PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2023/1468/2

Date: 11 April 2025

Queensland Government

SITE BASED STORMWATER MANAGEMENT PLAN

FOR THE PROPOSED
CARSELDINE VILLAGE HEART LOT 5003

LOCATED AT
520 BEAMS ROAD, CARSELDINE QLD 4034

PREPARED FOR
DELUCA CORPORATION PTY LTD

BORNHORST +WARD

Bornhorst & Ward Pty Ltd
A.B.N. 78 010 151 354
A.C.N. 010 151 354
Level 14, 133 Mary Street
Brisbane Qld 4000
Phone: (07) 3013 4699
E-mail: mail@bornhorstward.com.au

Bornhorst and Ward Project No: **23019**

If you have any queries regarding this proposal, then please contact: **Stewart Grant**

Revision	Date	Description	Author	Rev.	App.
A	10/Nov/2023	DRAFT REPORT	MK	RG	
B	13/Dec/2023	For Approval	MK	RG	RG
C	14/Dec/2023	For Approval	MK	RG	RG
D	8/Mar/2024	Further Issues Response	MK	RG	RG
E	27/Sep/2024	Engineering Drawings Revised	SG	RG	RG

RPEQ: 07048 Robert Gray

File Name: J:\2023\23019\07_REPORTS\DESIGNREPORTS\SWMP\RPT_SWMP.docx

BORNHORST +WARD

CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1. INTRODUCTION

Bornhorst and Ward has been commissioned to develop a stormwater management plan for the proposed residential development located within 520 Beams Road, Carseldine, QLD 4034 (Lot 7003 on plan SP331690). In particular, it is on lots 5003 of the Stage V subdivision of the Carseldine Village. The proposal consists of constructing a residential tower with a basement carpark. Plans of the proposed development layout can be seen in Appendix A.

This document reports on the existing and proposed civil works and infrastructure required as part of the proposed development. The engineering requirements for this proposal shall be in accordance with Engineering Best Management Practices and the State Planning Policy (2017). This development falls under the Carseldine Village PDA within the Brisbane City Council area.

This report outlines the preliminary design methodology in support of a Development Application and should be read in conjunction with other documents issued by the consultant team.

2. SITE CHARACTERISTICS

2.1 LOCATION AND EXISTING FEATURES

The development site, located at 520 Beams Road, Carseldine is currently undergoing a subdivision. The following site characteristics we expect upon the completion of the subdivision are:

- The site is bound by a public plaza to the north, Plaza Place to the east and Meander Street to the south and west;
- The development site is comprised of scattered grassland;
- The total area of the site is approximately 0.141 ha for lot 5003;
- The site is only accessible from Meander Street.
- All easements through the site are expected to be removed as part of the subdivision works.
- There is also an Energex easement just outside the northwest corner of lot V001 which is not shown on Queensland Globe. The development area of lot V001 was reduced as a result.
- Cabbage Tree Creek is about 400m south of the site.

Figure 1: Site Locality Plan

2.2 PROPOSED DEVELOPMENT

The following points outline the extent of works for the proposed development:

- A residential development with a basement carpark.
- The site will only be accessible to vehicles from Meander Street. Pedestrians will be able to access the site from Plaza Place.

Refer to the development drawings in Appendix A for further details of the proposed development.

2.3 TOPOGRAPHY AND CATCHMENT CHARACTERISTICS

The expected topography and catchment characteristics at the conclusion of the subdivision works are as follows:

- The high point of the existing site is RL 16.0m AHD located on the western edge of the site;
- The development falls from the high point at an approximate grade of 1.2% to a low point of RL 15.5m AHD in the eastern edge of the site;

- During minor events and major storm events, runoff from the site discharges as overland flow over the eastern edge of the development site to Plaza Place;
- The site is not expected to have any external catchments.

See the survey plan in Appendix C for more information.

2.4 EXISTING FLOODING CONDITIONS AND FREEBOARD REQUIREMENTS

Information obtained from the Brisbane City Councils Floodwise Property Report for the site indicates that the current site is subject to flooding from Cabbage Tree Creek. Characteristics of the flooding are as follows:

- Likely flooding during 1% and 2% AEP events
- The flooding occurs on the eastern portion of the site.
- The 1% AEP flood level is 14.7m.
- The centre of lot V001 has a risk of overland flow due to an existing depression in the land.
- The site has low risk of coastal storm tide.

Please refer to the Brisbane City Council's Floodwise Property Report in Appendix C and the Flood Overlay Map in Figure 2 below for more details.

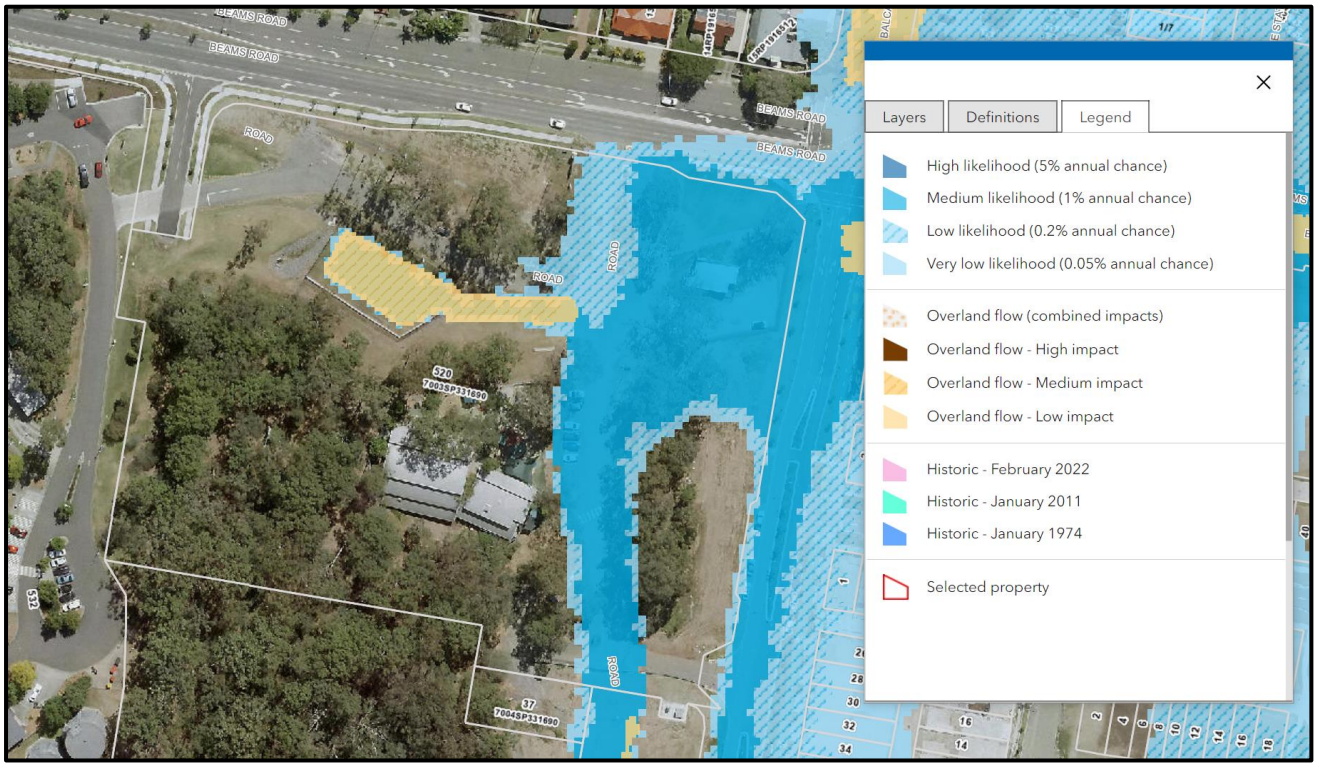


Figure 2: Brisbane City Council Interactive Flood Map

Design levels for the building must comply with the flood immunity standards specified by Brisbane City Council's City Plan (2014). The development will be assessed against the flood levels determined from our investigations. In accordance with the Brisbane City Council City Plan (2014), the minimum flood freeboard requirements would therefore be in order of:

Table 1: Flood Freeboard Requirements

Development Area	Council Flood Freeboard Requirements (AHD)	Council Required Development Level (AHD)	Development Level (m AHD)
Building Floor Level Habitable Room – Class 1-4	Category A	1% AEP flood level + 500mm	15.2
Building Floor Level Non-Habitable Room including Patio and Courtyard	Category B	1% AEP flood level + 300mm	15.0
Basement entry (Class 2)	Category C	1% AEP flood level + 300mm	15.0
Essential services (including lifts)	Category A	1% AEP flood level + 500mm	15.2
Building Floor level (Shopping Centre)	Category C	1% AEP flood level	14.7

Table 8.2.11.3.C, Table 8.2.11.3.D and Table 8.2.11.3.L of the Brisbane City Council's Flood Overlay Code were used to determine recommended development levels. The flood immunity levels have been based on a BCA building classification of "1-4" and "5, 6 or 8" within Table 8.2.11.3D. Flood planning level categories associated with this building classification have been deemed as A & C.

Table 1 above states the relevant flood immunity levels for the site. The site can reduce the likelihood of flooding by filling the site to at least the recommended development level. It should be noted that the site we receive after the subdivision is expected to have the lowest elevation of 15.0m AHD. As a consequence, we expect a low risk of inundation. As a result, the basement entry appears to be the critical design level relative to the Meander Street pavement under construction.

3. EXISTING AND PROPOSED CIVIL WORKS AND INFRASTRUCTURE

3.1 STORMWATER

3.1.1 Expected Infrastructure

The expected stormwater infrastructure based on the civil design drawings from KN group for the subdivision indicate the following infrastructure:

- A stormwater manhole and a field inlet is near the eastern boundary of lot V001 of the development pit.
- An existing 900mm stormwater pipe connects the manhole to the field inlet which subsequently discharges to the stormwater main in Plaza Place.
- The legal point of discharge for lot V001 is the existing manhole.
- A 1200mm stormwater pipe enlarging to 1350mm is located under Meander Street.
- A field inlet on the western boundary of lot 9001 is connected to the stormwater main under Meander Street. This is legal point of discharge for lot 9001.
- A field inlet on the southwestern corner of lot 5003 is connected to the stormwater main under Meander Street. This is the legal point of discharge for lot 5003.
- The stormwater infrastructure has been built for a fully developed catchment.

KN group infrastructure can be found in Appendix C of this report.

3.1.2 Proposed Infrastructure

The following points outline the proposed stormwater infrastructure for the development site:

- Roof water from 5003 will be collected internally and discharged to the legal point of discharge.
- Major events for lot 5003 will discharge as overland flow onto Meander Street.
- As the site is part of Carseldine Village which is directing adjacent to Cabbage Tree Creek, no stormwater detention is expected to be required as its located within the lower third of the catchment.
- No stormwater quality treatment measures are proposed as the site is less than 2500m2.

Refer to the Engineering drawings located in Appendix B.

4. STORMWATER QUANTITY ANALYSIS

The masterplan for Carseldine Village Heart was designed so that Stage 5 would contain commercial/residential lots comprising of 90% impervious area including surrounding verges. The proposed development of Lot 5003 is a relatively small area compared to the area of the adjacent verges.

As such the development falls within the 90% impervious design and meets the design criteria of the masterplan. Consequently, this development does not increase the run-off compared to the expected run-off, and thus no stormwater detention is expected to be required.

Refer Appendix C for the stormwater management plan relating to the entire Carseldine Village Heart precinct.

5. BRISBANE CITY COUNCIL CODES

The relevant Brisbane City Council Codes with respect to engineering aspects for assessment of the Development Application have been addressed. The codes will assist in assessing operational works requirements. The codes addressed in this report include:

- Flood overlay
- Stormwater Code

The completed codes can be found attached in Appendix D of this Report.

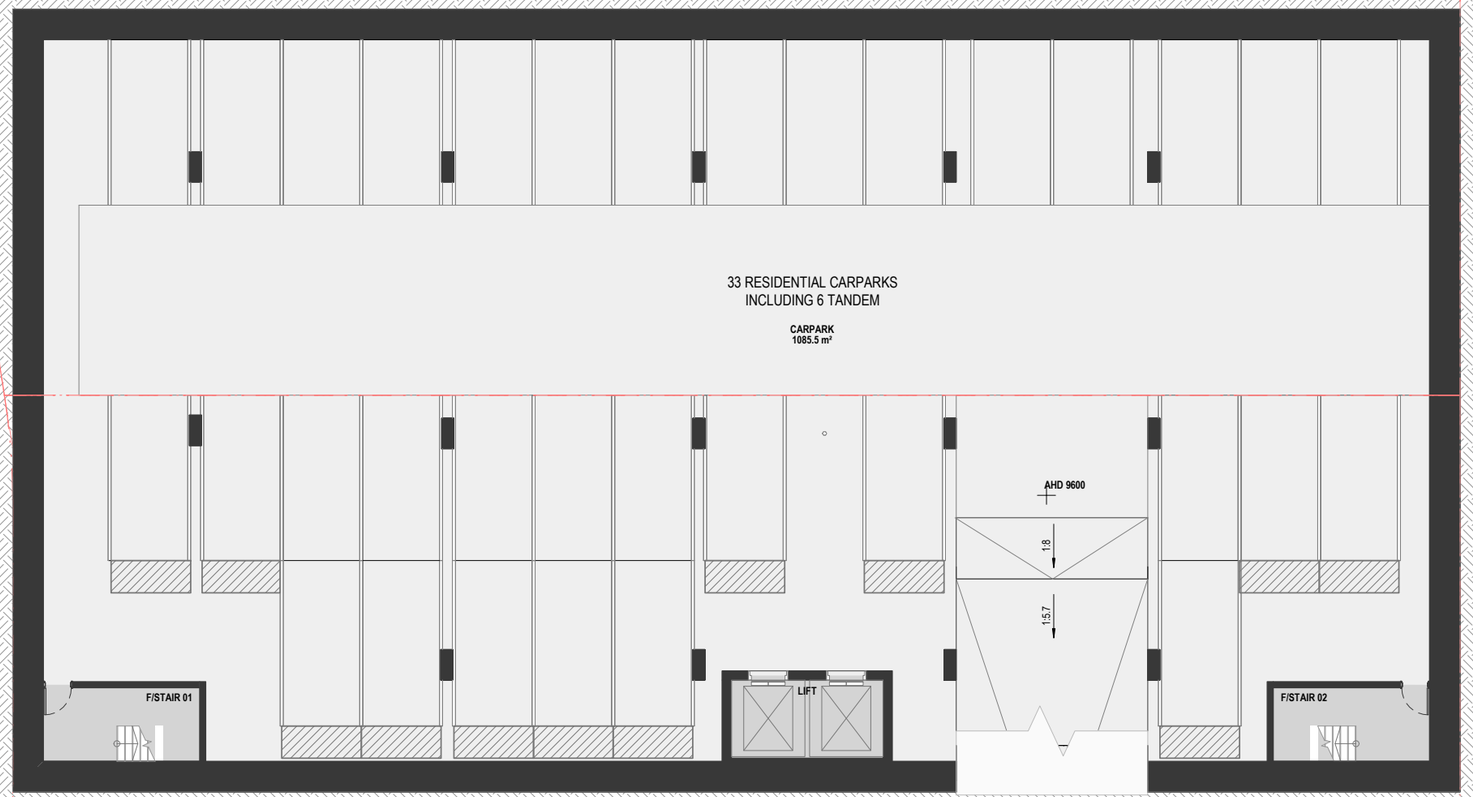
6. SUMMARY

This Engineering Report has demonstrated that the proposed development located at 520 Beams Road, can be developed in accordance with Engineering Best Management Practice, Brisbane City Council guidelines, QUDM (2017) and the State Planning Policy (2017). The following points summarise the findings and recommendations:

- The site is contained within the Carseldine Village PDA masterplan and the development is generally in accordance with the masterplan. As a result, no major upgrades or amendments are required to service the project. Refer Appendix A for masterplan catchment.
- There will be an increase in peak stormwater runoff from the development, however the development is located within the lower third of the cabbage tree creek catchment. Detention is unlikely due to potential adverse effects.
- Lots 5003 is less than 2500m2 and therefore stormwater quality treatment is not required, and is part of the Carseldine Village Heart masterplan.
- All entrances to the building will have freeboard to the anticipated overland flow down Meander Street documented by KN Group.

APPENDIX A

DEVELOPMENT DRAWINGS



1
SK 312

1
SK 311

1
SK 310

architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.

Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client
DELUCA

Project
THE VILLAGE CARSELDINE

Drawing
5003 - BASEMENT 02

PRELIMINARY

A1 Scale 1 : 100
Project No. 23.0159
Revision 1

Number SK - AR - DR - SK 090

Details

0mm 40 80mm

1
SK 312

1
SK 311

1
SK 310

architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.

Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client
DELUCA

Project
THE VILLAGE CARSELDINE

Drawing
5003 - BASEMENT 01

PRELIMINARY

A1 Scale 1 : 100
Project No. 23.0159
Revision 1

Number SK - AR - DR - SK 091

Details

Nominated Architect : Lawrence Toaldo NSWARB Reg. 10255.
Nominated Architect : Ray Brown NSWARB Reg. 6359.

0mm 40 80mm

architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.

Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client
DELUCA

Project
THE VILLAGE CARSELDINE

Drawing
5003 - GROUND FLOOR

PRELIMINARY

A1 Scale 1 : 100
Project No. 23.0159
Revision 1

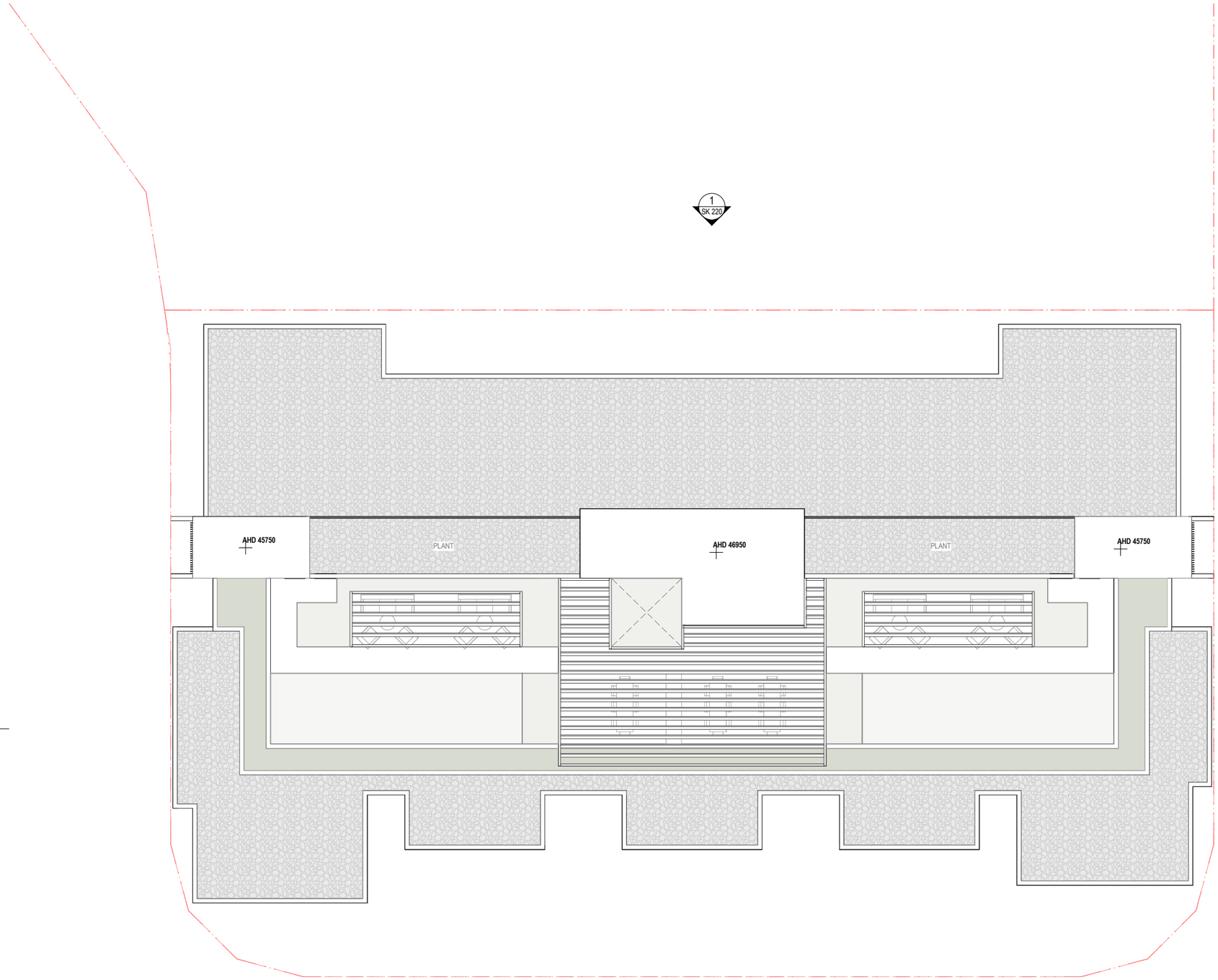
Number SK - AR - DR - SK 100

Details

0mm 40 80mm

architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.



Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client

DELUCA

Project

THE VILLAGE CARSELDINE

Drawing

5003 - ROOF PLAN

PRELIMINARY

A1 Scale 1 : 100

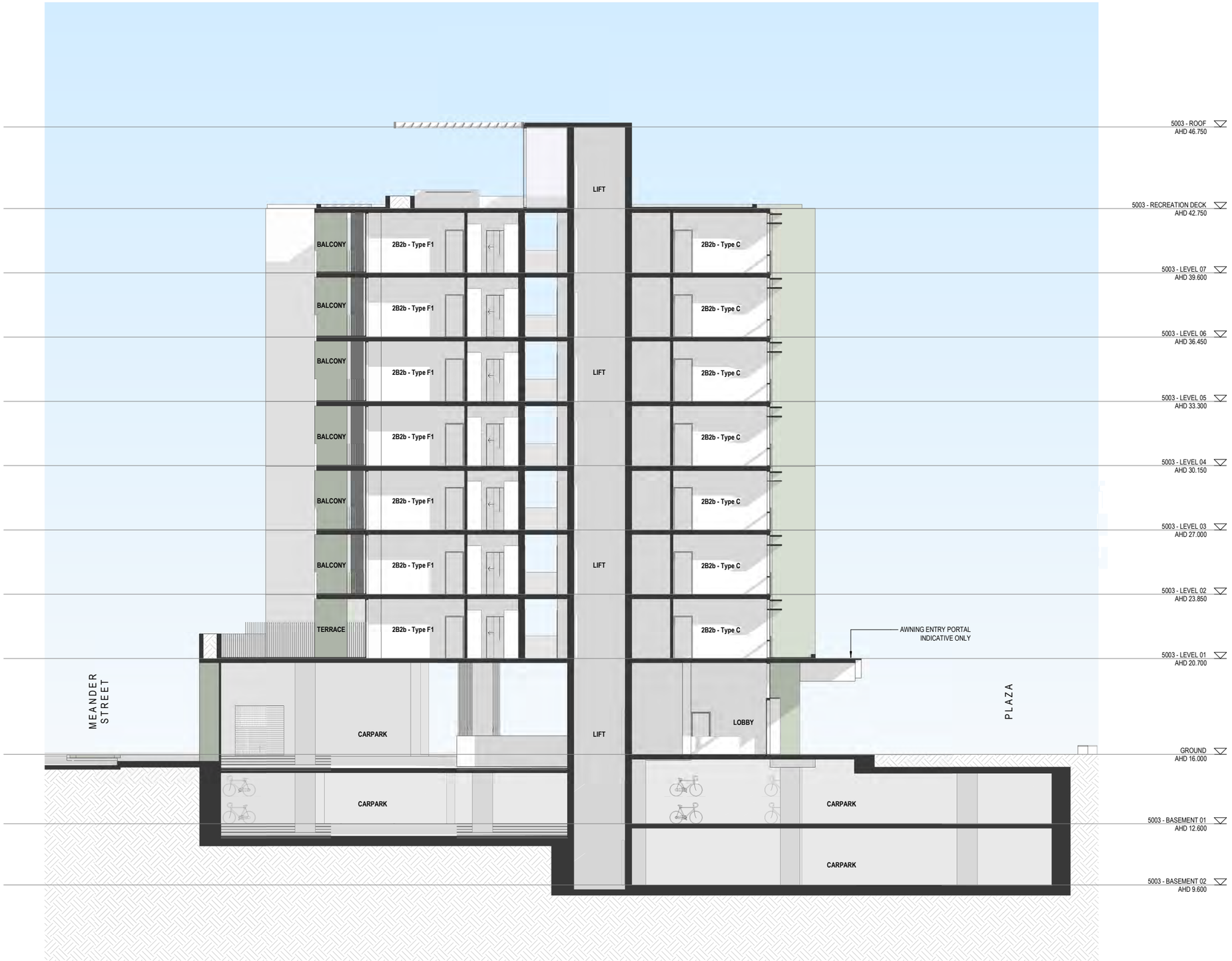
Project No. 23.0159

Revision 1

Number SK - AR - DR - SK 122

Details

0mm 40 80mm



architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.

Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client
DELUCA

Project
THE VILLAGE CARSELDINE

Drawing
5003 - SECTION 02

PRELIMINARY

A1 Scale 1 : 100
Project No. 23.0159
Revision 1

Number SK - AR - DR - SK 311

Details

0mm 40 80mm

architectus™ Conrad Gargett

We acknowledge the Traditional Custodians of the land on which this project is sited, and pay respects to their Elders past, present and emerging.

