed Access Easement
- Beams Road Resumption
- Indicative Site Access Locations *(Delivered by Future Developer - Subject to Future Development Applications)*

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.

ULTIMATE VERGE TREATMENTS BY FUTURE DEVELOPER - SUBJECT TO FUTURE DEVELOPMENT APPLICATION

PLAN REF: 128180 – 124
Rev No: I
DATE: 26 JULY 2022
CLIENT: EDQ
DRAWN BY: MD
CHECKED BY: MD / DG

0 5 10 15 20 25 1 : 500 @ A2

CARSELDINE URBAN VILLAGE
PLAN OF SUBDIVISION
STAGE V - VILLAGE HEART SUBDIVISION

URBAN DESIGN
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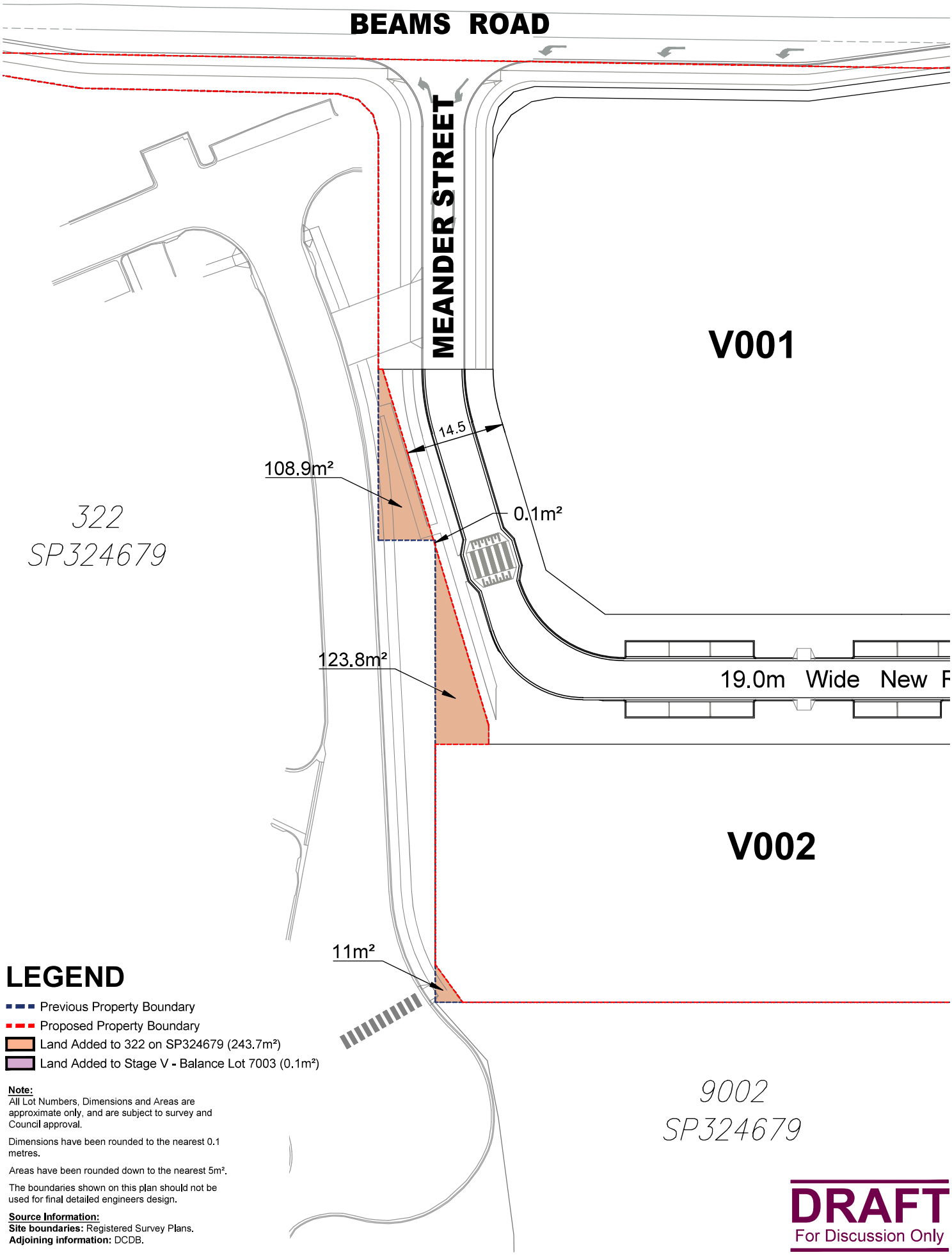

LEGEND

- Previous Property Boundary
- Proposed Property Boundary
- Land Added to 322 on SP324679 (243.7m²)
- Land Added to Stage V - Balance Lot 7003 (0.1m²)

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.

DRAFT
For Discussion Only

PLAN REF: 128180 – 150
Rev No: C
DATE: 26 JULY 2022
CLIENT: EDQ
DRAWN BY: MD
CHECKED BY: MD/DG

0 5 10 15 20 25 1 : 500 @ A3

CARSELDINE URBAN VILLAGE
STAGE V - VILLAGE HEART
BOUNDARY REALIGNMENT

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APPENDIX B CIVIL FUNCTIONALS

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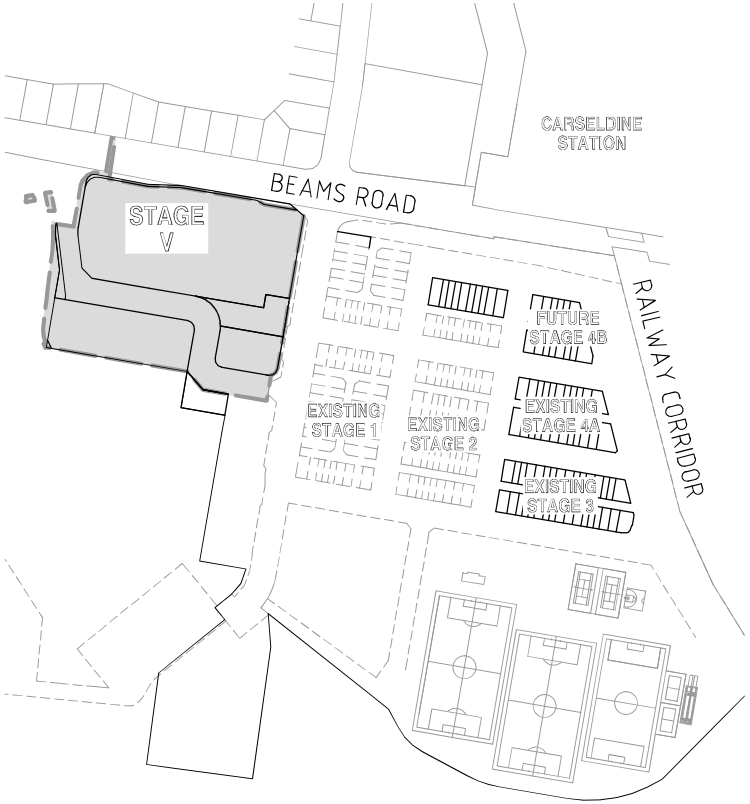
CARSELDINE VILLAGE

STAGE V
FUNCTIONAL LAYOUTS



PLAN
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DRAWING INDEX

DRAWING NO.	DRAWING TITLE
21-121-FL01	FUNCTIONAL LAYOUT - LOCALITY PLAN - DRAWING INDEX STAGE V1
21-121-FL02	FUNCTIONAL LAYOUT - EARTHWORKS PLAN
21-121-FL03	FUNCTIONAL LAYOUT - ROAD WORKS
21-121-FL04	FUNCTIONAL LAYOUT - STORMWATER
21-121-FL05	FUNCTIONAL LAYOUT - SEWER
21-121-FL06	FUNCTIONAL LAYOUT - WATER
21-121-FL07	FUNCTIONAL LAYOUT - WATER MAIN CONNECTION - DETAILS SHEET 1
21-121-FL08	FUNCTIONAL LAYOUT - WATER MAIN CONNECTION - DETAILS SHEET 2
21-121-FL09	FUNCTIONAL LAYOUT - WATER MAIN CONNECTION - NOTES
21-121-FL10	FUNCTIONAL LAYOUT - OVERALL SERVICES

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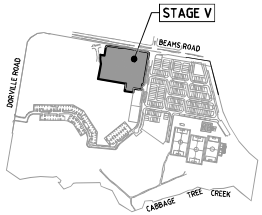
DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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

Drawing Title
FUNCTIONAL LAYOUT
LOCALITY PLAN
DRAWING INDEX STAGE V1

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	1 of 10

	Drawing No	Revision
A1	21-121- FL01	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\FUNCTIONAL\21-121-01-COVER.dwg Plotted by: MS on 29/07/2022 10:58:24 AM

FUNCTIONAL LAYOUT - EARTHWORK PLAN
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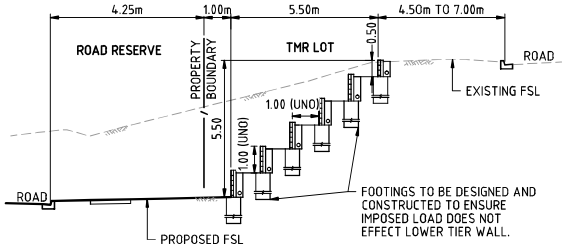

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NORTH

LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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Approved

Drawing Title
FUNCTIONAL LAYOUT
EARTHWORKS PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	2 of 10

A1	Drawing No	Revision
	21-121- FL02	A

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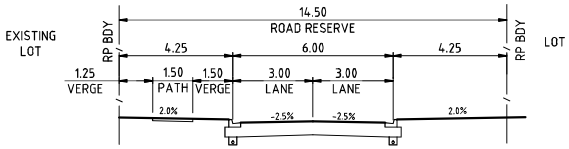

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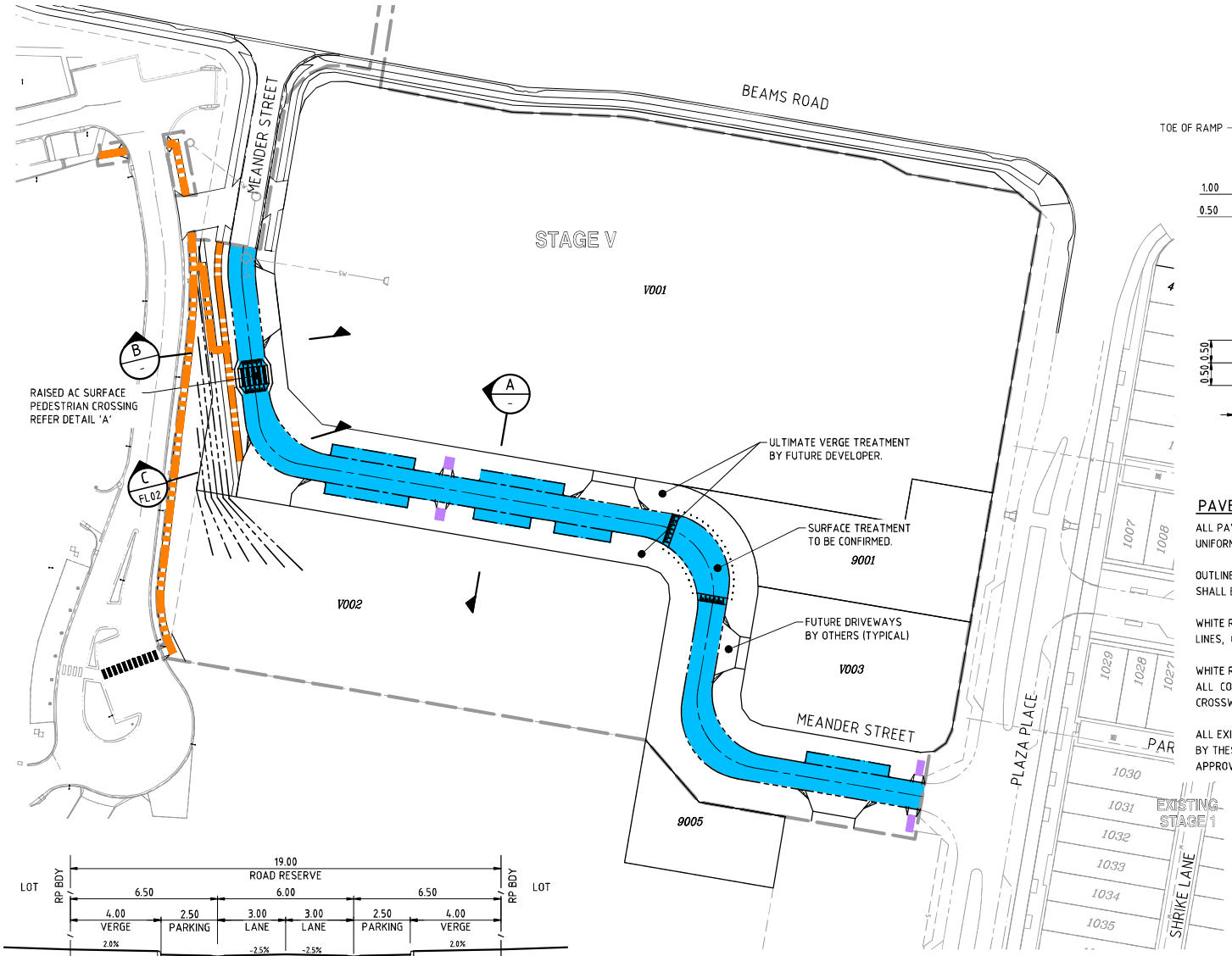
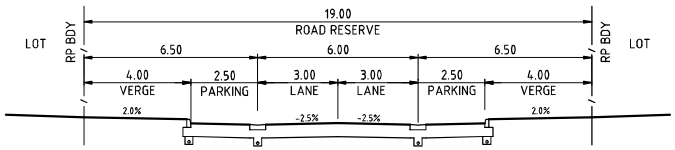


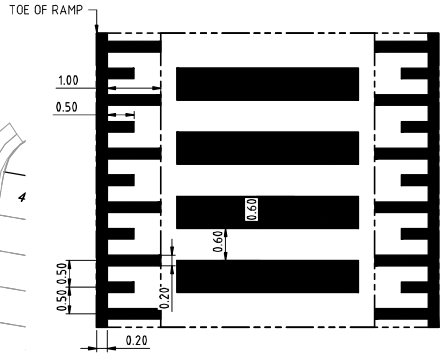


A - SECTION ACCESS PLACE - 19m
SCALE 1:100

FUNCTIONAL LAYOUT - ROADWORKS PLAN
SCALE 1:500

LEGEND

- WORKS BOUNDARY
- KERB AND CHANNEL TYPE E
- KERB ONLY TYPE E
- INVERT CHANNEL
- ROAD CENTRELINE
- EXISTING EDGE OF BITUMEN
- PROPOSED RETAINING WALL
- 6.0m WIDE PAVEMENT ACCESS PLACE - 19m
- 1.5m CONCRETE FOOTPATH
- 2.0m CONCRETE FOOTPATH



DETAIL A
LINEMARKING DETAILS
PEDESTRIAN CROSSING
SCALE 1:50

PAVEMENT MARKING NOTES

ALL PAVEMENT MARKING TO BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES - CURRENT EDITION.

OUTLINE MARKINGS, OFFSET 75mm MINIMUM FROM THE KERB FACE SHALL BE PROVIDED AROUND ALL RAISED ISLANDS AND MEDIANS.

WHITE REFLECTIVE PAINT SHALL BE USED FOR ALL LANE AND EDGE LINES, CHEVRONS AND OUTLINE MARKINGS.

WHITE REFLECTIVE THERMOPLASTIC MATERIAL SHALL BE USED FOR ALL CONTINUITY, TURN, HOLDING, GIVE WAY AND STOP LINES, CROSSWALK MARKINGS AND TURN ARROWS.

ALL EXISTING PAVEMENT MARKINGS THAT SHALL BE MADE OBSOLETE BY THESE WORKS SHALL BE REMOVED FROM THE ROAD SURFACE BY APPROVED METHOD.

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

DO NOT SCALE THIS DRAWING
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NORTH

LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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
ROAD WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	3 of 10

	Drawing No	Revision
A1	21-121- FL03	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\FUNCTIONAL\21-121-03-ROAD WORKS.dwg Plotted by: MS on 28/07/2022 10:58:41 AM

FUNCTIONAL LAYOUT – STORMWATER PLAN
SCALE 1:500

SCALE
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1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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NORTH

LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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
STORMWATER

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	4 of 10

Drawing No	Revision
21-121- FL04	A

A1

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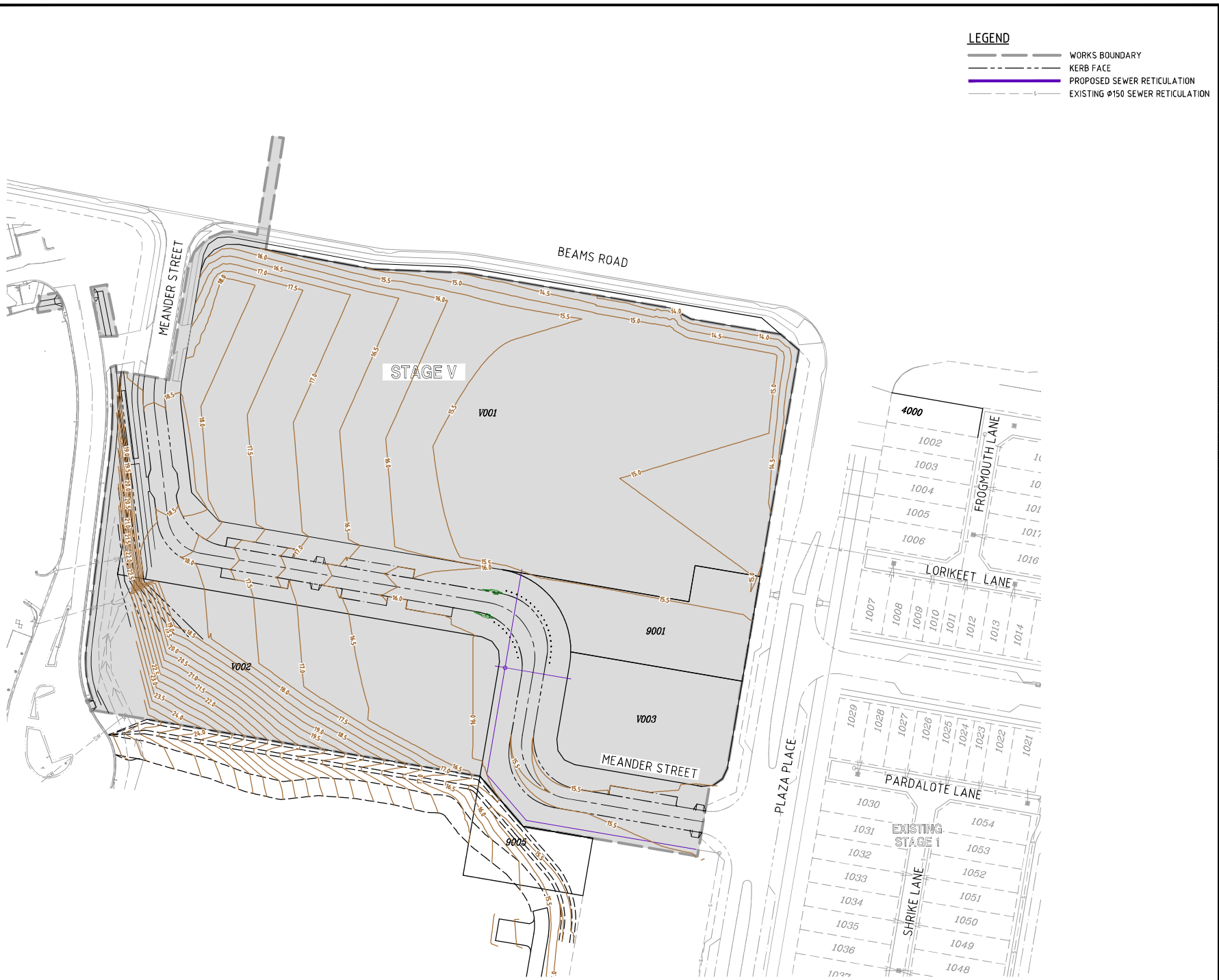

FUNCTIONAL LAYOUT – SEWER PLAN
SCALE 1:500

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1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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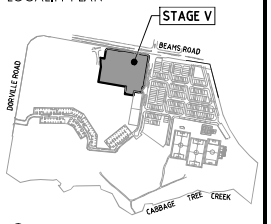
LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

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FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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Spring Hill Q 4000
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Drawing Title
FUNCTIONAL LAYOUT
SEWER

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	5 of 10

A1	Drawing No	Revision
	21-121- FL05	A

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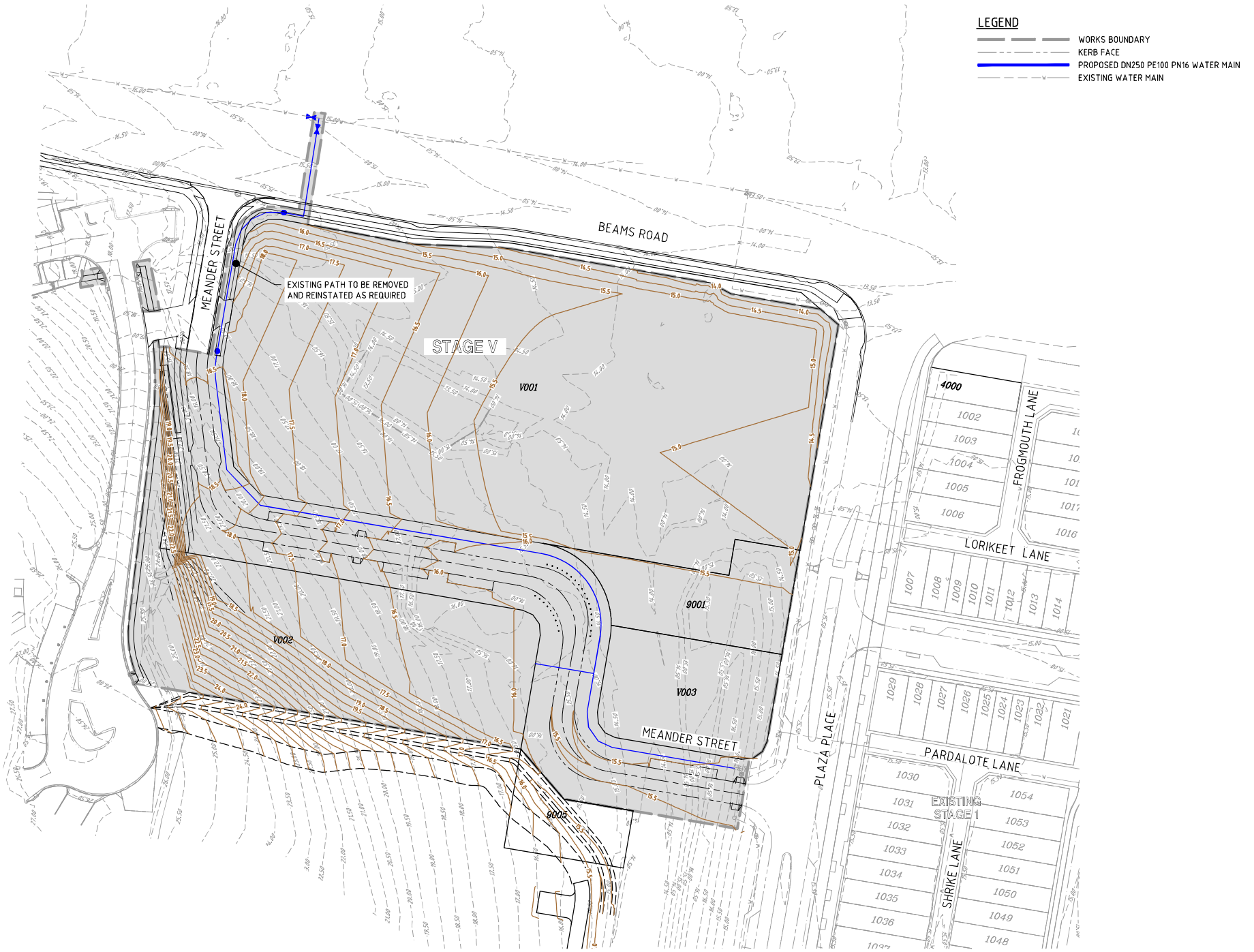

FUNCTIONAL LAYOUT – WATER PLAN
SCALE 1:500

SCALE
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1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

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LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	6 of 10

	Drawing No	Revision
A1	21-121- FL06	A

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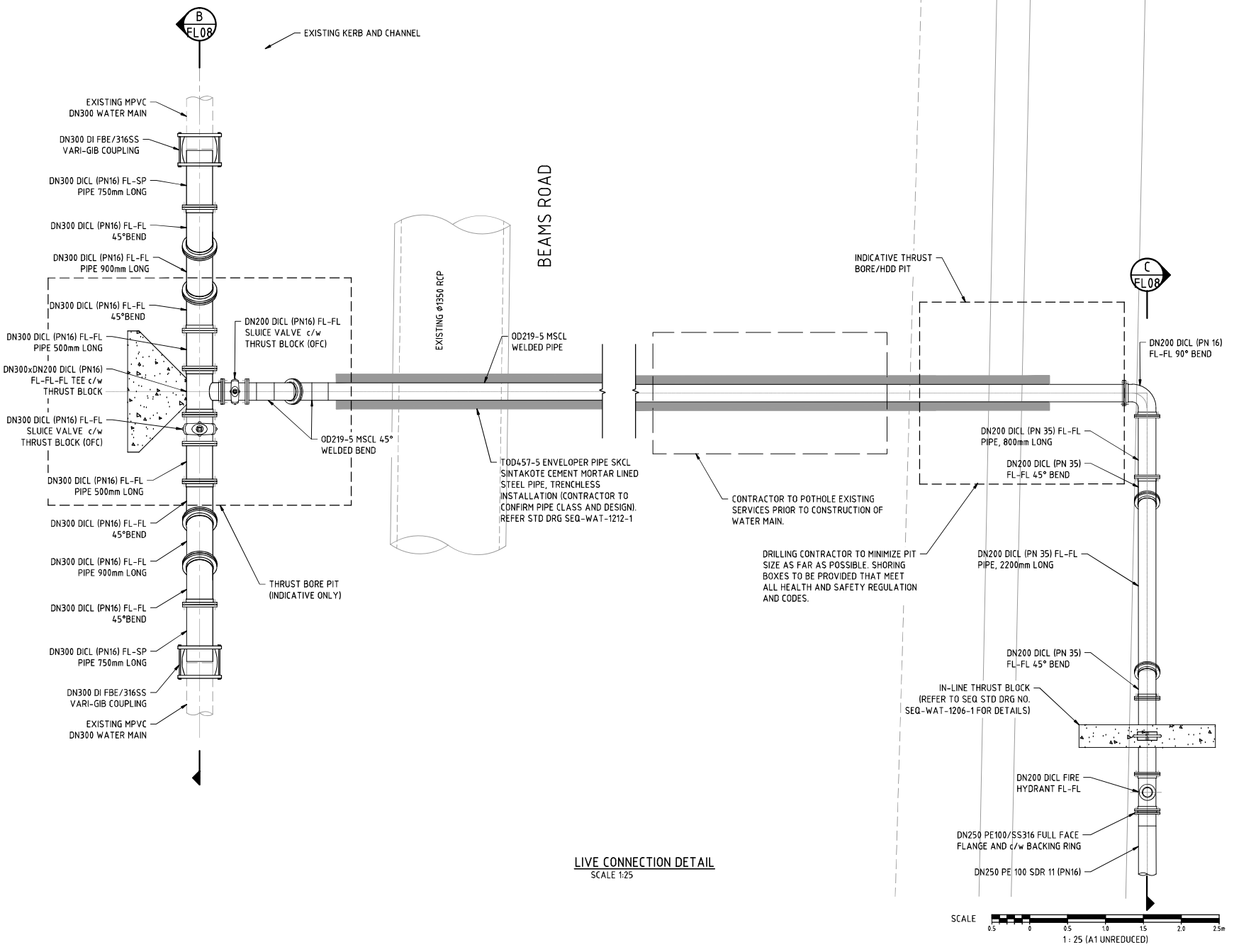

LIVE CONNECTION DETAIL
SCALE 1:25

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LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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 MAIN CONNECTION
DETAILS SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	7 of 10

Drawing No	Revision
21-121- FL07	A

A1

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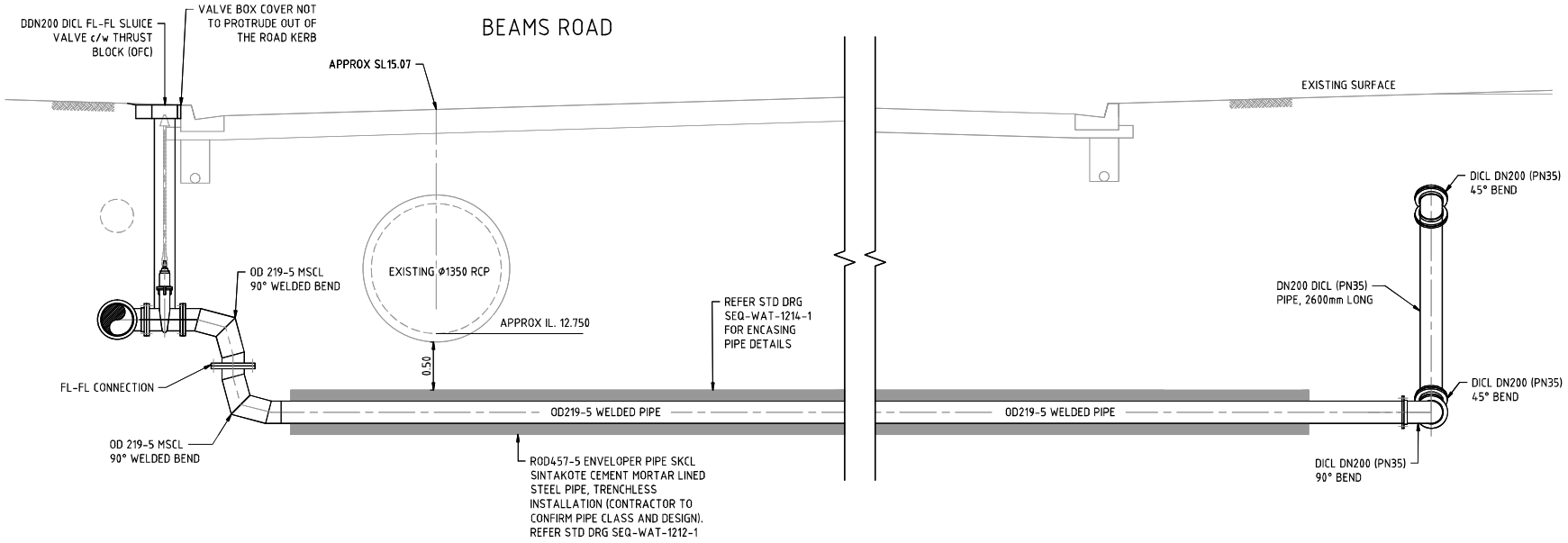

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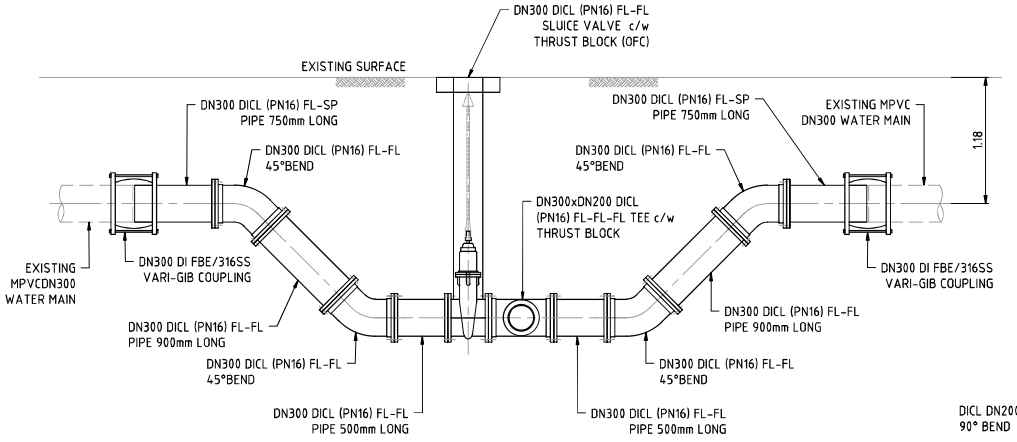

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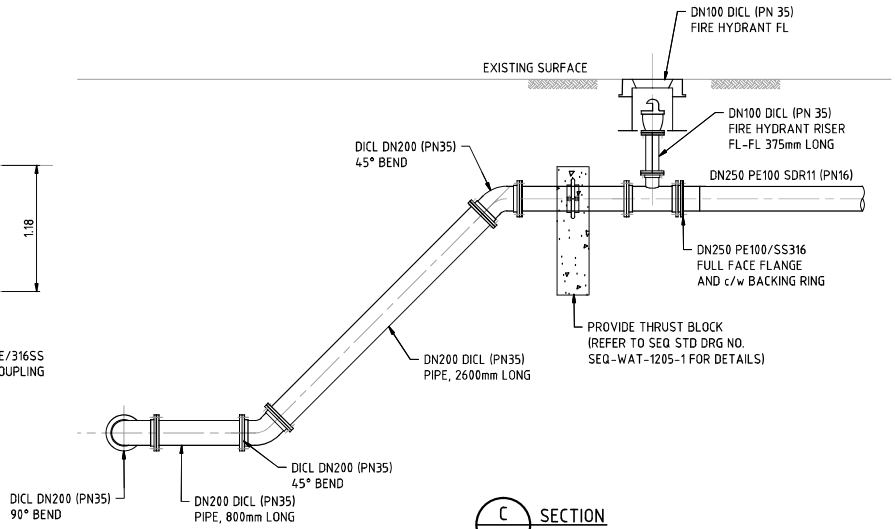

C FL07 SECTION
SCALE 1:25

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1 : 25 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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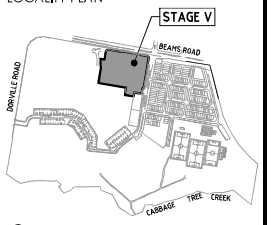
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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
WATER MAIN CONNECTION
DETAILS SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	8 of 10

Drawing No	Revision
21-121- FL08	A

A1

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\FUNCTIONAL\21-121-07-09-WATER-DETAILS.dwg Plotted by: MS on 28/07/2022 10:59:24 AM

ASSET REGISTER – WATER RETICULATION STAGE V

ESTATE/STAGE		CARSELDINE VILLAGE – STAGE V			
SITE ADDRESS		532 BEAMS ROAD			
FILE/APPLICATION		–			
QUU DELEGATES APP. DATE		–			
CLIENT		EDQ			
DRAWING PLAN No.					
MAINS	DIAMETER	MATERIAL DESIGN	MATERIAL CONST	LENGTH DESIGN	LENGTH CONST
	DN63	PE100 PN16	–	–	–
	DN125	PE100 PN16	–	–	–
	DN180	PE100 PN16	–	–	–
	DN200	PE100 PN16	100.00		
SERVICES	DIAMETER	MATERIAL DESIGN	MATERIAL CONST	LENGTH DESIGN	LENGTH CONST
	DN25	PE100 PN16	–	–	–
	DN32	PE100 PN16	–	–	–
	DN40	PE100 PN16	–	–	–
METERS	DIAMETER	NUMBER			
	20	–	–		
	32	–	–		
	40	–	–		

SERVICE DETAILS

No.	SIZE	LOT NUMBERS
24	40mm	– △
5	32mm	– ◯
19	25mm	–

ALL ENVIRONMENT PROTECTION MEASURES SHALL BE IMPLEMENTED PRIOR TO ANY CONSTRUCTION WORK, INCLUDING CLEARING, COMMENCING.

NOTE:
ALL CONSTRUCTION WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE QUEENSLAND WORK HEALTH AND SAFETY ACT 2011. CONTACT THE DIVISION OF WORKPLACE HEALTH AND SAFETY FOR INFORMATION. PHONE 1300 362 128.

ALL WATER AND SEWER CONSTRUCTION WORK UNDERTAKEN BY THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE WORKPLACE HEALTH AND SAFETY LEGISLATION.

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT SOUTH EAST WATER SUPPLY CODE SPECIFICATIONS AND STANDARDS & URBAN UTILITIES TECHNICAL GUIDELINE: DESIGN AND DOCUMENTATION OF WATER RETICULATION AND WASTEWATER (SEWERAGE) INFRASTRUCTURE.
2. UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.
3. ADOPT LIP OF KERB OR SHOULDER OF ROAD AS PERMANENT LEVEL.
4. COVER OVER MAINS FROM PERMANENT LEVEL TO BE AS SHOWN IN STANDARD DRAWING No. SEQ-WAT-1200-2.
5. CONSTRUCT EMBEDMENT AND TRENCHFILL TO SEQ-WAT-1200-2, 1201-1 TO SEQ-WAT-1204-1 (TYPE D SUPPORT UNLESS GEOTECHNICAL INVESTIGATIONS DEMONSTRATE THAT TYPE C SUPPORT IS ADEQUATE AND IPSWICH CITY COUNCIL STANDARDS FOR ROADWAY CROSSINGS, WHICHEVER IS MORE ONEROUS.
6. CONSTRUCT THRUST BLOCKS ON ALL VALVES, BENDS, TEES, TAPERS, DEAD ENDS, AND TRANSITIONS TO UNRESTRAINED PIPEWORK TO SEQ-WAT-1205-1 TO SEQ-WAT-1207-1.
7. WATER SERVICES UNDER ROADS MUST BE PLACED WITHIN A Ø100mm CONDUIT – REFER TO SEQ-WAT-1107-1
8. A WATER METER SUPPLIED AT THE DEVELOPER'S COST, IS TO BE INSTALLED AT THE SERVICE POINT OF EACH LOT IN ACCORDANCE WITH STANDARD DRAWING No. SEQ-WAT-1107-3.
9. ALL MATERIALS USED IN THE WORKS SHALL COMPLY WITH THE URBAN UTILITIES IPAM ACCEPTED PRODUCTS AND MATERIALS LIST

   – ALL CAST IRON FITTINGS SHALL BE TO AS2544 WITH SOCKET ENDS DESIGNED FOR USE WITH DUCTILE IRON PIPES AND FOR WATER SUPPLY PURPOSES SHALL BE 'LIGHT' CEMENT LINED.

   – OTHER TYPES AND CLASSES OF PIPES SHALL NOT BE INSTALLED.

   – CAST IRON GATE (SLUICE) VALVES SHALL CONFORM TO AS2638.

   – ALL VALVES AND HYDRANTS SHALL BE COATED INTERNALLY AND EXTERNALLY WITH A FUSION BONDED EPOXY.

   – ALL NUTS AND WASHERS SHALL BE STAINLESS STEEL GRADE 316.

   – ALL STAINLESS STEEL NUTS AND BOLTS MUST BE ASSEMBLED WITH AN ANTI-GALLING COMPOUND 'DURALAC' OR APPROVED EQUIVALENT AS PER SEQ WATER SUPPLY CODE CLAUSE 4.8.4.3 AND DRAWING SEQ-WAT-1313-1.
10. ALL CONCRETE FOOTPATHS TO BE CLEAR OF WATER MAINS (WHERE APPLICABLE).
11. CONSTRUCT TEST POINTS TO SEQ-WAT-1410-1 AT THE ENDS OF ALL NEW MAINS BEFORE THE SCOUR AND WHERE REQUIRED FOR COMMISSIONING PURPOSES. URBAN UTILITIES PREFERENCE IS TO AVOID TAPPING BANDS FOR TEST POINTS AND PROVIDE EITHER A TEMPORARY (RESTRAINED) DUCKFOOT HYDRANT OR FLANGED SHORT PIPE WITH A TEMPORARY TAPPED BLANK FLANGE. TESTING AGAINST LIVE MAINS AND VALVES IS NOT PERMITTED.
12. TESTING LOCATIONS AND TEMPORARY FITTINGS ARE REQUIRED ON SERVICES OVER 10.0m LONG UNLESS APPROVED IN WRITING FOR WORKS TO BE UNDERTAKEN AS LIVE WORKS. TESTING AND AS-CONSTRUCTED REQUIREMENTS TO BE DOCUMENTED ON DRAWINGS.
13. MARKERS SHALL BE INSTALLED FOR ALL SERVICE CROSSINGS, HYDRANTS AND VALVES IN ACCORDANCE WITH STANDARD DRAWING Nos. SEQ-WAT-1107-1, SEQ-WAT-1300-1 AND SEQ-WAT-1300-2.
14. THE CONSTRUCTION OF THE WATER RETICULATION WORK SHOWN ON THIS DRAWING MUST BE SUPERVISED BY AN ENGINEER WHO HAS R.P.E.Q. REGISTRATION. WORKS NOT COMPLYING WITH THIS REQUIREMENT WILL NOT BE PERMITTED TO CONNECT TO THE RETICULATION SYSTEM.
15. WATER MAIN SHALL BE LAID AT 2.500m ALIGNMENT FROM PROPERTY BOUNDARY UNLESS NOTES OTHERWISE.
16. WHERE PERMANENT HYDRANTS ARE NOT INSTALLED AT END OF MAINS OF EACH STAGE, A TEMPORARY HYDRANT WILL BE INSTALLED INSTEAD.
17. PROVIDE BULKHEADS/TRENCHSTOPS IN ACCORDANCE WITH SEQ WATER SUPPLY CODE TABLE 7.5 AND SEQ-WAT-1209-1 AND 1210-1.
18. CONSTRUCT SMALL DIAMETER PROPERTY SERVICES TO SEQ-WAT-1107-1 AND 1107-3.
19. INSTALL DETECTABLE MARKER TAPE ON ALL WATER MAINS AND PROPERTY SERVICES.
20. CONSTRUCT FIRE HYDRANTS AND STOP VALVES TO SEQ-WAT-1301-1, 1302-1, 1303-2, 1305-1, 1306-1 AND 1409-1.
21. CONSTRUCT SCOURS TO SEQ-WAT-1307-2 WHERE NECESSARY. SCOURS WITHIN IPSWICH CITY COUNCIL REGION MUST DISCHARGE INTO AN OPEN STORMWATER GULLY PIT, NOT TO THE INVERT OF KERB AND CHANNEL. DISCHARGE TO KERB AND CHANNEL VIA A STANDARD KERB ADAPTOR THROUGH THE FACE OF THE KERB IS NOT ACCEPTED BY URBAN UTILITIES.
22. 316SS BACKING RINGS SHALL BE USED WITH FULL-FACE PE FLANGES. PE STUB-FLANGES ARE NOT ACCEPTED.
23. WHEN JOINING TO EXISTING UNRESTRAINED PIPELINES, PROVIDE A DICL SHORT PIPE WITH THRUST FLANGE AND THRUST BLOCK. BOLT ON UNI FLANGES SHALL NOT BE USED AS THRUST FLANGES. THRUST (PUDDLE) FLANGES SHALL BE AN APPROVED PREFABRICATED DICL/MSCL SHORT PIPE WITH PREFABRICATED THRUST FLANGE.
24. AC MAINS SHALL BE REPLACED COLLAR-COLLAR
25. ALL DISUSED SERVICES SHALL BE PLUGGED AT THE MAIN AND FERRULE CLOSED OR TAPPING BAND REMOVED AND SECTION OF MAIN SUBSTITUTED AS LIVE WORKS. LARGE DIAMETER SERVICES SHALL BE DISUSED BY REMOVING ANY PROPERTY SERVICE PIPEWORK AT THE POINT OF CONNECTION TO THE MAIN (INCLUDING VALVE), AND INSTALLING A BLANK FLANGE DIRECTLY ON THE TEE (OR OTHERWISE REMOVE THE TEE ALTOGETHER AND REPLACE WITH STRAIGHT PIPE).
26. PROVIDE DN40PE WATER SERVICES FOR ROAD CROSSINGS SERVICING TWO DWELLINGS. PROVIDE DN32PE WATER SERVICES FOR ROAD CROSSINGS SERVICING A SINGLE DWELLING. IF THE LONG TERM STATIC HEAD OF THE PROPERTY SERVICE IS LESS THAN 350 kPa (35.m) OR IF PRIVATE BOOSTER IS REQUIRED, THE MINIMUM SIZE OF PROPERTY SERVICE SHALL BE 32mm ID.
27. URBAN UTILITIES WATER METERS AND FIRE HYDRANTS MUST BE LOCATED CLEAR OF ENERGEX PILLARS.

VEGETATION PROTECTION

A. TREES LOCATED ALONG THE FOOTPATH SHALL BE, TRANSPLANTED PRIOR TO CONSTRUCTION, OR REPLACED IF DESTROYED.

B. WHEN WORKING WITHIN 4m OF TREES, RUBBER OR HARDWOOD GIRDLES SHALL BE CONSTRUCTED WITH 1.8m BATTENS CLOSELY SPACED AND ARRANGED VERTICALLY FROM GROUND LEVEL. GIRDLES SHALL BE STRAPPED TO TREES PRIOR TO CONSTRUCTION AND REMAIN UNTIL COMPLETION.

C. TREE ROOTS SHALL BE TUNNELLED UNDER, RATHER THAN SEVERED. IF ROOTS ARE SEVERED THE DAMAGED AREA SHALL BE TREATED WITH A SUITABLE FUNGICIDE. CONTACT RELEVANT COUNCIL ARBORIST FOR FURTHER ADVICE.

D. ANY TREE LOPPING REQUIRED SHOULD BE UNDERTAKEN BY AN APPROVED ARBORIST.

SOIL

A. TOPSOIL AND SUBSOIL SHALL BE STOCKPILED SEPARATELY.

B. CARE SHALL BE TAKEN TO PREVENT SEDIMENT FROM ENTERING THE STORMWATER SYSTEM. THIS MAY INVOLVE PLACING APPROPRIATE SEDIMENT CONTROL AROUND STOCKPILES.