Revision

REV	DESCRIPTION	DATE	APP.
1	Prelim EDQ Pack	09/08/2024	DF

Client

DELUCA

Project

THE VILLAGE CARSELDINE

Drawing

5003 - SECTION 03

PRELIMINARY

A1 Scale 1 : 100

Project No. 23.0159

Revision 1

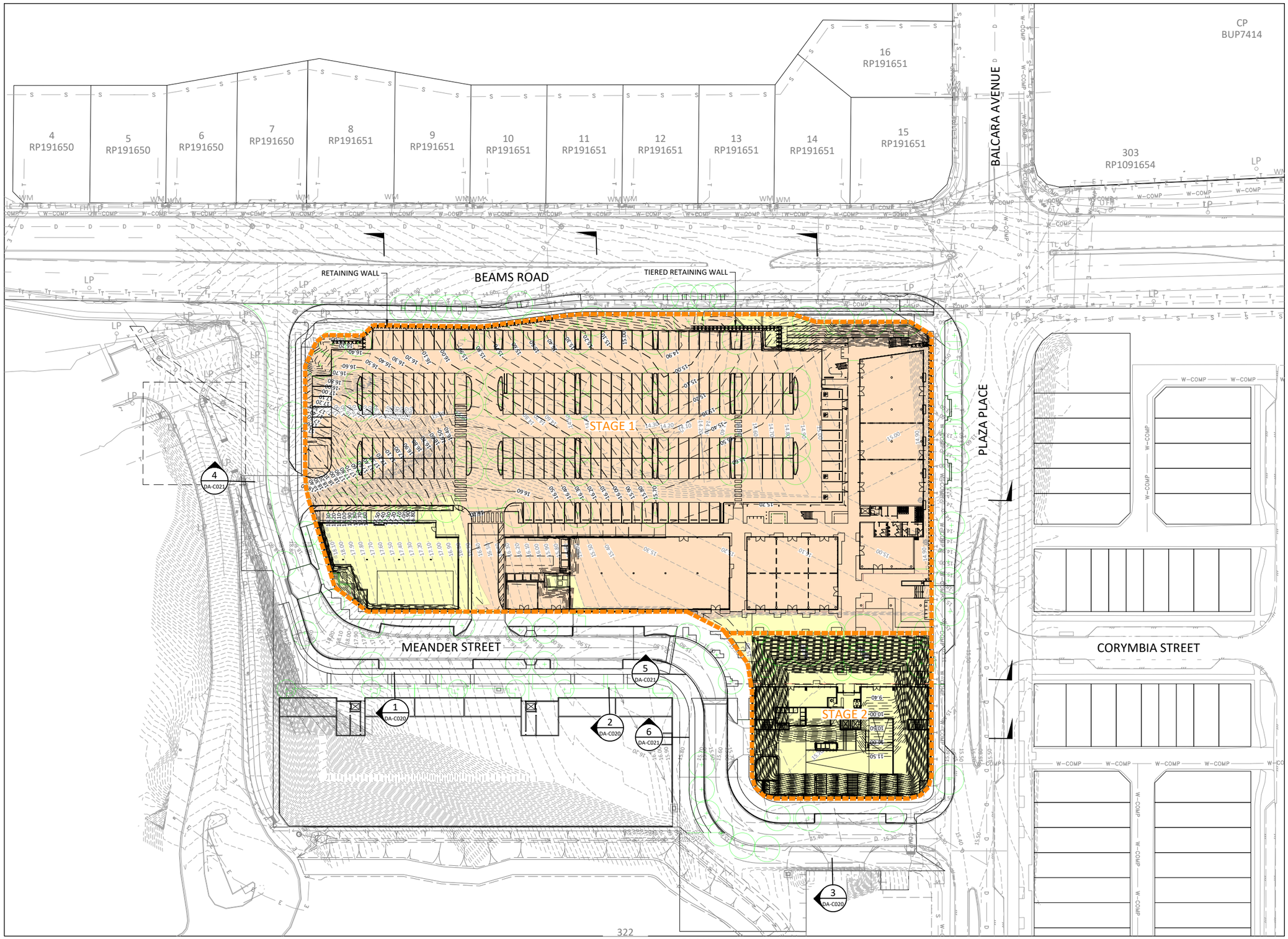
Number SK - AR - DR - SK 312

Details

0mm 40 80mm

APPENDIX B

ENGINEERING DRAWINGS



PLAN
SCALE 1:500

EARTHWORKS

PROPOSED

CUT

FILL

ESTIMATED VOLUMES

BULK EARTHWORKS VOLUMES
(EXCLUDING BULKING FACTORS)

CUT TO FILL (IF SUITABLE):	8,000m³
IMPORT FILL:	300m³

LANDSCAPING (BY OTHERS)

STAGING

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

PROJECT NORTH

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES — A1 UNREDUCED, A3 REDUCED

SCALES — UNREDUCED / REDUCED

0 5 10 15 20 25 m

1: 500 / 1: 1000

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
G	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
F	31.05.24	MINOR AMENDMENTS	ETA	ETA		
E	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
D	10.04.24	FOR COORDINATION	ETA	ETA		
C	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED
RPEQ
DATE

CHECKED
DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT: DE LUCA CORPORATION PTY LTD

PROJECT: CARSELDINE VILLAGE

SUBJECT: EARTHWORKS LAYOUT

PROJECT No. 23019

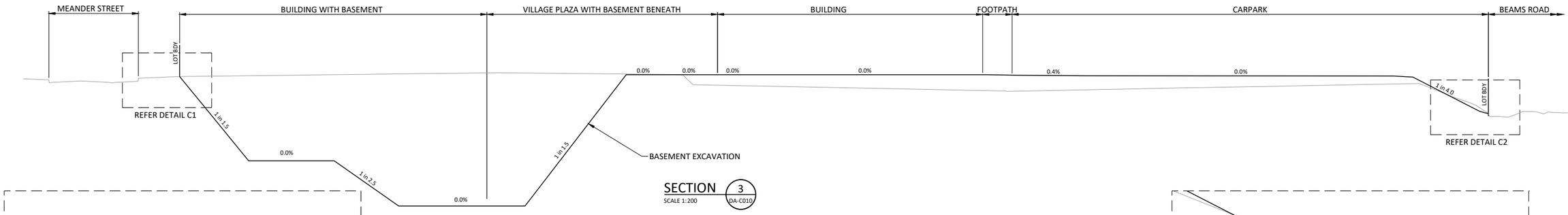
DRAWING No. DA-C010

REVISION G

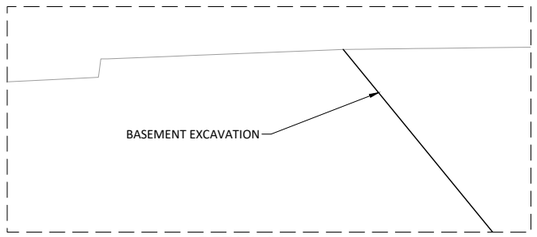
0 10 20 30 40 50 100

ORIGINAL SIZE A1

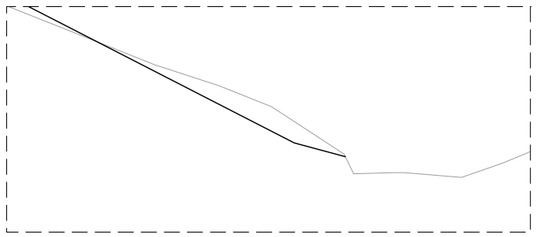
I:\2023\230139\05_DRAWINGS\DWG\DA\DWG\DA-C010.DWG
27/09/2024 9:14:15 AM



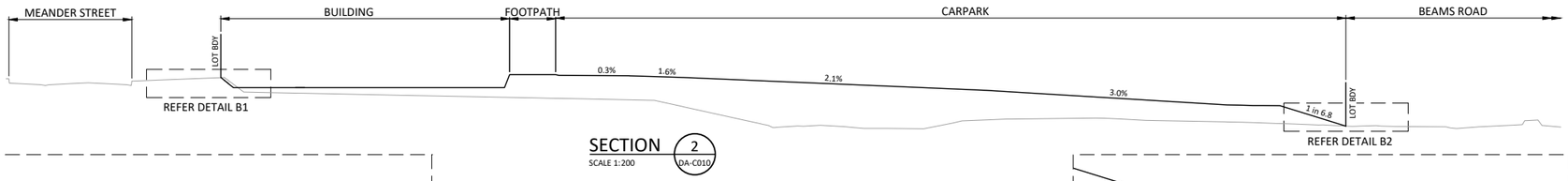
SECTION 3
SCALE 1:200
DA-C010



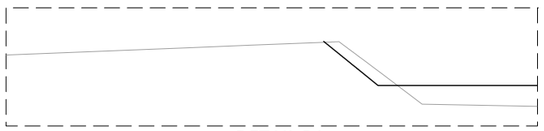
DETAIL C1
SCALE 1:50



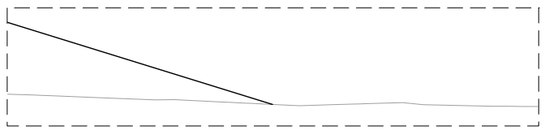
DETAIL C2
SCALE 1:50



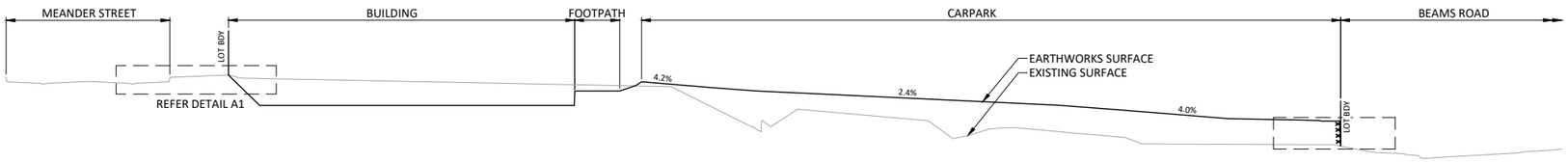
SECTION 2
SCALE 1:200
DA-C010



DETAIL B1
SCALE 1:50

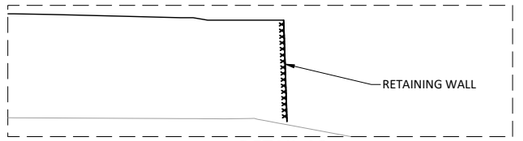


DETAIL B2
SCALE 1:50



SECTION 1
SCALE 1:200
DA-C010

DETAIL A1
SCALE 1:50



DETAIL A2
SCALE 1:50

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES

A1 UNREDUCED
A3 REDUCED

SCALES — UNREDUCED / REDUCED

0 0.5 1 1.5 2 2.5 m — 1: 50 / 1: 100

0 2 4 6 8 10 m — 1: 200 / 1: 400

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
G	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
F	31.05.24	MINOR AMENDMENTS	ETA	ETA		
E	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
D	10.04.24	FOR COORDINATION	ETA	ETA		
C	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED
. . . . . RPEQ
DATE

CHECKED
DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT
DE LUCA CORPORATION PTY LTD

PROJECT
CARSELDINE VILLAGE

SUBJECT
EARTHWORKS SECTIONS SHEET 1

PROJECT No.
23019

DRAWING No.
DA-C020

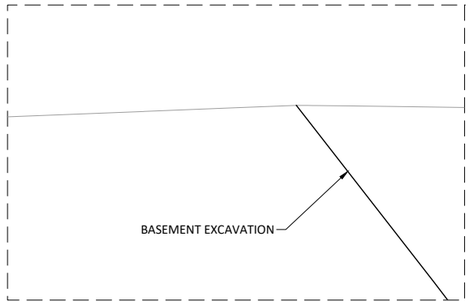
REVISION
G

0 10 20 30 40 50 100

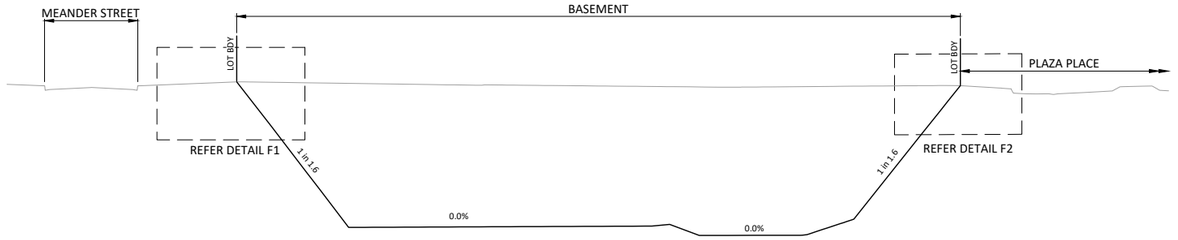
ORIGINAL SIZE A1

27/09/2024 9:02:40 AM

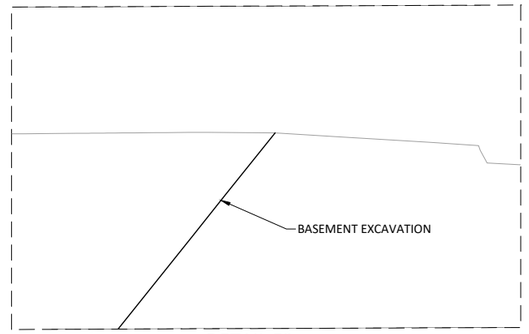
I:\23023\23019\05_DRAWINGS\DRG\DA\DRG\DA-C020.DWG



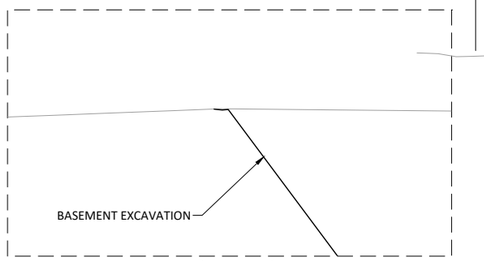
DETAIL F1
SCALE 1:250



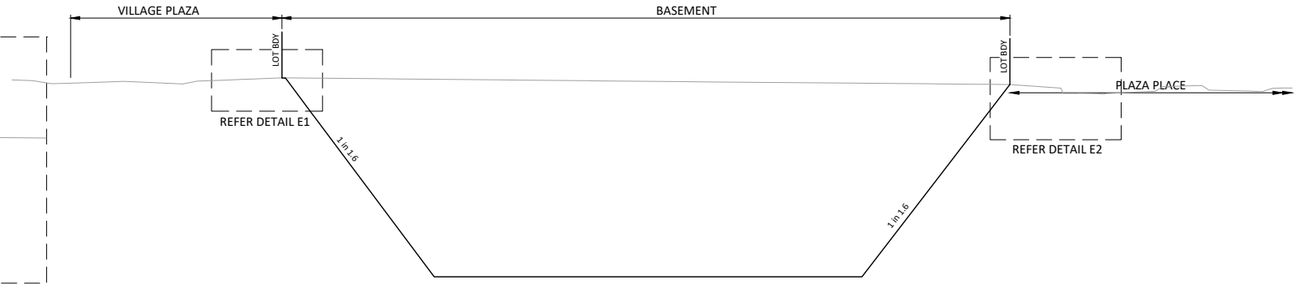
SECTION 6
SCALE 1:200 DA-C010



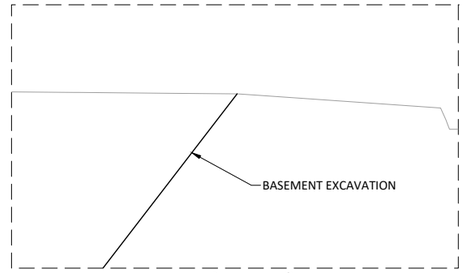
DETAIL F2
SCALE 1:50



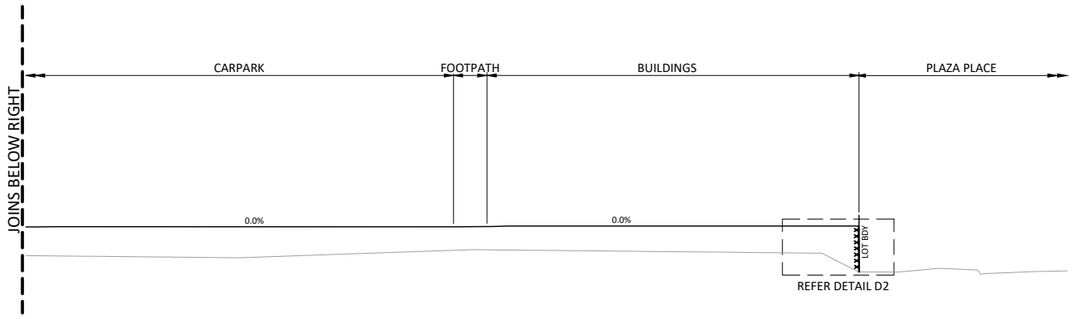
DETAIL E1
SCALE 1:50

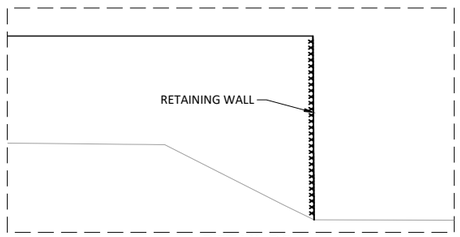


SECTION 5
SCALE 1:200 DA-C010

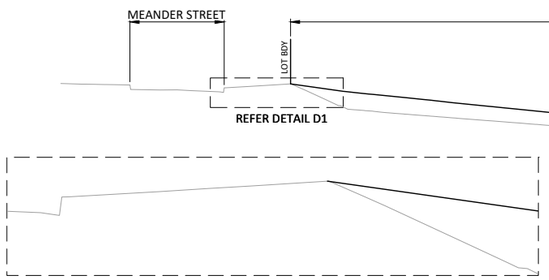


DETAIL E2
SCALE 1:50





DETAIL D2
SCALE 1:50



DETAIL D1
SCALE 1:50

SECTION 4
SCALE 1:200 DA-C010

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES

A1 UNREDUCED
A3 REDUCED

SCALES UNREDUCED / REDUCED

0 0.5 1 1.5 2 2.5 m 1: 50 / 1: 100

0 2 4 6 8 10 m 1: 200 / 1: 400

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
G	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
F	31.05.24	MINOR AMENDMENTS	ETA	ETA		
E	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
D	10.04.24	FOR COORDINATION	ETA	ETA		
C	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED
RPEQ
DATE

CHECKED
DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT
DE LUCA CORPORATION PTY LTD

PROJECT
CARSELDINE VILLAGE

SUBJECT
EARTHWORKS SECTIONS SHEET 2

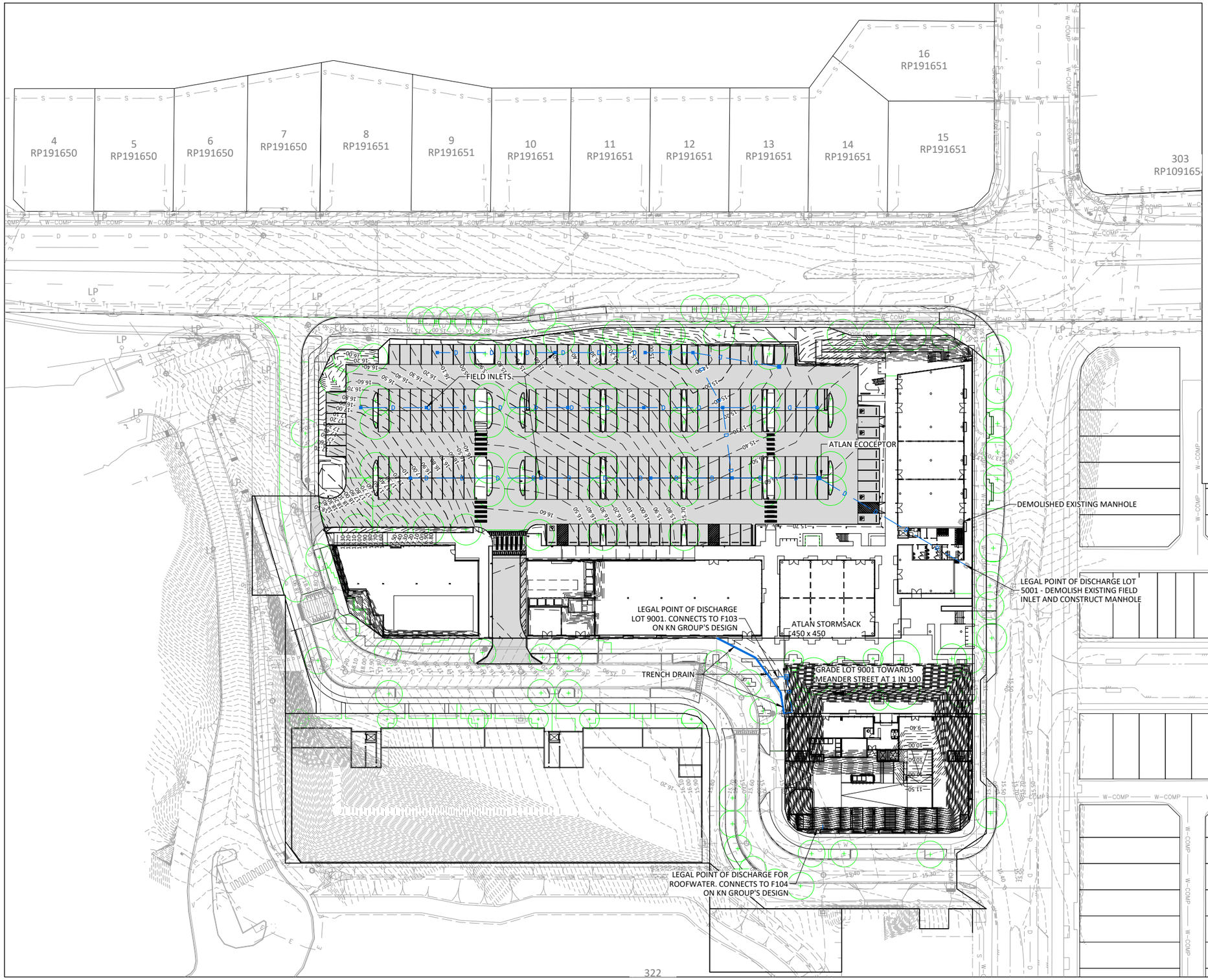
PROJECT No.
23019

DRAWING No. DA-C021

REVISION G

ORIGINAL SIZE A1

J:\2023\23019\05_DRAWINGS\DRG\DA\DRG\DA-C020.DWG
27/09/2024 9:02:44 AM



PLAN
SCALE 1:500

STORMWATER

EXISTING	PROPOSED	
	1.2	CATCHMENT NUMBER
		CATCHMENT BOUNDARY
		OPEN CHANNEL
RW RW	RW RW	ROOFWATER DRAINAGE
		STORMWATER DRAINAGE
D—COMP		STORMWATER DRAINAGE (FROM RECORDS)
		DIRECTION OF FLOW

SEWERAGE

EXISTING	PROPOSED	
S	S	SEWERAGE
COMP—S		SEWERAGE (FROM RECORDS)
	S	SEWERAGE PROPERTY CONNECTION
RM	RM	SEWERAGE RISING MAIN

WATER

EXISTING	PROPOSED	
W	W	WATER
W—COMP		WATER (FROM RECORDS)

LANDSCAPING (BY OTHERS)

NOTE

ROOFWATER DRAINAGE FROM LOT 5001 IS TO CONNECT TO INTERNAL STORMWATER DRAINAGE PRIOR TO ATLAN ECOCEPTOR

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

PROJECT NORTH

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES — A1 UNREDUCED, A3 REDUCED

SCALES — UNREDUCED / REDUCED

0 5 10 15 20 25 m
1: 500 / 1: 1000

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
E	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
D	31.05.24	MINOR AMENDMENTS	ETA	ETA		
C	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
B	10.04.24	FOR COORDINATION	ETA	ETA		
A	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED — RPEQ — DATE

CHECKED — DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT: DE LUCA CORPORATION PTY LTD

PROJECT: CARSELDINE VILLAGE

SUBJECT: SITEWORKS AND DRAINAGE LAYOUT

PROJECT No. 23019

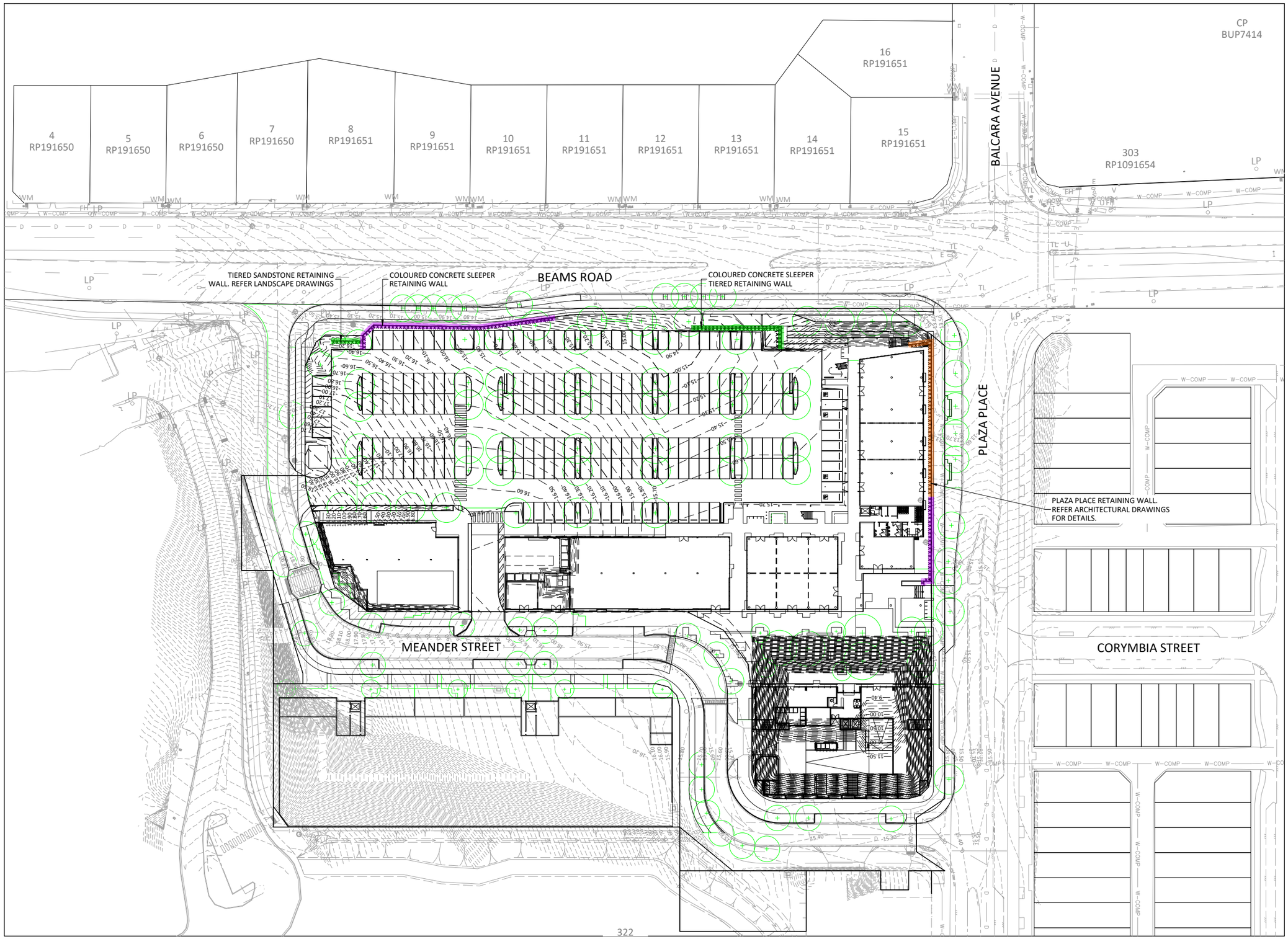
DRAWING No. DA-C030

REVISION E

0 10 20 30 40 50 100

ORIGINAL SIZE A1

J:\JOBS\23019\05_DRAWINGS\DWG\DA\DWG\DA-C030.DWG
27/09/2024 9:02:49 AM



PLAN
SCALE 1:500

RETAINING WALL LEGEND

1 TIER WALL
LESS THAN 1.0m

1 TIER WALL
BETWEEN 1.0m TO 2.0m

2 TIER WALL
BETWEEN 1.0m TO 2.0m

NOTE

- RETAINING SYSTEM TO BE AS PER LANDSCAPE ARCHITECT DETAIL.