CREEK CROSSINGS

A. SILTATION CONTROL MEASURES SHALL BE PLACED DOWNSTREAM OF ANY EXCAVATION WORK.

B. APPROPRIATE SEDIMENT CONTROLS SHALL BE USED TO PREVENT SEDIMENT FROM ENTERING THE CREEK.

C. NO SOIL SHALL BE STOCKPILED WITHIN 5m OF CREEK.

REHABILITATION

A. PREDISTURBANCE SOIL PROFILES AND COMPACTION LEVELS SHALL BE REINSTATED.

B. PREDISTURBANCE VEGETATION PATTERNS SHALL BE RESTORED.

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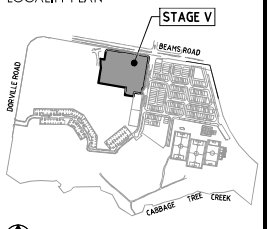
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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
WATER MAIN CONNECTION NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	9 of 10

	Drawing No	Revision
A1	21-121- FL09	A

FUNCTIONAL LAYOUT- OVERALL SERVICES PLAN
SCALE 1:500

1 : 500 (A1 UNREDUCED)

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LOCALITY PLAN

REVISIONS

No	Description	Date	By
A	FOR INFORMATION	24.06.2022	RW

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

FUNCTIONAL LAYOUT
CARSELDINE VILLAGE
STAGE V

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L1, 62 Astor Tce
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Drawing Title

FUNCTIONAL LAYOUT
OVERALL SERVICES

Drawn	Designed	Checked	Date
RW	JB	MS	May '22

Scale	Sheet
AS SHOWN	10 of 10

	Drawing No	Revision
A1	21-121- FL10	A

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APPENDIX C CATCH DRAIN CONCEPT PLANS

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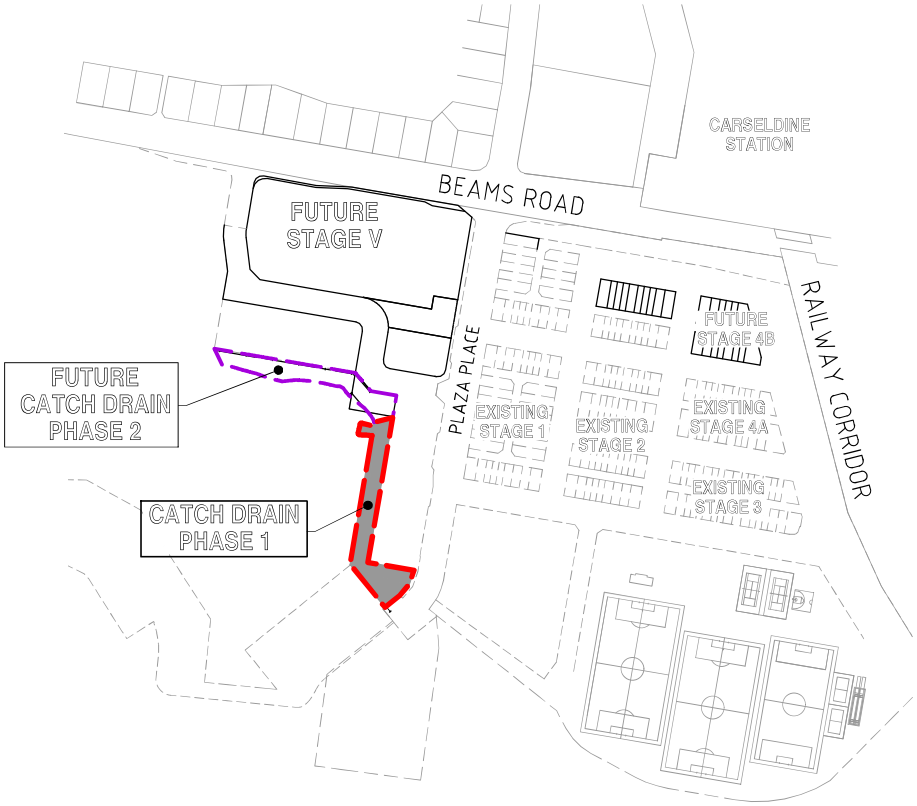
CARSELDINE VILLAGE

CATCH DRAIN



PLAN
SCALE 1:2000

DRAWING INDEX

SCALE
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1 : 2000 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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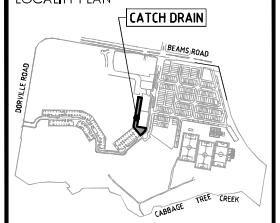
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	RW

DRAFT

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE
CATCH DRAIN

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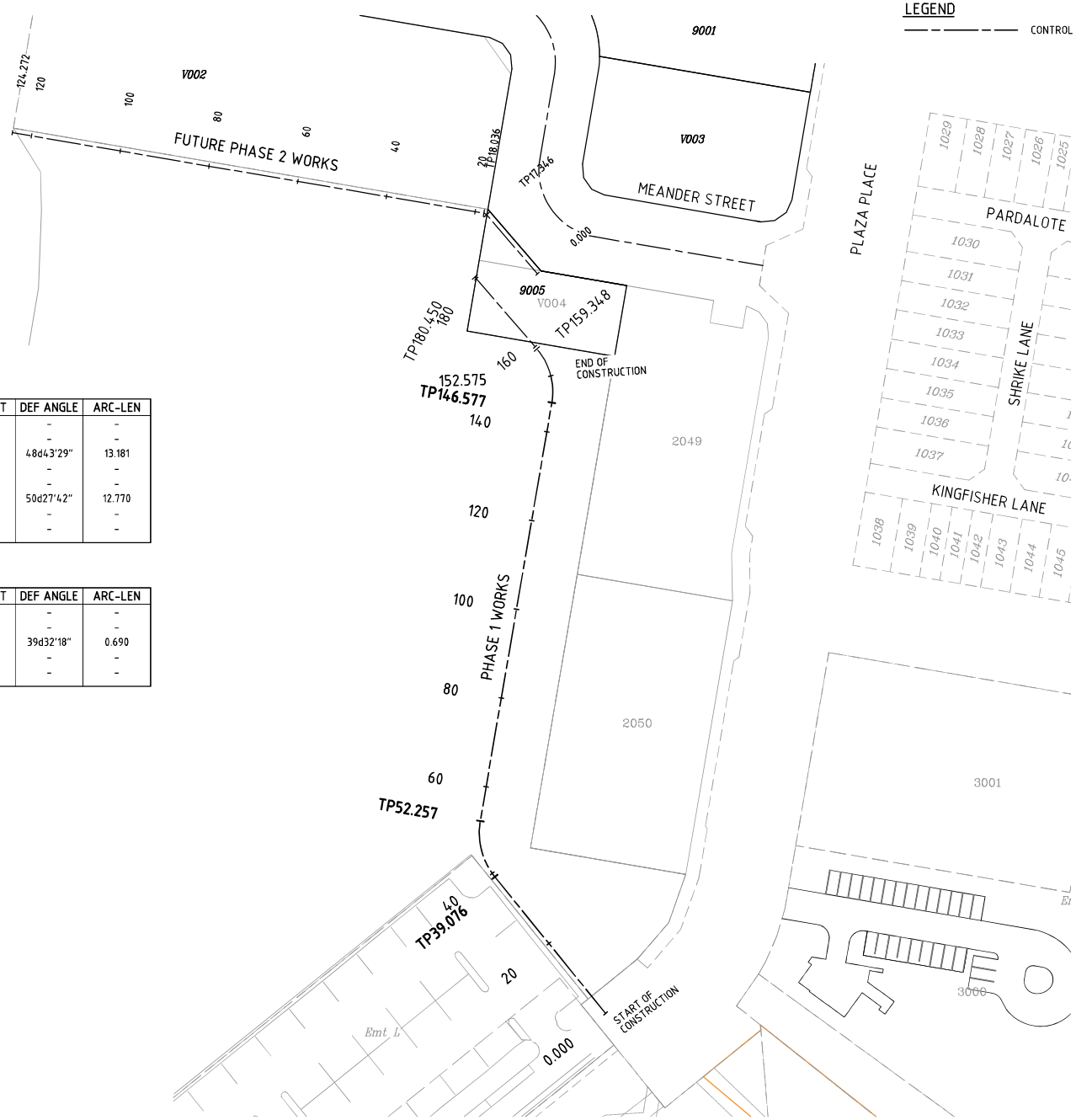
Drawing Title
GENERAL
LOCALITY PLAN,
DRAWING INDEX AND NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	01 of 12

	Drawing No	Revision
A1	22-106-01	A



SETOUT PLAN
SCALE 1:500

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

CATCH DRAIN CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	502587.596	6974671.368	320d58'50"	-	-	-	-
TC	39.076	502562.994	6974701.727	320d58'50"	-	-	-	-
IP2	45.666	502558.575	6974707.181	-	15.500	7.019	48d43'29"	13.181
CT	52.257	502559.759	6974714.099	9d42'19"	-	-	-	-
TC	146.577	502575.659	6974807.069	9d42'19"	-	-	-	-
IP3	152.963	502576.811	6974813.804	-	14.500	6.833	50d27'42"	12.770
CT	159.348	502572.351	6974818.980	319d14'38"	-	-	-	-
IP4	180.451	502558.574	6974834.965	319d14'38"	-	-	-	-

FUTURE PHASE 2 WORKS CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	502572.482	6974835.677	319d14'38"	-	-	-	-
TC	17.346	502561.157	6974848.817	319d14'38"	-	-	-	-
IP2	17.691	502560.923	6974849.089	-	1.000	0.359	39d32'18"	0.690
CT	18.036	502560.569	6974849.150	279d42'19"	-	-	-	-
IP3	124.272	502455.853	6974867.059	279d42'19"	-	-	-	-

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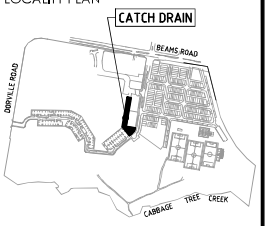
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	

DRAFT

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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Drawing Title
GENERAL SETOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

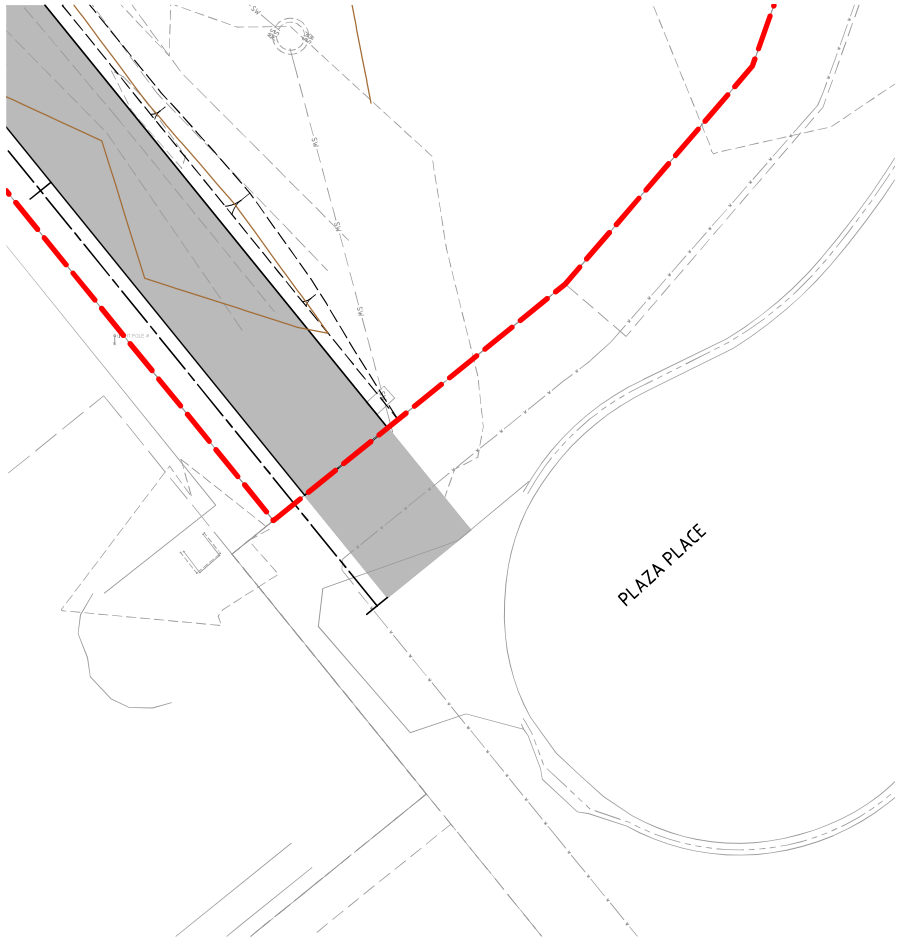
Scale	Sheet
AS SHOWN	02 of 12

A1	Drawing No	Revision
	22-106-02	A

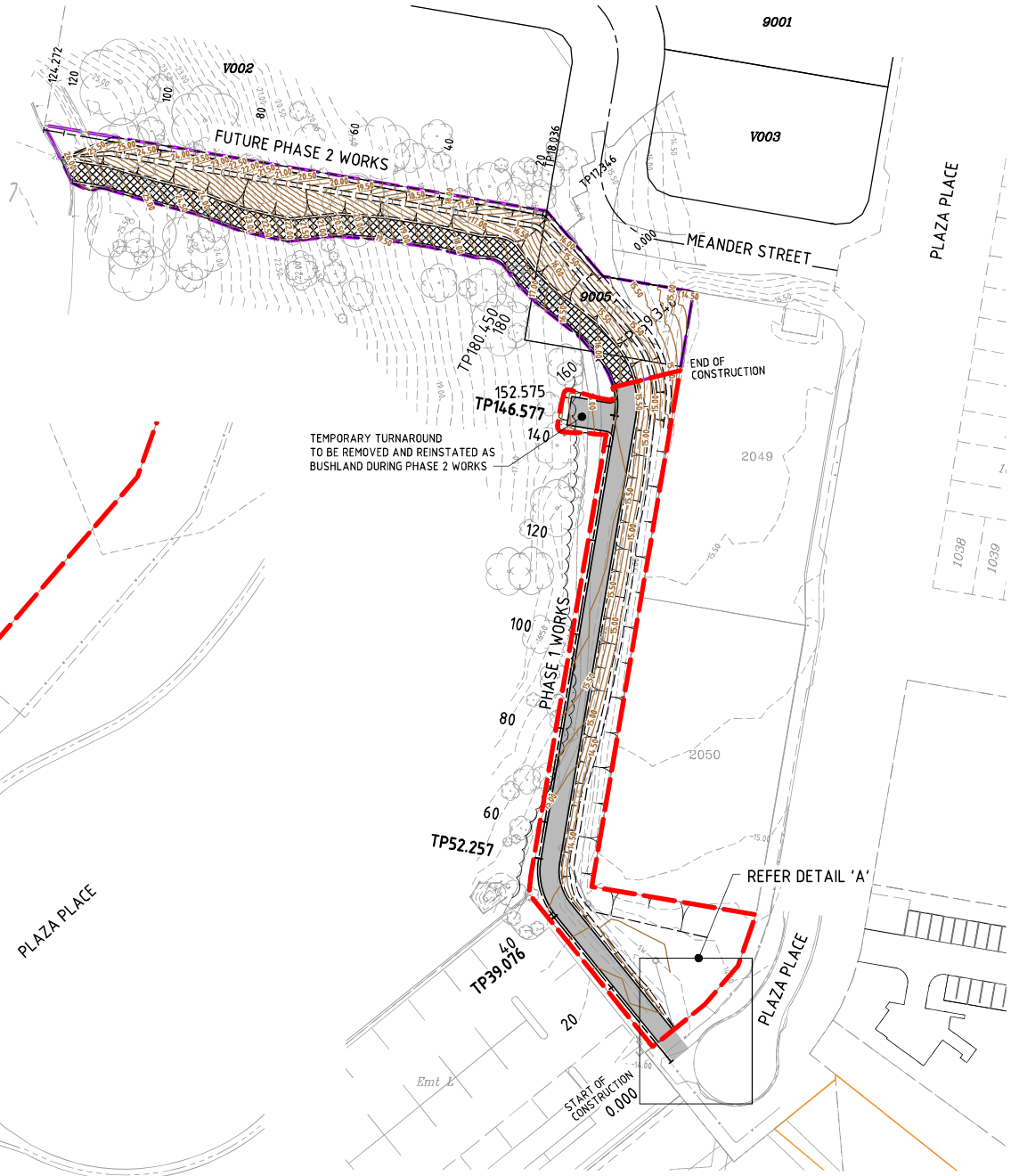
M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-02-GE-SETOUT.dwg Plotted by: RW on 8/07/2022 3:10:51 PM

LEGEND

- EXTENT OF WORKS PHASE 1
- FUTURE EXTENT OF WORKS PHASE 2
- CONTROL LINE
- FINISHED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- 4m WIDE GRAVEL ACCESS TRACK
- FUTURE 4m WIDE GRAVEL ACCESS TRACK



DETAIL 'A'
SCALE 1:100



LAYOUT PLAN
SCALE 1:500

SCALE 1 : 100 (A1 UNREDUCED)

SCALE 1 : 500 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
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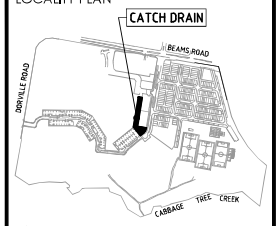
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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
GENERAL LAYOUT PLAN

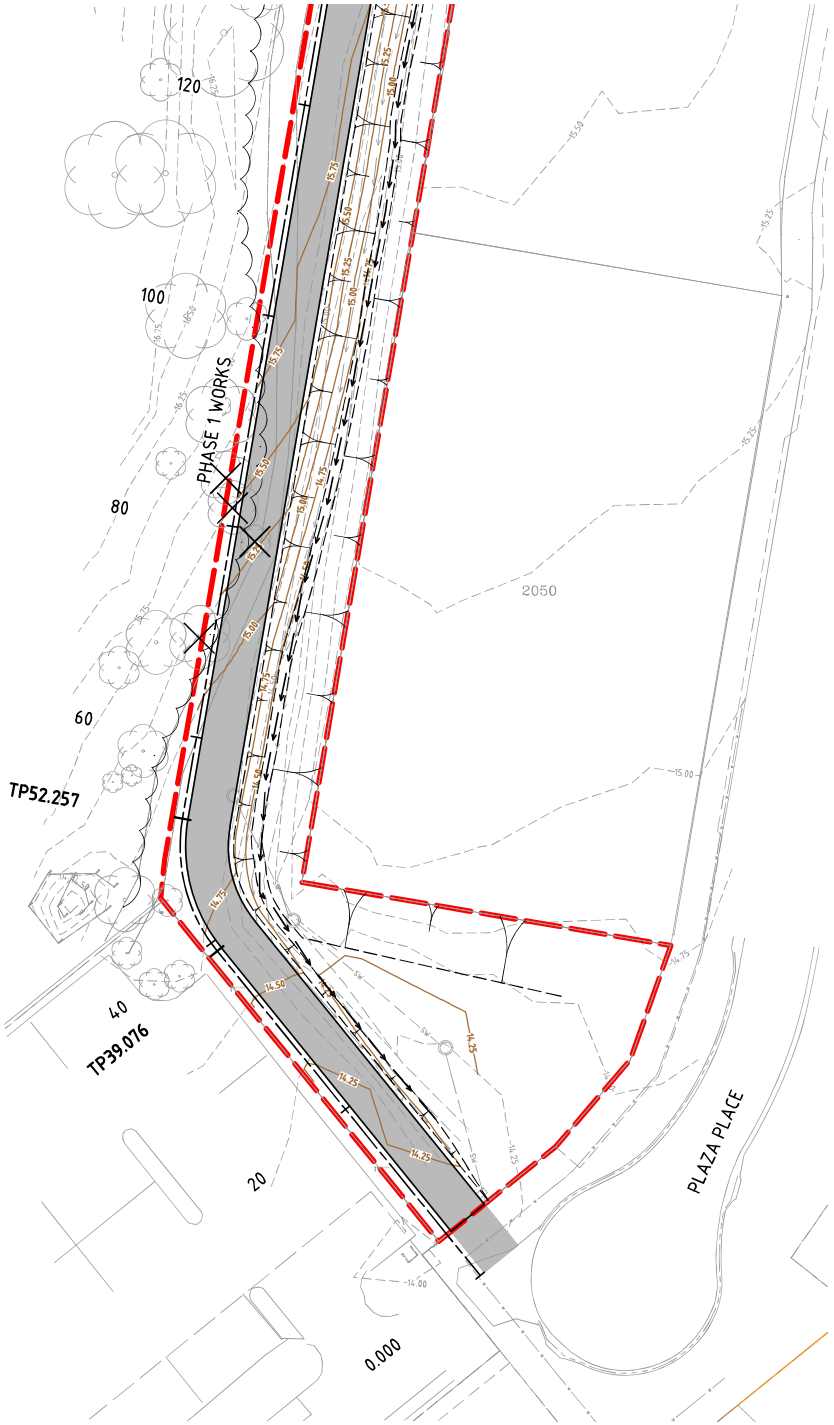
Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	03 of 12

	Drawing No	Revision
A1	22-106-03	A

M:\2022\22706 Carseldine Village Catch Drain\ACAD\22-106-03-GE-LAYOUT.dwg Plotted by: RW on 8/07/2022 3:10:58 PM

JOINS KNG DWG No 22-106-05



EARTHWORKS CONTOUR PLAN
SCALE 1:250

LEGEND

- EXTENT OF WORKS PHASE 1
- FUTURE EXTENT OF WORKS PHASE 2
- CONTROL LINE
- CATCH DRAIN
- FINISHED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- 4m WIDE GRAVEL ACCESS TRACK
- FUTURE 4m WIDE GRAVEL ACCESS TRACK
- EXISTING TREE
- EXISTING TREE TO BE REMOVED TO BE CONFIRM BY OTHERS

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

DO NOT SCALE THIS DRAWING
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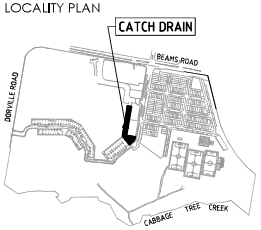
NORTH

LOCALITY PLAN



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Drawing Title
EARTHWORKS CONTOUR PLAN SHEET 1

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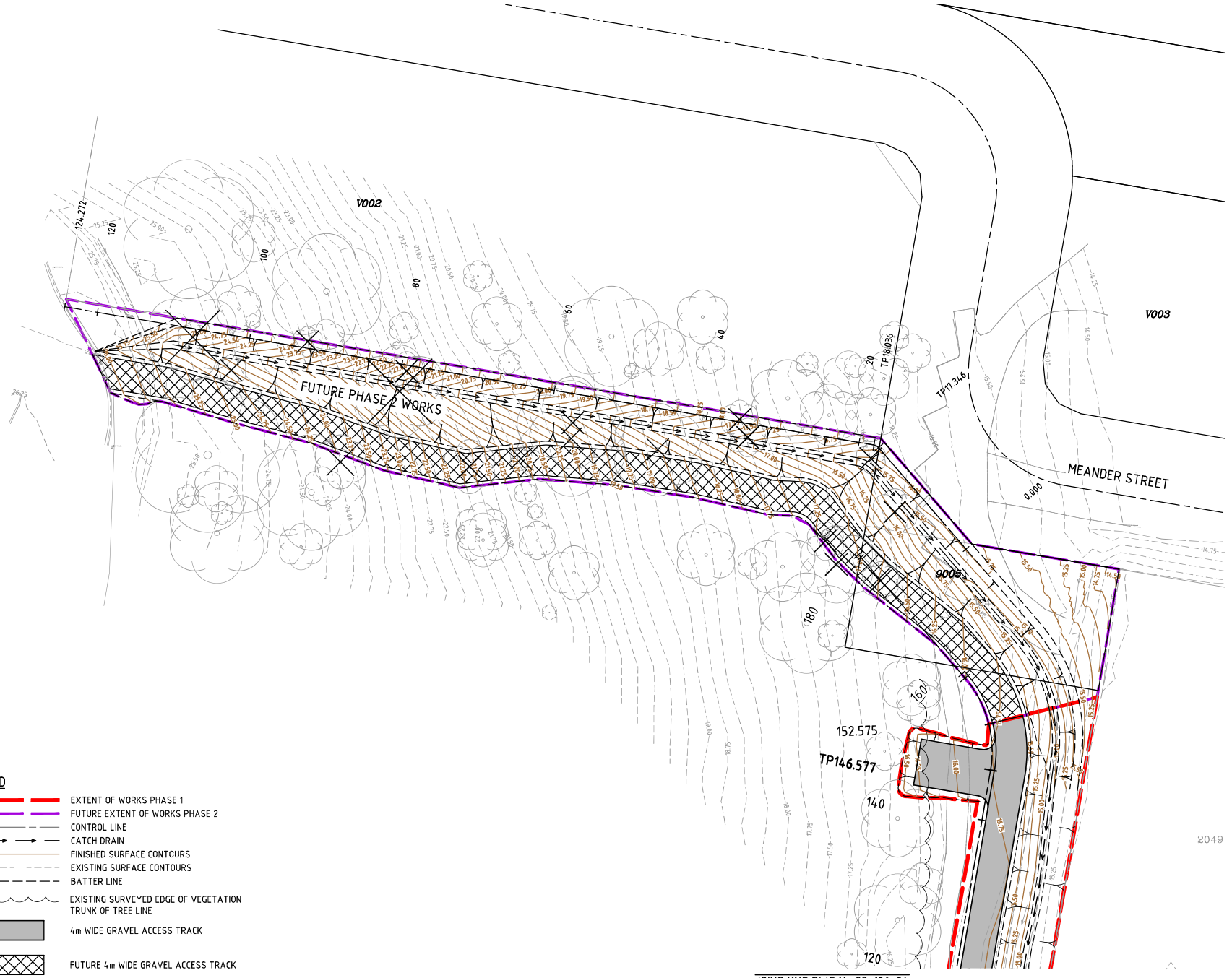
AS SHOWN	04 of 12

	Drawing No	Revision
A1	22-106-04	A



LEGEND

- EXTENT OF WORKS PHASE 1
- FUTURE EXTENT OF WORKS PHASE 2
- CONTROL LINE
- CATCH DRAIN
- FINISHED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- 4m WIDE GRAVEL ACCESS TRACK
- FUTURE 4m WIDE GRAVEL ACCESS TRACK
- EXISTING TREE
- EXISTING TREE TO BE REMOVED TO BE CONFIRM BY OTHERS

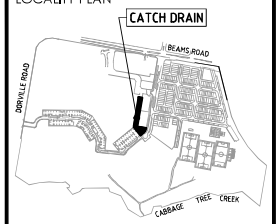
EARTHWORKS CONTOUR PLAN
SCALE 1:250

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

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ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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Drawing Title
EARTHWORKS CONTOUR PLAN SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	05 of 12

	Drawing No	Revision
A1	22-106-05	A

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DO NOT SCALE THIS DRAWING
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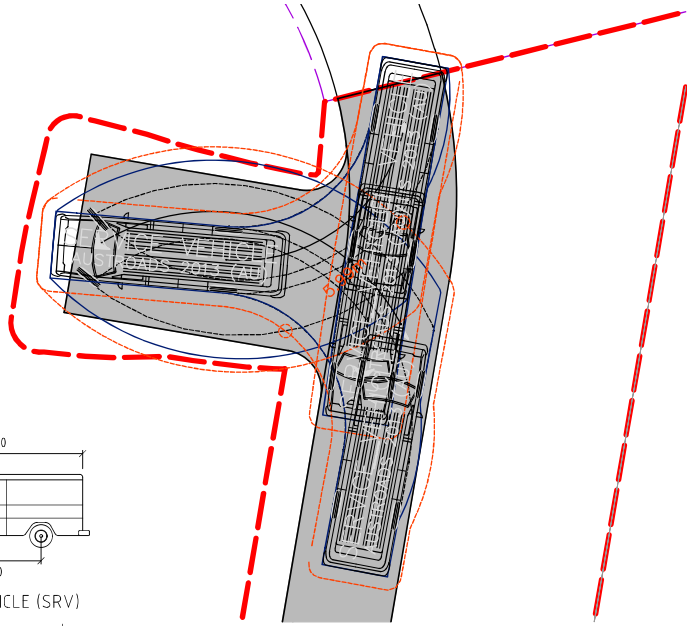
LEGEND

- EXTENT OF WORKS PHASE 1
- 36.0 FINISHED SURFACE CONTOURS
- 36.0 EXISTING SURFACE CONTOURS
- BATTER LINE
- FUTURE BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- GRAVEL ACCESS TRACK

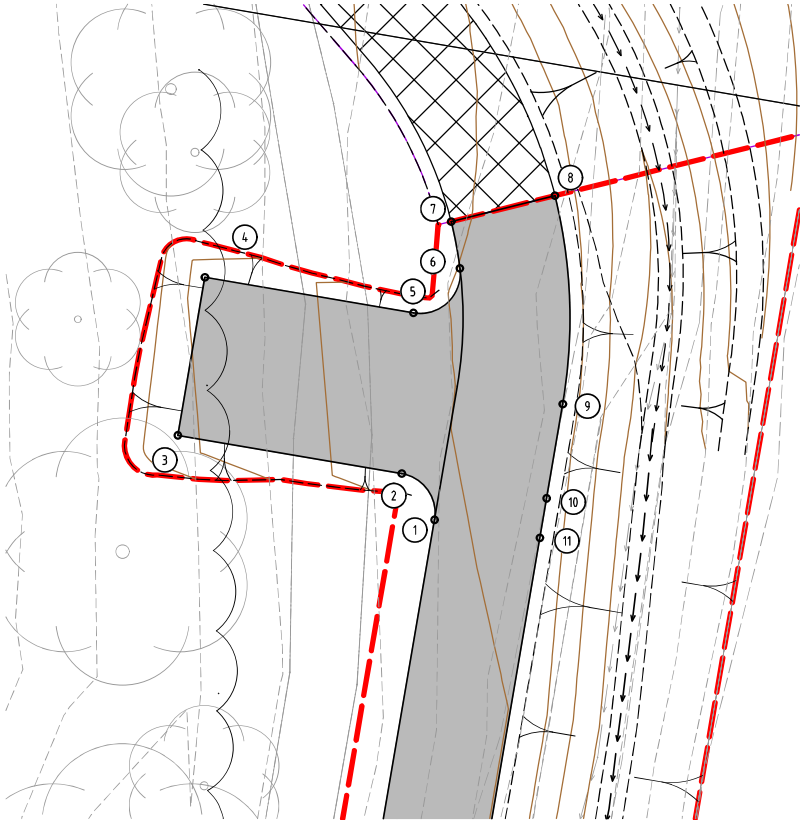
NOTE:
TEMPORARY TURNAROUND
TO BE REMOVED AND REINSTATED AS
BUSHLAND DURING PHASE 2 WORKS



SERVICE VEHICLE (SRV)

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7

TEMPORARY TURNAROUND TURN PATHS
SCALE 1:100



TEMPORARY TURNAROUND DETAIL
SCALE 1:100

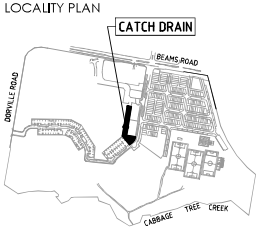
SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
1	502575.296	6974801.980	15.816
2	502574.071	6974803.711	15.863
3	502565.695	6974805.144	16.291
4	502566.706	6974811.058	16.214
5	502574.508	6974809.724	15.818
6	502576.249	6974811.390	15.745
7	502575.922	6974813.141	15.789
8	502579.803	6974814.108	15.590
9	502580.095	6974806.311	15.546
10	502579.492	6974802.784	15.588
11	502579.239	6974801.306	15.616

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

NORTH

LOCALITY PLAN



REVISIONS

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Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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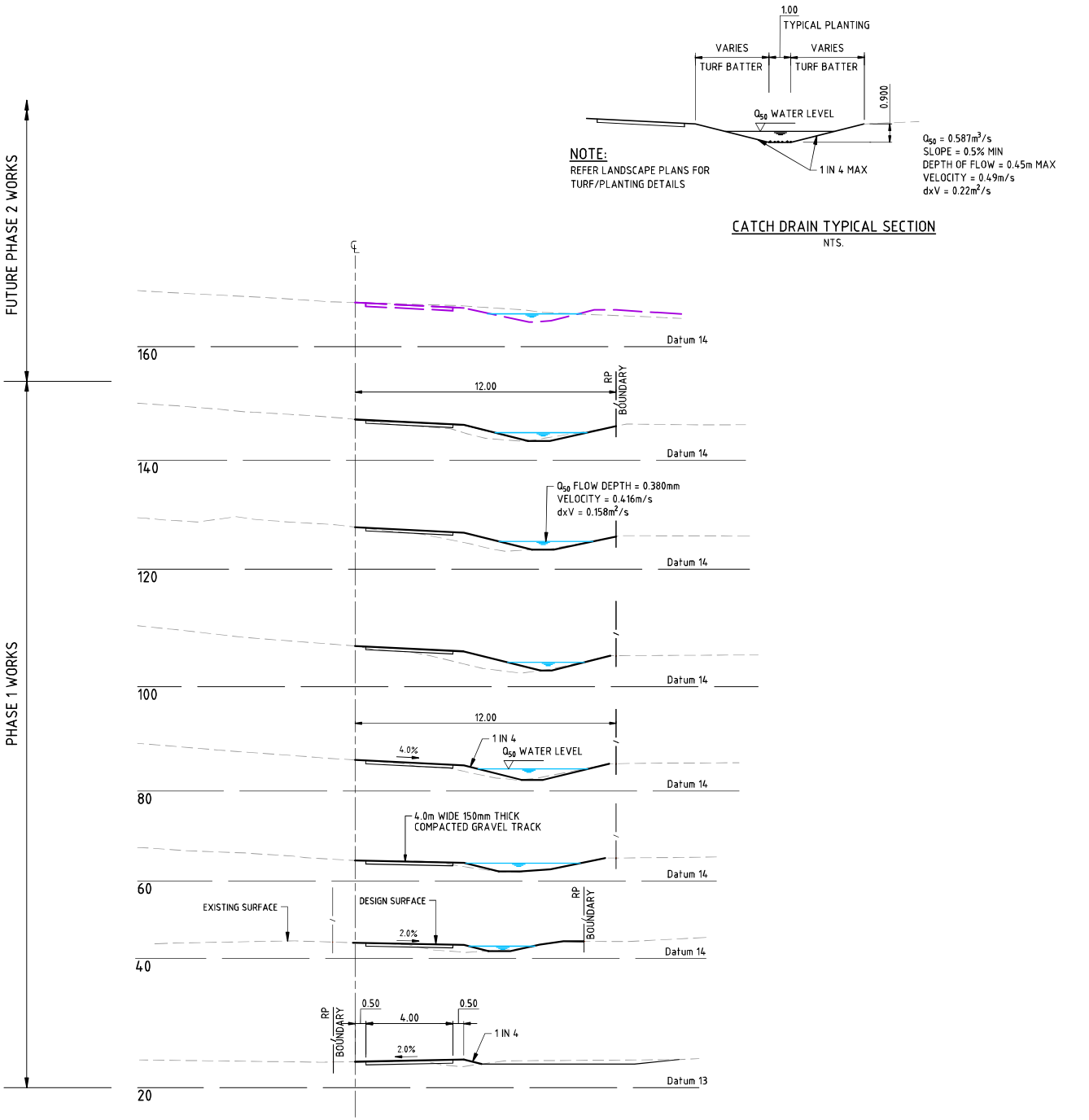
Drawing Title
TEMPORARY TURNAROUND DETAILS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	06 of 12

	Drawing No	Revision
A1	22-106-06	A



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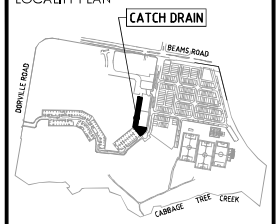
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
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CARSELDINE VILLAGE CATCH DRAIN

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Drawing Title
CATCH DRAIN
CROSS SECTIONS
PHASE 1 WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	07 of 12

	Drawing No	Revision
A1	22-106-07	A

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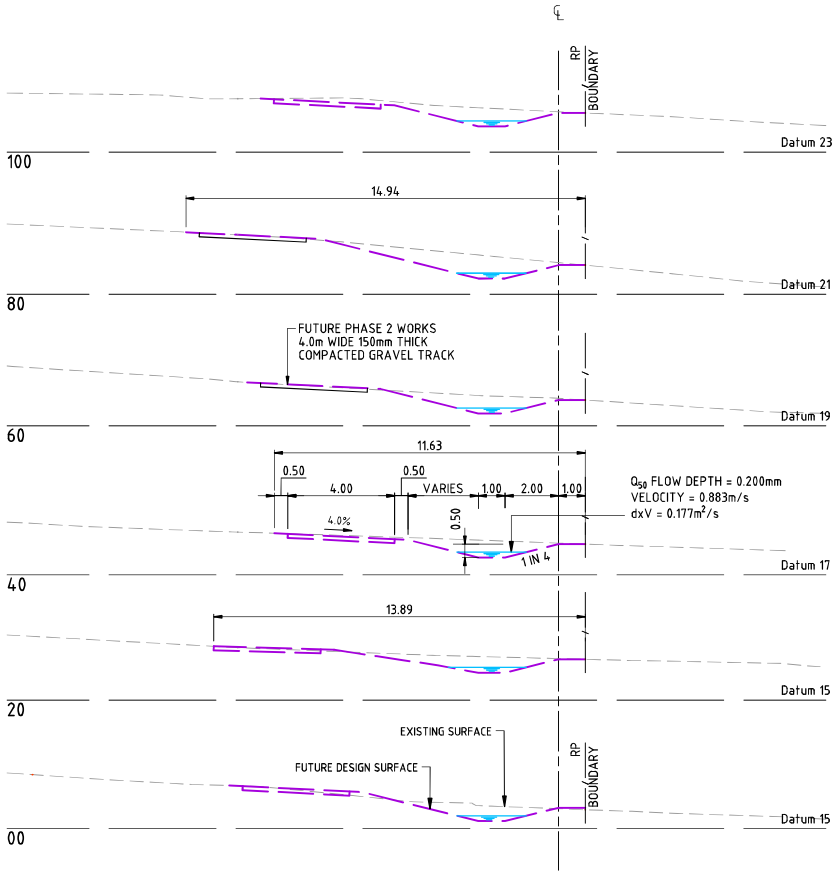


CROSS SECTIONS - CATCH DRAIN FUTURE PHASE 2 WORKS

SCALE 1 : 100

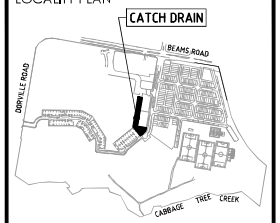
SCALE 1 0.5 0 1 2 3 4 5 6 7 8 9 10m

1 : 100 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
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Drawing Title
CATCH DRAIN
CROSS SECTIONS
FUTURE PHASE 2 WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	08 of 12

	Drawing No	Revision
A1	22-106-08	A

CATCH DRAIN SEDIMENT AND EROSION CONTROL LAYOUT PLAN
SCALE 1:500

LEGEND

SEDIMENT AND DIVERSION FENCE (TEMP)

AREA TO BE GRASS SEEDED AND MULCHED

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

DO NOT SCALE THIS DRAWING
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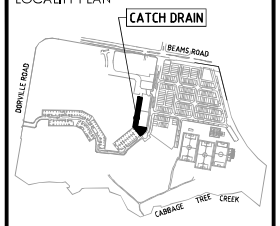
NORTH

LOCALITY PLAN



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Drawing Title
EROSION AND SEDIMENT CONTOUR PLAN LAYOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	09 of 12

	Drawing No	Revision
A1	22-106-09	A

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EROSION AND SEDIMENT CONTROL PROGRAM

1. THIS PROGRAM AND ASSOCIATED PLANS SHOULD BE READ IN CONJUNCTION WITH THE SITE MANAGEMENT SPECIFICATION INCORPORATED IN THE CONTRACT DOCUMENTS. THE PROVISIONS OF THE SPECIFICATION ARE TO BE STRICTLY ADHERED TO.
2. THE BASIC OBJECTIVES OF THE EROSION AND SEDIMENT CONTROL ARE:
   I. IDENTIFY CRITICAL AREAS AND PROVIDE APPROPRIATE ATTENTION TO THOSE AREAS.
   II. PLAN SITE LAYOUTS SO THAT ACCESS TO ALL REQUIRED DRAINAGE EROSION AND SEDIMENT CONTROL MEASURE IS MAINTAINED.
   III. LIMIT EXPOSURE TIME BY PROGRAMMING TO MINIMISE THE AREA OF LAND EXPOSED TO POTENTIALLY ADVERSE WEATHER CONDITIONS AT ANY ONE TIME. I.E. PROGRESSIVELY CLEAR AND REVEGETATE.
   IV. PROVIDE CONTROL MEASURES INCLUDING TEMPORARY AND PERMANENT DRAINAGE, EROSION AND SEDIMENT CONTROLS.
3. THE EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH BEST PRACTICE FOR EROSION AND SEDIMENT CONTROL, THE POLLUTION CONTROL MANUAL FOR URBAN STORMWATER MANAGEMENT, THE QUEENSLAND URBAN DRAINAGE MANUAL, AND THE SOIL EROSION AND SEDIMENT CONTROL – ENGINEERING GUIDELINES FOR QUEENSLAND (CURRENT EDITIONS).
4. CONSTRUCTION SEQUENCE THE CONSTRUCTION SEQUENCE WILL GENERALLY BE:
   I. OBTAIN ALL NECESSARY PERMITS AND APPROVALS BEFORE SITE ESTABLISHMENTS.
   II. HOLD A PRE-CONSTRUCTION CONFERENCE.
   III. STABILISE ALL CONSTRUCTION ACCESS ROUTES AND ENTRY/EXIT POINTS.
   IV. ESTABLISH SEDIMENT CONTROL STRUCTURES AND TEMPORARY DRAINAGE CONTROL MEASURES AS NECESSARY.
   V. CARRY OUT BULK EARTHWORKS.
   VI. MAINTAIN AND REPAIR DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES.
   VII. REMOVE SEDIMENT CONTROL MEASURES WHEN THE SITE IS STABILISED. I.E. >70% GROUND COVER
   VIII. THE CONTRACTOR SHALL PREPARE A SUPPLEMENTARY EROSION AND SEDIMENT CONTROL PLAN TO SUIT HIS/HER CONSTRUCTION METHODOLOGY, AND SUBMIT THIS PLAN FOR APPROVAL TO THE SUPERINTENDENT. IT SHOULD BE NOTED THAT ANY SIGNIFICANT VARIATION TO THIS PLAN MAY REQUIRE RESUBMISSION TO COUNCIL FOR APPROVAL. THE CLIENT SHALL NOT BE RESPONSIBLE FOR ANY SUCH ASSOCIATED DELAY.
5. ALL ESC DEVICES ARE TO BE INSPECTED WEEKLY, PRIOR TO EXPECTED AND AFTER RAINFALL ANY DAMAGE IS TO BE REPAIRED AS REQUIRED TO MAINTAIN THEIR EFFICACY.
6. ALL TEMPORARY EROSION AND SEDIMENT CONTROL (ESC) MEASURE TO BE MAINTAINED AND FULLY OPERATIONAL DURING THE MAINTENANCE PERIOD AND ARE TO BE REMOVED AFTER THE SATISFACTORY COMPLETION OF AN OFF-MAINTENANCE INSPECTION BY COUNCIL AND PRIOR TO FORMAL ACCEPTANCE "OFF MAINTENANCE" BY COUNCIL.
7. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR IS TO PROVIDE A DETAILED PROGRAM TO THE SUPERINTENDENT SHOWING THE TIMING FOR ALL WORKS ASSOCIATED WITH THE PROJECT, NOMINATING, IN PARTICULAR, THE PROGRAM FOR INSTALLATION OF SOIL AND EROSION CONTROL SYSTEMS.
8. EARTHWORKS SHALL BE CARRIED OUT IN SUCH A MANNER THAT THE SITE IS MAINTAINED IN A WELL DRAINED CONDITION, AREAS OF LOOSE SOIL ARE MINIMISED AND CONCENTRATIONS OF STORMWATER ARE MINIMISED. BULK EARTHWORKS WILL BE CARRIED OUT OVER THE ENTIRE SITE IN ONE STAGE.
9. A SHAKE DOWN AS DETAILED ON THE PLAN COMPRISING FREE DRAINAGE GRAVEL SHALL BE LOCATED ADJACENT TO THE POINT OF ACCESS WHERE VEHICLES CAN BE WASHED DOWN PRIOR TO EXIT TO THE STREET SYSTEM IF REQUIRED. THE WASH DOWN AREA SHALL BE KEPT FREE OF MUD.
10. FOR DETAILS OF ENTRY/EXIT SEDIMENT PAD REFER TO BEST PRACTICE EROSION & SEDIMENT CONTROL BOOK 1, PAGE 2.48, FIGURE 2.6.
11. SUPPLEMENTARY EROSION AND SEDIMENT CONTROL DEVICES MAY BE REQUIRED AT THE DISCRETION OF THE SUPERINTENDENT.
12. SEDIMENTATION FENCES TO BE PLACED AS SHOWN. FOR DETAILS OF SEDIMENT FENCE REFER BEST PRACTICE EROSION & SEDIMENT CONTROL BOOK 1, PAGE 2.50, FIGURE 2.8.
13. WHERE SEDIMENT FENCES ARE SHOWN TO BE CONSTRUCTED IN AREAS OF SIGNIFICANT EARTHWORKS, ERECTION OF THE FENCE MAY BE DEFERRED UNTIL COMPLETION OF THE BULK EARTHWORKS, SUBJECT TO ABSENCE OF RAIN.

TREES

1. ENSURE COMPLIANCE WITH THE REQUIREMENTS OF AS4970 – TREES ON CONSTRUCTION SITES. THIS MAY REQUIRE CONSULTATION AND GUIDANCE FROM A CLASS V CERTIFIED ARBORIST AS TREES OUTSIDE THE IMMEDIATE WORK AREA MAY BE AFFECTED.
2. ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THE 28 SOUTH ENVIRONMENTAL FMP, INCLUDING IMPLEMENTING THE NOMINATED TREE PROTECTION ZONES.

EROSION AND SEDIMENT CONTROL NOTES

1. NO DISTURBED AREA IS TO REMAIN DENUDED LONGER THAN 60 DAYS.
2. ALL EROSION AND SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING AND GRUBBING OR ANY OTHER EARTHWORKS OR TRENCHING.
3. ALL STORMWATER, SEWER LINE AND SERVICES TRENCHES NOT IN STREETS ARE TO BE MULCHED AND SEEDED WITHIN 15 DAYS AFTER BACKFILL, NO MORE THAN 150 METRES ARE TO BE OPEN AT ANY ONE TIME.
4. ALL TEMPORARY EARTH BANKS, DIVERSIONS AND SEDIMENT DAM EMBANKMENTS ARE TO BE MACHINE-COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATIVE COVER WITHIN 10 DAYS AFTER GRADING. STRAW OR HAY MULCH IS REQUIRED.
5. ALL FILL EMBANKMENTS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS OPERATION.
6. ALL CUT AND FILL BATTERS ARE TO BE SEEDED AND MULCHED WITHIN 10 DAYS OF COMPLETION OF GRADING.
7. ADDITIONAL SILT AND EROSION CONTROLS MAY BE REQUIRED AS ORDERED ON SITE BY THE SUPERVISING ENGINEER.
8. ALL CONTROLS ARE TO BE INSPECTED AFTER EACH STORM EVENT AND MAINTAINED AS REQUIRED. CONTROLS ARE TO BE MAINTAINED UNTIL THE DISTURBED AREAS ARE PERMANENTLY STABILIZED OR UNTIL NO LONGER REQUIRED.