LANDSCAPING (BY OTHERS)

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

PROJECT NORTH

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES — A1 UNREDUCED, A3 REDUCED

SCALES — UNREDUCED / REDUCED

0 5 10 15 20 25 m
1: 500 / 1: 1000

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
F	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
E	31.05.24	MINOR AMENDMENTS	ETA	ETA		
D	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
C	10.04.24	FOR COORDINATION	ETA	ETA		
B	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED
RPEQ
DATE

CHECKED
DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT: DE LUCA CORPORATION PTY LTD

PROJECT: CARSELDINE VILLAGE

SUBJECT: RETAINING WALL LAYOUT

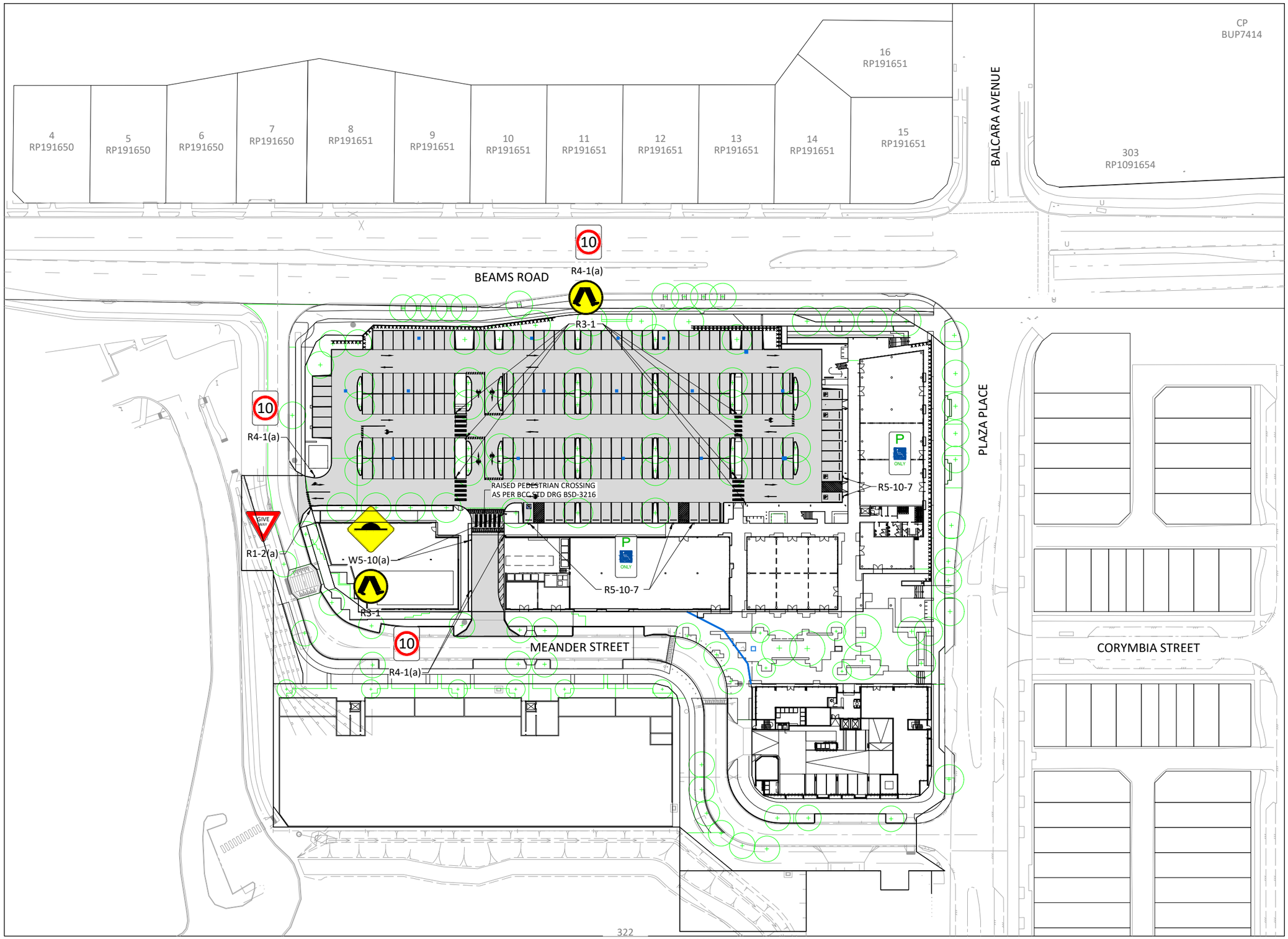
PROJECT No.: 23019

DRAWING No.: DA-C070

REVISION: F

0 10 20 30 40 50 100
ORIGINAL SIZE A1

I:\2023\23019\05_DRAWINGS\DWG\DA\DWG\DA-C070.DWG
27/09/2024 9:02:54 AM



PLAN
SCALE 1:500

LANDSCAPING (BY OTHERS)

THIS DRAWING IS BEST VIEWED IN COLOUR AND ON AN ELECTRONIC DEVICE

PROJECT NORTH

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES

A1 UNREDUCED
A3 REDUCED

SCALES

UNREDUCED / REDUCED

0 5 10 15 20 25 m

1: 500 / 1: 1000

STATUS

DEVELOPMENT APPLICATION

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
E	27.09.24	UPDATED LOT 5003 BASEMENT EXCAVATION	SG	SG	RG	
D	31.05.24	MINOR AMENDMENTS	ETA	ETA		
C	17.04.24	UPDATED BASEMENT & RETAINING WALLS	ETA	ETA	RG	
B	10.04.24	FOR COORDINATION	ETA	ETA		
A	08.03.24	FURTHER ISSUES RESPONSE	ETA	ETA		

ASSOCIATED CONSULTANTS

APPROVED
7729 RPEQ
DATE

CHECKED
DATE

BORNHORST +WARD
+61 (7) 3013 4699 www.bornhorstward.com.au

CLIENT
DE LUCA CORPORATION PTY LTD

PROJECT
CARSELDINE VILLAGE

SUBJECT
SIGNS AND LINEMARKING LAYOUT

PROJECT No.
23019

DRAWING No.
DA-C080

REVISION
E

0 10 20 30 40 50 100

ORIGINAL SIZE A1

J:\2023\23019\05_DRAWINGS\DWG\DA\DWG\DA-C080.DWG
27/09/2024 9:03:00 AM

APPENDIX C

EXISTING SITE INFORMATION

CARSELDINE VILLAGE

STAGE V

PLAN
SCALE 1:2000

DRAWING INDEX

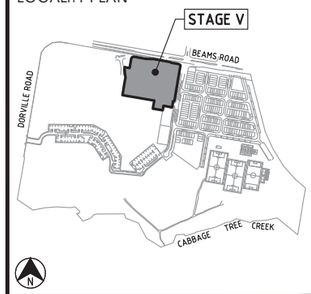
DRAWING NO.	DRAWING TITLE
21-121-01	GENERAL - LOCALITY PLAN, DRAWING INDEX AND NOTES
21-121-02	GENERAL - SETOUT PLAN
21-121-03	GENERAL - LAYOUT PLAN
21-121-04	EARTHWORKS - SPOT LEVELS PLAN
21-121-05	EARTHWORKS - GENERAL ARRANGEMENT - TIER RETAINING WALLS
21-121-06	EARTHWORKS - TIER RETAINING WALLS - SECTION AND DETAIL
21-121-07	ROADWORKS - LONGITUDINAL SECTION - MEANDER STREET
21-121-08	ROADWORKS - CROSS SECTIONS - MEANDER STREET
21-121-09	ROADWORKS - INTERSECTION DETAILS - SHEET 1
21-121-10	ROADWORKS - INTERSECTION DETAILS - SHEET 2
21-121-11	ROADWORKS - INTERSECTION DETAILS - SHEET 3
21-121-12	ROADWORKS - SIGNS AND LINEMARKING PLAN
21-121-13	STORMWATER - CATCHMENT PLAN
21-121-14	STORMWATER - CALCULATION TABLE - SHEET 1
21-121-15	STORMWATER - CALCULATION TABLE - SHEET 2
21-121-16	STORMWATER - LONGITUDINAL SECTIONS - SHEET 1
21-121-17	STORMWATER - LONGITUDINAL SECTIONS - SHEET 2
21-121-18	STORMWATER - MANHOLE DETAILS - SHEET 1
21-121-19	STORMWATER - MANHOLE DETAILS - SHEET 2
21-121-20	SAFETY IN DESIGN

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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

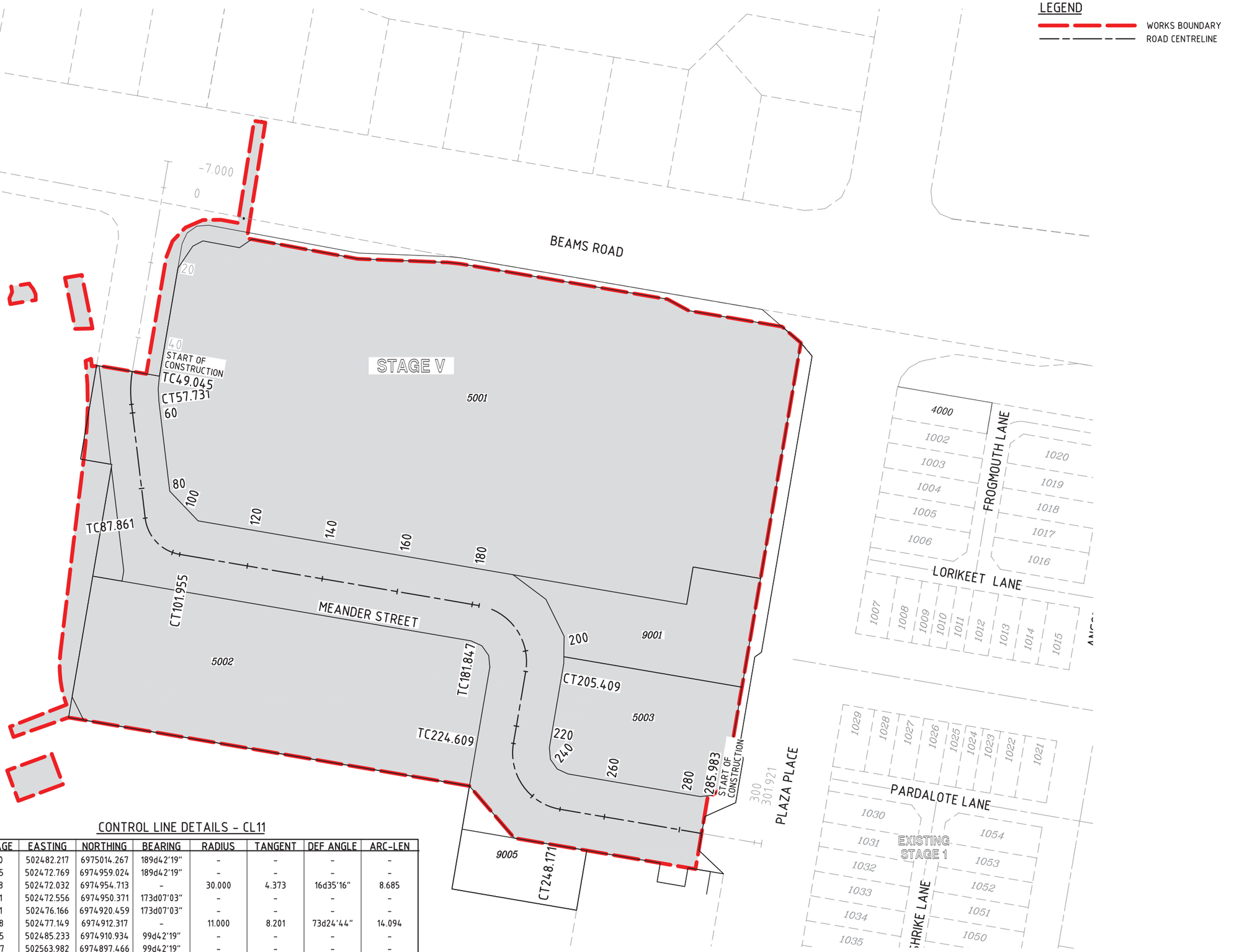
Approved
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:35+10'00'

Drawing Title
GENERAL
LOCALITY PLAN,
DRAWING INDEX AND NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	01 of 20

	Drawing No	Revision
A1	21-121- 01	A



CONTROL LINE DETAILS - CL11

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	-7.000	502482.217	6975014.267	189d42'19"	-	-	-	-
TC	49.045	502472.769	6974959.024	189d42'19"	-	-	-	-
IP2	53.388	502472.032	6974954.713	-	30.000	4.373	16d35'16"	8.685
CT	57.731	502472.556	6974950.371	173d07'03"	-	-	-	-
TC	87.861	502476.166	6974920.459	173d07'03"	-	-	-	-
IP3	94.908	502477.149	6974912.317	-	11.000	8.201	73d24'44"	14.094
CT	101.955	502485.233	6974910.934	99d42'19"	-	-	-	-
TC	181.847	502563.982	6974897.466	99d42'19"	-	-	-	-
IP4	193.628	502578.767	6974894.937	-	15.000	15.000	90d00'00"	23.562
CT	205.409	502576.238	6974880.152	189d42'19"	-	-	-	-
TC	224.609	502573.002	6974861.227	189d42'19"	-	-	-	-
IP5	236.390	502570.473	6974846.441	-	15.000	15.000	89d59'60"	23.562
CT	248.171	502585.258	6974843.912	99d42'19"	-	-	-	-
IP6	301.921	502638.239	6974834.851	99d42'19"	-	-	-	-

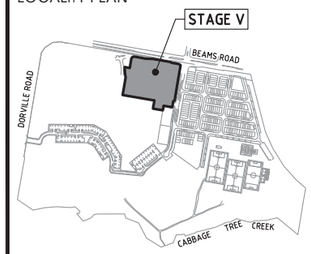
SETOUT PLAN
SCALE 1:500

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:35+10'00'

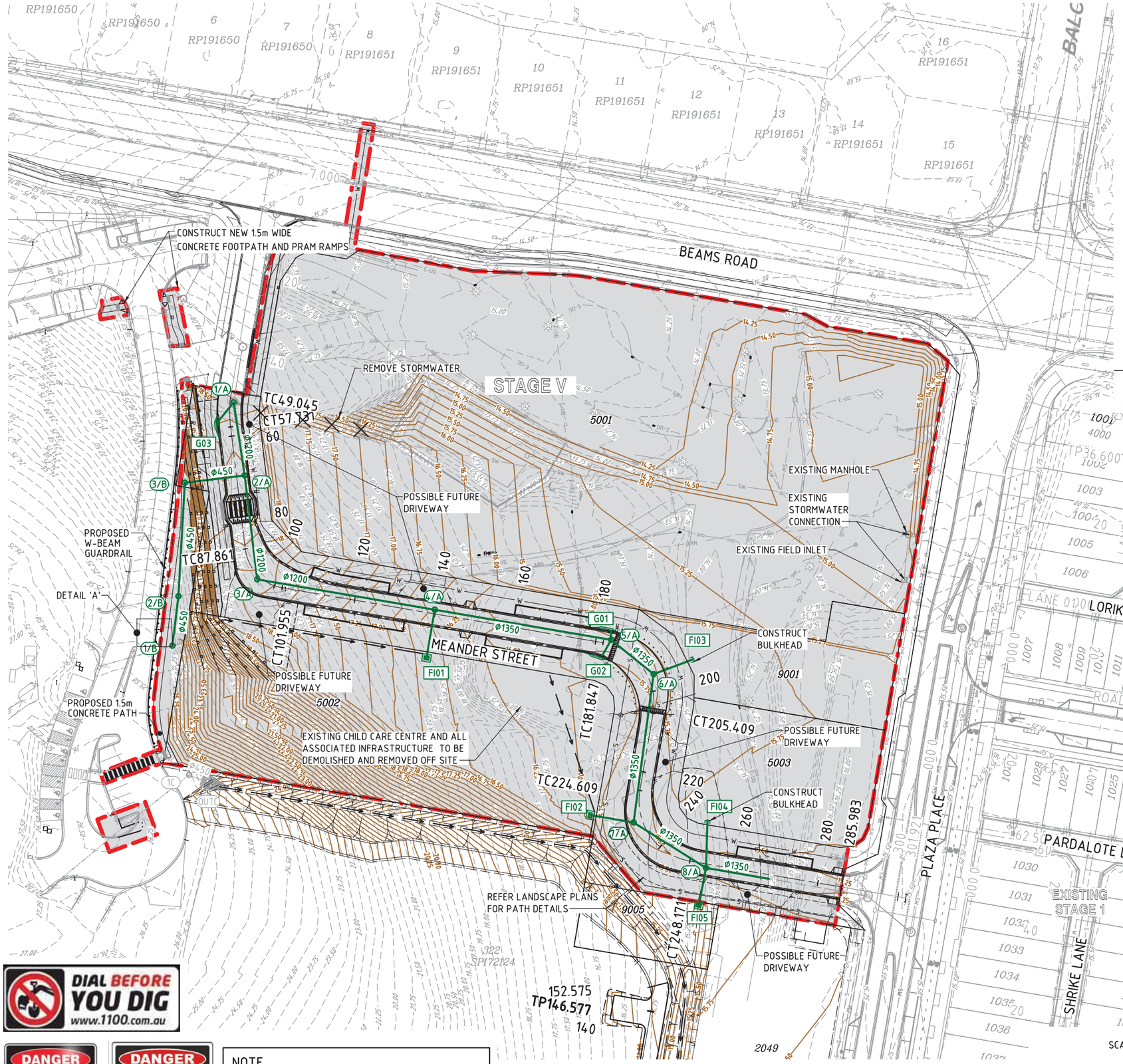
Drawing Title
GENERAL SETOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	02 of 20

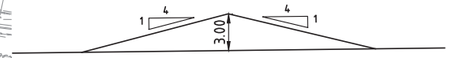
	Drawing No	Revision
A1	21-121-02	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\121-121-02-GE-SETOUT.dwg Plotted by: RW on 30/10/2023 3:44:42 PM

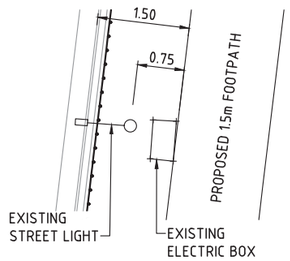


LEGEND

- WORKS BOUNDARY
- ROAD CENTRELINE
- KERB AND CHANNEL - TYPE E
- KERB ONLY - TYPE E
- INVERT CHANNEL
- MOUNTABLE KERB WITH BACKING STRIP
- PROPOSED RETAINING WALL
- PROPOSED W-BEAM GUARDRAIL
- STORMWATER DRAINAGE
- SEWER MAIN
- WATER MAIN
- EXISTING STORMWATER DRAINAGE
- EXISTING SEWER MAIN
- EXISTING WATER MAIN
- FINISHED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- BATTER LINE
- TURF BUND 300mm HIGHT
- 17N STORMWATER MANHOLE/NUMBER
- G706 STORMWATER GULLY PIT/NUMBER
- R703 ROOFWATER FIELD INLET/NUMBER



BUND DETAIL
NTS.



DETAIL 'A'
SCALE 1:50

LAYOUT PLAN
SCALE 1:500

SCALE 1.0 0.5 0 1.0 2.0 3.0 4.0 5.0m
1 : 50 (A1 UNREDUCED)

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

DIAL BEFORE YOU DIG www.1100.com.au

DANGER UNDERGROUND CABLES

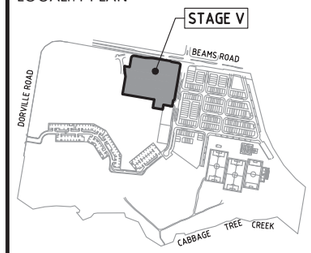
DANGER LIVE WIRES AND COMMUNICATION SERVICES

NOTE
PROPOSED WORKS ARE NEAR EXISTING SERVICES. CONTRACTOR TO COMPLETE DBYD AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCING CONSTRUCTION.

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:35+10'00'

Drawing Title
GENERAL LAYOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	03 of 20

	Drawing No	Revision
A1	21-121-03	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-03-GE-LAYOUT.dwg Plotted by: RW on 30/10/2023 3:45:07 PM

LEGEND

- WORKS BOUNDARY
- ROAD CENTRELINE
- KERB AND CHANNEL - TYPE E
- KERB ONLY - TYPE E
- INVERT CHANNEL
- MOUNTABLE KERB WITH BACKING STRIP
- FINISHED SURFACE CONTOURS (36.0)
- EXISTING SURFACE CONTOURS (36.0)
- BATTER LINE
- EXTENT OF CUT
- EXTENT OF FILL

EARTHWORKS SPOT LEVELS PLAN

SCALE 1:500

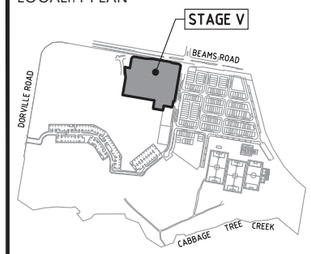
SCALE 5 0 5 10 15 20 25m
1 : 250 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:36+10'00'

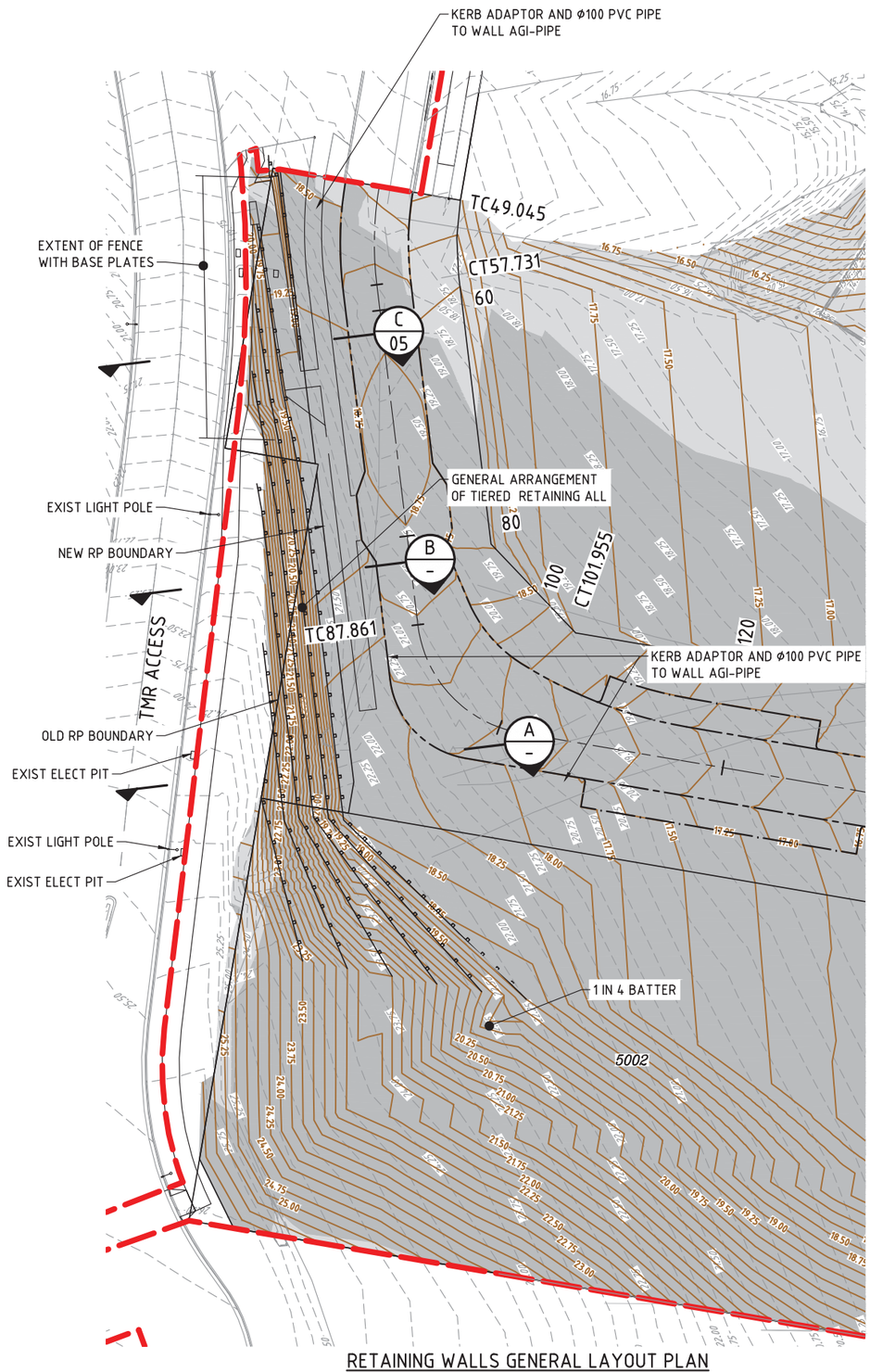
Drawing Title
EARTHWORKS SPOT LEVELS PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