PHASE 1 - CLEARING AND BULK EARTHWORKS

CONSTRUCT AND MAINTAIN SILT FENCES, STRAW BALE TRAPS, ALLOTMENT DRAINAGE BANKS, CATCH DRAINS AND HYDROMULCHING WHICH CONTROL SEDIMENT AND EROSION DURING CLEARING AND BULK EARTHWORKS.

PHASE 2 - TRENCH EXCAVATION

CONSTRUCT AND MAINTAIN SILT FENCES, STRAW BALE TRAPS, ALLOTMENT DRAINAGE BANKS AND CATCH DRAINS WHICH CONTROL SEDIMENTATION AND EROSION DURING TRENCHING WORK.

PHASE 3 - PAVEMENT CONSTRUCTION

CONSTRUCT AND MAINTAIN SILT FENCES, STRAW BALE TRAPS, ALLOTMENT DRAINAGE BANKS, GULLY INLET PROTECTION, AND PIPE INLET/OUTLET PROTECTION WHICH CONTROL SEDIMENTATION AND EROSION DURING PAVEMENT CONSTRUCTION. SAND BAGGING TO BE PLACED ACROSS PAVEMENT TO CONTROL RUNOFF IN PAVEMENT BOXING AS DIRECTED ON SITE.

PHASE 4 - MAINTENANCE PERIOD

CONSTRUCT AND MAINTAIN CONTROLS AND VEGETATIVE TREATMENTS WHICH CONTROL SEDIMENTATION AND EROSION PRIOR TO THE ESTABLISHMENT OF GRASS COVER.
PROVIDE 600mm WIDE GRASS FILTER STRIPS BEHIND KERB AND CHANNEL.

NOTE: TURF TREATMENT IN CERTAIN AREAS BY LANDSCAPER. REFER TO LANDSCAPE DRAWING.

NOTE

ALL VEHICLES EXITING FROM THE SITE ARE TO BE CLEANED AND TREATED TO PREVENT MATERIAL BEING TRACKED OR DEPOSITED ONTO PUBLIC ROADS.
IF MATERIAL IS ACCIDENTLY DEPOSITED ONTO PUBLIC ROADS IT SHALL BE REMOVED WITHOUT DELAY. IF THE SHAKEDOWN DEVICE PROVES TO BE INEFFECTIVE THE CONTRACTOR IS TO USE OTHERS MEANS TO PREVENT MATERIAL BEING DEPOSITED ONTO PUBLIC ROADS.

TOPSOIL

1. STRIP AND STOCKPILE AVAILABLE TOPSOIL (ASSUMED AVERAGE DEPTH 150mm) FROM ALL DISTURBED AREAS PRIOR TO BULK EARTHWORKS. GRADE EVENLY BETWEEN ALLOTMENT FINISHED SURFACE LEVELS AND ENSURE LOTS ARE FREE DRAINING.
2. MINIMUM SLOPE ACROSS ALLOTMENTS TO BE 1%.
3. ALL FOOTPATHS, BATTERS, AND EARTHWORKS AFFECTED ALLOTMENTS ARE TO BE TOPSOILED TO A MINIMUM DEPTH OF 150mm (LIGHTLY COMPACTED) AND TURFED WHERE SPECIFIED.

SEDIMENT FENCES

1. SEDIMENT FENCES TO BE PLACED AS SHOWN. SEDIMENT FENCED TO BE REPAIRED AND EXCESSIVE SEDIMENT DEPOSITS SHALL BE REMOVED ONCE CAPACITY FALLS BELOW 75%.
2. FOR DETAILS OF SEDIMENT FENCE REFER BEST PRACTICE EROSION & SEDIMENT CONTROL BOOK 1, PAGE 2.50, FIGURE 2.8.
3. SEDIMENT FENCES TO BE REPAIRED AS REQUIRED AND EXCESSIVE SEDIMENT DEPOSITS SHOULD BE REMOVED.
4. INSTALL KERB INLETS WITH GRAVEL RANGING FROM 50mm TO 75mm IN SIZE SHALL BE INSTALLED AT ALL COMPLETED INLETS. REFER IPWEAQ STANDARD DRAWING D-0041. THESE SHALL BE MAINTAINED IN A CLEAN CONDITION. IN THE EVENT OF HEAVY RAIN THEY SHALL BE REMOVED TO MINIMISE THE POTENTIAL FOR FLOODING.
5. CHECKS OF SILT CONTROL DEVICES ARE TO BE MADE WEEKLY, OR AFTER ANY SIGNIFICANT STORM EVENT TO ENSURE INTEGRITY AND PERFORMANCE.

TURFING

1. PROVIDE TURFING TO ENTIRE WIDTH OF ALL SWALES, FOOTPATHS AND 1 IN 4 CUT AND FILL BATTERS.
2. FOOTPATH BATTERS ARE TO BE STABILISED WITH TOPSOIL (AND TURFED) AS SOON AS PRACTICAL AFTER THE BATTERS HAVE BEEN COMPLETED.

DURING CONSTRUCTION SEQUENCE:

1. TOPSOIL STOCKPILES SHALL BE LESS THAN 1m DEEP AND UNCOMPACTED. A SEDIMENTATION FENCE SHALL BE CONSTRUCTED ON THE D/S SIDE, OR THE STOCKPILE STABILISED WITH VEGETATION, MULCH, OR A SOIL STABILISER.
2. SEDIMENTATION FENCES TO BE PLACED AS SHOWN.
3. REGULARLY INSPECT BANKS AND REPAIR ANY SLUMPS, WHEEL TRACK DAMAGE OR LOSS OF FREEBOARD.
4. REMOVE SEDIMENT TO AVOID PONDING FROM CATCH DRAINS.
5. REMOVE EXCESSIVE SEDIMENT FROM UPSTREAM OF CHECK DAM.
6. ROAD RESERVE TO BE USED AS HAUL ROAD.
7. A CATCH DRAIN OR DIVERSION BANK IS TO BE PROVIDED ON THE TOP SIDE OF ALL CUTS, WITH DISCHARGE EITHER TO UNDISTURBED GRASS LANDS OR TO THE CROSS ROAD DRAINAGE.
8. SUPPLEMENTARY EROSION AND SEDIMENT CONTROL DEVISED MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER.
9. WATER QUALITY SAMPLES MUST BE TAKEN AND ANALYSED PRIOR TO THE RELEASE OF ANY WATER FROM THE SEDIMENT POND. WATER QUALITY MUST SATISFY THE FOLLOWING CRITERIA: TSS<50MG/L PH BETWEEN 6.5 AND 8.5.
10. ALL WATER QUALITY DATA INCLUDING DATES OF RAINFALL, TESTING AND WATER RELEASE MUST BE MAINTAINED IN AN ON-SITE REGISTER. THIS REGISTER IS TO BE MAINTAINED FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON SITE FOR INSPECTION BY COUNCIL OFFICERS ON REQUEST.
11. EXPOSED AREAS ON LOTS ARE TO BE SEEDED AND MULCHED (E.G. HYDROMULCHED). MULCH SHALL BE APPLIED AT A MINIMUM RATE OF 2.5T/HA. ALTERNATIVELY THEY SHALL BE DRILL-SEEDED AND IRRIGATED SO AS TO ENSURE >70% GROUND COVER WITHIN 14 DAYS FROM NOVEMBER TO APRIL, OR 30 DAYS FROM MAY TO OCTOBER.

FOLLOWING CONSTRUCTION:

1. SEDIMENTATION FENCES TO BE MAINTAINED UNTIL TURFING IS COMPLETED.
2. SEDIMENT BASINS TO BE CHECKED AFTER EVERY SIGNIFICANT STORM AND DESILTED ONCE THE SETTLEMENT LIMIT HAS BEEN REACHED.

STABILISATION:

1. THE AMOUNT OF AREA EXPOSED AT ANY ONE TIME TO BE MINIMISED BY STAGING THE WORKS WHEREVER POSSIBLE AND AIMING TO ACHIEVE FINISHED LEVEL IN EACH AREA AS QUICKLY AS POSSIBLE BEFORE OPENING NEW AREAS.
2. TOPSOIL TO BE STRIPPED AND STOCKPILED SEPARATELY TO SUB-SOILS.
3. STOCKPILES TO BE PROVIDED WITH SURFACE COVER USING A CHEMICAL SURFACE STABILISER SUCH AS VITAL CHEMICALS VITAL-BON MATT STONEWALL.
4. IF WORKS ARE DELAYED OR PUT ON HOLD THEN TEMPORARY EROSION CONTROL COVERING TO BE PROVIDED USING VITAL CHEMICALS VITAL-BON MATT P47-VR1 OR EQUIVALENT.
5. ONCE AREAS REACH FINISHED LEVEL:
   a. TOPSOIL TO BE SPREAD TO CAP/BURY THE DISPERSIVE SUBSOILS.
   b. TOPSOIL TO BE DRILL-SEEDED WITH A MIXTURE OF ANNUAL AND PERENIAL GRASS SPECIES (REFER TABLE) AND FERTILISER WITH CROP-KING 88 (0.3t/Ha).
   c. TEMPORARY SOIL COVER TO BE APPLIED CONSISTING OF VITAL CHEMICALS VITAL-BON MATT P47-VR1 OR EQUIVALENT.
   d. WATERING UNDERTAKEN AS NECESSARY UNTIL STABLE GRASS SURFACE COVER IS ESTABLISHED.

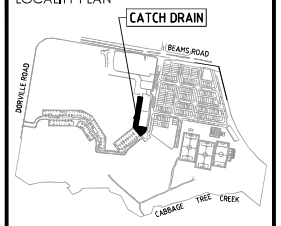
SEED MIXES

	SUMMER BLEND (APPLICATIONS NOVEMBER - DECEMBER)	MID SEASON BLEND (APPLICATIONS MARCH/APRIL & SEPTEMBER/OCTOBER)	WINTER BLEND (APPLICATIONS MAY AUGUST)
UNHULLED GREEN COUCH (CYNODON DACTYLON) OR BLUE COACH (DIGITARIA DIDACYLA)	25%	25%	25%
HULLED GREEN COUCH (CYNODON DACTYLON) OR BLUE COACH (DIGITARIA DIDACYLA)	25%	25%	25%
JAPANESE MILLET	30%	15%	N/A
RYE GRASS	N/A	15%	30%
CARPET GRASS (AXONOPUS AFFINIS)	20%	20%	20%

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved

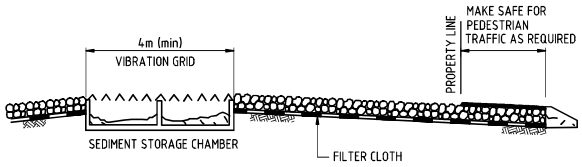
Drawing Title
EROSION AND SEDIMENT CONTROL PLAN NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	10 of 12

	Drawing No	Revision
A1	22-106-10	A

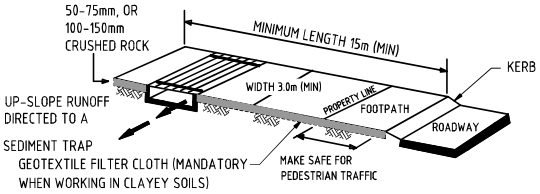
M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-09-11-SEDIMENT.dwg Plotted by: RW on 8/07/2022 3:11:21 PM



TYPICAL PROFILE OF A VIBRATION GRID

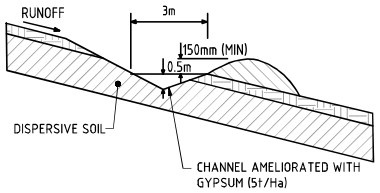
SITE ACCESS POINT SHAKEDOWN FACILITY

N.T.S.



SITE ACCESS POINT ENTRY/EXIT PAD

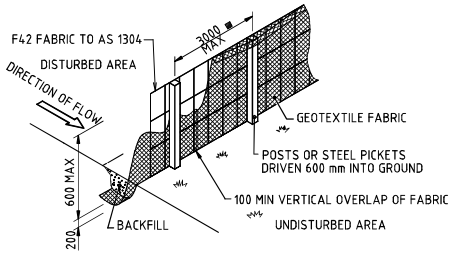
N.T.S.



CATCH DRAIN

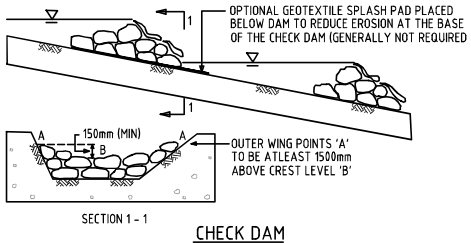
OPEN EARTH SLOPES						VEGETATED SLOPES		
SLOPE	HORIZ.	VERT.	SLOPE	HORIZ.	VERT.	SLOPE	HORIZ.	VERT.
1%	80m	0.9m	15%	19m	2.9m	<10%	NO MAXIMUM	
2%	60m	1.2m	20%	16m	3.2m	12%	100m	12m
4%	40m	1.6m	25%	14m	3.5m	15%	80m	12m
6%	32m	1.9m	30%	12m	3.5m	20%	55m	11m
8%	28m	2.2m	35%	10m	3.5m	25%	40m	10m
10%	25m	2.5m	40%	9m	3.5m	30%	30m	9m
12%	22m	2.6m	50%	6m	3.0m	>36%	CASE SPECIFIC	

TYPICAL CATCH DRAINS DIMENSIONS & SPACINGS



SEDIMENT FENCE

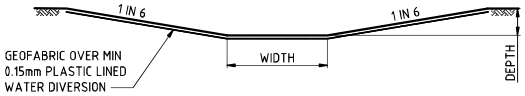
N.T.S.



SECTION 1 - 1

CHECK DAM

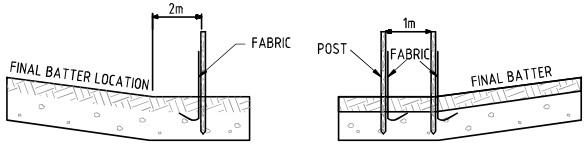
N.T.S.



TYPICAL LINED CATCH DRAIN

SCALE 1 : 40

SIZING TO BE DETERMINED DURING CONSTRUCTION



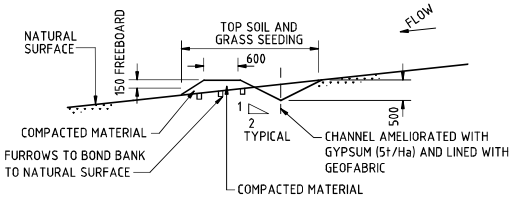
a) PLACEMENT OF SEDIMENT FENCE AT BASE OF FILL SLOPE

b) USE OF DOUBLE SEDIMENT FENCE AT THE BASE OF FILL SLOPE

SEDIMENT FENCE DETAILS

N.T.S.

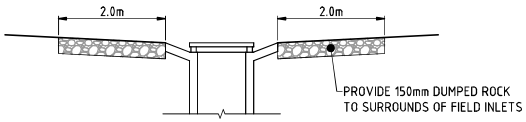
LOCATION OF SEDIMENT FENCE AT BASE OF FILL SLOPE



CROSS SECTION

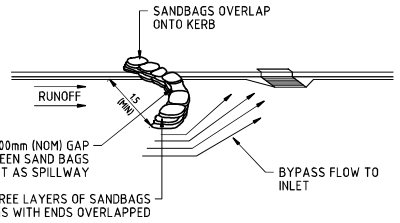
DIVERSION CHANNEL

N.T.S.



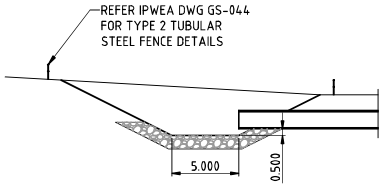
FIELD INLET PROTECTION

N.T.S.



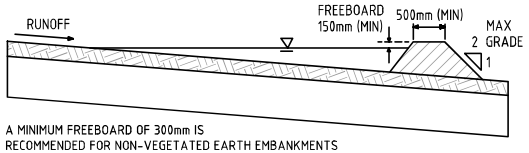
ON GRADE GULLY INLET

N.T.S.



TEMPORARY HEADWALL DETAIL

SCALE N.T.S



A MINIMUM FREEBOARD OF 300mm IS RECOMMENDED FOR NON-VEGETATED EARTH EMBANKMENTS

DIVERSION DRAINAGE BANK

N.T.S.

DO NOT SCALE THIS DRAWING
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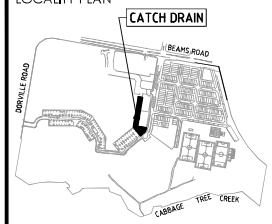
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	

DRAFT

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project: CARSELDINE VILLAGE CATCH DRAIN

kn group
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Spring Hill Q 4000
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Approved

Drawing Title: EROSION AND SEDIMENT CONTOUR PLAN DETAILS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	11 of 12

A1	Drawing No	Revision
	22-106-11	A

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
Project: CARSELDINE VILLAGE – CATCH DRAIN
Prepared By: Jason Burton Date: 10th June 2022
Reviewed By: Mark Shaw Date: 10th June 2022

Safety in Design Analysis

- Complete Safety in Design Analysis by populating the table where applicable with all of the relevant safety issues for the project. For example:

☐ Positioning of new services adjacent to existing live services	☒ Slope Stability
☒ Construction adjacent to existing road carriageways	☐ Retaining Walls
☐ Pedestrians	☒ Dust Control
☒ Civil Construction Workers	☒ Erosion and Sediment Control/Management
☒ Maintenance Workers	☒ Sediment Basin Construction
☒ Work Place Health and Safety Constraints	☐ Wetland/Dam Construction
☐ Unusual material handling	☐ Working under traffic
☐ Falls from heights	
☒ Underground Services (existing)	Project Specific Design Elements:
☐ Electrical Service Installation	
☐ Gas Service Installation	
☐ Communication Installation	
☐ Traffic Signal Installation	
☒ Landscape Workers	
☐ Line marking Workers	
☒ Excavation – open cut trenching - Trench excavation depths	
☐ Tunnel Boring	
☒ Confined Spaces	
☒ Lifting of loads	
☒ Unloading of materials and storage	
☐ Storage of hazardous materials	
☒ Geotechnical investigation – works	
☒ Bulk Earthworks	
☒ List all relevant safety studies	

The following table summarises the safety in design issues considered.

Section of Works	Identify any Potential Incident or Hazard	Consequence	Likelihood	Risk Rating	Risk Control Measures	Consequence	Likelihood	Residual Risk Rating (after design applied)	Risk Manager
Earthworks Material Investigation	Geotechnical Investigation	C	3	S	SWMS required by Contractor	D	3	M	Contractor
Road/Earthworks Works	Pedestrians Injury	D	3	M	TMP to be provided by Contractor to exclude pedestrians from work site	E	3	L	Contractor
	Civil Construction Workers – Injury	A	4	H	TMP and SWMS required for all activities	C	2	S	Contractor
	Maintenance Workers	A	4	H	TMP and SWMS required for all activities	C	3	S	Contractor
	Underground Services (Existing)	A	3	H	DBYD information to be sort prior to design. Existing to be located by survey if applicable to design. All existing services to be located and depths confirmed prior to commencement. SWMS to be provided by Contractor	C	2	S	Designer/ Contractor
Working adjacent to existing Infrastructure	Conflict between construction equipment / personnel and live infrastructure in particular Power lines	B	4	S	All existing services highlighted in the documentation. Contractor to complete DBYD search before commencing works. SWMS to be provided by Contractor	C	4	M	Designer/ Contractor
Service trench/ pipe installation	Location of all trenches to provide clearance to all other services and all structures or battered embankments	A	4	H	Mains located with safe working clearance to existing pressure mains, structures and battered embankments	C	4	M	Designer
	Trench depth	A	4	M	Depth of trenches minimized for both safety and cost efficiency	C	4	M	Designer
Works within Confined Spaces	Construction of stormwater, sewer, water and wetland structures	A	4	M	Contractor to ensure works undertaken in a manner complying with safe work method statements	D	5	L	Contractor
Silt and Erosion Control	Public access to water retaining temporary sediment basins	A	5	S	Protection measures – that is fencing of all water retaining structures with side slopes greater than 1 in 5 as described in International Erosion Control Association (Australasian) Table B9	C	4	M	Designer/ Contractor

RISK ASSESSMENT AND CONTROL

Risk Assessment

Select **one** category from each of the columns below that best represents the likely outcome if the potential hazard actually did occur. For each consequence consider the **most likely outcome** and **not** the 'absolute worst' case.

Consequence		Likelihood	
A	Death – major environmental damage	1	Certain
B	Permanent Disability – severe environmental damage	2	Probable
C	Lost Time Injury – moderate environmental damage	3	Possible
D	Medical Treatment Injury – minor environmental damage	4	Unlikely
E	First Aid Treatment	5	Very Unlikely

RISK RATING

H: High Risk **S: Significant Risk**

M: Moderate Risk **L: Low Risk**

Read the Risk Rating from the matrix below:

Risk Assessment Matrix	A	B	C	D	E
1	H	H	H	S	S
2	H	H	S	S	M
3	H	H	S	M	L
4	H	S	M	L	L
5	S	S	M	L	L

Certain - means an event or situation that is happening more or less all the time, including continuous situations
Permanent Disability – means a disability, such as loss of a limb or eyesight, loss of hearing, chronic skin disorder, chronic back disorder, emphysema, and the like

Probable – means an event or situation that occurs or is likely to occur about ten times or more per year
Possible – means an event or situation that occurs or is likely to occur about once per year
Unlikely – means an event or situation that occurs or is likely to occur less frequently than once every ten years

Issued 10th June 2022 Rev - A

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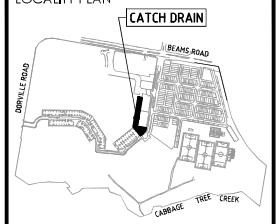
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	08.07.2022	

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project: CARSELDINE VILLAGE CATCH DRAIN

kn group
ABN 35 112 53 611
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Approved

Drawing Title: SAFETY IN DESIGN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	12 of 12

	Drawing No	Revision
A1	22-106-12	A

APPENDIX D DIAL BEFORE YOU DIG (DBYD)

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

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

Dial Before You Dig Terms and Conditions

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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.

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.

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.