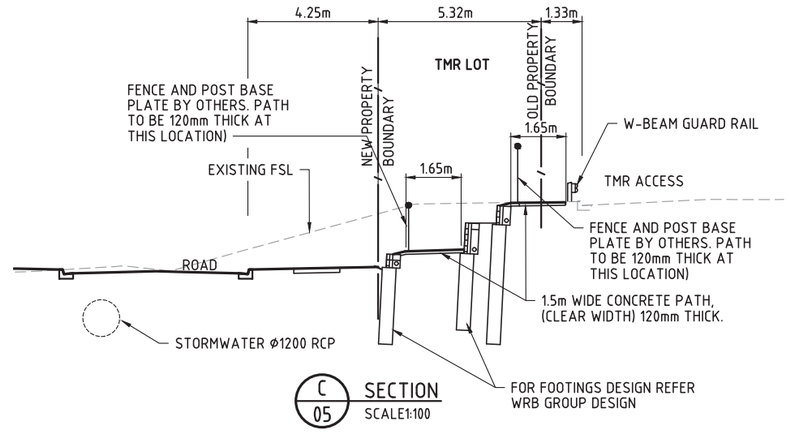
Scale	Sheet
AS SHOWN	04 of 20

	Drawing No	Revision
A1	21-121-04	A

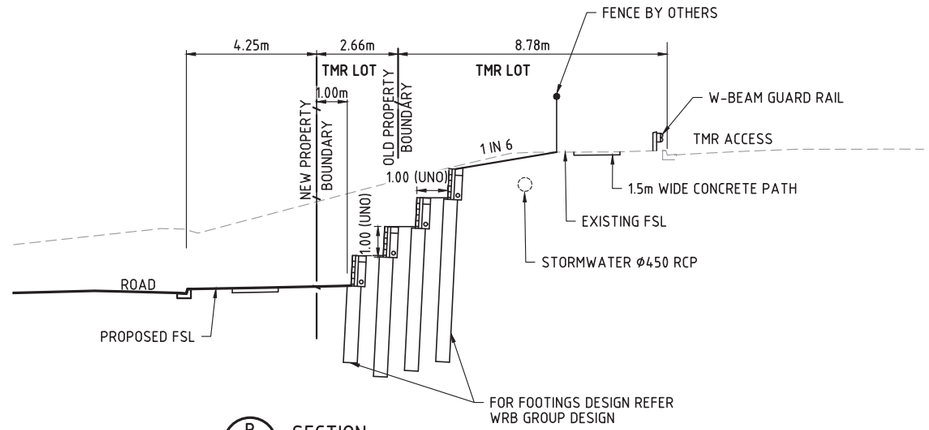
M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-04-06-EW-SPOT.dwg Plotted by: RW on 30/10/2023 3:45:23 PM



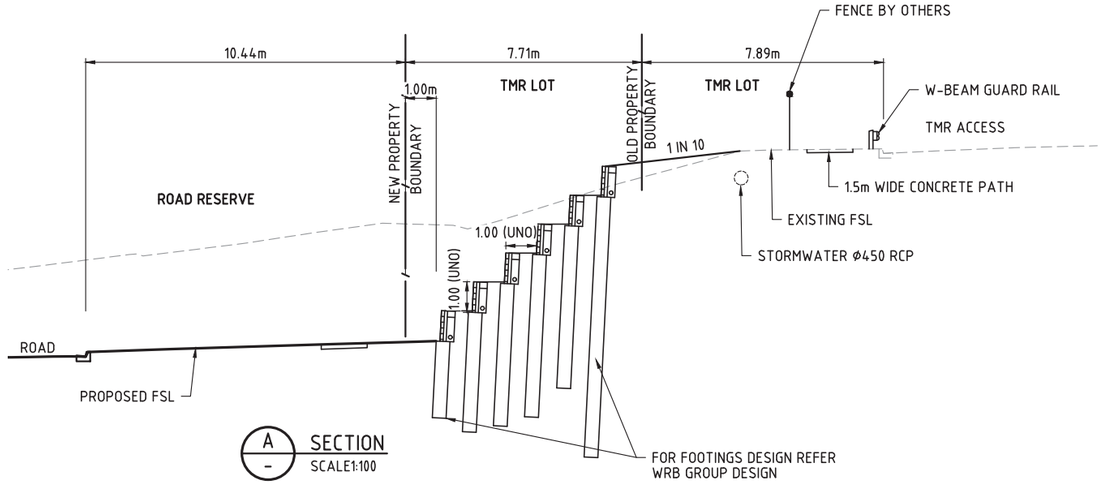
RETAINING WALLS GENERAL LAYOUT PLAN
SCALE 1:250



C 05 SECTION
SCALE1:100



B - SECTION
SCALE1:100



A - SECTION
SCALE1:100

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

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

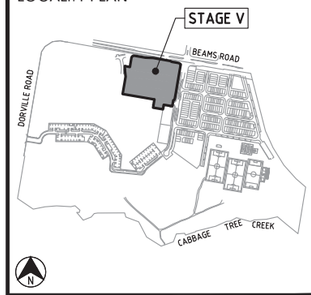
LEGEND

- WORKS BOUNDARY
- ROAD CENTRELINE
- KERB AND CHANNEL - TYPE E
- KERB ONLY - TYPE E
- INVERT CHANNEL
- 36.0 FINISHED SURFACE CONTOURS
- 36.0 EXISTING SURFACE CONTOURS
- BATTER LINE
- EXTENT OF CUT
- EXTENT OF FILL

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:36+10'00'

Drawing Title
EARTHWORKS GENERAL ARRANGEMENT TIER RETAINING WALLS

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	05 of 20

	Drawing No	Revision
A1	21-121-05	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-04-06-EW-SPOT.dwg Plotted by: RW on 30/10/2023 3:45:28 PM

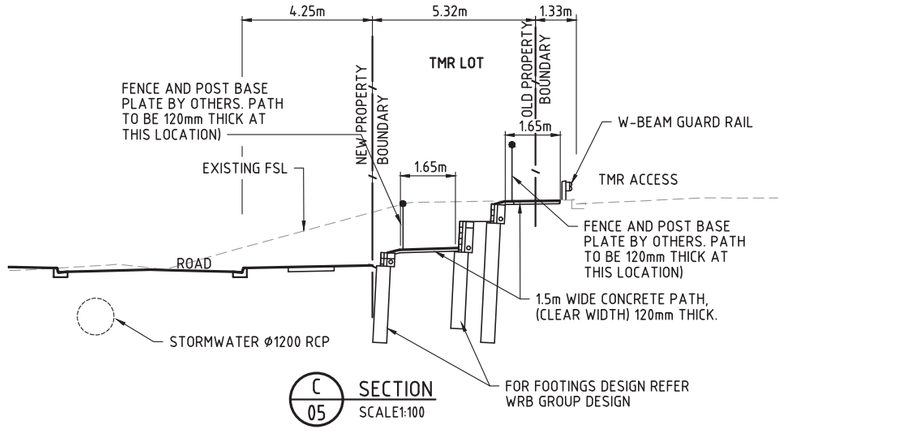
PATH DETAIL
SCALE 1:50

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
1	502468.005	6974938.003	18.939
2	502467.588	6974941.462	18.904
3	502467.408	6974942.951	18.878
4	502464.538	6974940.590	18.989
5	502464.462	6974941.084	18.982
6	502465.872	6974942.765	18.917
7	502464.233	6974942.568	18.958
8	502465.567	6974944.742	19.012
9	502463.928	6974944.545	19.012
10	502463.844	6974955.917	19.550
11	502462.205	6974955.719	19.550
12	502463.539	6974957.895	19.590
13	502461.900	6974957.697	19.631
14	502461.325	6974957.628	19.645
15	502463.287	6974959.526	19.540
16	502461.280	6974959.284	19.480

LEGEND

- WORKS BOUNDARY
- ROAD CENTRELINE
- KERB AND CHANNEL - TYPE E
- KERB ONLY - TYPE E
- INVERT CHANNEL
- 36.0 FINISHED SURFACE CONTOURS
- 36.0 EXISTING SURFACE CONTOURS
- BATTER LINE
- EXTENT OF CUT
- EXTENT OF FILL



C/05 SECTION
SCALE1:100

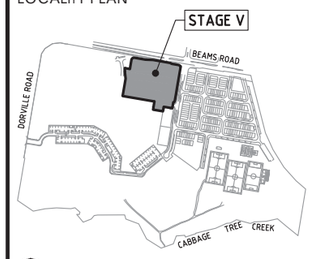
SCALE 1.0 0.5 0 1.0 2.0 3.0 4.0 5.0m
1 : 50 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:36+10'00'

Drawing Title
EARTHWORKS
TIER RETAINING WALLS
SECTION AND DETAIL

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	06 of 20

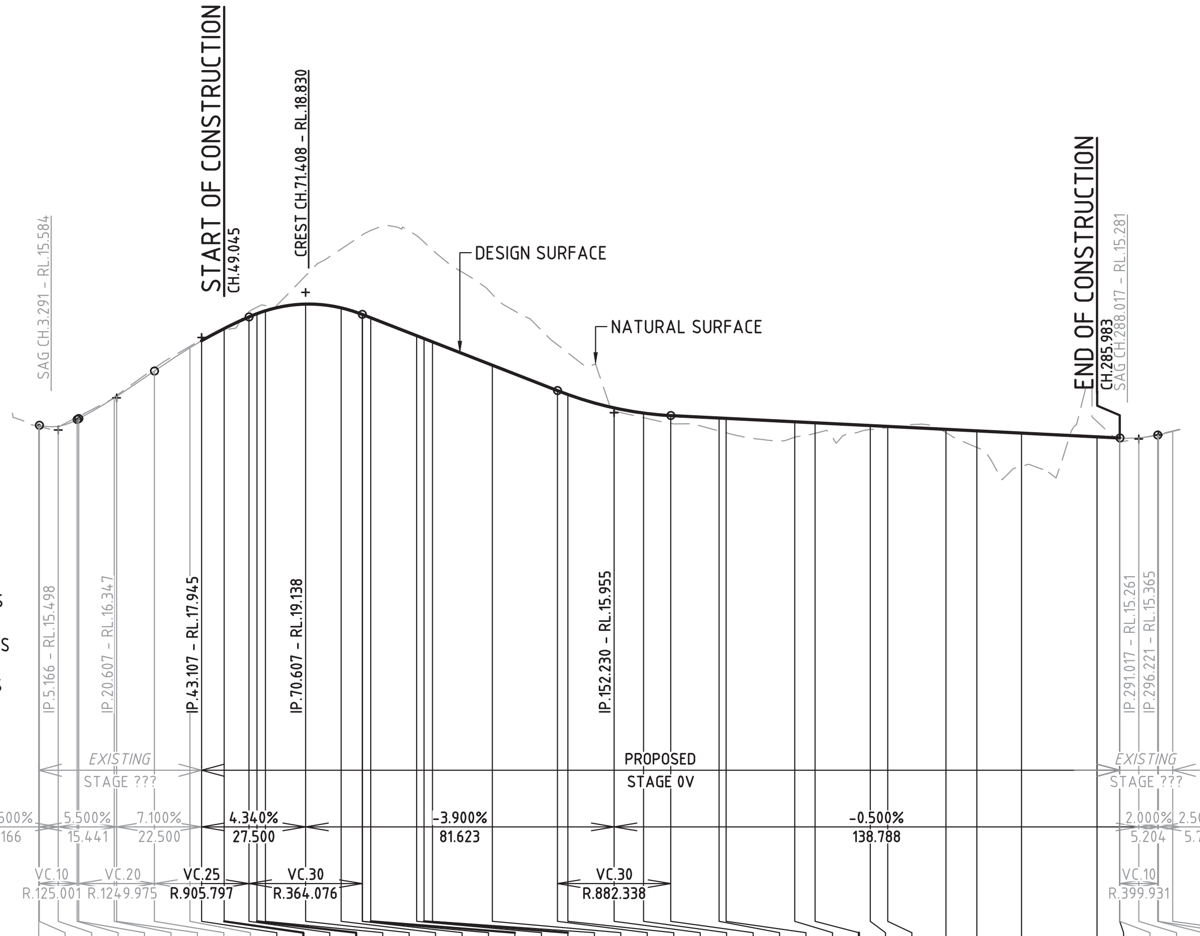
	Drawing No	Revision
A1	21-121-06	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-04-06-EW-SPOT.dwg Plotted by: RW on 30/10/2023 3:45:32 PM

NOMINAL PAVEMENT DETAILS

LOCAL ACCESS

50mm ASPHALTIC CONCRETE
100mm BASE COURSE (TYPE 2.1, CBR 80)
150mm UPPER SUB-BASE COURSE (TYPE 2.3, CBR 45)
SUBGRADE REPLACEMENT AS REQUIRED (TYPE 2.4, CBR 15)
DESIGN ESA = 3.7×10^5



\# REFER TO INTERSECTION DETAILS ON KN DWG 21-121-09 FOR ROAD CENTRELINE CROWN SHIFT LEVELS

* REFER INTERSECTION DETAILS ON KN DWG 21-121-09 AND 10

Stage Number: EXISTING STAGE ??? | PROPOSED STAGE 0V | EXISTING STAGE ???

Vertical Geometry Grade / Vertical Geometry Length (m): -2.500% 5.166 | 5.500% 15.441 | 7.100% 22.500 | 4.340% 27.500 | -3.900% 81.623 | -0.500% 138.788 | 2.000% 5.204 | 2.500% 5.700

Vertical Curve Length (m) / Vertical Curve Radius (m): VC 10 R.125.001 | VC 20 R.1249.975 | VC 25 R.905.797 | VC 30 R.364.076 | VC 30 R.882.338 | VC 10 R.399.931

DATUM R.L.2.000

VOLUMES

CUT	39	332	250	634	1351	867	262	0	0	3	0	79	22
FILL	15	4	0	0	0	46	152	9	103	9	187	198	1

PEGGED CHAINAGE	LIP OF KERB LHS	LIP OF KERB RHS	NATURAL SURFACE	CUT/FILL DEPTH	DESIGN SURFACE
-7.000			15.944		
0.000			15.595	0.032	15.627
0.166			15.591	0.032	15.623
5.166			15.577	0.021	15.598
10.166			15.836	-0.063	15.773
10.607			15.859	-0.062	15.797
20.000			* [illegible]	-0.019	16.349
20.607			16.411	-0.024	16.387
30.607			17.130	-0.072	17.057
40.000			17.711	-0.036	17.675
43.107			17.893	-0.035	17.858
49.045	18.079	18.284	18.149	0.030	18.179
55.607	18.412	18.474	18.636	-0.149	18.487
57.731	18.506	18.526	18.746	-0.173	18.573
60.000	18.584	18.584	18.790	-0.139	18.651
70.607	18.761	18.761	19.576	-0.747	18.829
80.000	*	18.638	20.284	-1.555	18.729
85.607	*	18.486	20.657	-2.103	18.553
85.624	*	18.485	20.658	-2.105	18.552
87.861	*	*	20.778	-2.313	#
100.000	*	*	20.643	-2.651	#
101.955	*	17.848	20.469	-2.553	#
104.191	*	17.761	20.261	-2.433	17.828
120.000	17.144	17.144	19.090	-1.878	17.212
137.230	16.472	16.472	17.756	-1.216	16.540
140.000	16.369	16.369	17.540	-1.104	16.436
152.230	16.015	16.015	15.999	0.083	16.082
160.000	15.878	15.878	15.824	0.122	15.946
167.230	15.812	15.812	15.668	0.211	15.880
180.000	15.748	*	15.475	0.341	15.816
181.847	*	*	15.424	0.382	15.807
200.000	*	*	15.307	0.409	15.716
205.409	15.621	*	15.409	0.280	15.689
220.000	15.548	15.548	15.514	0.101	15.616
224.609	*	*	15.565	0.028	15.593
240.000	*	*	15.434	0.082	15.516
248.171	*	15.408	15.037	0.439	15.475
260.000	15.348	15.348	14.539	0.877	15.416
280.000	15.248	15.248	15.720	-0.404	15.316
285.983	15.219	15.219	15.177	0.109	15.286
286.017	15.218	15.218	15.178	0.108	15.286
291.017			15.276	0.016	15.292
296.017			15.376	-0.015	15.361
296.221			15.381	-0.016	15.365
300.000			15.475	-0.016	15.459

Horiz Curve Data: R.-30 8.685 | R.-11 14.094 | R.15 23.562 | R.-15 23.562

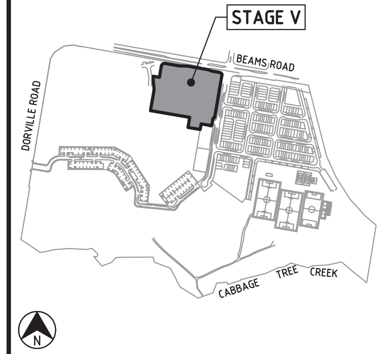
LONGITUDINAL SECTION - MEANDER STREET

SCALE - 1:500 (H)
1:100 (V)

SCALE A 1:1000 (Horiz.)
B 1:100 (Vert.)
(A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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

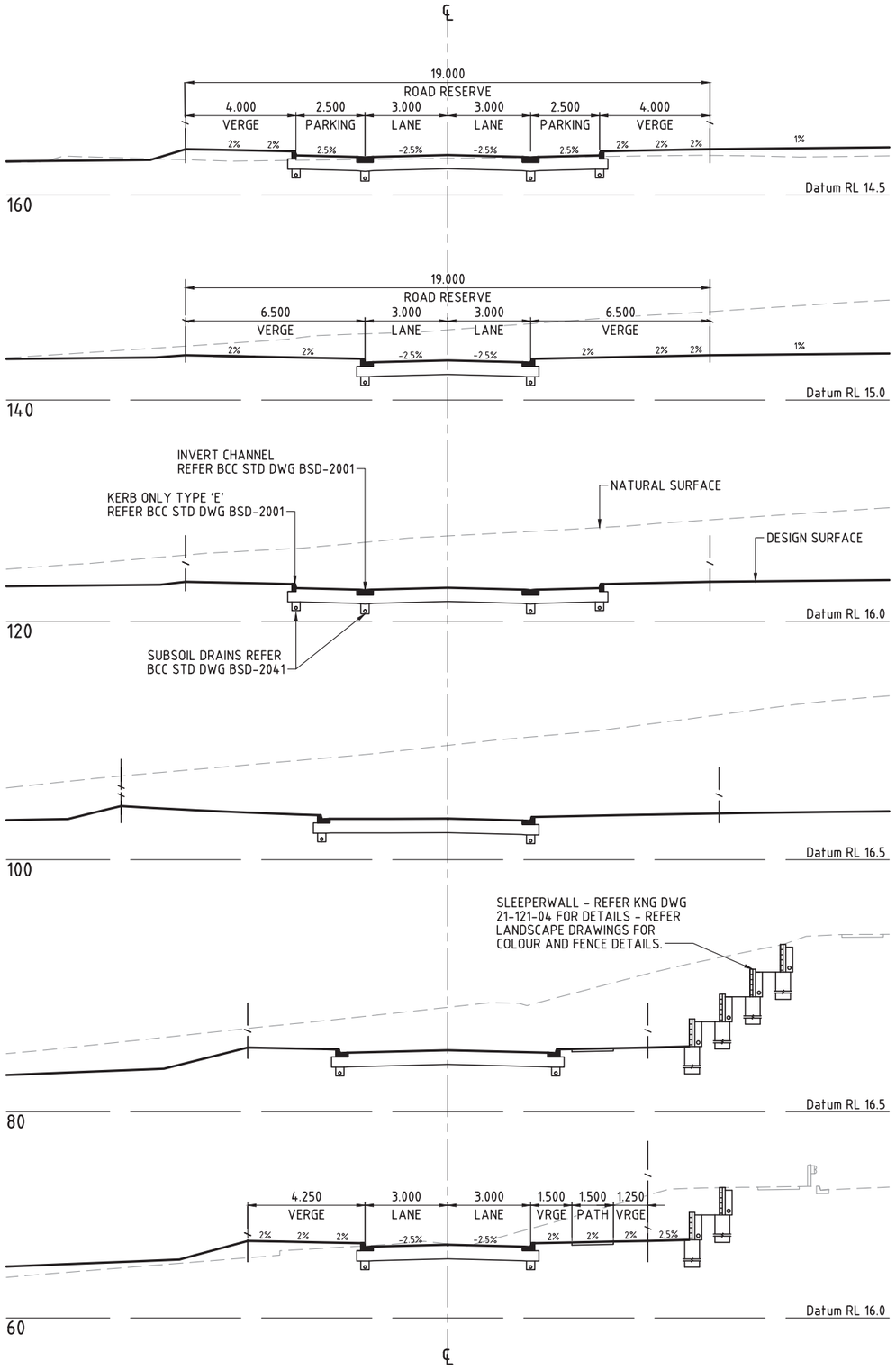
Approved
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:37+10'00'

Drawing Title
ROADWORKS
LONGITUDINAL SECTION
MEANDER STREET

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale: AS SHOWN | Sheet: 07 of 20
A1 | Drawing No: 21-121-07 | Revision: A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-07-08-RD-LONGS.dwg Plotted by: RW on 30/10/2023 3:45:36 PM



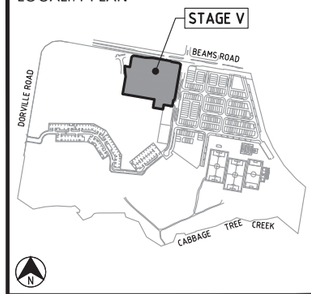
CROSS SECTIONS - MEANDER STREET
SCALE 1:100

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

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-07-08-RD-LONGS.dwg Plotted by: RW on 30/10/2023 3:45:37 PM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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

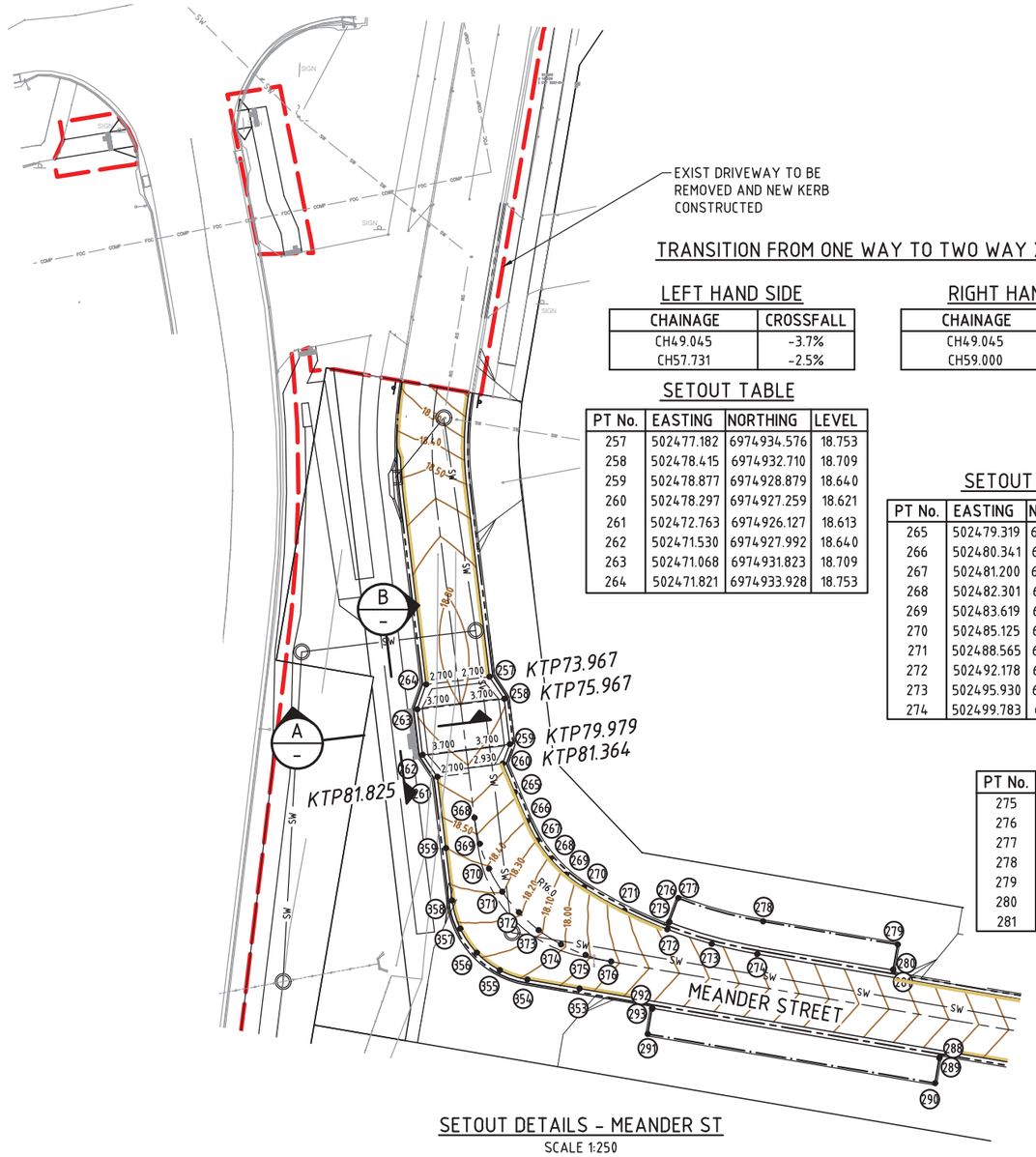
Approved
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:37+10'00'

Drawing Title
ROADWORKS
CROSS SECTIONS
MEANDER STREET

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	08 of 20

A1	Drawing No	Revision
	21-121-08	A



SETOUT DETAILS - MEANDER ST
SCALE 1:250

TRANSITION FROM ONE WAY TO TWO WAY XFALL

LEFT HAND SIDE

CHAINAGE	CROSSFALL
CH49.045	-3.7%
CH57.731	-2.5%

RIGHT HAND SIDE

CHAINAGE	CROSSFALL
CH49.045	+3.5%
CH59.000	-2.5%

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
257	502477.182	6974934.576	18.753
258	502478.415	6974932.710	18.709
259	502478.877	6974928.879	18.640
260	502478.297	6974927.259	18.621
261	502472.763	6974926.127	18.613
262	502471.530	6974927.992	18.640
263	502471.068	6974931.823	18.709
264	502471.821	6974933.928	18.753

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
265	502479.319	6974924.839	18.518
266	502480.341	6974922.419	18.397
267	502481.200	6974920.754	18.297
268	502482.301	6974919.238	18.188
269	502483.619	6974917.907	18.068
270	502485.125	6974916.792	17.941
271	502488.565	6974914.857	17.716
272	502492.178	6974913.268	17.564
273	502495.930	6974912.040	17.435
274	502499.783	6974911.185	17.290

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
275	502492.329	6974913.853	17.566
276	502492.348	6974913.903	17.568
277	502493.105	6974915.911	17.621
278	502500.255	6974913.945	17.345
279	502511.614	6974912.002	16.896
280	502511.252	6974909.883	16.842
281	502511.243	6974909.834	16.841

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
368	502475.898	6974922.679	18.552
369	502476.344	6974920.484	18.471
370	502477.134	6974918.388	18.390
371	502478.248	6974916.445	18.304
372	502479.657	6974914.704	18.213
373	502481.326	6974913.211	18.117
374	502483.212	6974912.002	18.019
375	502485.267	6974911.110	17.921
376	502487.437	6974910.557	17.828

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
353	502484.778	6974908.273	17.848
354	502480.368	6974909.027	17.983
355	502478.045	6974909.822	18.050
356	502476.089	6974911.308	18.114
357	502474.701	6974913.334	18.182
358	502474.022	6974915.694	18.256
359	502473.486	6974920.135	18.398

SETOUT TABLE

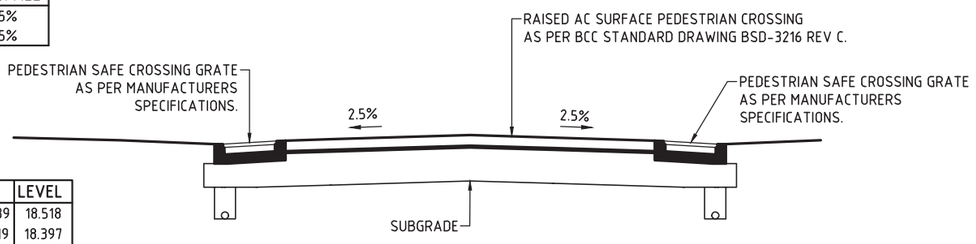
PT No.	EASTING	NORTHING	LEVEL
288	502515.152	6974902.469	16.640
289	502515.140	6974902.421	16.644
290	502514.777	6974900.301	16.697
291	502490.530	6974904.448	17.657
292	502490.892	6974906.568	17.603
293	502490.900	6974906.617	17.602

GENERAL NOTES

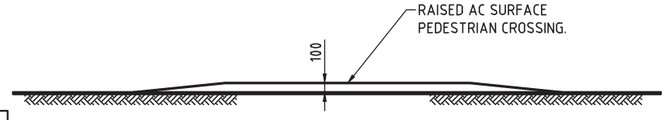
1. SETOUT TABLES ARE GIVEN AT KERB LIP LEVELS.
2. KERB LIP LEVELS ARE GIVEN AT QUARTER POINTS, TP'S AND EQUAL PARTS U.N.O.
3. KERB RADII AND OFFSETS ARE GIVEN AT NOMINAL KERB FACE .
4. EXTRA DETAIL FOR SETTING OUT IS AVAILABLE ON CAD FILE.
5. FOR KERB INFORMATION REFER TO B.C.C. STD DWG BSD-2001.
6. ALL KERB RAMPS WHERE RAMP FLATTER THAN 1:9 TO INCLUDE TACTILE INDICATORS.

LEGEND

- ROAD CENTRELINE
- BARRIER K&C (TYPE E)
- INVERT
- BARRIER KERB ONLY (TYPE E)
- NOMINAL FACE OF KERB
- TACTILE GROUND SURFACE INDICATORS (TGSI)

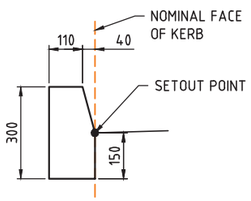


A/09 RAISED AC SURFACE PEDESTRIAN CROSSING
SCALE 1 : 50

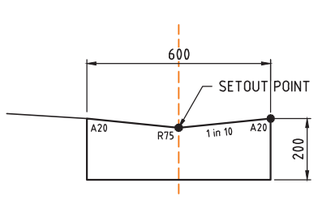


B/09 RAISED AC SURFACE PEDESTRIAN CROSSING
SCALE 1 : 50

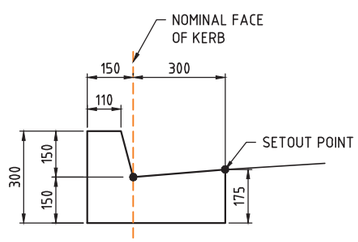
NB: TO BE READ IN CONJUNCTION WITH DTMR'S TRAFFIC AND ROAD USE MANAGEMENT MANUAL - USE OF ROAD HUMPS AS PEDESTRIAN CROSSINGS



KERB SETOUT DETAIL
BARRIER - STANDARD TYPE 'E'
SCALE 1:10



KERB SETOUT DETAIL
INVERT CHANNEL
SCALE 1:10



KERB SETOUT DETAIL
KERB AND CHANNEL - STANDARD TYPE 'E'
SCALE 1:10

SCALE 0.1 0.05 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0m
1 : 10 (A1 UNREDUCED)

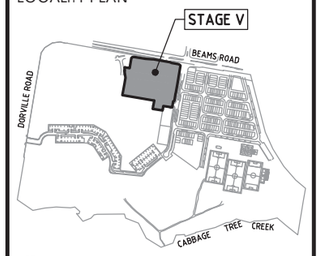
SCALE 1.0 0.5 0 1.0 2.0 3.0 4.0 5.0m
1 : 50 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2023.11.02 08:49:01 +10'00'

Drawing Title
ROADWORKS INTERSECTION DETAILS SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	09 of 20

Drawing No	Revision
21-121-09	A

A1

C:\Users\jb\AppData\Local\Temp\AcPublish_4716\21-121-09-12-RD-DETAILS.dwg Plotted by: JB on 2/11/2023 8:45:48 AM

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
282	502542.311	6974904.520	15.888
283	502542.319	6974904.569	15.889
284	502542.682	6974906.689	15.943
285	502561.015	6974903.553	15.814
286	502560.653	6974901.434	15.760
287	502560.644	6974901.384	15.759

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
334	502564.437	6974900.127	15.739
335	502567.345	6974899.630	15.721
336	502568.433	6974899.714	15.764
337	502573.540	6974897.405	15.745
338	502577.579	6974893.171	15.724
339	502579.597	6974888.207	15.705
340	502579.701	6974882.603	15.685
341	502579.398	6974880.829	15.679
342	502578.933	6974879.894	15.622
343	502578.900	6974879.697	15.621

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
294	502553.998	6974895.825	15.786
295	502553.986	6974895.777	15.788
296	502553.624	6974893.657	15.842
297	502534.995	6974896.844	16.045
298	502535.357	6974898.963	15.992
299	502535.362	6974899.013	15.990

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
344	502573.071	6974877.650	15.606
345	502573.277	6974880.861	15.614
346	502572.892	6974881.942	15.666
347	502572.149	6974885.183	15.688
348	502570.707	6974888.184	15.710
349	502568.644	6974890.788	15.732
350	502566.056	6974892.876	15.753
351	502565.277	6974893.682	15.711
352	502560.570	6974895.310	15.754

SETOUT TABLE

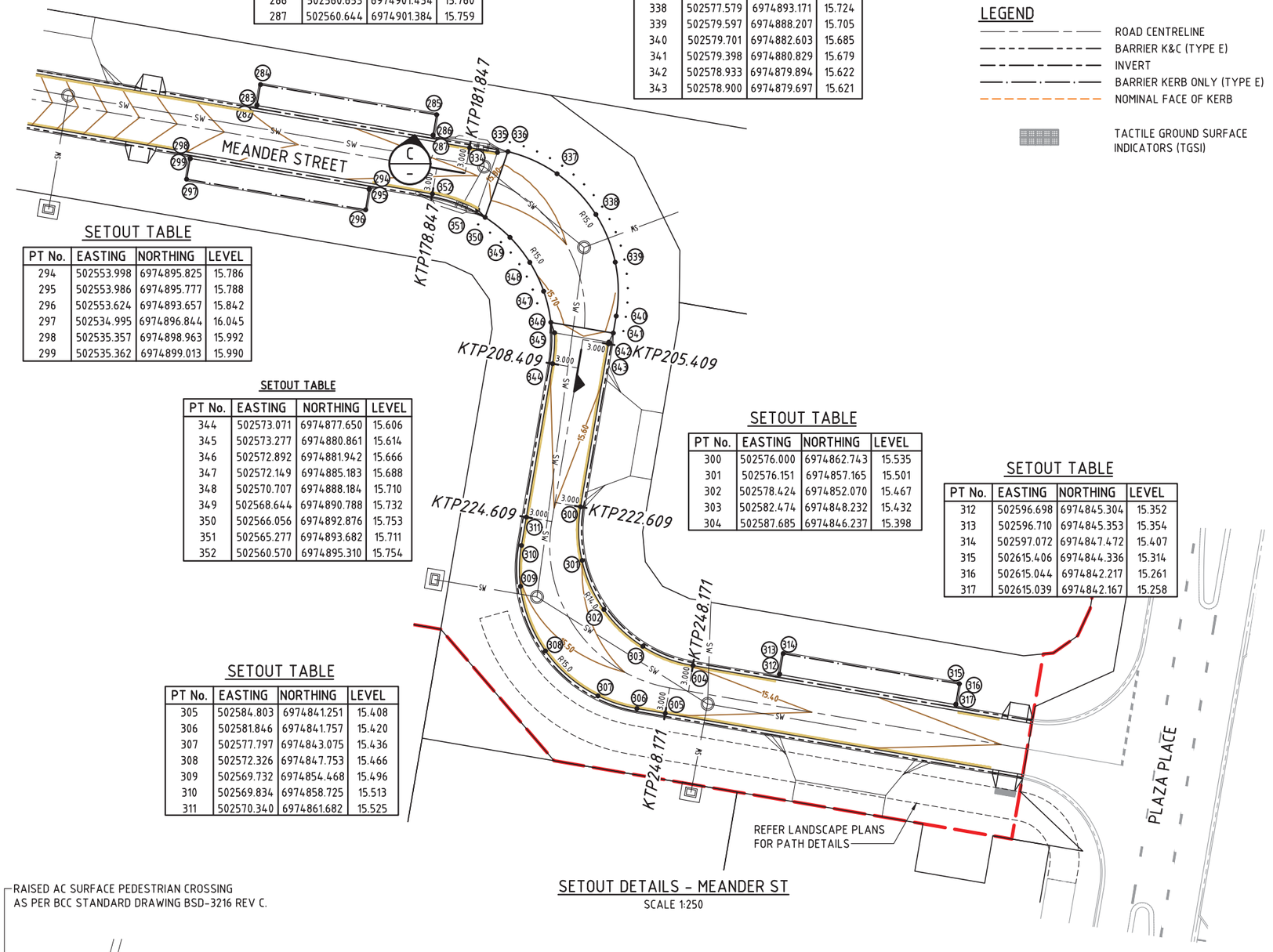
PT No.	EASTING	NORTHING	LEVEL
300	502576.000	6974862.743	15.535
301	502576.151	6974857.165	15.501
302	502578.424	6974852.070	15.467
303	502582.474	6974848.232	15.432
304	502587.685	6974846.237	15.398

SETOUT TABLE

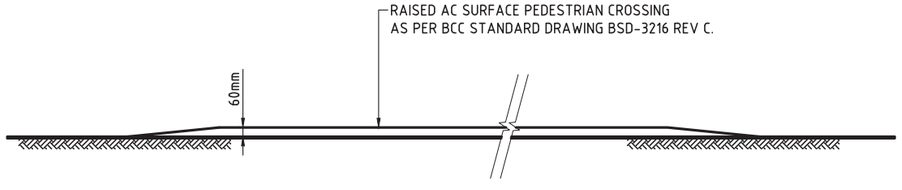
PT No.	EASTING	NORTHING	LEVEL
312	502596.698	6974845.304	15.352
313	502596.710	6974845.353	15.354
314	502597.072	6974847.472	15.407
315	502615.406	6974844.336	15.314
316	502615.044	6974842.217	15.261
317	502615.039	6974842.167	15.258

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
305	502584.803	6974841.251	15.408
306	502581.846	6974841.757	15.420
307	502577.797	6974843.075	15.436
308	502572.326	6974847.753	15.466
309	502569.732	6974854.468	15.496
310	502569.834	6974858.725	15.513
311	502570.340	6974861.682	15.525



SETOUT DETAILS - MEANDER ST
SCALE 1:250



C/10 RAISED AC SURFACE PEDESTRIAN CROSSING
SCALE 1 : 50

NB: TO BE READ IN CONJUNCTION WITH DTMR'S TRAFFIC AND ROAD USE MANAGEMENT MANUAL - USE OF ROAD HUMPS AS PEDESTRIAN CROSSINGS

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

GENERAL NOTES

1. SETOUT TABLES ARE GIVEN AT KERB LIP LEVELS.
2. KERB LIP LEVELS ARE GIVEN AT QUARTER POINTS, TP'S AND EQUAL PARTS U.N.O.
3. KERB RADII AND OFFSETS ARE GIVEN AT NOMINAL KERB FACE .
4. EXTRA DETAIL FOR SETTING OUT IS AVAILABLE ON CAD FILE.
5. FOR KERB INFORMATION REFER TO B.C.C. STD DWG BSD-2001.
6. ALL KERB RAMPS WHERE RAMP FLATTER THAN 1:9 TO INCLUDE TACTILE INDICATORS.

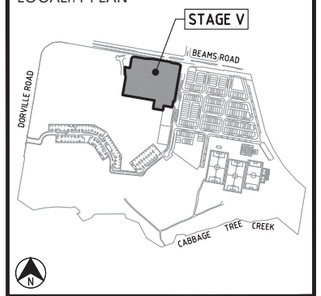
LEGEND

- ROAD CENTRELINE
- BARRIER K&C (TYPE E)
- INVERT
- BARRIER KERB ONLY (TYPE E)
- NOMINAL FACE OF KERB
- TACTILE GROUND SURFACE INDICATORS (TGSI)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:37+10'00'

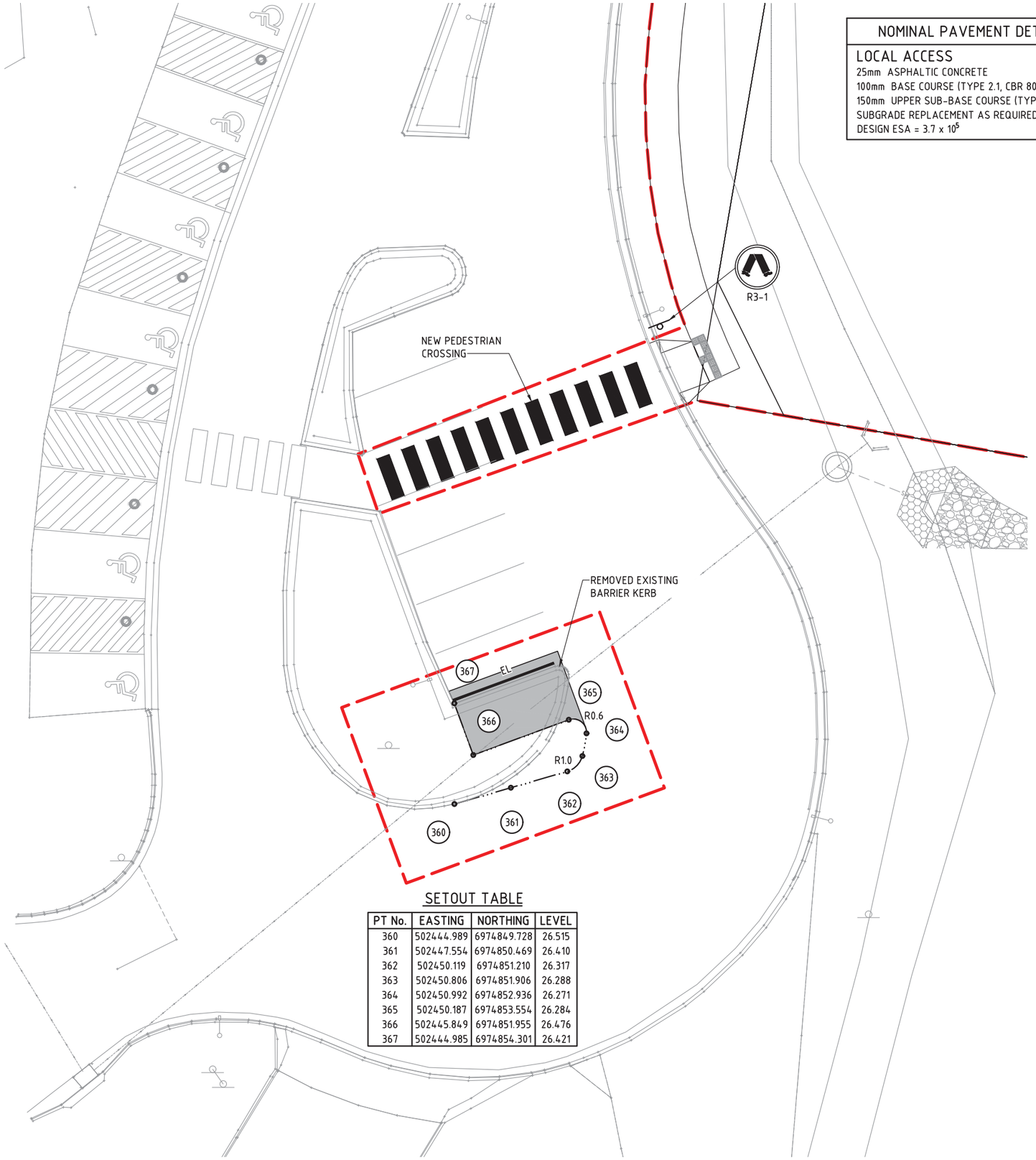
Drawing Title
ROADWORKS INTERSECTION DETAILS SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	10 of 20

A1	Drawing No	Revision
	21-121-10	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-09-12-RD-DETAILS.dwg Plotted by: RW on 30/10/2023 3:45:43 PM



NOMINAL PAVEMENT DETAILS

LOCAL ACCESS

25mm ASPHALTIC CONCRETE
100mm BASE COURSE (TYPE 2.1, CBR 80)
150mm UPPER SUB-BASE COURSE (TYPE 2.3, CBR 45)
SUBGRADE REPLACEMENT AS REQUIRED (TYPE 2.4, CBR 15)
DESIGN ESA = 3.7×10^5

GENERAL NOTES

1. SETOUT TABLES ARE GIVEN AT KERB LIP LEVELS.
2. KERB LIP LEVELS ARE GIVEN AT QUARTER POINTS, TP'S AND EQUAL PARTS U.N.O.
3. KERB RADII AND OFFSETS ARE GIVEN AT NOMINAL KERB FACE .
4. EXTRA DETAIL FOR SETTING OUT IS AVAILABLE ON CAD FILE.
5. FOR KERB INFORMATION REFER TO B.C.C. STD DWG BSD-2001.
6. ALL KERB RAMPS WHERE RAMP FLATTER THAN 1:9 TO INCLUDE TACTILE INDICATORS.

LEGEND

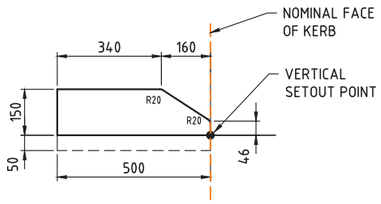
- WORKS BOUNDARY
- MOUNTABLE KERB WITH BACKING STRIP
- BARRIER KERB ONLY (TYPE E)
- NOMINAL FACE OF KERB
- TACTILE GROUND SURFACE INDICATORS (TGSI)
- NEW PAVEMENT
- 150mm — EDGE LINE (EL)

SETOUT TABLE

PT No.	EASTING	NORTHING	LEVEL
360	502444.989	6974849.728	26.515
361	502447.554	6974850.469	26.410
362	502450.119	6974851.210	26.317
363	502450.806	6974851.906	26.288
364	502450.992	6974852.936	26.271
365	502450.187	6974853.554	26.284
366	502445.849	6974851.955	26.476
367	502444.985	6974854.301	26.421

INTERSECTION DETAIL -

SCALE 1:100



KERB SETOUT DETAIL - MOUNTABLE WITH BACKING STRIP

SCALE 1:10

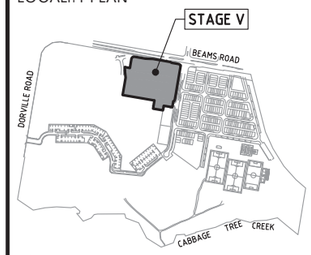
SCALE 0.1 0.05 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0m
1 : 10 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:38+10'00'

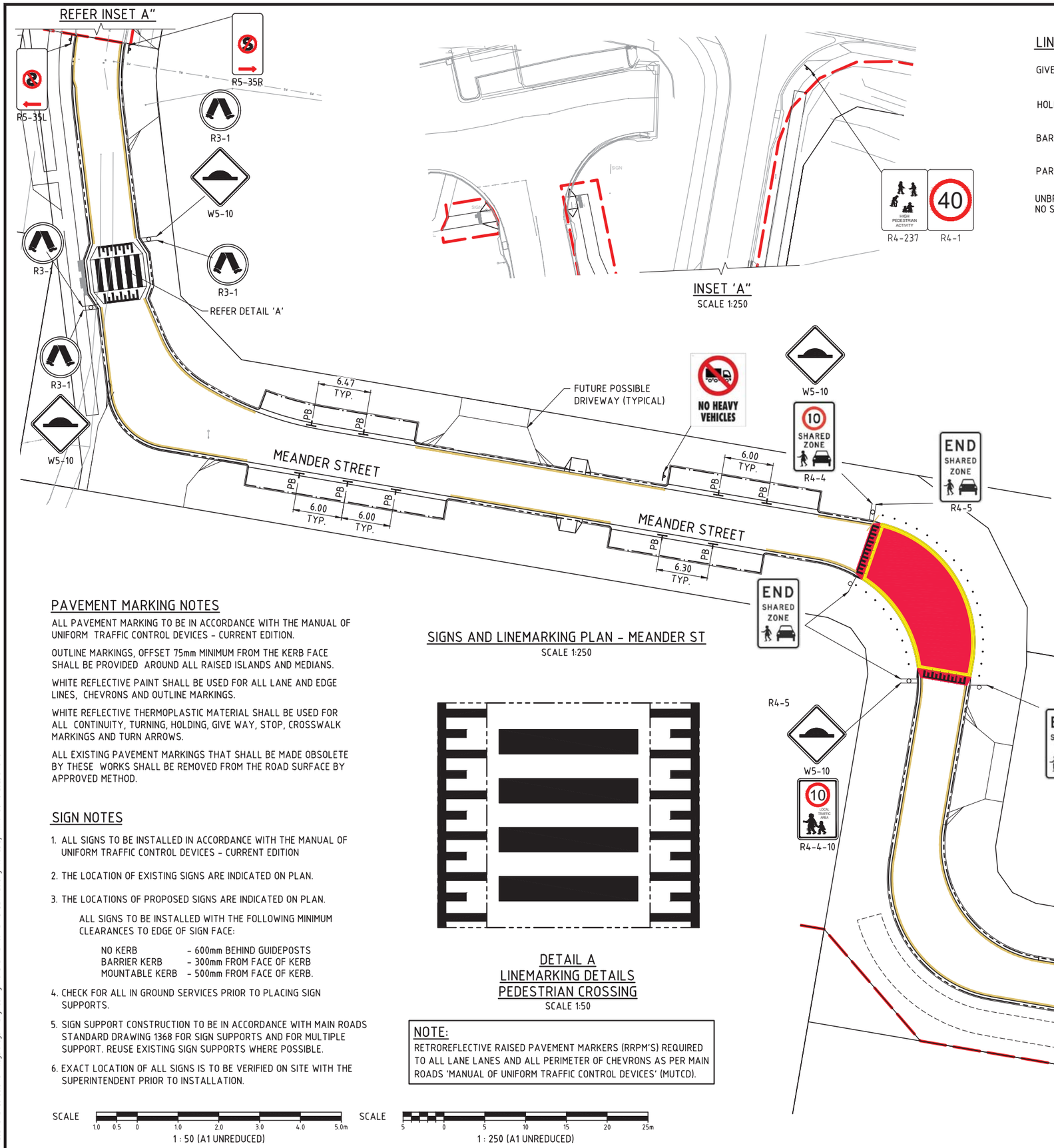
Drawing Title
ROADWORKS
INTERSECTION DETAILS
SHEET 3

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	11 of 20

	Drawing No	Revision
A1	21-121-11	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-09-12-RD-DETAILS.dwg Plotted by: RW on 30/10/2023 3:45:44 PM



INSET 'A"
SCALE 1:250

LINEMARKING LEGEND

GIVE WAY LINE (GWL)	600mm STRIPE AND GAP, 300mm
HOLD LINE (HL)	600mm, 600mm, 200mm
BARRIER LINE (BL)	80mm
PARKING BAY LINE (PB)	100mm
UNBROKEN YELLOW NO STOPPING LINE (LLCY)	100mm
TACTILE GROUND SURFACE INDICATORS (TGSI)	

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, TURNING, HOLDING, GIVE WAY, STOP, 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.

SIGN NOTES

1. ALL SIGNS TO BE INSTALLED IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES - CURRENT EDITION
2. THE LOCATION OF EXISTING SIGNS ARE INDICATED ON PLAN.
3. THE LOCATIONS OF PROPOSED SIGNS ARE INDICATED ON PLAN.

   ALL SIGNS TO BE INSTALLED WITH THE FOLLOWING MINIMUM CLEARANCES TO EDGE OF SIGN FACE:

NO KERB	- 600mm BEHIND GUIDEPOSTS
BARRIER KERB	- 300mm FROM FACE OF KERB
MOUNTABLE KERB	- 500mm FROM FACE OF KERB.

4. CHECK FOR ALL IN GROUND SERVICES PRIOR TO PLACING SIGN SUPPORTS.
5. SIGN SUPPORT CONSTRUCTION TO BE IN ACCORDANCE WITH MAIN ROADS STANDARD DRAWING 1368 FOR SIGN SUPPORTS AND FOR MULTIPLE SUPPORT. REUSE EXISTING SIGN SUPPORTS WHERE POSSIBLE.
6. EXACT LOCATION OF ALL SIGNS IS TO BE VERIFIED ON SITE WITH THE SUPERINTENDENT PRIOR TO INSTALLATION.

SIGNS AND LINEMARKING PLAN - MEANDER ST
SCALE 1:250

DETAIL A
LINEMARKING DETAILS
PEDESTRIAN CROSSING
SCALE 1:50

NOTE:
RETROREFLECTIVE RAISED PAVEMENT MARKERS (RRPM'S) REQUIRED TO ALL LANE LANES AND ALL PERIMETER OF CHEVRONS AS PER MAIN ROADS 'MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' (MUTCD).