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

Plant Solutions and Assistance

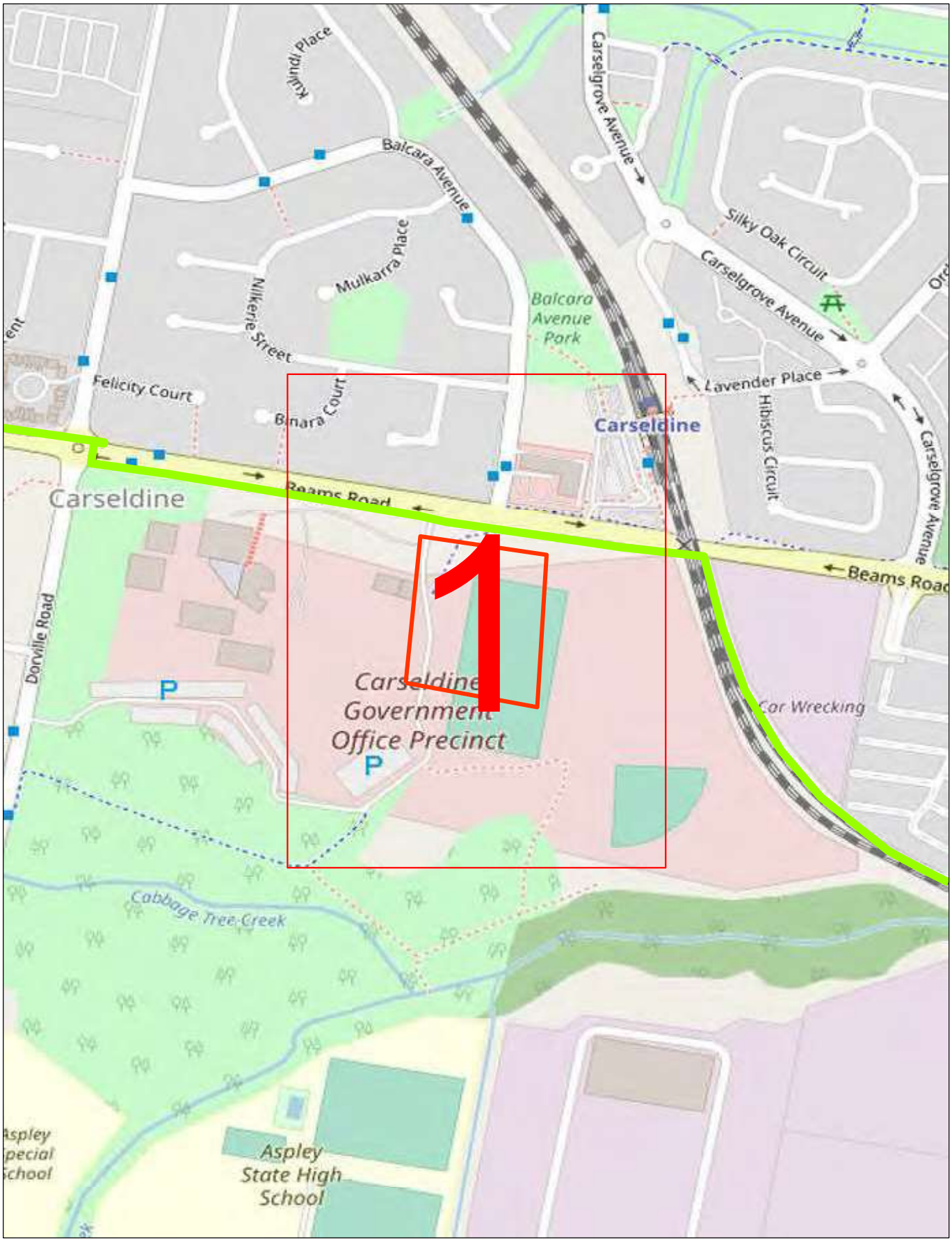
If Powerlink's plant location plans or visual location of Powerlink's plant by hand digging reveals that the location of this plant is situated wholly or partly where the developer or constructor plans to work, then Powerlink's Property Services Team must be contacted on (07) 3866 1313 to discuss possible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

Date: 09/02/2(

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
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0 0.05km

Imagery sourced from Open StreetMaps

LEGEND:

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

Affected DBYD Work Area Symbols

Date: 09/02/2(

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

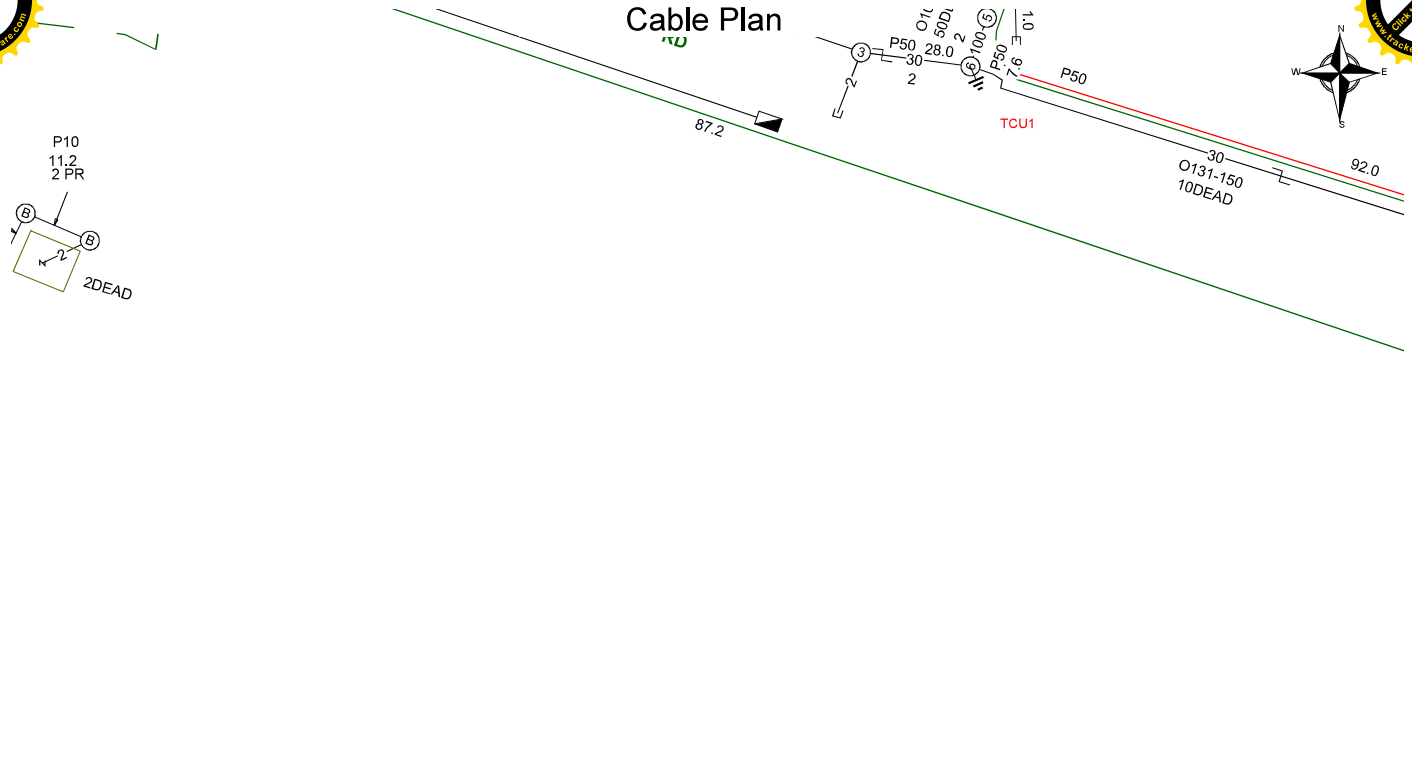
Imagery sourced from Open StreetMaps

LEGEND:

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

Affected DBYD Work Area Symbols

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

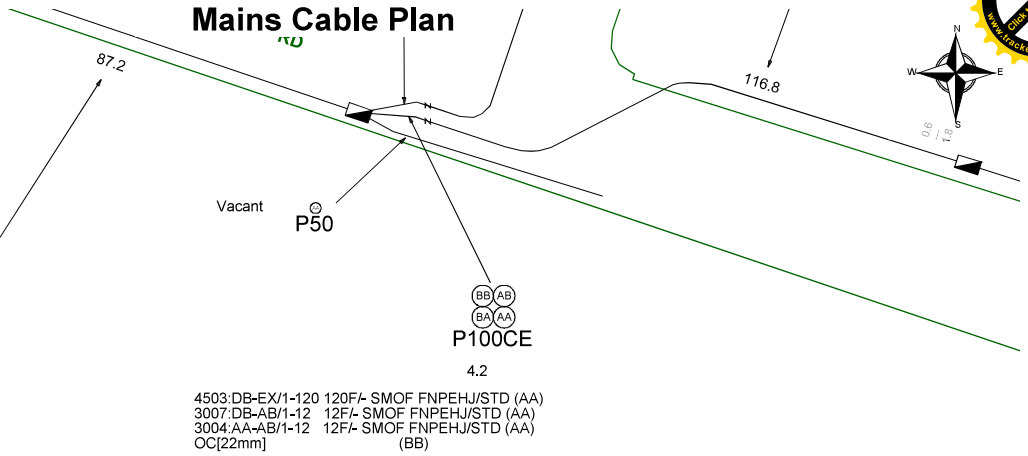
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths 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.

Mains Cable Plan



DB-EX/1-120 120F/- SMOF FNPEHJ/STD (AA)
M1-100 100 CPIUT (AA)
07:DB-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
04:AA-AB/1-12 12F/- SMOF FNPEHJ/STD (AA)
ST (AA)
8:M801-1000 200 CPIUT (AB)
8:M601-700 200 CPIUT (AB)
100DEAD
232 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)

Telstra

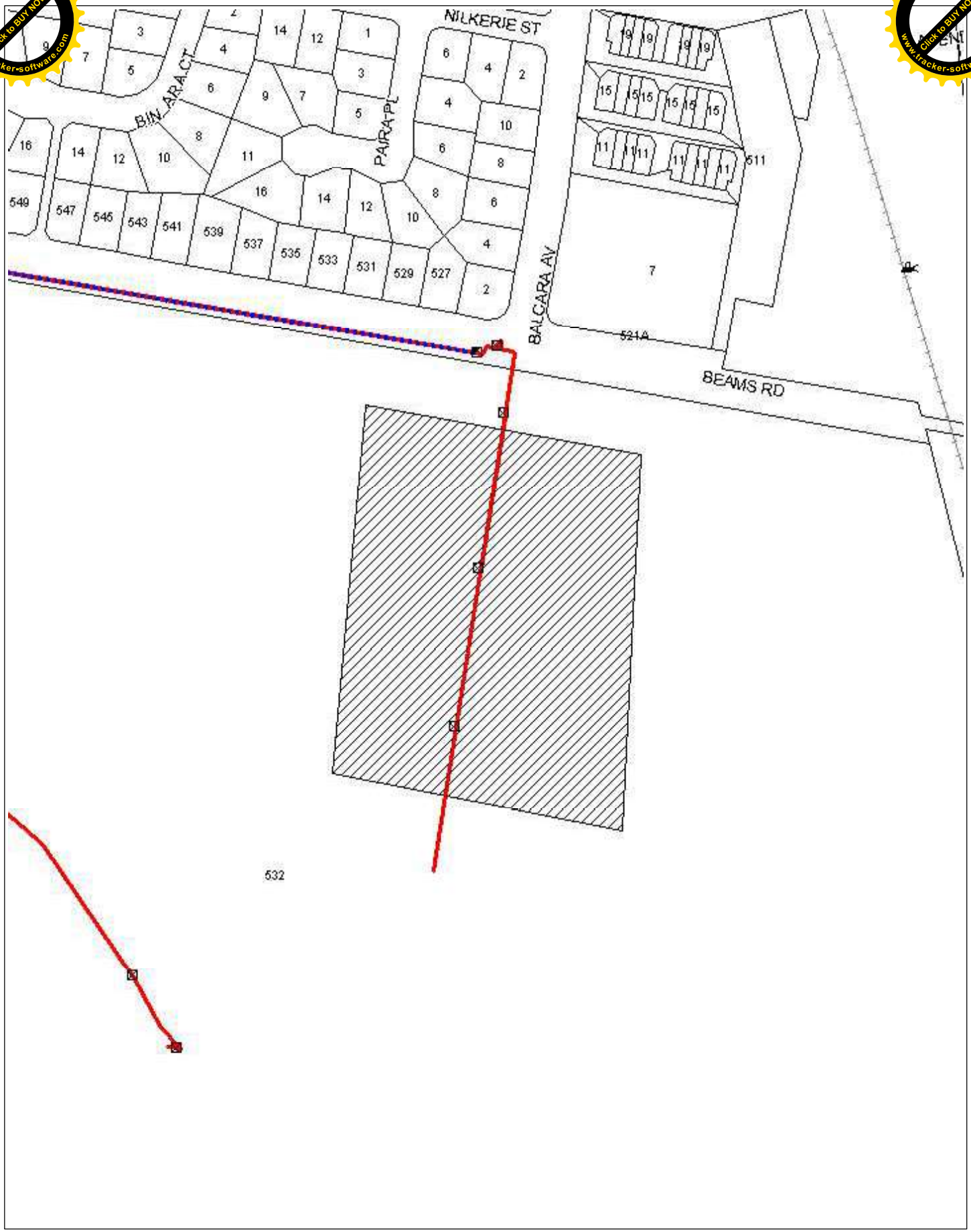
For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

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

Generated On 09/02/2021 15:02:13

Sequence Number: 106379435

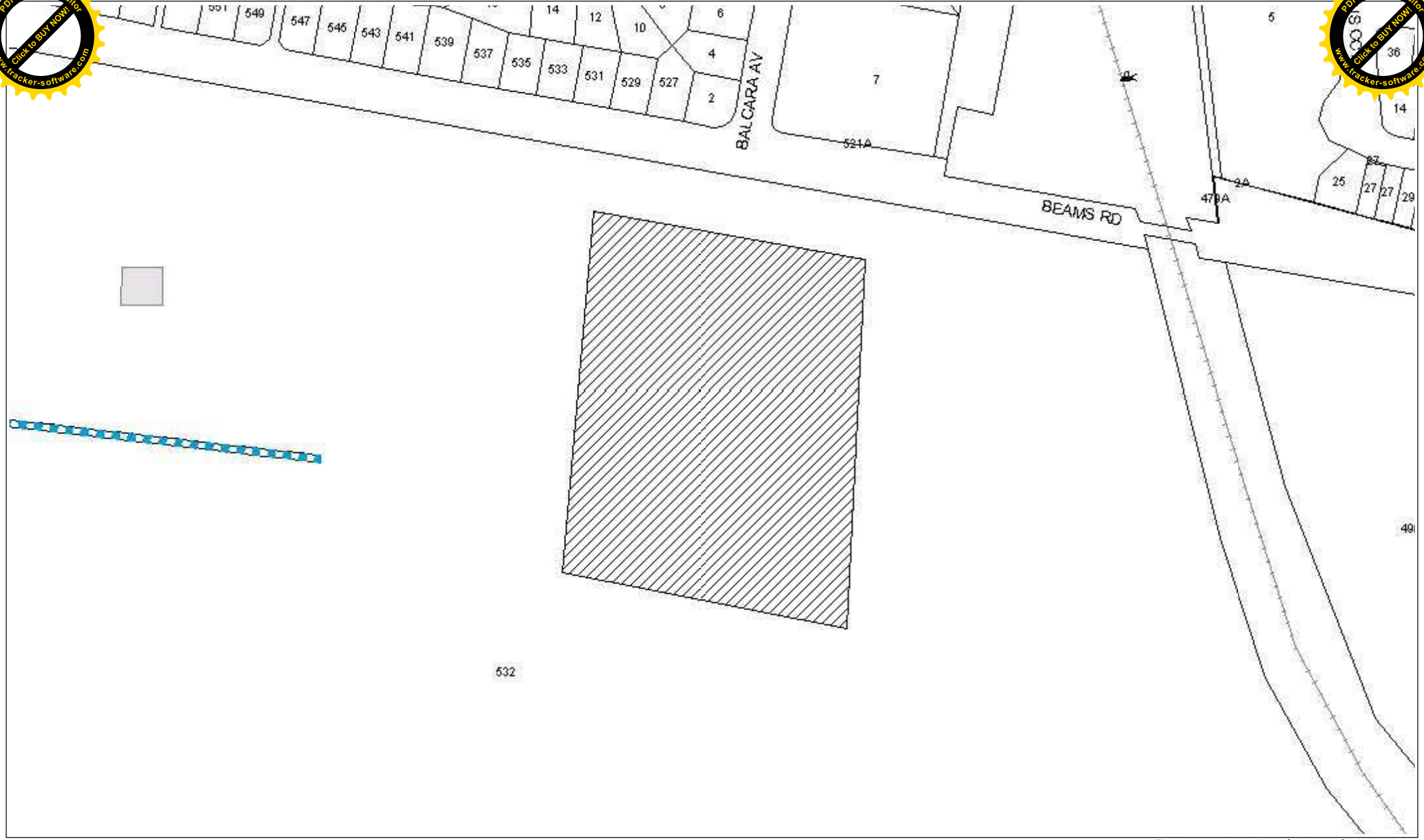
CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.



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



Uecomm

Cable Uecomm Underground

Scale: #INSERT MAP SCALE#

Printed On: 09/02/2021

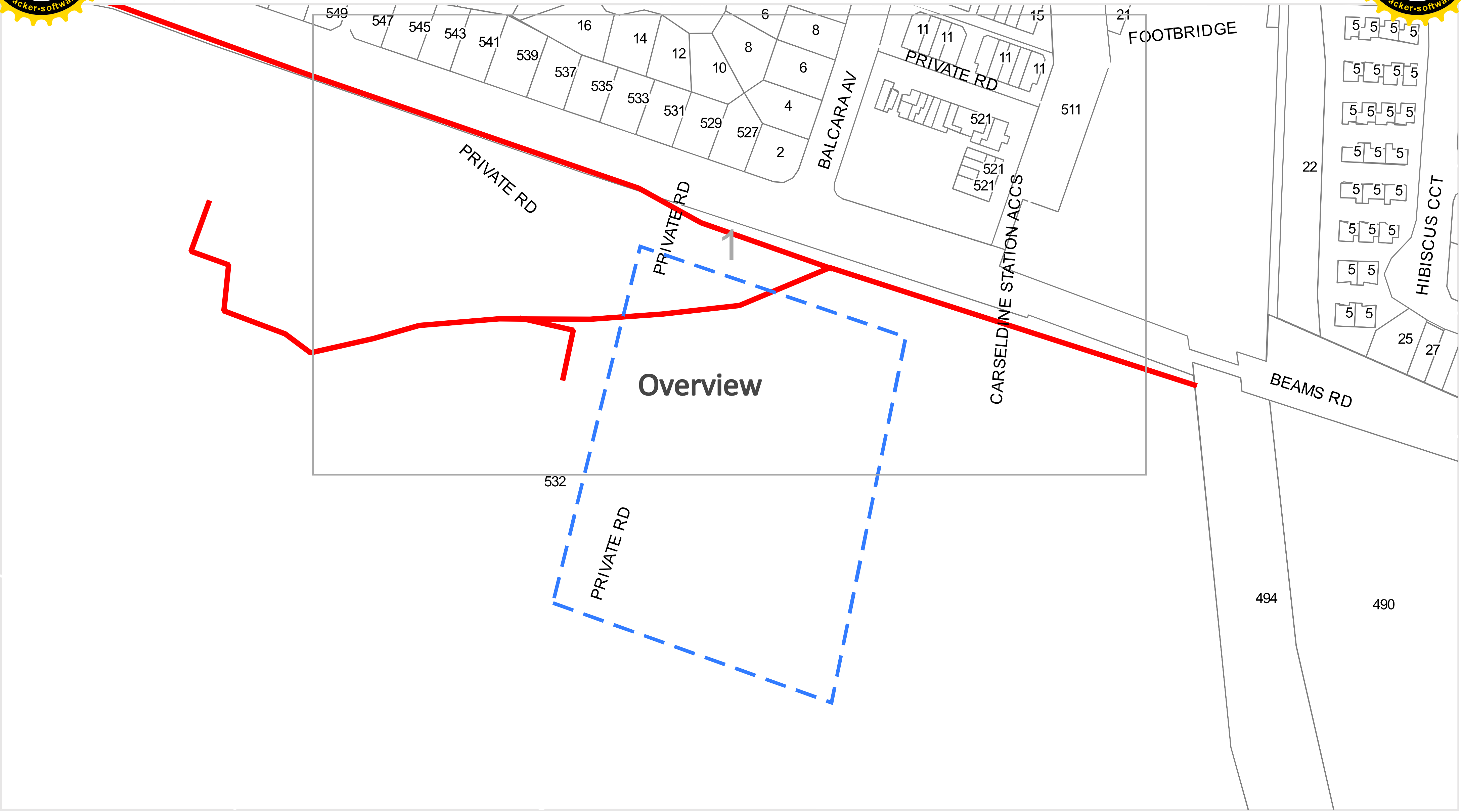
Sequence Number: 106379436

Location: 532 Beams Road

Job Location
Line
Point
Area

Undergound Asset
Uecomm

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

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither AARNet or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

arnet
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nd Research Network

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

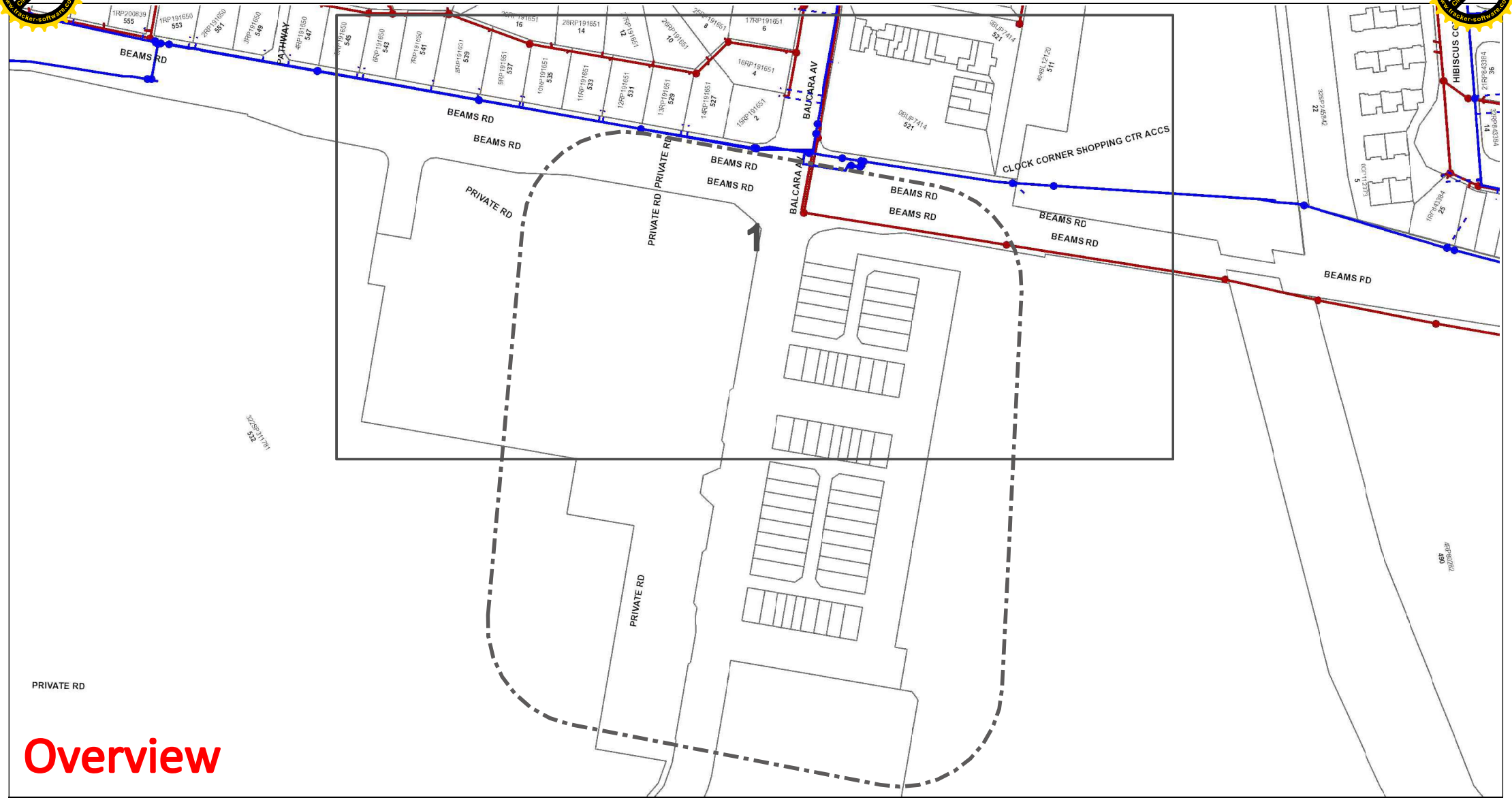
Legend | Scale: 1:1500

N

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

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither AARNet or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