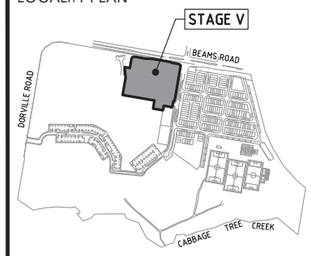
SCALE 1.0 0.5 0 1.0 2.0 3.0 4.0 5.0m
1 : 50 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:38+10'00'

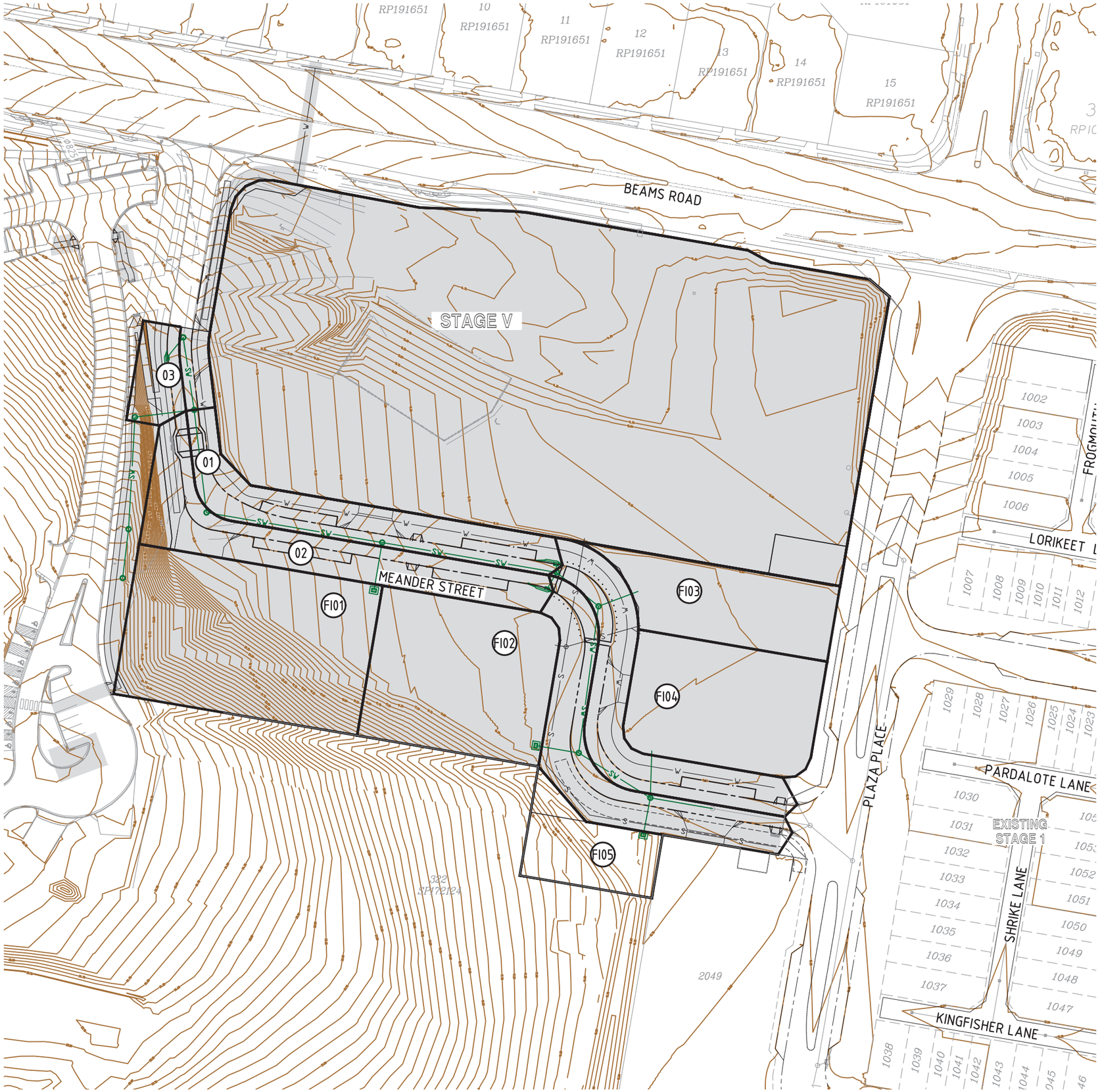
Drawing Title
ROADWORKS
SIGNS AND LINEMARKING PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	12 of 20

	Drawing No	Revision
A1	21-121-12	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-09-12-RD-DETAILS.dwg Plotted by: RW on 30/10/2023 3:45:45 PM



CATCHMENT PLAN
SCALE 1:500

LEGEND

- PROPOSED CATCHMENT BOUNDARY
- (1BA) CATCHMENT NUMBER
- BARRIER KERB AND CHANNEL - TYPE E
- KERB ONLY - TYPE E
- PROPOSED STORMWATER DRAINAGE
- 36.0 SURFACE CONTOURS

CATCHMENT TABLE

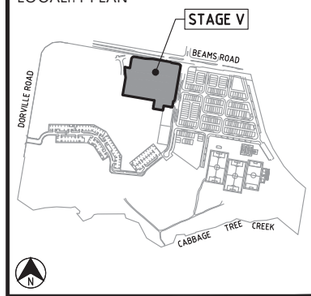
CATCHMENT No.	AREA (ha)
03	0.028
FI01	0.231
01	0.099
02	0.121
FI03	0.101
FI02	0.171
FI04	0.141
FI05	0.061

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:38+10'00'

Drawing Title
STORMWATER CATCHMENT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	13 of 20

A1	Drawing No	Revision
	21-121-13	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-13-SW-CATCHMENT.dwg Plotted by: RW on 30/10/2023 3:45:52 PM

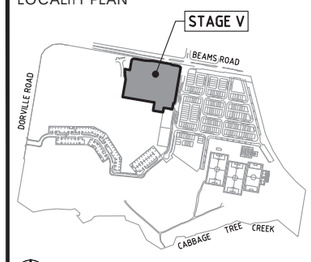
LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN								DRAIN DESIGN														HEADLOSSES										PART FULL		DESIGN LEVELS						
						tc	I											Qg	Qb			tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp						
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C * A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY		INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C * A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS		VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L * Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s			l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m				m	%	m	m	m	m	m	m	m	m	
10 50	1/B	1/B to 2/B																24				0.00 0.00	215 291	0.000 0.000	0			0 (Pipe flow= Grate flow)	12.216	9.63	450(3)	0.00 (5.56)	0.20				0.000	0.20	0.000			0.20	0.000	0.00	0.000			23.841 22.665	23.391 22.215	23.391		23.391	25.238	1/B
10 50	2/B	2/B to 3/B																24				0.20 0.20	215 291	0.000 0.000	0			0 (Pipe flow= Grate flow)	27.856	6.21	450(3)	0.00 (4.46)	0.46				0.000	0.20	0.000			0.20	0.000	0.00	0.000			22.645 20.916	22.195 20.466	22.195		22.195	24.507	2/B
10 50	3/B	3/B to 2/A																24				0.66 0.66	215 291	0.000 0.000	0			0 (Pipe flow= Grate flow)	14.785	8.00	450(3)	0.00 (5.07)	0.25				0.000	0.20	0.000			0.20	0.000	0.00	0.000			18.385 17.202	17.935 16.752	17.935		17.935	21.858	3/B
10 50	EXMH/A	EXMH/A to 1/A																24				5.64 5.64	206 279	1.763 1.763	1366			1366 Additional flow: 1.366 cumecs (Pipe flow= Sum upstr atten flows)	13.764	1.07	1200(3)	1.19 (3.57)	0.19				0.072	1.50	0.109			1.50	0.109	0.12	0.016			15.778 15.631	15.993 15.977	16.102		16.102	17.521	EXMH/A
10 50	G03	G03 to 1/A	03	ROAD		5.00 5.00	215 291		0.88 1.00	0.028 0.028	0.025 0.028	0.025 0.028	15 23	15	0.00	0		4 (UNLOCKED	14 0)	1	LOST	5.00 5.00	215 291	0.025 0.028	23			14 (Pipe flow= Grate flow)	6.488	3.18	375(3)	0.13 (2.83)	0.11				0.001	7.90	0.007			7.90	0.007	0.01	0.000	0.054 (0.041 1y)	1.43 (1.20 1y)	17.546 17.340	17.546 17.019	17.553		17.553	18.500	G03
10 50	1/A	1/A to 2/A	03															24				5.83 5.83	204 275	1.788 1.791	1368			1366 (Pipe flow= Sum upstr atten flows)	18.156	0.40	1200(3)	1.19 (2.19)	0.25		Qo 1.366 Do 1200 Flow G03 made eqv grate flow Angle 18 Chart 36 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.51 K0.5 1.86 Qu/Qo 0.99 Cg 0.03 K 1.52 S/Do 2.0 K0 1.79 K0.5 2.07 K 1.80 S/Do 1.5 K0 2.11 K0.5 2.54 K 2.12		0.072	1.81	0.130	Interp val for S/Do CHART 35 S/Do 2.0 K0 1.55 K0.5 1.74 K 1.55 S/Do 1.5 K0 1.75 K0.5 1.80 K 1.75 Interp val for S/Do K vals above for stepped pipes as grate flow		2.21 1.36 Kw 2.21	0.159	0.12	0.022			15.571 15.498	15.847 15.825	15.977		16.006	18.275	1/A
10 50	2/A	2/A to 3/A	03															24				6.08 6.08	201 271	1.788 1.788	1346			(Pipe flow= Sum upstr atten flows) 1366 (Sum Imp Area Maj 1.790 Sum Flow Maj 1.348 Overland Flow Maj -0.018) (100% of overland flow diverted = -0.018; Equiv Area = Diverted Flow x 360/271mm/h = 0.002 to outside network)	25.659	0.40	1200(3)	1.19 (2.19)	0.36		Qo 1.366 Do 1200 Flow 3/B made eqv grate flow CHART 50 Du/Do 1.00 alpha 2 K'w 0.13 Vu 1.21 WSE 0.03		0.072	0.34	0.024	Ku 0.34 Kw 0.47 K vals above for stepped pipes as grate flow		0.47	0.034	0.12	0.031			15.478 15.376	15.801 15.770	15.825		15.835	18.777	2/A
10 50	3/A	3/A to 4/A	03															24				6.44 6.44	196 266	1.785 1.788	1321			1366 (Pipe flow= Sum upstr atten flows)	44.217	0.68	1200(3)	1.19 (2.85)	0.62		Qo 1.366 Do 1200 CHART 50 Du/Do 1.00 alpha 73 K'w 0.29 Vu 1.21 WSE 0.14 Ku 1.66 Kw 1.96		0.072	1.66	0.119			1.96	0.141	0.12	0.053			15.356 15.055	15.651 15.598	15.770		15.792	18.139	3/A
10 50	FI01	FI01 to 4/A	FI01			5.00 5.00	215 291		0.88 1.00	0.231 0.231	0.203 0.231	0.203 0.231	121 187 FLOW WIDTH/DEPTH 0.133Dp m	121	0.00	393	#D	0.3	L3A	0.54	121 (UNLOCKED | 0 0)	G02	5.00 5.00	215 291	0.203 0.231	187			121 (Pipe flow= Grate flow)	12.006	2.00	375(3)	1.10 (2.24)	0.18				0.062	2.75	0.170			2.75	0.170	0.48	0.057			15.295 15.055	15.655 15.598	15.825		15.825	16.469	FI01
10 50	4/A	4/A to 5/A	03;FI01															24				7.06 7.06	190 257	1.988 2.019	1441	1272	10	(Pipe flow= Sum upstr atten flows) 1431	43.920	0.20	1350(3)	0.99 (1.68)	0.73		Qo 1.431 Do 1350 Routine 2.1 CHART 53 Du/Do 0.9 Qu/Qo 0.93 Kw=Ku= -0.13 Combined pipes in line case Join Pipes: 3/A and FI01		0.050	0.20	0.010	Vel1 1.171 Vel2 0.970 Eq Dia 1255 Angle 173 Flow 1.431 CHART 50 Du/Do 0.93 alpha 0 K'w 0.05 Vu 1.16 WSE 0.00 Ku -0.05 Kw 0.02 Interpolated Ku= -0.13 Kw=-0.13		0.20	0.010	0.07	0.030			15.055 14.967	15.588 15.558	15.598		15.598	16.420	4/A
10 50	G01	G01 to 5/A	01	ROAD		5.00 5.00	215 291		0.88 1.00	0.099 0.099	0.087 0.099	0.087 0.099	52 80 FLOW WIDTH 2.183 m	52	0.64	83		5 (UNLOCKED	51 0)	1	LOST	5.00 5.00	215 291	0.087 0.099	80	589	29	(Pipe flow= Grate flow) 51	2.243	2.00	375(3)	0.46 (2.24)	0.04				0.011	7.90	0.085			7.90	0.085	0.09	0.002			14.774 14.729	15.560 15.558	15.645		15.645	15.736	G01
10 50	G02	G02 to 5/A	02	ROAD		5.00 5.00	215 291		0.88 1.00	0.121 0.121	0.106 0.121	0.106 0.121	63 98 FLOW WIDTH 2.394 m DOWNSTREAM 0.610m	63	0.64	83		5 (UNLOCKED	57 0)	6	LOST	5.00 5.00	215 291	0.106 0.121	98	588	40	(Pipe flow= Grate flow) 57	4.858	2.00	375(3)	0.52 (2.24)	0.08				0.014	7.90	0.109			7.90	0.109	0.11	0.005			14.769 14.672	15.563 15.558	15.672		15.672	15.736	G02
10 50	5/A	5/A to 6/A	03;FI01;01;02															24				7.79 7.79	183 248	2.181 2.239	1542	519	71	(Pipe flow= Sum upstr atten flows) 1471	13.367	0.20	1350(3)	1.01 (1.68)	0.22				0.052	1.20	0.062			1.20	0.062	0.07	0.010			14.947 14.920	15.496 15.486	15.558		15.558	15.771	5/A
10 50	FI03	FI03 to 6/A	FI03			5.00 5.00	215 291		0.88 1.00	0.101 0.101	0.089 0.101	0.089 0.101	53 82 FLOW WIDTH/DEPTH 0.076Dp m	53	0.00	393	#D	0.3	L3A	0.54	53 (UNLOCKED | 0 0)	LOST	5.00 5.00	215 291	0.089 0.101	82			53 (Pipe flow= Grate flow)	10.456	2.00	375(3)	0.48 (2.24)	0.17				0.012	2.75	0.032			2.75	0.032	0.09	0.010			14.323 14.114	15.496 15.486	15.528		15.528	15.734	FI03
10 50	6/A	6/A to 7/A	03;FI01;01;02;FI03															24				8.01 8.01	181 246	2.270 2.340	1599	519	99	(Pipe flow= Sum upstr atten flows) 1500	36.720	0.20	1350(3)	1.03 (1.68)	0.59		Qo 1.500 Do 1350 Flow FI03 made eqv grate flow Angle 59 Chart 45 S/Do 2.5 chartdeg Du/Do 1.00 K0 2.16 K0.5 1.81 Qu/Qo 0.97 Cg 0.08 K 2.14 S/Do 2.0 K0 2.47 K0.5 2.34 K 2.46 S/Do 1.5 K0 2.74 K0.5 2.80 K 2.75		0.054	1.50	0.081	Interp val for S/Do CHART 44 S/Do 2.0 K0 1.99 K0.5 2.11 K 2.00 S/Do 1.5 K0 2.12 K0.5 2.17 K 2.13 Interp val for S/Do K vals above for stepped pipes as grate flow		2.76 1.48 Kw 2.76	0.149	0.08	0.028			14.900 14.827	15.405 15.377	15.486		15.554	15.708	6/A
10 50	FI02	FI02 to 7/A	FI02			5.00 5.00	215 291		0.88 1.00	0.171 0.171	0.150 0.171	0.150 0.171	90 138 FLOW WIDTH/DEPTH 0.108Dp m	90	0.00	393	#D	0.3	L3A	0.54	90 (UNLOCKED | 0 0)	LOST	5.00 5.00	215 291	0.150 0.171	138			90 (Pipe flow= Grate flow)	10.804	2.00	375(3)	0.81 (2.24)	0.18				0.033	2.75	0.092			2.75	0.092	0.26	0.028			14.710 14.494	15.405 15.377	15.497		15.497	15.741	FI02
10 50	7/A	7/A to 8/A	03;FI01;01;02;FI03;FI02															24				8.60 8.60	176 239	2.420 2.511	1667	519	135	(Pipe flow= Sum upstr atten flows) 1532	20.949	2.50	1350(3)	1.05 (5.92)	0.33				0.056	1.50	0.084			1.50	0.084	0.08	0.017			14.659 14.135	15.293 15.276	15.377		15.377	15.517	7/A
10 50	FI04	FI04 to 8/A	FI04			5.00 5.00	215 291		0.88 1.00	0.141 0.141	0.124 0.141	0.124 0.141	74 114 FLOW WIDTH/DEPTH 0.095Dp m	74	0.00	393	#D	0.3	L3A	0.54	74 (UNLOCKED | 0 0)	LOST	5.00 5.00	215 291	0.124 0.141	114			74 (Pipe flow= Grate flow)	11.641	2.00	375(3)	0.67 (2.24)	0.19				0.023	2.75	0.063			2.75	0.063	0.18	0.021			14.081 13.848	15.297 15.276	15.360		15.360	15.484	FI04
10 50	FI05	FI05 to 8/A	FI05			5.00 5.00	215 291		0.88 1.00	0.061 0.061	0.054 0.061	0.054 0.061	32 49 FLOW WIDTH/DEPTH 0.055Dp m	32	0.00	393	#D	0.3	L3A	0.54	32 (UNLOCKED | 0 0)	LOST	5.00 5.00	215 291	0.054 0.061	49			32 (Pipe flow= Grate flow)	9.358	2.00	375(3)	0.29 (2.24)	0.16				0.004	2.75	0.012			2.75	0.012	0.03	0.003			14.102 13.915	15.279 15.276	15.291		15.291	15.180	FI05

CALCULATIONS TABLE

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-14-15-SW-CALCS.dwg Plotted by RW on 30/10/2023 3:45:55 PM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:39+10'00'

Drawing Title
STORMWATER CALCULATION TABLE SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	14 of 20

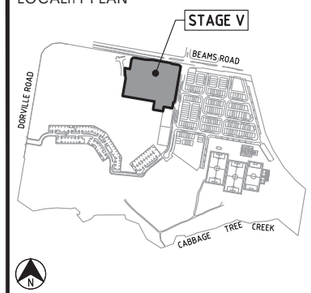
	Drawing No	Revision
A1	21-121-14	A

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN										HEADLOSSES										PART FULL		DESIGN LEVELS							
						tc	I	C10	C	A	C*A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C * A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C * A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E. CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L * Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s				m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
10 50	8/A	8/A to 9/A	03;FI01;01;02;FI0 3;FI02;FI04;FI05														24				8.93 8.93	174 236	2.598 2.713	1779	519	178 (Pipe flow=	1600 Sum upstr	15.700 atten flows)	0.40	1350(3)	1.10 (2.37)	0.24		Qo 1.600 Do 1350 Routine 3.2 Join Pipes: FI04 and 7/A Vel1 0.543 Vel2 1.058 Eq Dia 1389 Angle 204 Flow 1.574 Routine 2.10 CHART 49 High vel Ist Eqv FI04 & 7/A Dhv 1389 Qhv 1.574 Dhv/Dv 3.7 Dhv/Do 1.03	0.062	1.17	0.072	Qhv/Qo 0.98 H 3.54 Low vel latrl FI05 Div 375 Qlv 0.026 Div/Do 0.28 Qlv/Qo 0.02 L -0.15 H-L 3.69 No grate flow: H-L -0.2 = 3.49 Ku=Kw= 3.49 CHART 53 Du/Do 1.0 Qu/Qo 0.98 Kw=Ku= 0.32 Interpolated Ku= 1.17 Kw= 1.17		1.17	0.072	0.09	0.014			14.115 14.052	15.204 15.190	15.276		15.276	15.430	8/A
10 50	9/A	9/A to EXMH1	03;FI01;01;02;FI0 3;FI02;FI04;FI05														24				9.17 9.17	172 234	2.598 2.713	1764		(Pipe flow=	1600 Sum upstr	24.539 atten flows)	0.22	1350(3)	1.10 (1.76)	0.37		Qo 1.600 Do 1350 CHART 50 Du/Do1.00 alpha 0 K'w 0.05 Vu 1.12 WSE 0.02 Ku 0.31 Kw 0.36	0.062	0.31	0.019			0.36	0.023	0.09	0.021			14.032 13.978	15.171 15.150	15.190		15.194	15.350	9/A
10 50	1/C	1/C to OUTC															24				0.00 0.00	215 291	0.000 0.000	0		(Pipe flow=	0 Grate flow)	4.420	1.00	450(3)	0.00 (1.79)	0.07			0.000	0.20	0.000			0.20	0.000	0.00	0.000			24.909 24.865	24.459 24.415	24.459		24.459	26.036	1/C

CALCULATIONS TABLE

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:39+10'00'

Drawing Title
STORMWATER
CALCULATION TABLE
SHEET 2

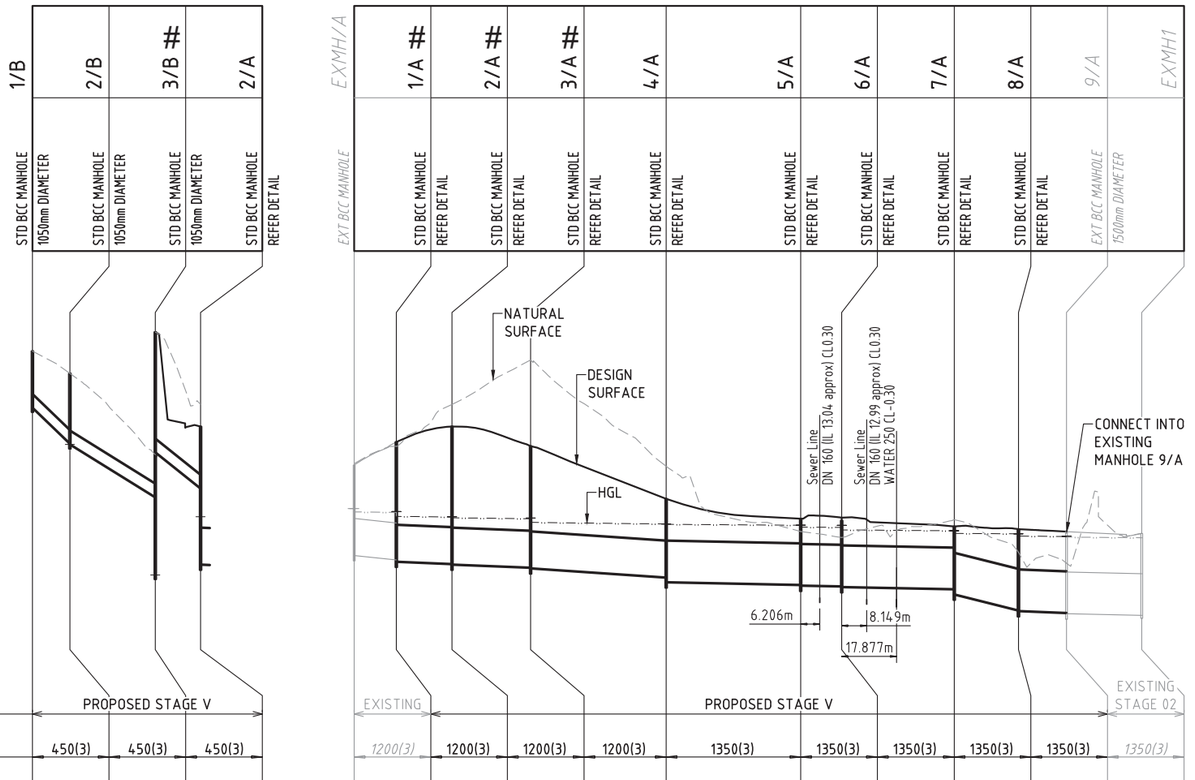
Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	15 of 20

	Drawing No	Revision
A1	21-121-15	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-14-15-SW-CALCS.dwg Plotted by: RW on 30/10/2023 3:45:55 PM

STRUCTURE NAME	1/B	2/B	# 3/B	2/A	EXMH/A	# 1/A	# 2/A	# 3/A	4/A	5/A	6/A	7/A	8/A	9/A	EXMH1
STRUCTURE DESCRIPTION	STD BCC MANHOLE 1050mm DIAMETER	STD BCC MANHOLE 1050mm DIAMETER	STD BCC MANHOLE 1050mm DIAMETER	STD BCC MANHOLE REFER DETAIL	EXT BCC MANHOLE	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	STD BCC MANHOLE REFER DETAIL	EXT BCC MANHOLE 1500mm DIAMETER	



#CIVIL CONTRACTOR TO PROVIDE FORM 15/12 ON MANHOLE DESIGN & BUILD

STAGE		PROPOSED STAGE V				EXISTING	PROPOSED STAGE V								EXISTING STAGE 02	
PIPE SIZEmm (Class)		450(3)	450(3)	450(3)		*1200(3)*	1200(3)	1200(3)	1200(3)	1350(3)	1350(3)	1350(3)	1350(3)	1350(3)	*1350(3)*	
PIPE GRADE %		9.63%	6.21%	8.00%		*1.07%*	0.40%	0.40%	0.68%	0.20%	0.20%	0.20%	2.50%	0.40%	*0.22%*	
PIPE SLOPE 1 in X		10.39	16.11	12.50		*93.63*	250.00	250.00	147.04	500.00	499.99	500.00	40.00	250.00	*454.55*	
FULL PIPE FLOW VELOCITY (m/s)		0.00	0.00	0.00		*1.19*	1.19	1.19	1.19	0.99	1.01	1.03	1.05	1.10	*1.10*	
PART FULL FLOW VELOCITY (m/s)																
DATUM RL																
WATER LEVEL IN STRUCTURE	23.391		22.195		16.102	16.006		15.835		15.792		15.598		15.558		15.554		15.377		15.276		15.194		*15.150*	
HYDRAULIC GRADE LEVEL	23.391	23.391	22.195	22.195	17.935	17.935	15.825	15.801	16.102	*15.993*	15.977	15.847	15.825	15.801	15.770	15.651	15.598	15.588	15.558	15.496	15.486	15.405	15.377	15.293	15.276	15.204	15.190	*15.171*	*15.150*	
PIPE FLOW (Cumecs)		0.000		0.000		0.000				*1.366*		1.366		1.366		1.366		1.431		1.471		1.500		1.532		1.600		*1.600*		
PIPE CAPACITY AT GRADE (Cumecs)		0.884		0.710		0.806				*4.090*		2.503		2.503		3.264		2.434		2.434		2.434		8.604		3.442		*2.552*		
DEPTH TO INVERT		1.847	2.292	2.312	1.392	3.923	2.025	4.506	*2.950*	3.851	3.911	4.486	4.506	3.970	3.990	2.572	2.725	2.164	2.184	2.148	2.168	2.050	2.218	2.655	2.675	2.658	*2.678*	*2.672*	
INVERT LEVEL OF DRAIN	23.391	22.215	22.195	20.466	17.935	16.752	14.271	*14.571*	14.424	14.364	14.291	14.271	14.169	14.149	13.848	13.695	13.607	13.587	13.560	13.540	13.467	13.299	12.775	12.755	12.692	*12.672*	*12.618*	
DESIGN SURFACE LEVEL	25.238	24.507	21.858	18.777	17.521	18.275	18.777	18.139	16.420	15.711	15.708	15.517	15.430	15.350	*15.290*															
SETOUT CO-ORDINATE	E:502458.289 N:6974896.742	E:502459.750 N:6974908.870	E:502461.330 N:6974936.681	E:502476.006 N:6974938.475	*E:502475.541 N:6974970.014*	E:502473.319 N:6974956.431	E:502476.006 N:6974938.475	E:502479.081 N:6974913.001	E:502522.666 N:6974905.551	E:502565.958 N:6974898.152	E:502576.359 N:6974889.756	E:502711.457 N:6974853.365	E:502589.209 N:6974842.241	E:502604.678 N:6974839.558	*E:502628.856 N:6974835.365*	
RUNNING CHAINAGE	0.000	12.216	12.216	27.856	40.072	14.785	54.857	*0.000*	13.764	13.764	18.156	31.920	25.659	57.579	44.217	101.796	43.920	145.716	13.367	159.083	36.720	195.803	20.949	216.752	15.700	232.452	*24.539*	*256.991*		

LINE

CONSTRUCTION EQUIPMENT	PIPE CLASS	MINIMUM COMPACTION COVER TO PIPE OBVERT			
		375ø	450ø	525ø	600ø
VIBRATORY RAMMER (UP TO 75kg)	2	0.450	0.400	0.400	0.350
	3	0.300	0.300	0.3000	0.250
VIBRATORY TRENCH ROLLER (UP TO 2t)	2	0.400	0.400	0.350	0.250
	3	0.250	0.200	0.200	0.200
VIBRATORY SMOOTH DRUM (UP TO 7t)	2	0.700	0.700	0.650	0.650
	3	0.450	0.450	0.450	0.350
VIBRATORY SMOOTH DRUM (UP TO 10t)	2	0.850	0.850	0.800	0.800
	3	0.550	0.550	0.500	0.500
EXCAVATOR & COMPACTION WHEEL (15t)	2	0.700	0.650	0.650	0.650
	3	0.450	0.450	0.450	0.450
EXCAVATOR & COMPACTION WHEEL (25t)	2	1.050	1.000	0.950	0.900
	3	0.650	0.650	0.650	0.650
GRADER (CAT120H) (14.5t)	2	0.600	0.600	0.450	0.200
	3	0.600	0.450	0.450	0.200
GRADER (CAT140H) (17.0t)	2	0.600	0.600	0.600	0.200
	3	0.600	0.200	0.200	0.200
SCRAPER (CAT613C11) (27.2t)	2	0.600	0.600	0.600	0.600
	3	0.600	0.600	0.600	0.600
SCRAPER (CAT621F) (53.8t)	2	0.700	0.700	0.650	0.650
	3	0.650	0.650	0.600	0.600
DOZER (CATD7 G)	2	0.600	0.600	0.600	0.200
	3	0.200	0.200	0.200	0.200
DOZER (CATD9 R)	2	0.600	0.600	0.600	0.600
	3	0.600	0.600	0.600	0.600
EXCAVATOR (CAT315B) (15.8t)	2	0.200	0.200	0.200	0.200
	3	0.200	0.200	0.200	0.200
EXCAVATOR (CAT317) (17.3t)	2	0.200	0.200	0.200	0.200
	3	0.200	0.200	0.200	0.200
EXCAVATOR (CAT325B) (25.9t)	2	0.200	0.200	0.200	0.200
	3	0.200	0.200	0.200	0.200

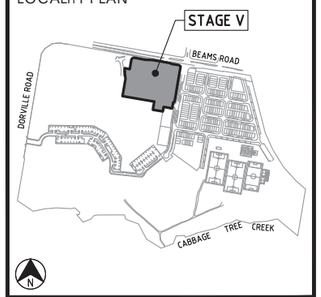
SCALE A 1:1000 (Horiz.) 10 5 0 10 20 30 40 50 60 70 80 90 100m

B 1:100 (Vert.) 1 0.5 0 1 2 3 4 5 6 7 8 9 10m

(A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:39+10'00'

Drawing Title
STORMWATER LONGITUDINAL SECTIONS SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

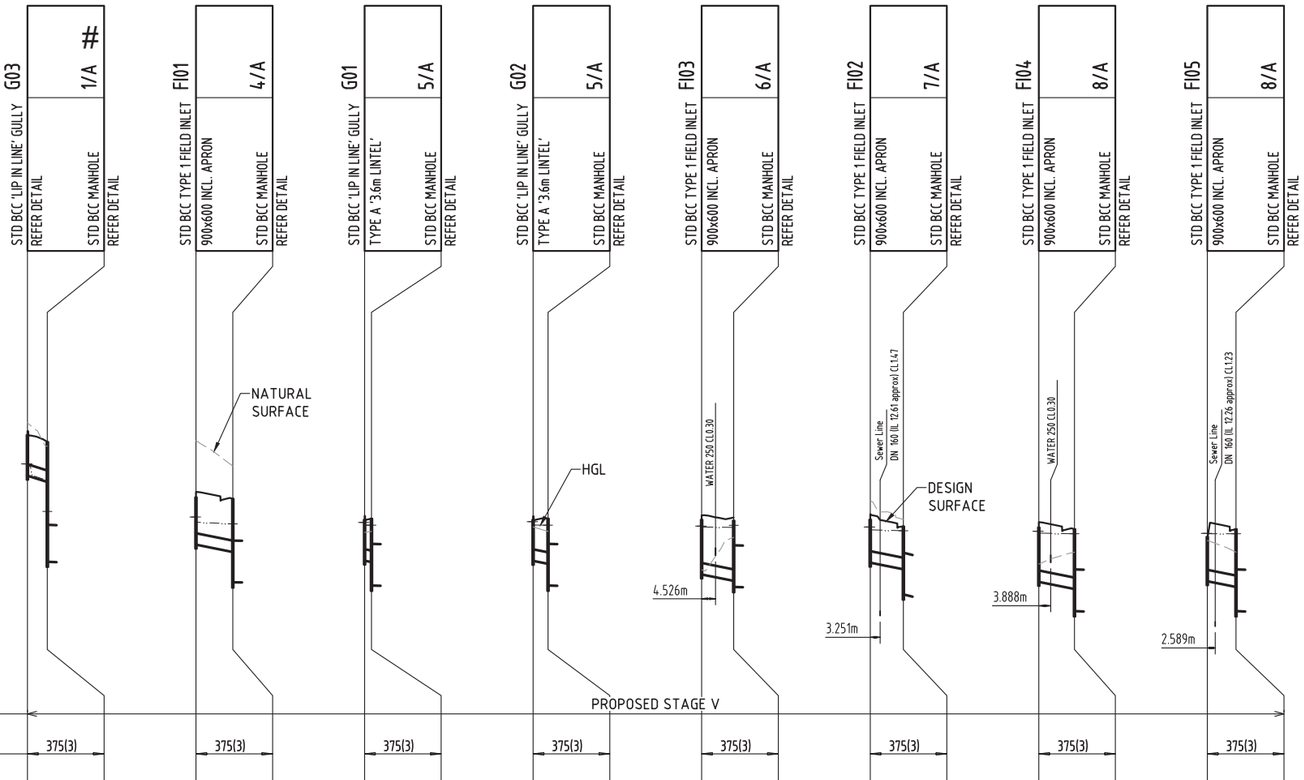
Scale	Sheet
AS SHOWN	16 of 20

	Drawing No	Revision
A1	21-121-16	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-16-17-SW-LONGS.dwg Plotted by: RW on 30/10/2023 3:45:59 PM

STRUCTURE NAME	G03	#	FI01	4/A	G01	5/A	G02	5/A
STRUCTURE DESCRIPTION	STD BCC 'LIP IN LINE' GULLY REFER DETAIL	1/A STD BCC MANHOLE REFER DETAIL	STD BCC TYPE 1 FIELD INLET 900x600 INCL. APRON	STD BCC MANHOLE REFER DETAIL	STD BCC 'LIP IN LINE' GULLY TYPE A '3.6m LINTEL'	STD BCC MANHOLE REFER DETAIL	STD BCC 'LIP IN LINE' GULLY TYPE A '3.6m LINTEL'	STD BCC MANHOLE REFER DETAIL
STAGE	PROPOSED STAGE V							
PIPE SIZEmm (Class)	375(3)		375(3)		375(3)		375(3)	
PIPE GRADE %	3.18%		2.00%		2.00%		2.00%	
PIPE SLOPE 1 in X	31.43		50.00		50.00		50.00	
FULL PIPE FLOW VELOCITY (m/s)	0.13		1.10		0.46		0.52	
PART FULL FLOW VELOCITY (m/s)	1.43 (1.20 1y)							
DATUM RL	3.0							
WATER LEVEL IN STRUCTURE	17.553	16.006	15.825	15.598	15.645	15.558	15.612	15.558
HYDRAULIC GRADE LEVEL	17.553	17.546 / 15.977	15.825	15.655 / 15.598	15.645	15.560 / 15.558	15.612	15.563 / 15.558
PIPE FLOW (Cumecs)		0.014		0.121		0.051		0.057
PIPE CAPACITY AT GRADE (Cumecs)		0.312		0.248		0.248		0.248
DEPTH TO INVERT		1.329 / 1.310		1.549 / 1.740		1.337 / 1.417		1.342 / 1.474
INVERT LEVEL OF DRAIN		17.171 / 16.965		14.920 / 14.680		14.399 / 14.354		14.394 / 14.297
DESIGN SURFACE LEVEL	18.500	18.275	16.469	16.420	15.736	15.771	15.736	15.771
SETOUT CO-ORDINATE	E:502469.239 N:6974951.386	E:502473.319 N:6974956.431	E:502520.643 N:6974893.717	E:502522.666 N:6974905.551	E:502565.857 N:6974900.393	E:502565.958 N:6974898.152	E:502563.563 N:6974893.925	E:502565.958 N:6974898.152
RUNNING CHAINAGE	0.000 / 6.488	6.488	0.000 / 12.006	12.006	0.000 / 2.243	2.243	0.000 / 4.858	4.858
LINE	3		4		5		6	

STRUCTURE NAME	FI03	6/A	FI02	7/A	FI04	8/A	FI05	8/A
STRUCTURE DESCRIPTION	STD BCC TYPE 1 FIELD INLET 900x600 INCL. APRON	STD BCC MANHOLE REFER DETAIL	STD BCC TYPE 1 FIELD INLET 900x600 INCL. APRON	STD BCC MANHOLE REFER DETAIL	STD BCC TYPE 1 FIELD INLET 900x600 INCL. APRON	STD BCC MANHOLE REFER DETAIL	STD BCC TYPE 1 FIELD INLET 900x600 INCL. APRON	STD BCC MANHOLE REFER DETAIL
STAGE								
PIPE SIZEmm (Class)	375(3)		375(3)		375(3)		375(3)	
PIPE GRADE %	2.00%		2.00%		2.00%		2.00%	
PIPE SLOPE 1 in X	50.00		50.00		50.00		50.00	
FULL PIPE FLOW VELOCITY (m/s)	0.48		0.81		0.67		0.29	
PART FULL FLOW VELOCITY (m/s)								
DATUM RL								
WATER LEVEL IN STRUCTURE	15.528	15.554	15.497	15.377	15.360	15.276	15.291	15.276
HYDRAULIC GRADE LEVEL	15.528	15.496 / 15.486	15.497	15.405 / 15.377	15.360	15.297 / 15.276	15.291	15.279 / 15.276
PIPE FLOW (Cumecs)		0.053		0.090		0.074		0.032
PIPE CAPACITY AT GRADE (Cumecs)		0.248		0.248		0.248		0.248
DEPTH TO INVERT		1.786 / 1.969		1.406 / 1.398		1.778 / 1.957		1.453 / 1.890
INVERT LEVEL OF DRAIN		13.948 / 13.739		14.335 / 14.119		13.706 / 13.473		13.727 / 13.540
DESIGN SURFACE LEVEL	15.734	15.708	15.741	15.517	15.484	15.430	15.180	15.430
SETOUT CO-ORDINATE	E:502586.151 N:6974893.423	E:502576.359 N:6974889.756	E:502560.808 N:6974885.186	E:502571.457 N:6974853.365	E:502589.594 N:6974853.876	E:502589.209 N:6974842.241	E:502587.475 N:6974833.045	E:502589.209 N:6974842.241
RUNNING CHAINAGE	0.000 / 10.456	10.456	0.000 / 10.804	10.804	0.000 / 11.641	11.641	0.000 / 9.358	9.358
LINE	7		8		9		10	



SCALE A 1:1000 (Horiz.) 10 5 0 10 20 30 40 50 60 70 80 90 100m

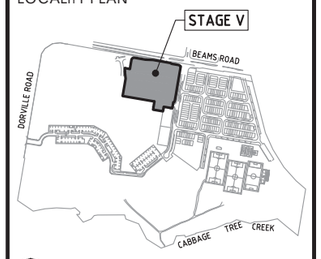
B 1:100 (Vert.) 1 0.5 0 1 2 3 4 5 6 7 8 9 10m

(A1 UNREDUCED)

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-16-17-SW-LONGS.dwg Plotted by: RW on 30/10/2023 3:46:00 PM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

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

M. Shaw

Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:40+10'00'

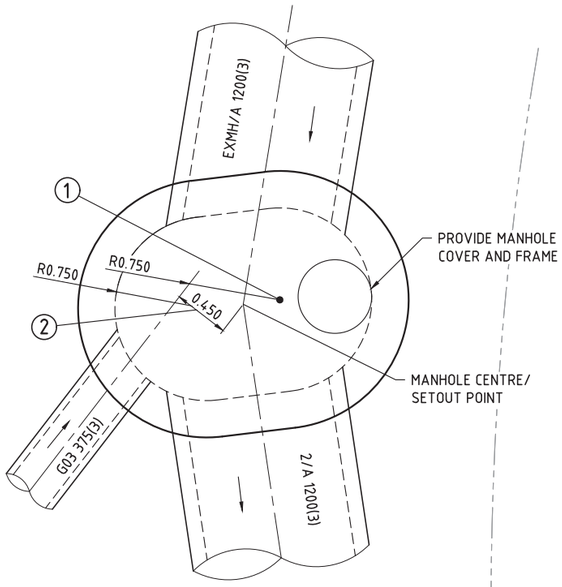
Drawing Title

STORMWATER LONGITUDINAL SECTIONS SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	17 of 20

A1	Drawing No	Revision
	21-121-17	A

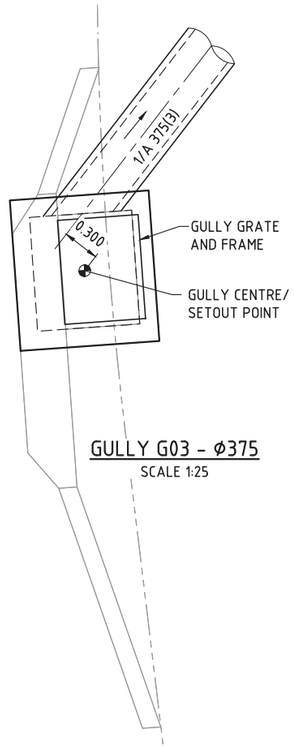


MANHOLE 1/A - ϕ1500 EXT. 600

SCALE 1:25

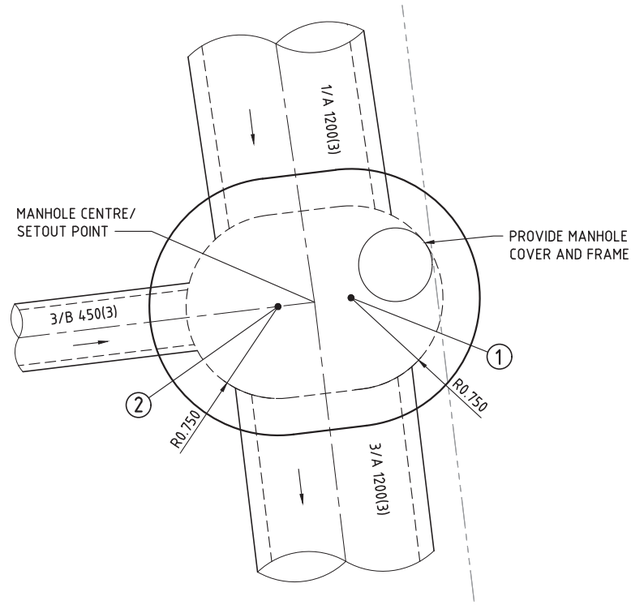
SETOUT TABLE

POINT	EASTING	NORTHING
1	502473.617	6974956.467
2	502473.021	6974956.395



GULLY G03 - ϕ375

SCALE 1:25

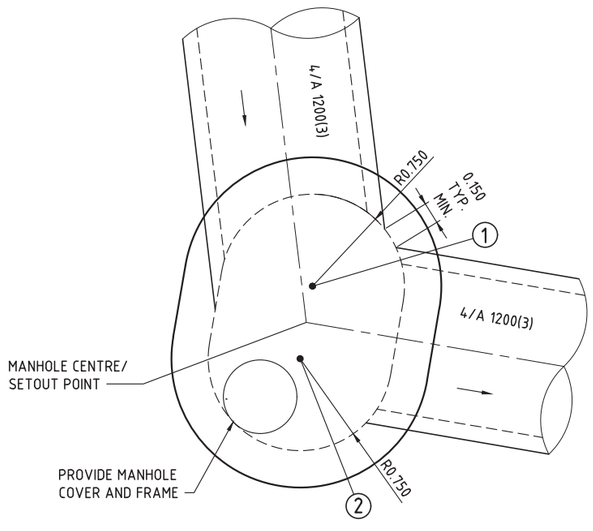


MANHOLE 2/A - ϕ1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502476.304	6974938.511
2	502475.708	6974938.439

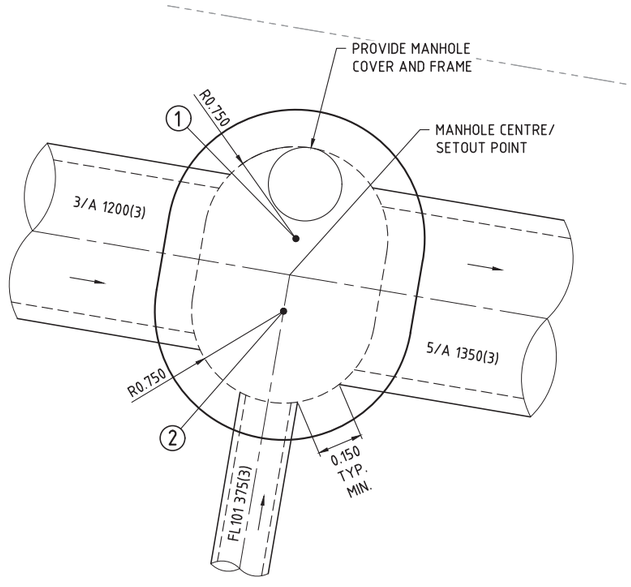


MANHOLE 3/A - ϕ1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502479.132	6974913.297
2	502479.030	6974912.705



MANHOLE 4/A - ϕ1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502522.717	6974905.847
2	502522.615	6974905.255

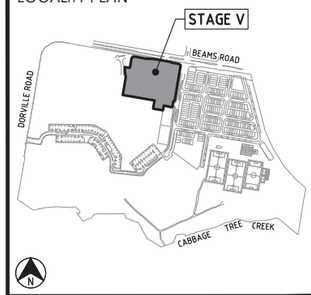
SCALE 0.5 0 0.5 1.0 1.5 2.0 2.5m

1 : 25 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

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

Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:40+10'00'

Drawing Title

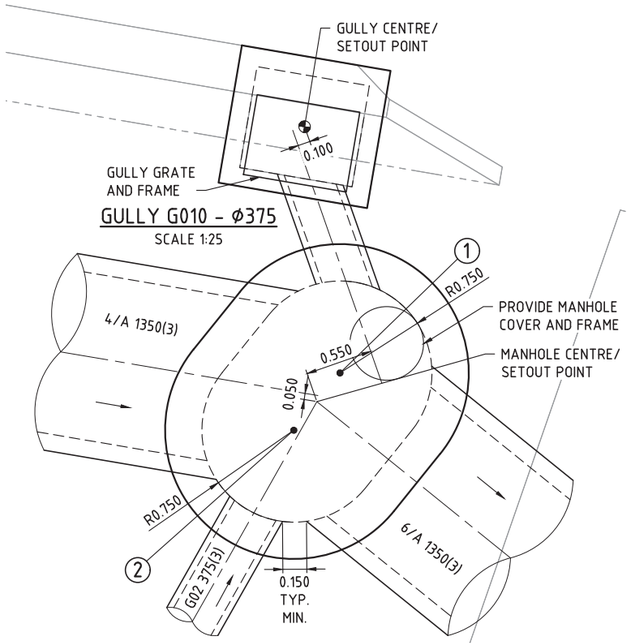
STORMWATER
MANHOLE DETAILS
SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	18 of 20

	Drawing No	Revision
A1	21-121-18	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-18-19-SW-MH.dwg Plotted by: RW on 30/10/2023 3:46:04 PM

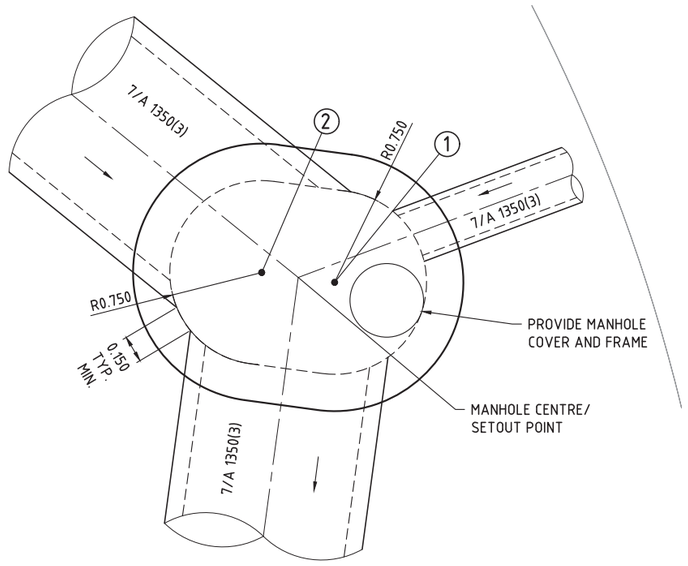


MANHOLE 5/A - ø1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502566.146	6974898.385
2	502565.770	6974897.919

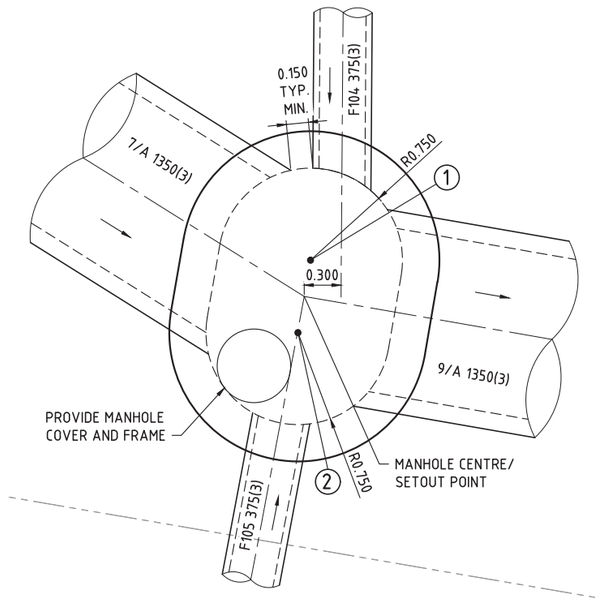


MANHOLE 6/A - ø1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502576.656	6974889.716
2	502576.062	6974889.796

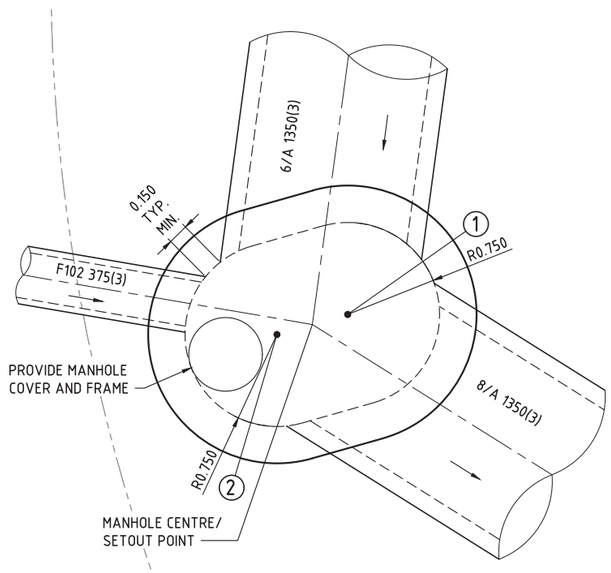


MANHOLE 8/A - ø1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502589.260	6974842.537
2	502589.158	6974841.945



MANHOLE 7/A - ø1500 EXT. 600

SCALE 1:25

SETOUT TABLE

POINT	EASTING	NORTHING
1	502571.746	6974853.447
2	502571.168	6974853.283

SCALE

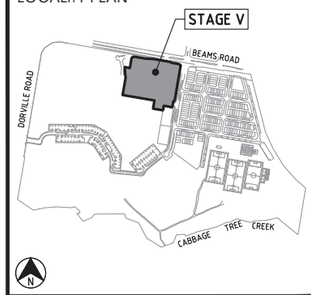
0.5 0 0.5 1.0 1.5 2.0 2.5m

1 : 25 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client

ECONOMIC
DEVELOPMENT
QUEENSLAND (EDQ)

Project

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

M. Shaw

Digitally signed by
Mark Shaw RPEQ
17544
Date: 2023.11.02
07:36:40+10'00'

Drawing Title

STORMWATER
MANHOLE DETAILS
SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	19 of 20

	Drawing No	Revision
A1	21-121-19	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-18-19-SW-MH.dwg Plotted by: RW on 30/10/2023 3:46:04 PM

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
Project: CARSELDINE VILLAGE – STAGE V
Prepared By: Jason Burton Date: 08th August 2023
Reviewed By: Mark Shaw Date: 08th August 2023

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

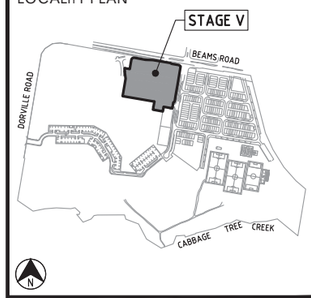
Probable – means an event or situation that occurs or is likely to occur about ten times or more per year
Possible – means an event or situation that occurs or is likely to occur about once per year
Unlikely – means an event or situation that occurs or is likely to occur less frequently than once every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

Issued 08th August 2023 Rev - A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-20-SAFETY.dwg Plotted by: RW on 30/10/2023 3:46:07 PM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	30.10.2023	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
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
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.02 07:36:41+10'00'

Drawing Title
SAFETY IN DESIGN

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	20 of 20

	Drawing No	Revision
A1	21-121-20	A

CARSELDINE URBAN VILLAGE

UPDATED STORMWATER MANAGEMENT PLAN

DesignFlow

Prepared for Economic Development Queensland

October 2019

Document Control Sheet

Report Title:	Carseldine Urban Village – Updated Stormwater Management Plan
Suggested Reference:	Carseldine Urban Village – Updated Stormwater Management Plan (DesignFlow, 2019)
Version:	04
Client:	Economic Development Queensland
Author(s):	Ralph Williams
Reviewed By:	Shaun Leinster
Approved By:	Shaun Leinster RPEQ15637 
Date:	10/10/2019
File Location:	S:\Projects\4306
Circulation:	Electronic Copies: Economic Development Queensland

Disclaimer

This document has been prepared solely for the benefit of the client identified above, and is issued in confidence for the purposes only for which it is supplied. Unauthorised use of this document in any form whatsoever is prohibited. No liability is accepted by DesignFlow Consulting Pty Ltd, or any employee, contractor or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply not withstanding that the document may be made available to other persons for an application for permission or approval to fulfil a legal obligation.