Urban Utilities - Water, Recycled Water and Sewer Infrastructure



Overview

PRIVATE RD

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

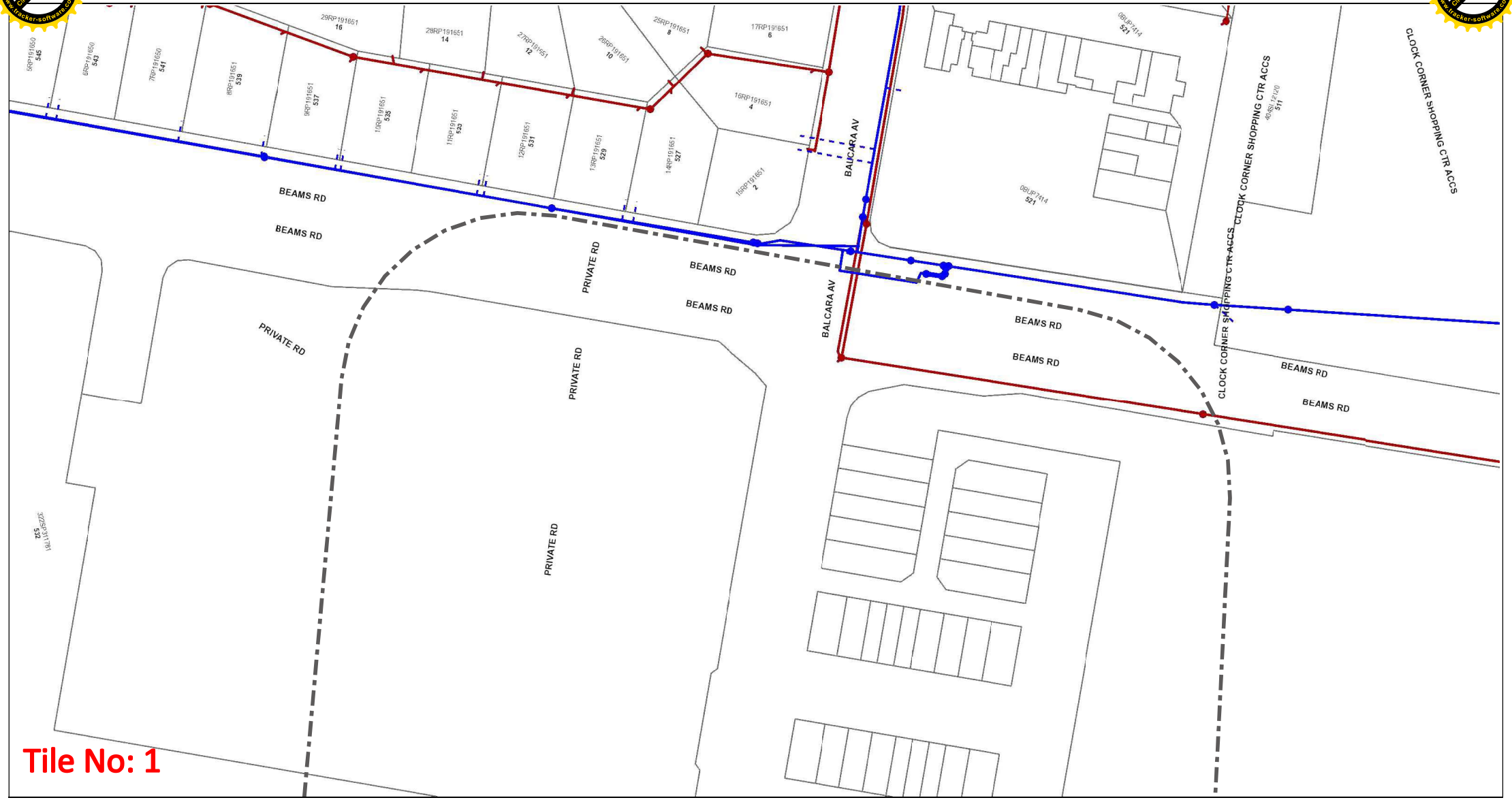
Map Scale 1:1781

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

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

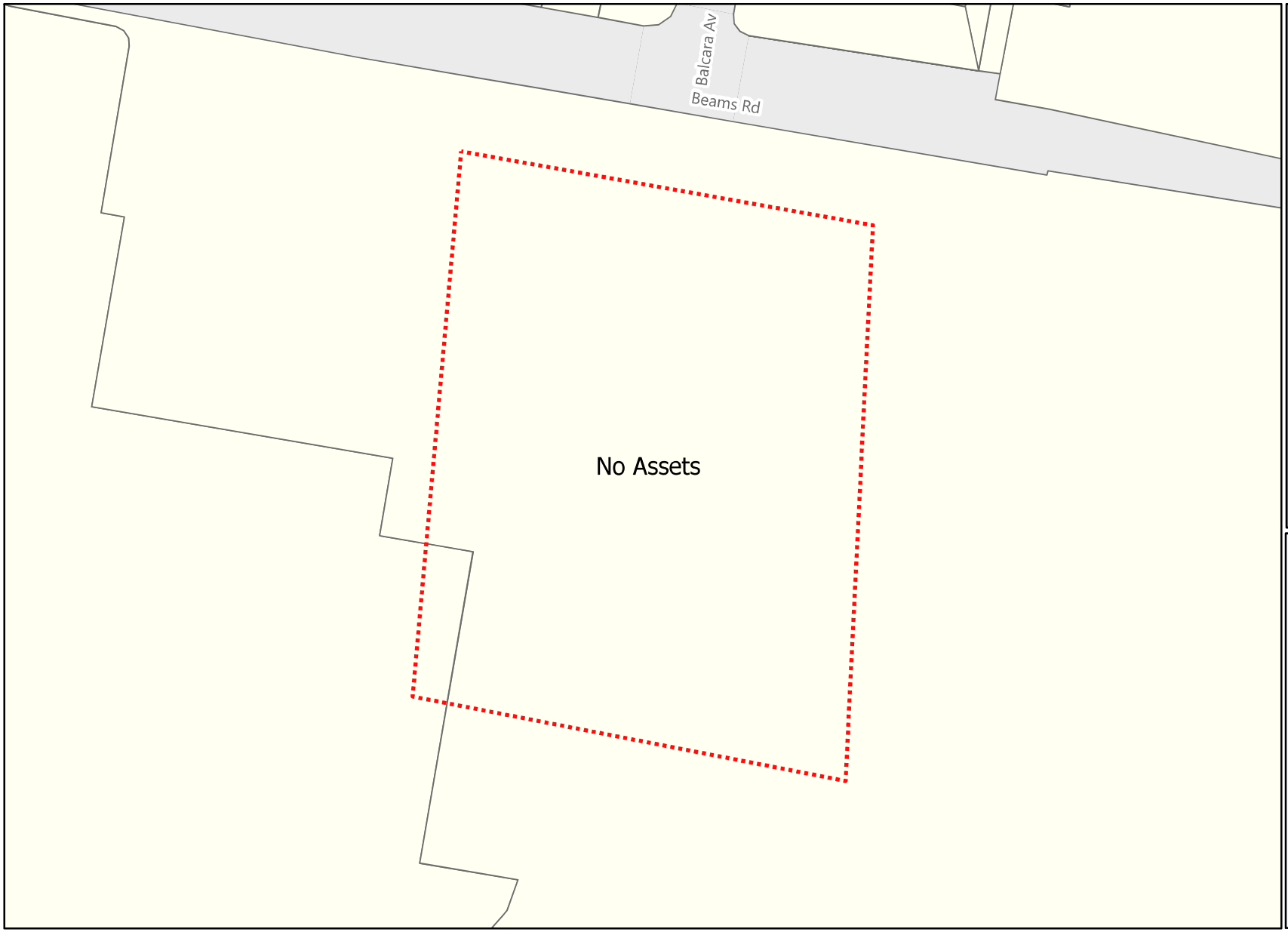
Map Scale 1:1000

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

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



Legend

DBYD Enquiry

Disclaimer:
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Data must not be used for direct marketing or be used in breach of the privacy laws.

Copyright of data is as follows:
Cadastre and Street Names © 2020 State of Queensland (Department of Natural Resources, Mines and Energy)

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

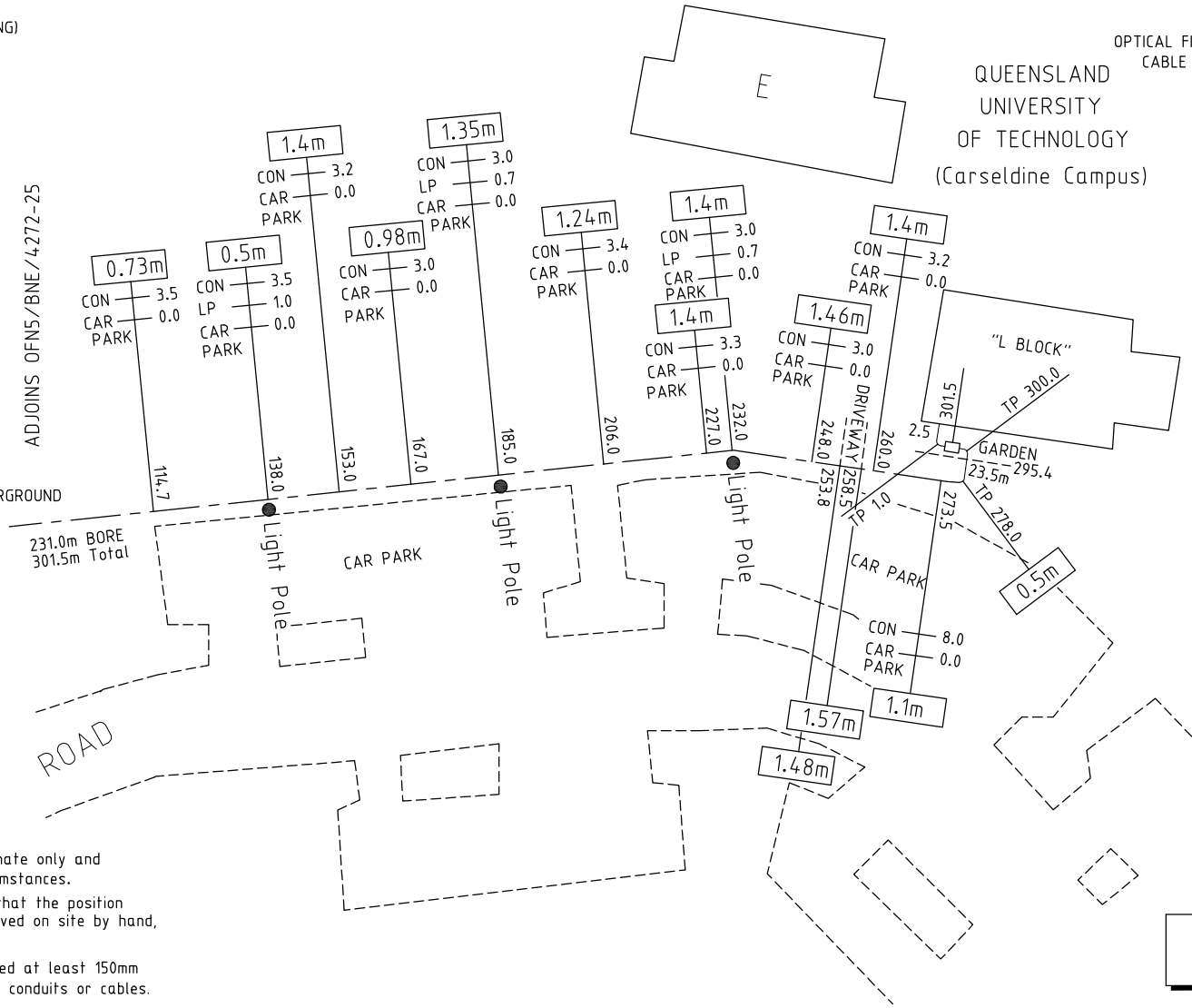
Scale 1:2,000

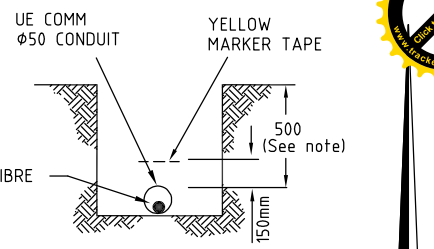
N

Plans generated by SmarterWX™ Automate

LEGEND

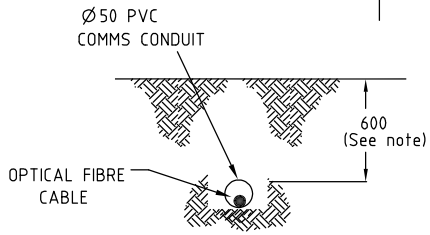
- ELECTRICITY POLE
- FIBRE OPTIC CABLE
- CABLE CONDUIT (TRENCHING)
- CABLE CONDUIT (BORE TUNNELLING)
- EXISTING CONDUIT
- UE P2 PIT
- UE P5 PIT
- UE P6 PIT
- UE P8 PIT
- UE P9 PIT
- BL - BUILDING LINE
- BOK - BACK OF KERB
- CL - CENTRELINE OF CONDUIT
- TP - TURNING POINT OF CONDUIT
- FENCE LINE, FL
- TELSTRA MANHOLE
- 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

DIAL BEFORE YOU DIG www.1100.com.au

Job No 21045072

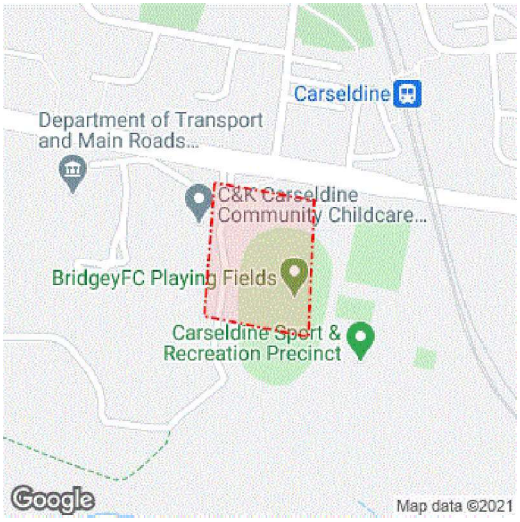
Phone: 1100
www.1100.com.au

Caller Details

Contact:	Mr Mark Shaw	**Caller Id:**	1411846	**Phone:**	0488 044 500
Company:	KN Group	**Mobile:**	Not Supplied	**Fax:**	Not Supplied
Address:	Level 2/71 Grey Street South Brisbane QLD 4101	**Email:**	mshaw@knpl.com.au		

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:	**Onsite Activity:**
Excavation	Manual Excavation
Location of Workplace:	**Location in Road:**
Both	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 E 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.

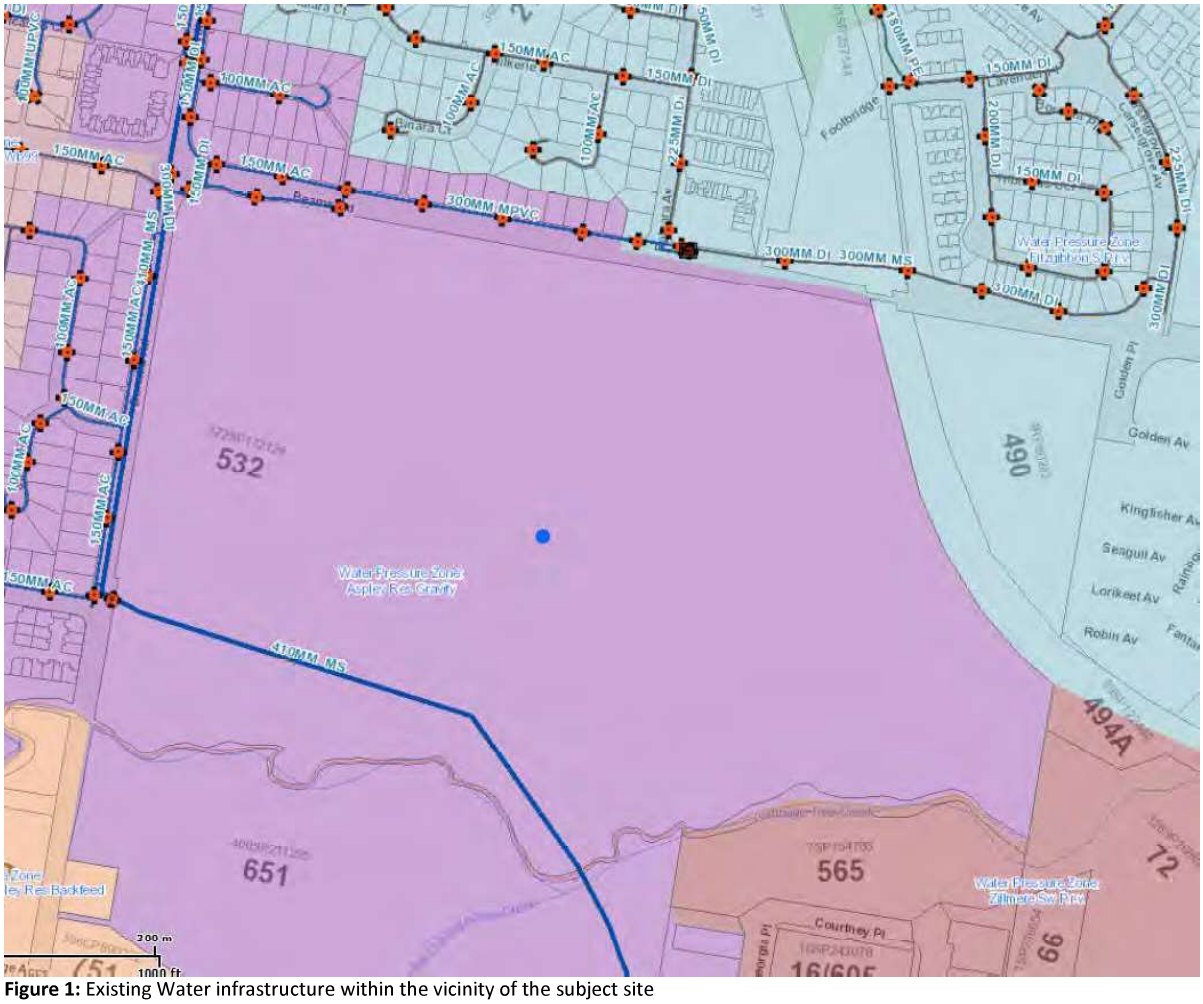


Figure 1: Existing Water infrastructure within the vicinity of the subject site

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

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.

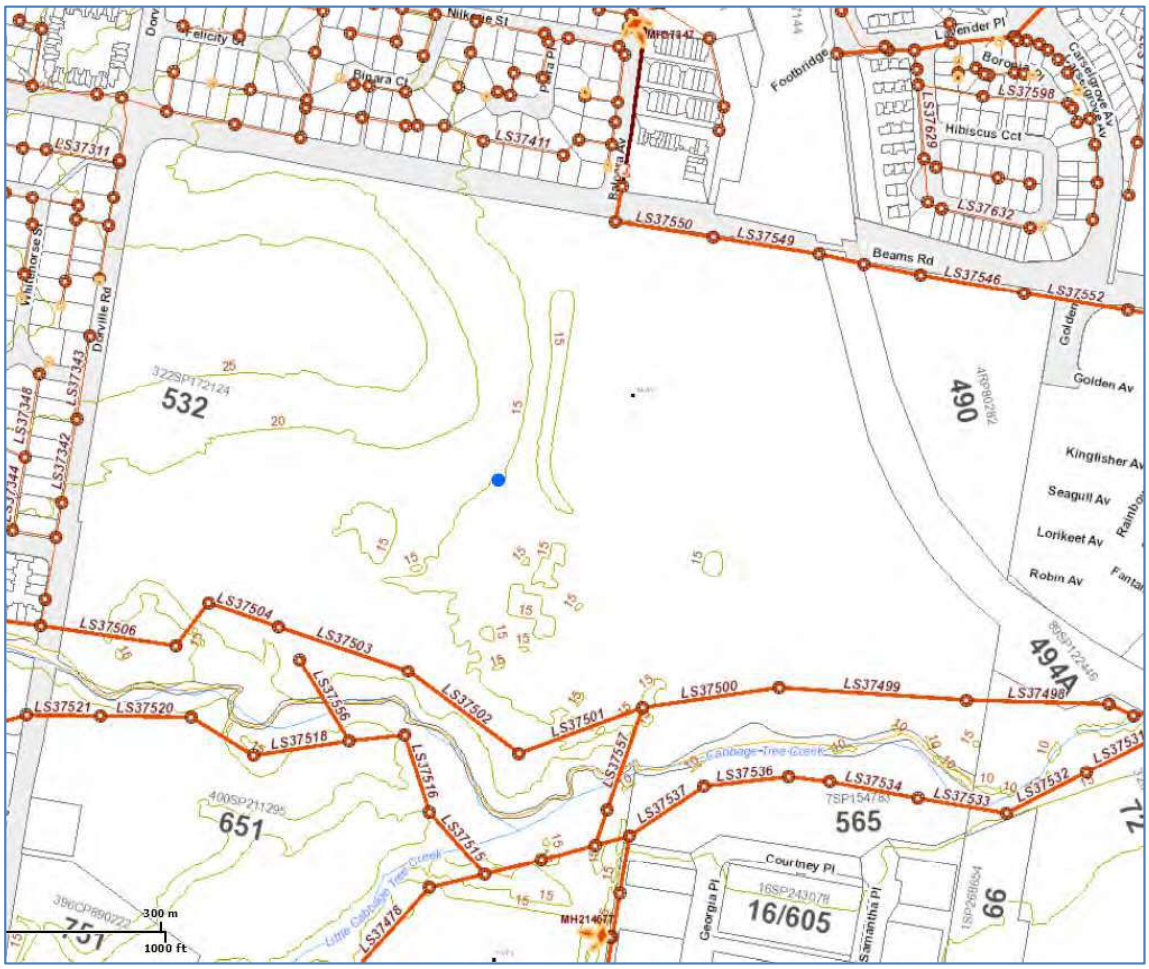


Figure 1: Existing Wastewater infrastructure within the vicinity of the subject site

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

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.

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)

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

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:

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**.

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**.

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

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

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.

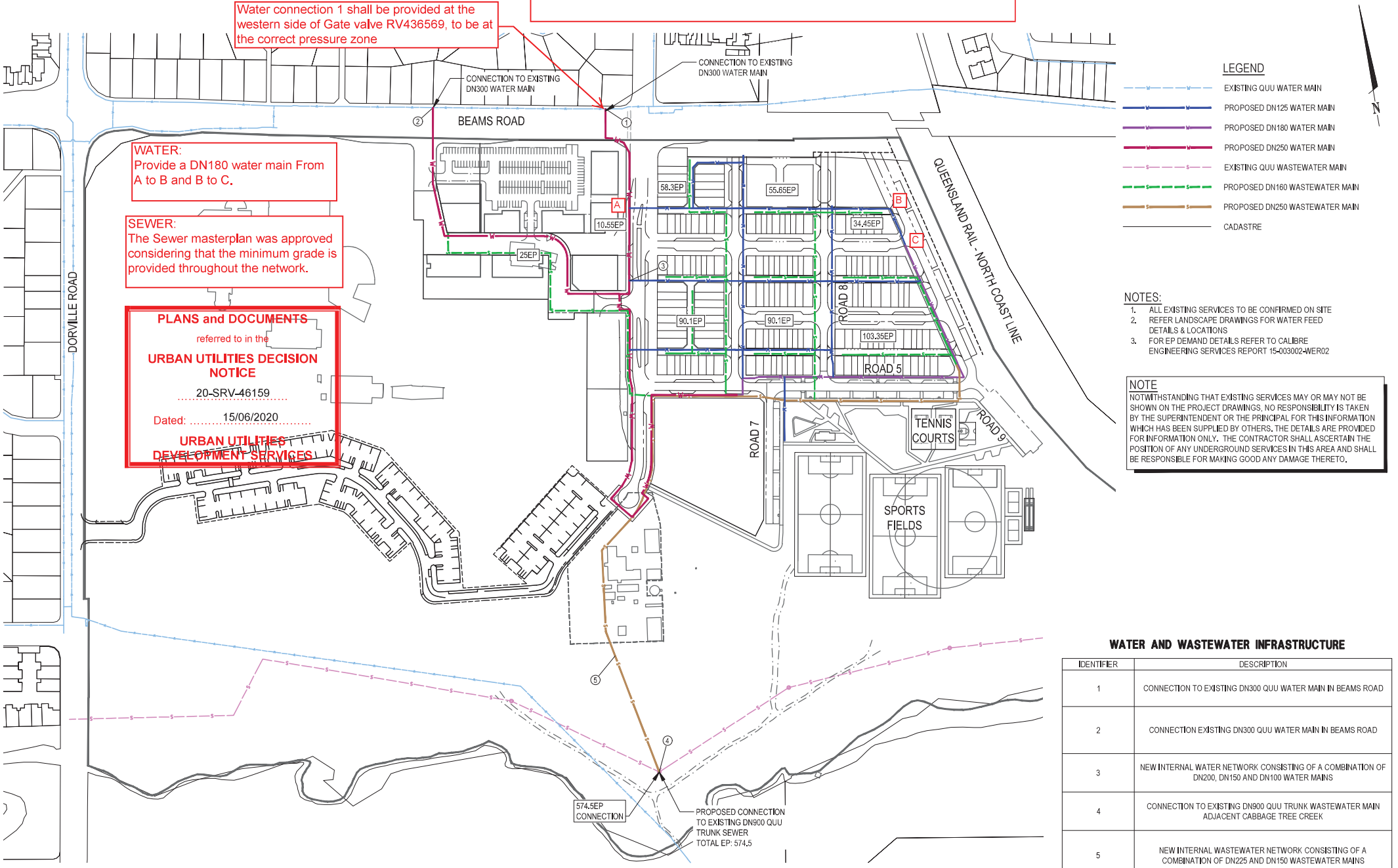
If you have any questions in relation to this Service Advice Notice, please do not hesitate to contact your account manager, Vindy Hapuarachchi, on 07 3855 6251 or vindy.hapuarachchi@urbanutilities.com.au.

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

Yours sincerely

Sajid Imam Syed
Development Assessment Team Leader
Urban Utilities

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



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 AMMENDED	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 30 20 10 0 30 60m A1; 1:3000 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

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 F ASBESTOS REMEDIATION STRATEGY AND DISPERSIVE SOIL REPORT

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

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'.

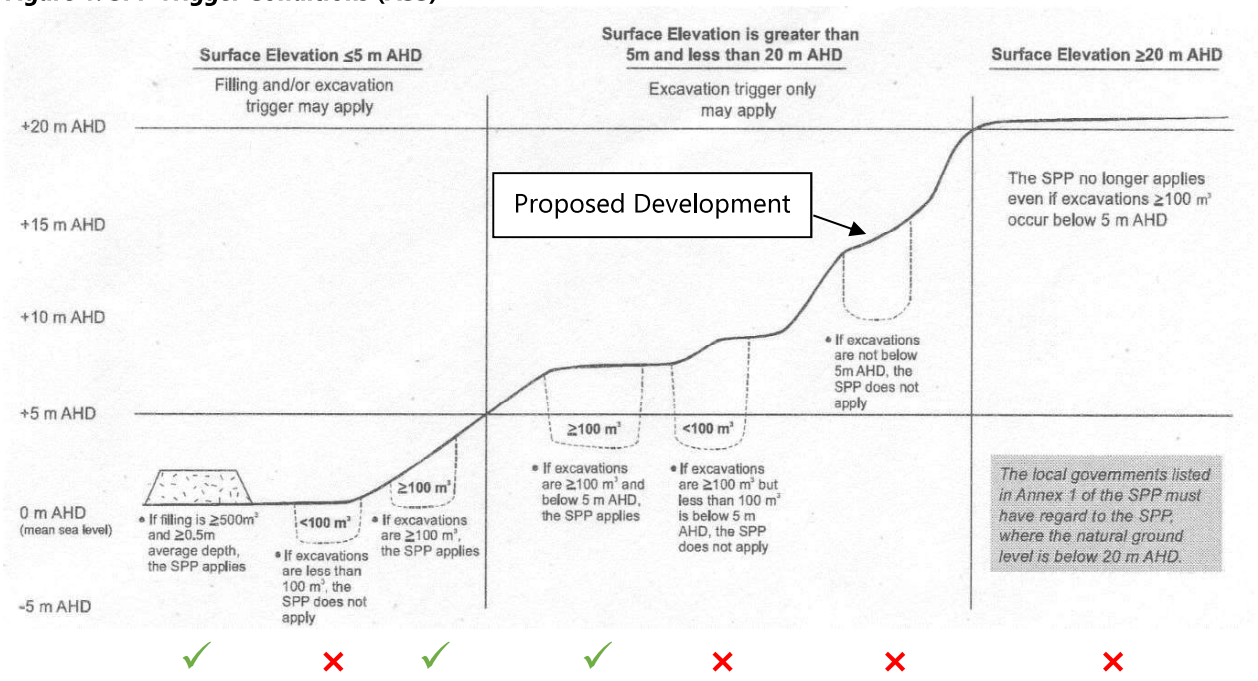
Plate 1: DEHP Acid Sulfate Soil Mapping

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.

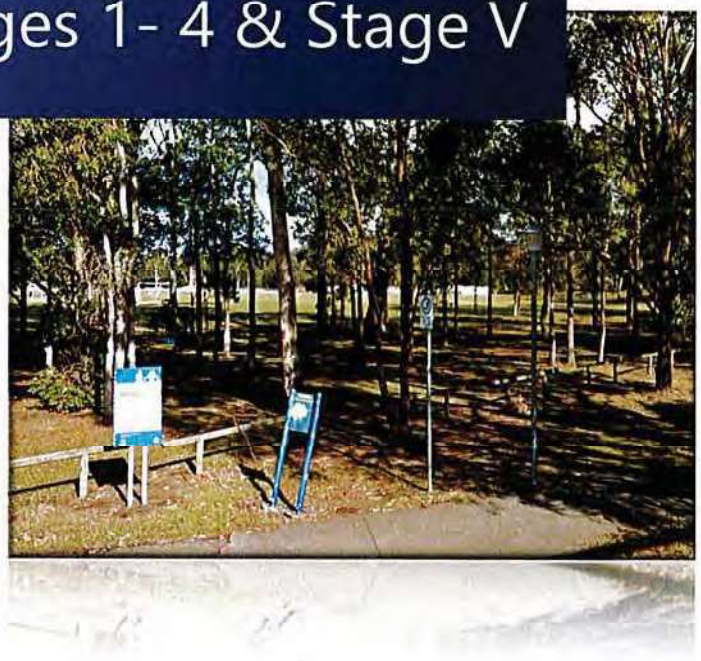
Yours faithfully,

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

STANDARD LIMITATIONS

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

ENVIRONMENT INSTITUTE OF AUSTRALIA AND NEW ZEALAND

GALLAGHER ENVIRONMENTAL | 59 Cremorne Rd Kedron Qld 4031 | ABN 56 493 696 583 | glen@genviro.com.au

DOCUMENT CONTROL

Gallagher Environmental

59 Cremorne Rd
KEDRON QLD 4031

Telephone: +41 438 724 929
Email: glen@genviro.com.au

ABN 56 493 696 583

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.

TABLE OF CONTENTS

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;

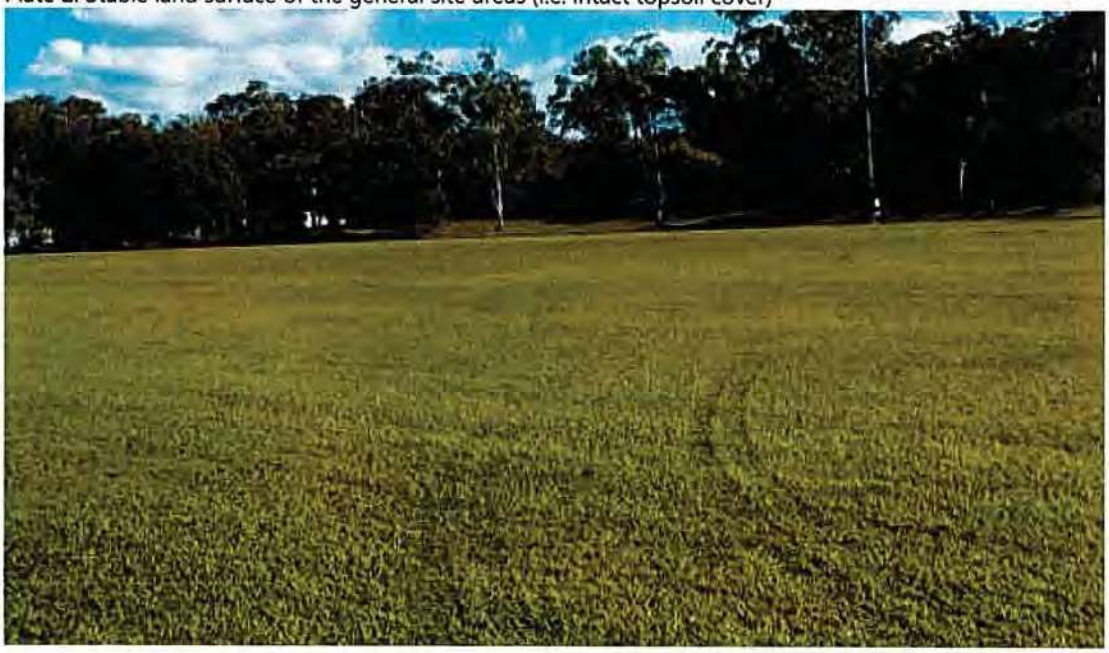
Figure 1: Regional Geology

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
LOCATION: Carseldine Urban Village – Stages 1 – 4 & Stage V			SCALE: As Shown
CLIENT: C/- Calibre Group	DATE: 22.04.20	DRAWN: GMG	SIGNED:

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 rowspan="2">Monitoring Requirements</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>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,

GM Gallagher

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
				CLAY LOAM grey & orange, mod. structure	D		
0.5							5
				Observation Terminated			
1.0							
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
				SANDY LIGHT CLAY grey & orange, mod. structure	D		6
0.5							
				Observation Terminated			
1.0							
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

ASC CLASSIFICATION:
DERMOSOLS

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

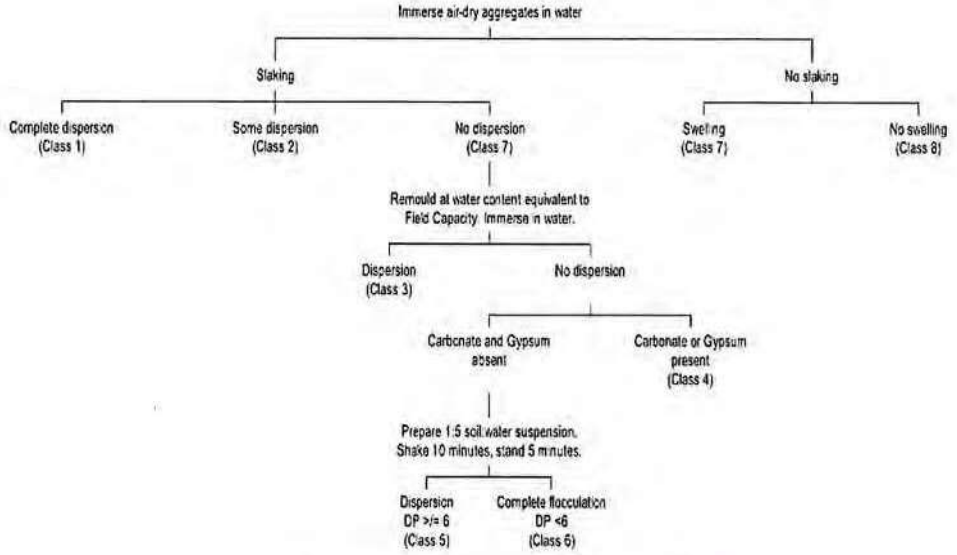
Gallagher Environmental
Soil Water Environment

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

CPESC

GMGallagher

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 ($H^+ + Al^{3+}$).

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	---	---	---	---

APPENDIX G GEO-TECHNICAL

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Spring Hill Qld 4000
07 3017 1900
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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

SGS Australia Pty Ltd
ABN 44 000 964 278

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REVISION AND CHECKING HISTORY

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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.

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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.

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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.

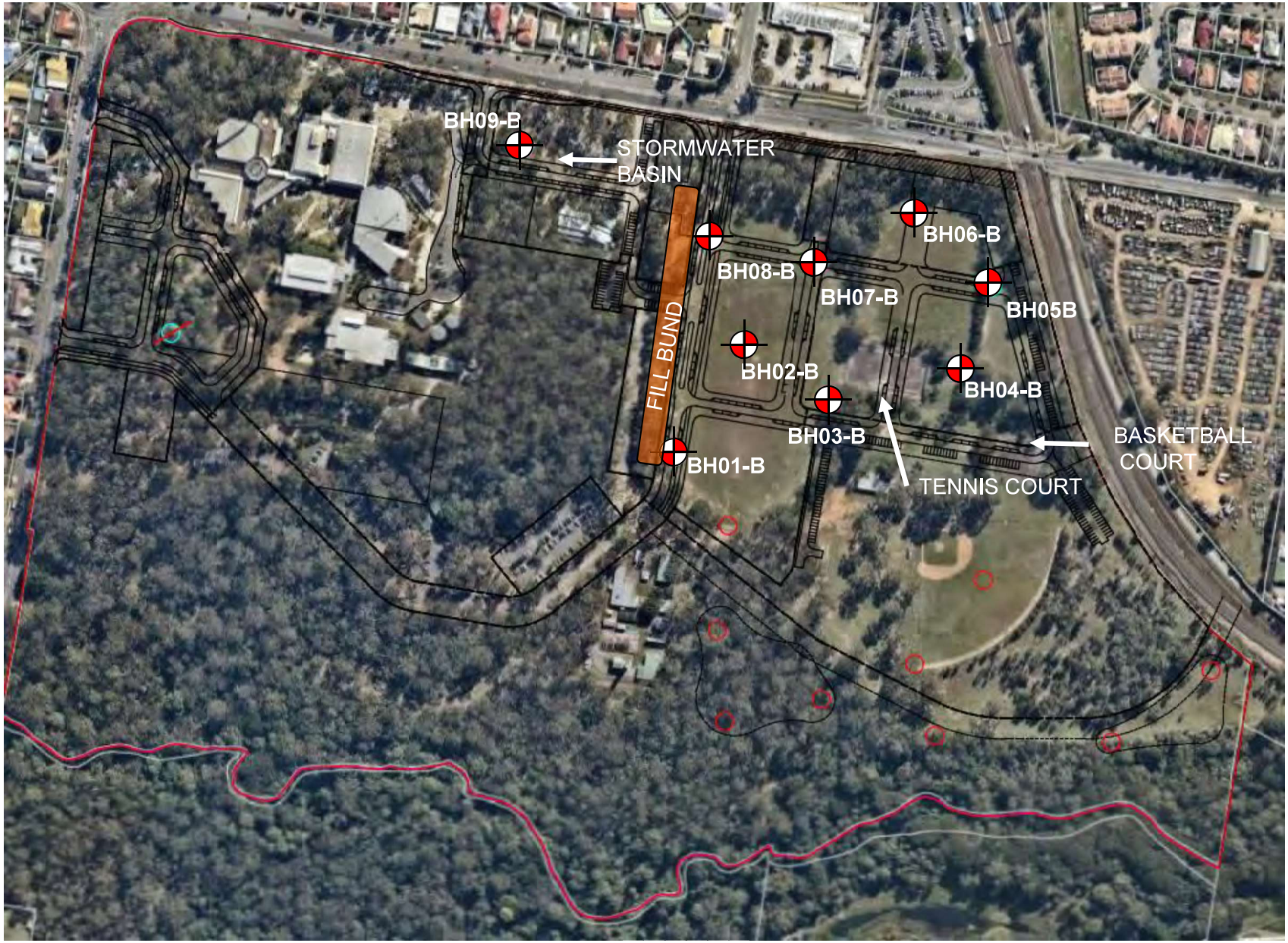
It is important for the client to understand that long term serviceability of the structure will require all the findings of this report to be considered and undertaken. No responsibility will be accepted where these are not put into effect prior to commencement or in conjunction with construction as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

SGS Australia Pty Ltd
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

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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												
		3										U_{50}	PP=450kPa 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

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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										
							Cl	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

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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

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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				
		4										U_{50}	PP=380kPa REC=150mm	
		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

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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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TEST CERTIFICATE

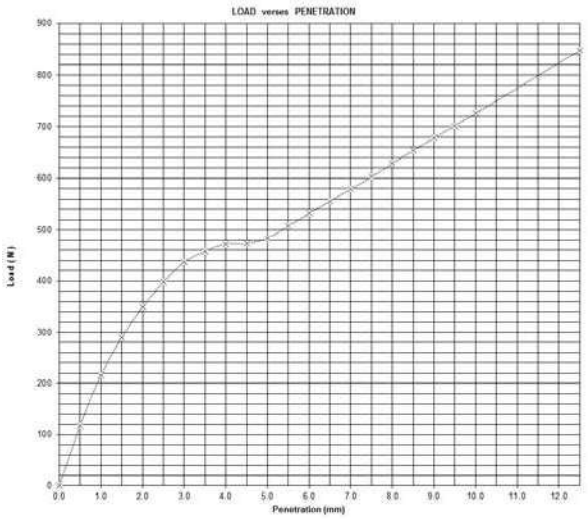
SGS Australia Pty Ltd
Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

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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TEST CERTIFICATE

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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-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:	(Cl) 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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TEST CERTIFICATE

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:	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:	(Cl) 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

Client Address: 1/18 Leanne Crescent Lawnton Qld 4501

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TEST CERTIFICATE

SGS Australia Pty Ltd
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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-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

Client Address: 1/18 Leanne Crescent Lawnton Qld 4501

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TEST CERTIFICATE

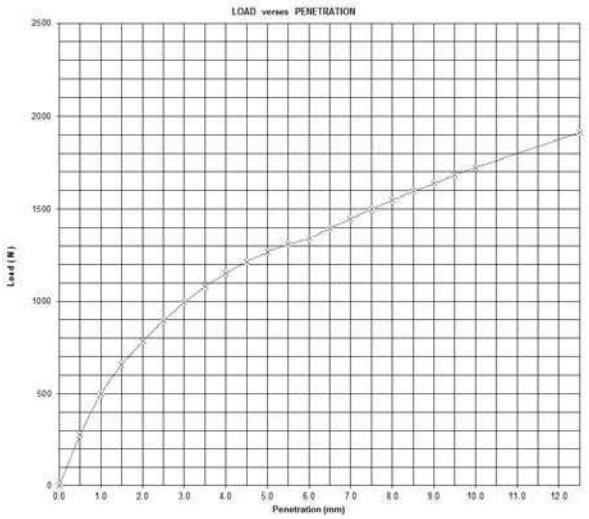
SGS Australia Pty Ltd
Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

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-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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TEST CERTIFICATE

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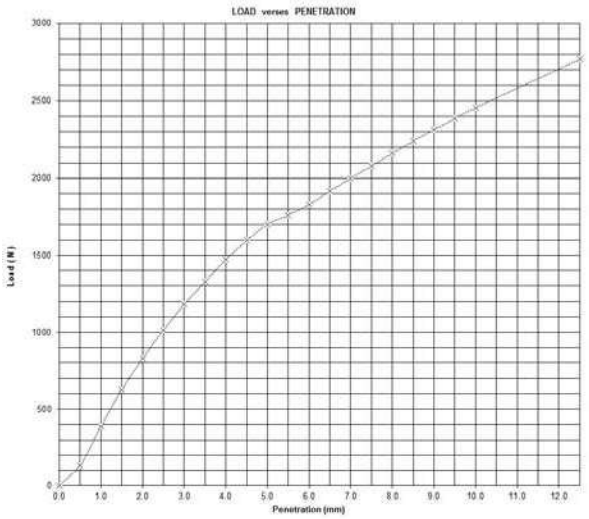
Lawnton Laboratory
Unit 1/18 Leanne Crescent
Lawnton QLD 4501
AUSTRALIA

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-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

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 H 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.	A/S	**S01** A terraced retaining wall in accordance with Brisbane City Council guidelines is proposed to address the 5.0m level difference to the adjoining property.	
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** The terraced retaining wall shall be designed with 1m high vert : 1m horizontal terraces in accordance with council guidelines. The 1m horizontal sections will incorporate low maintenance planting.	
	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 FFMP addresses the consideration of significant vegetation. Retaining walls will be designed and constructed in accordance with the structures standards in the infrastructure design planning scheme policies and certified by a RPEQ.	

Solution: 9 = Acceptable Solution
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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** Retaining walls will have a finish that presents to adjoining land that is maintenance free and accessible from the development.	
	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** Currently 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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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.	A/S	**S06** The Phase 2 vegetated catch drain works are proposed as part of this DA. The design allows for major flows to be conveyed to a legal point of discharge. The vegetated profile is to council requirements.	
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 EDQ DA/TS and 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 Saunders Havill Group Landscape 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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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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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** Where 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. Any damage to the Beams Rd carriageway and verges due to the installation of the proposed water main crossing will be rectified at the developer's expense. 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 has been demonstrated within the 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 has been demonstrated within the 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.	

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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 with these subdivision works.	

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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 will be suitably designed and certified geo-technical engineer by an design approved structural 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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