Qualifications & Limitations

In preparing this report, Designflow has relied upon and assumed accurate data provided by Brisbane City Council (BCC) and other sources. Unless otherwise stated in this report, Designflow has not attempted to verify the accuracy or completeness of any such information. The accuracy of this report is reliant upon the accuracy of this information.

This investigation is based upon BCC's established flood model of the Cabbage Tree Creek floodplain. While some refinements have been made to BCC's models to suit the current project, overall the modelling approach and assumptions have been applied consistently with that of the established models. Consequently, the model accuracy limitations of BCC's flood models also generally apply to this investigation.

Modelling for this investigation is based on a design event approach and assumptions that are consistent with current industry practice. It is important to be aware that real world flood events are random and highly variable. Consequently, observed and future flooding characteristics may not reflect those described in this report.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Designflow for use of any part of this report in any other context.

Study results should not be used for purposes other than those for which they were prepared.

Table of Contents

EXECUTIVE SUMMARY

Carseldine Urban Village (Lot 322 on SP172124) is a proposed development on a 45ha site, currently occupied by Queensland Government facilities and community sports fields. The development is currently being undertaken by Economic Development Queensland (EDQ) and involves the creation of lots for a mix of uses including commercial and retail, residential, retirement living and a sporting complex.

This report presents the details of an Updated Stormwater Management Plan for the development to meet the requirements under:

- *State Planning Policy* – SPP (DLGIP, 2017) for the operational stormwater quality objectives;
- *Queensland Urban Drainage Manual* (QUDM) for stormwater quantity management; and
- *Brisbane City Council Planning Scheme*

This report supersedes the previously issued stormwater management plan for the site (DesignFlow, April 2018). This updated stormwater management plan captures the following updates and information that has been made available since the issue of the April 2018 report:

- Updated and approved overall masterplan for the development (source: RPS, October 2019)
- Latest earthworks associated with the development (source: Calibre Consulting, June 2019)
- Existing site pipe drainage survey (completed June 2019 – source: Land Partners)

STORMWATER QUALITY MANAGEMENT

The updated stormwater treatment strategy includes two (2) bioretention basins that treat development runoff prior to discharge to Cabbage Tree Creek:

- Bioretention Basin B1 265m^2 filter area treating Stages 2, 3 (part of) and S
- Bioretention Basin B2 500m^2 filter area total treating the remainder of the development (Stages 1,3 (part of), 4 and 5)

These basins are located outside of the Cabbage Tree Creek riparian corridor and will have low impact on existing vegetation. The proposed locations also avoid conflicts with the future busway corridor.

Drainage swales along the eastern boundary of the site and at the southern boundary of the Stage S sports fields also provide additional treatment.

FLOOD MANAGEMENT

Flood impact assessment demonstrates no significant impacts occurring external to the site as a result of development. Some afflux (~50mm) is observed immediately south east of the development boundary, however this afflux occurs within a low-lying flood prone bushland area and is not considered an actionable nuisance.

Improved flood conditions are observed at Beams Road and the rail line at the north-east end of the site. This is because much of the site drainage will be directed to Cabbage Tree Creek. Furthermore, during larger magnitude events, the proposed development fill restricts Cabbage Tree Creek breakout flow from entering this area.

Required mitigation measures to manage flood impacts external to the site include:

- Providing flood storage over the sports field zone for events greater than the 5% AEP (20 year ARI).
- Incorporation of a 1200mm dia pipe with one-way flap valve along the new drainage swale draining the eastern half of the development. This minimizes the impacts of Cabbage Tree Creek flows into the site via this new connection to Cabbage Tree Creek.
- Inclusion of a flood barrier (~1m high) along the eastern boundary of the site. This avoids increases in flood levels along the rail line adjacent to the site.

This report is based on regional flood modelling based upon the Brisbane City Council (BCC) flood model for Cabbage Tree Creek. Updated regional modelling and detailed local modelling will occur as part of continuing design development for the site.

1 SITE CHARACTERISTICS

1.1 SITE LOCATION

The Carseldine Urban Village development is located approximately 14km north of Brisbane. The site is bounded by Beams road to the north, Cabbage Tree Creek to the south, Brisbane rail to the east and Dorville Road to the west.

Figure 1 shows the location of the site.

Figure 1: Locality plan

1.2 CLIMATE

Figure 2 provides a summary of the monthly rainfall based on climate statistics for Brisbane (station No 40223).

The annual average rainfall is 1,190 mm, whilst annual evaporation is approximately 1,950mm. The figure clearly indicates the seasonal nature of rainfall and evaporation with lower rainfall and evaporation periods during the winter months.

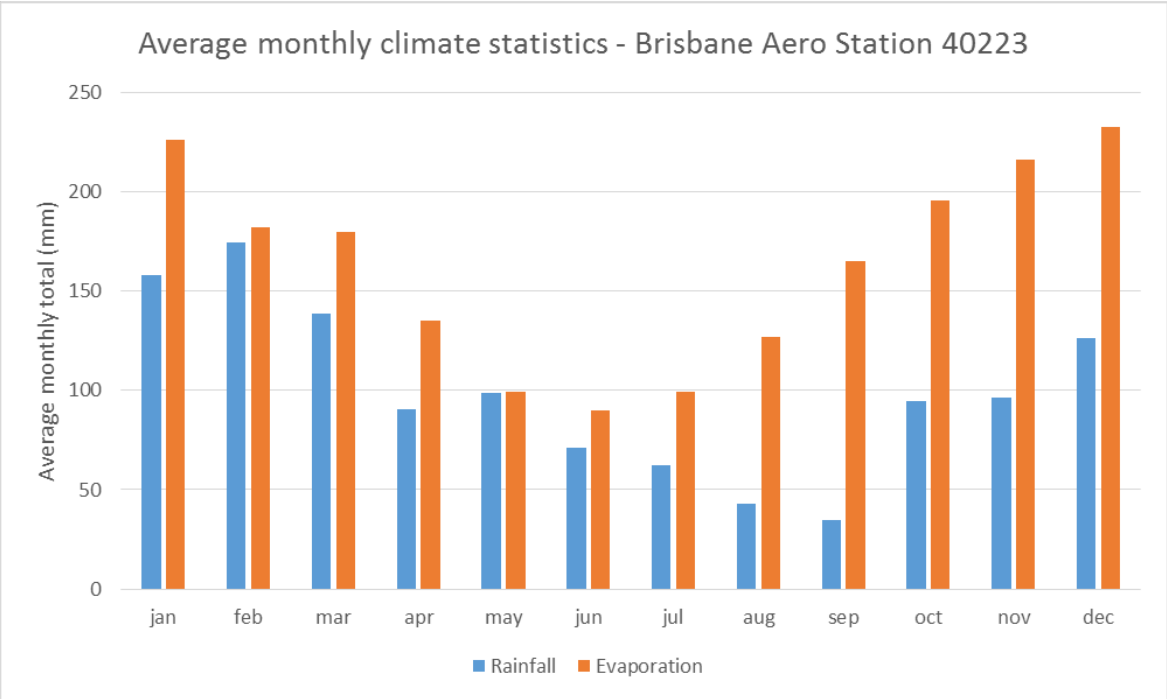


Figure 2 Average monthly climate statistics

1.3 TOPOGRAPHY, CATCHMENTS AND DRAINAGE

Ground levels across the site range from approximately RL28 at the high point located at the north western boundary of the development to approximately RL9.5 at the south eastern corner at Cabbage Tree Creek. Grades across the site are flat to moderate typically ranging from 0.5 to 10%.

The site is characterised by areas of low lying and poorly drained topography. Figure 3 shows the existing topography and general drainage of the current site. The majority of the site drainage is toward Cabbage Tree Creek to the south, whilst the north west section of the site drains northward. Poorly drained areas are also noted at the north east of the site.

Pipe drainage within the site discharges at two (2) outfalls to Cabbage Tree Creek. This drainage system minimises localised site flooding in the more frequent events, when regional flooding from Cabbage Tree Creek does not occur.

In general, the northern bank of Cabbage Tree Creek is higher than adjacent ground levels further north within the site. This means flood flows are initially contained within Cabbage Tree Creek but then break out of the banks of the creek over the high point on the northern bank and inundate low lying and poorly drained areas within the site.

At the north eastern end of the site, low lying areas occur adjacent to the rail line and at the northern boundary of the existing sports fields adjacent to Beams Road. This area appears to be providing an overland flow path for flood flows.

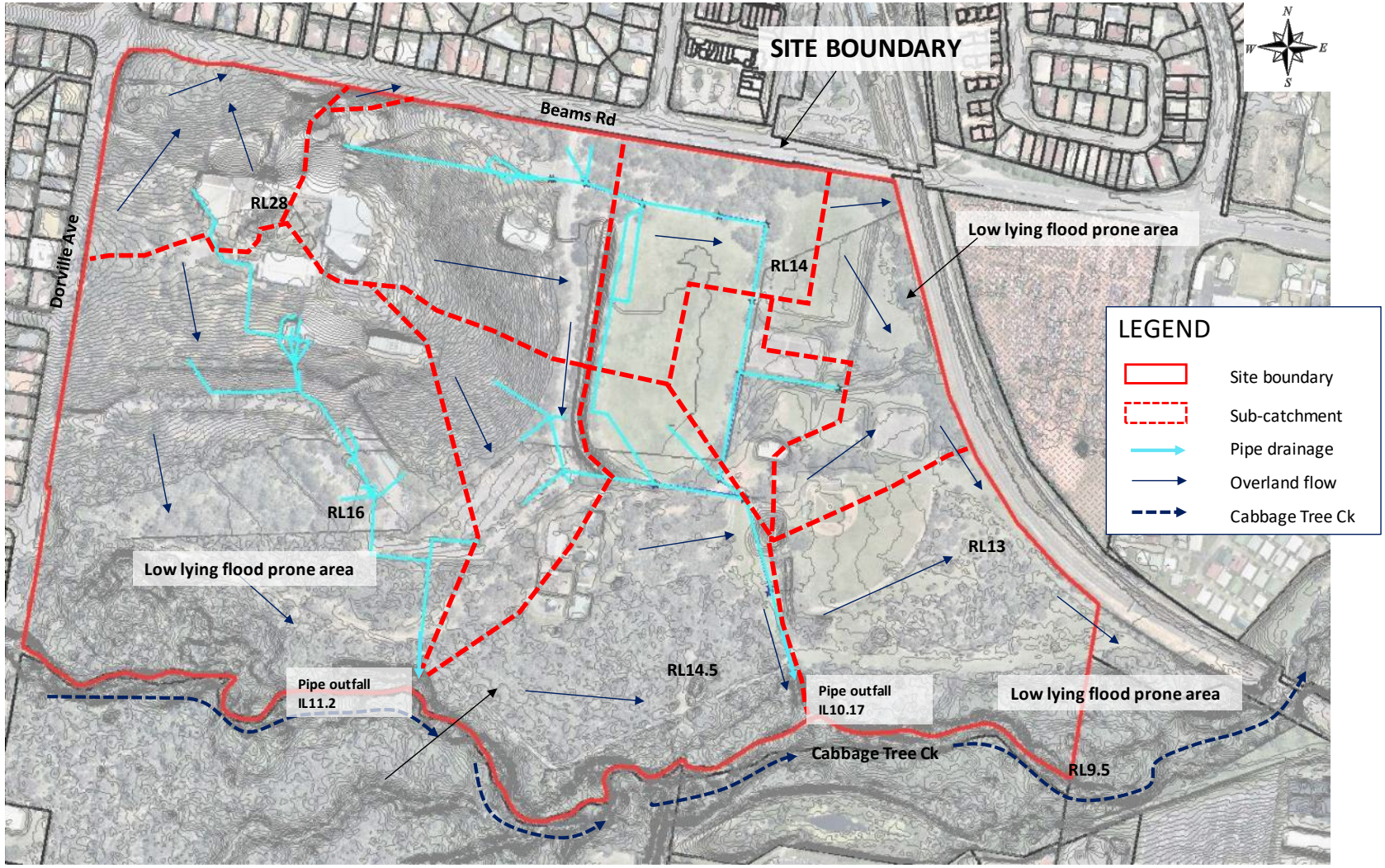


Figure 3: Topography and drainage

1.4 SOILS AND VEGETATION

Soils across the site are generally characterised by alluvial soils comprising surface clayey silt overlying medium to high plasticity silty clay and sandy clay, with interbedded layers of clayey sand, gravelly sand and gravel (SGS, 2017).

The site comprises of sports fields and government buildings in the northern half of the site. Extensive good value bushland occurs in the southern half of the site including the Cabbage Tree Creek riparian corridor (refer Figure 1).

1.5 PROPOSED DEVELOPMENT

The Carseldine Urban Village development is located within a 45ha site. The site includes existing government facilities at the north western end of the development that are to be retained. Existing sports fields at the north eastern corner of the site are to be redeveloped, whilst a new sporting precinct will be constructed at the south eastern corner of the site. A future busway is planned at the southern end of the site. The existing QUT research facility at the southern end of the site is planned to be decommissioned in 2020.

The overall development will include approximately 10.3ha of new commercial and residential development, and an approximated 5 ha of new sporting complex area.

The current development layout for Carseldine Urban Village is shown in Figure 4.

Figure 4 Proposed Carseldine Urban Village development (Source: RPS 2019)

2 STORMWATER DESIGN OBJECTIVES

Stormwater management objectives have been established based on the following:

- *State Planning Policy* (DLGIP, 2017)
- *Queensland Urban Drainage Manual* (2016)
- *Brisbane City Council (BCC) Planning Scheme*

2.1 STORMWATER QUALITY

The stormwater quality management objectives that apply to the operational phase of the development are defined in the State Planning Policy (DLGIP, 2017) which applies load based objectives presented in Table 1.

Table 1 – Stormwater quality objectives

Constituent	Discharge criteria
Total suspended solids (TSS)	80% reduction in post developed mean annual load
Total phosphorous (TP)	60% reduction in post developed mean annual load
Total nitrogen (TN)	45% reduction in post developed mean annual load
Gross pollutants	90% reduction in post developed mean annual load

Construction phase erosion and sediment control objectives are outlined in Table A Appendix 2 of SPP (DLGIP, 2017). Detailed erosion and sediment control plans will be provided with the Operational Works application.

2.2 FLOODING

The flood management objectives applicable to the site are presented in Table 2. Carseldine Urban Village development lies within Brisbane City Council (BCC) mapped City Wide Waterway corridor zone.

Table 2 Flood objectives

Criterion	Design Objective
No worsening hydraulic conditions	No worsening hydraulic impact to be demonstrated external to the site for the critical duration storm for the 39% AEP to 1% AEP events
BCC flood overlay code PO2 Development within a creek/waterway flood planning area	a) Maintains conveyance of flood waters to allow flow and debris to pass predominantly unimpeded through the site b) Does not concentrate, intensify or divert floodwater onto upstream, downstream or adjacent properties c) Will not result in a material increase in flood levels or flood hazard on upstream, downstream or adjacent properties
BCC Flood overlay code PO8 Development for filling or excavation in an area affected by creek/waterway flooding	Does not directly, indirectly or cumulatively cause any material increase in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the floodplain

3 STORMWATER MANAGEMENT STRATEGY

The stormwater management strategy for the Carseldine Urban Village development has been developed based on discussions with EDQ, the design team and field inspections to identify opportunities and constraints.

When developing the strategy, several guiding principles were considered:

- achieve obligations under the *State Planning Policy*, *BCC planning scheme policy* and *Queensland Urban Drainage Manual*
- ensure stormwater management systems are functionally feasible within the constraints of the development and drainage levels
- avoid numerous stormwater management sites
- avoid works within the Cabbage Tree Creek riparian buffer zone
- minimize impacts on existing good value vegetation
- avoid works encroaching into the future busway corridor
- minimize the need for an on-site flood basin, where possible
- utilization of the 10m wide acoustic barrier at the eastern boundary of the site for drainage conveyance and treatment

Figure 5 shows the stormwater management strategy for the Carseldine Urban Village development. The strategy has been developed considering the proposed drainage for the development (source: Calibre Consulting). This includes pipe drainage for minor storm events and overland flows for flows exceeding pipe capacity.

Performance assessments of the proposed management strategy are presented in Section 4 (stormwater quality) and Section 5 (flooding).

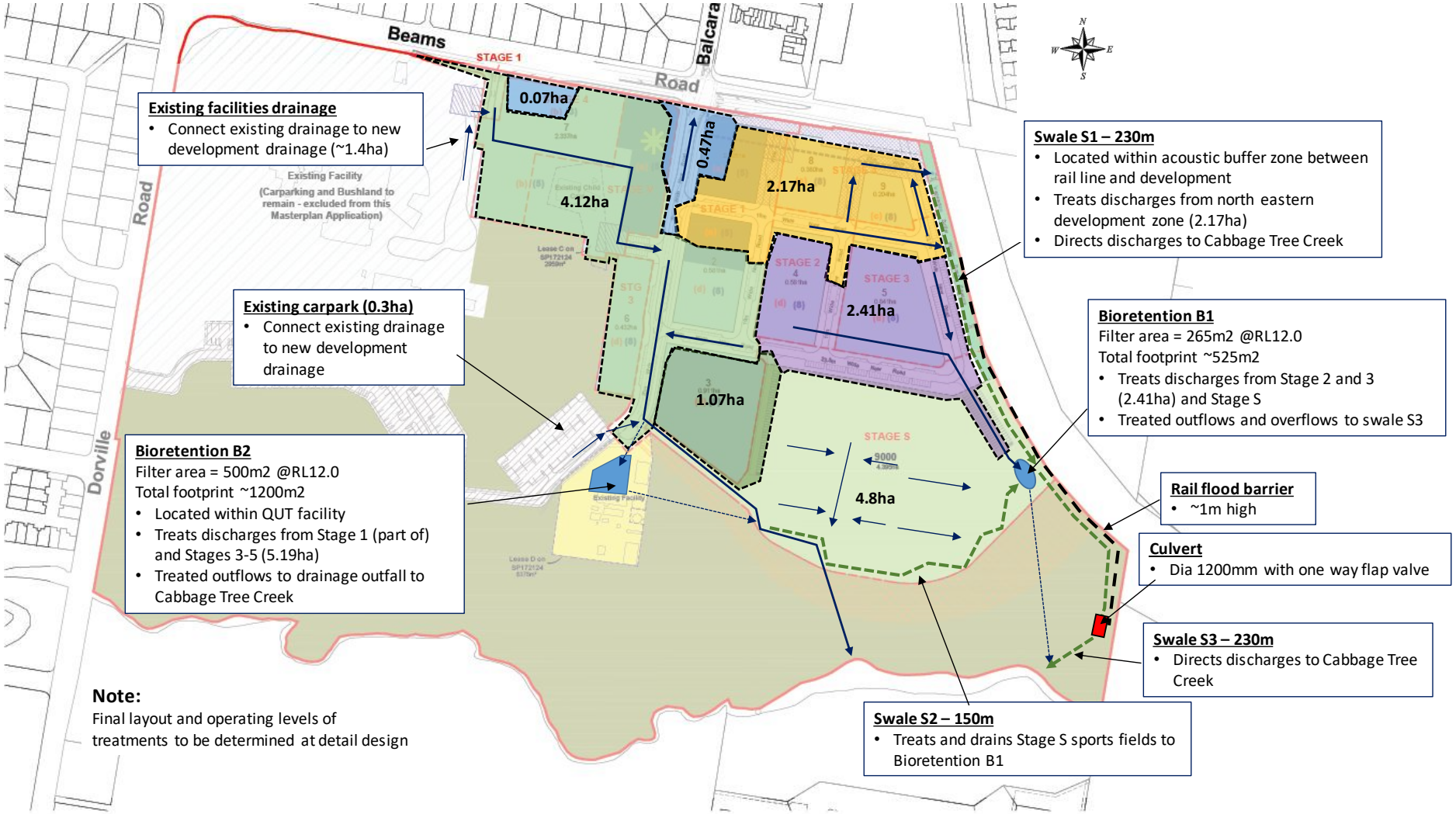


Figure 5 Stormwater Management Strategy Carseldine Urban Village

Table 3 Stormwater treatment elements

ID and Stages Treated	Treatment		Catchment	Comment
	Type	Area/length	ha	
B1 – Stages 2,3 (part of) and S	Bioretention	265m²	2.41	Located within Stage S. Treats discharges from Stage 2 and 3 (part of). Receives treated flows from Stage S sports fields. Treated flows and overflows to swale S3.
B2 – Stages 1 and 3 (part of) and 4-5	Bioretention	500m²	5.19	Located within the QUT facility. Treats Stages 1 and 3 (part of) and Stages 4 and 5. Receives low from diversion from main drainage pipe. Treated outflows to drainage outfall to Cabbage Tree Ck.
S1 – Stages 1, 2 and 3 (part of) and 4	Swale	230m	2.17	Treats north eastern development zone (Stage 1, 2 and 3 (part of) and Stage 4).
S2 – Stage S	Swale	150m	4.8	Treats and drains Stage S sports fields to Bioretention B1
S3 – Stages 1 and 3 (part of) and 2,4 and S	Swale	230m	B1+S1+S2	Conveys eastern development zone discharges to Cabbage Tree Ck. Provides additional treatment for upstream discharges prior to discharge to Cabbage Tree Creek
Stage 1 (part of) – Beams Rd	untreated		0.54	Development treatment upsized to offset this untreated portion of the development
TOTAL			15.11	

3.1 STORMWATER TREATMENT

The treatment strategy includes two (2) bioretention basins treating the development zones as shown in Figure 5. Swales along the southern boundary of the Stage S sports fields and at the eastern boundary of the site will also provide a treatment function prior to discharge to Cabbage Tree Creek.

Two small development areas (0.54ha total) adjacent to Beams Road at the northern end of the development do not report to the treatments proposed. The stormwater treatment proposed as part of this strategy have been sufficiently sized to compensate (i.e. over-treat) for the treatment of this area. Refer to Section 4 for performance assessments.

It should also be noted that the proposed drainage strategy will connect existing drainage from the existing facilities at the north west of the site to drainage that will report to Bioretention basin B2. This provides treatment of an area that previously was untreated.

Bioretention Basin B1

Bioretention Basin B1 (filter area 265m² at RL12.0) treats Stage 2 development and the eastern Stage 3 development and receives treated discharges from the swale (S2) draining Stage S sports fields. This basin is located at the eastern boundary of the site, just south of Stage S carpark. Pipe discharges enter the basin from the development zone via the Stage S carpark.

Treated outflows from the bioretention basin discharge to swale S3. Overflows from the bioretention connect directly to swale S3 via an overflow weir.

Detail designs for this bioretention basin have now been completed and construction is currently underway as part of Stage S works. A general arrangement of the bioretention basin is shown in Figure 6.

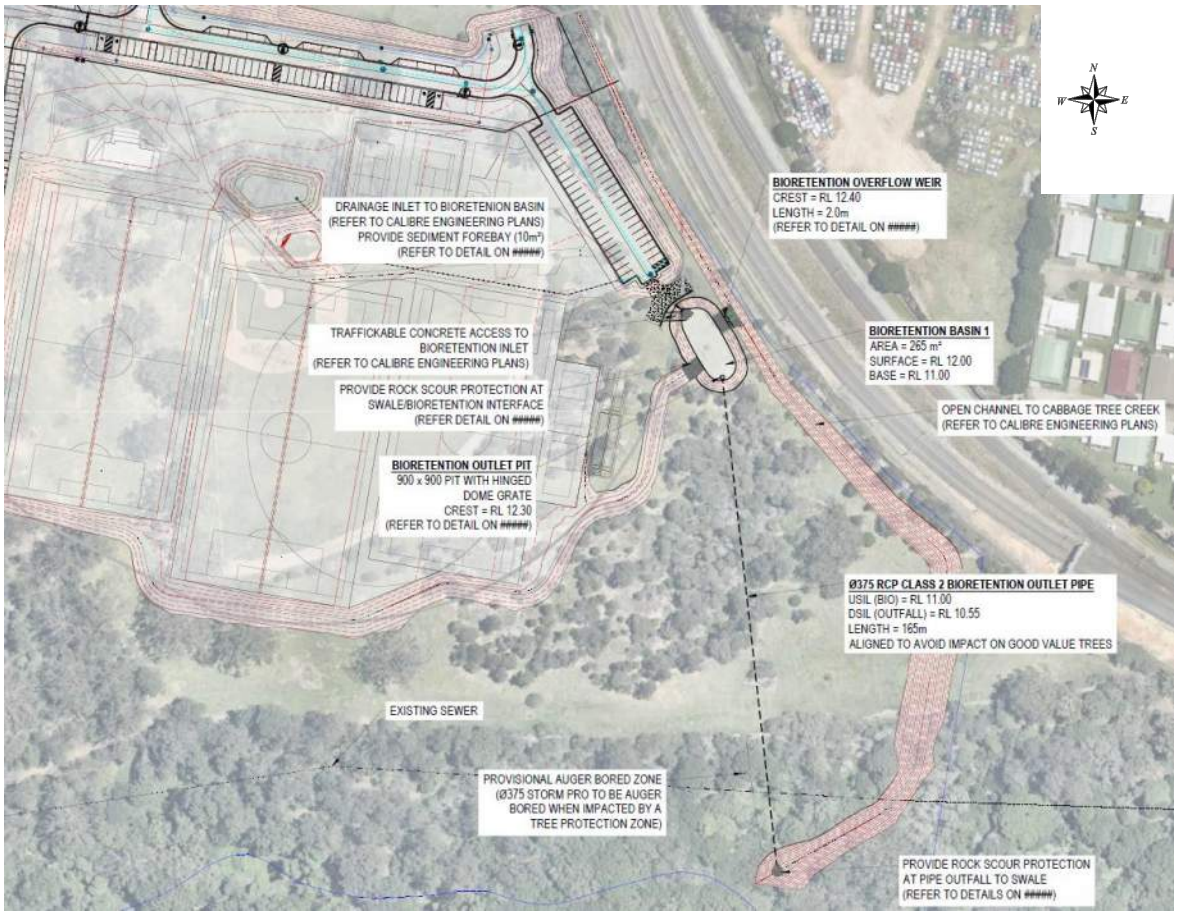


Figure 6 Bioretention basin B1 general arrangement

Bioretention Basin B2

Bioretention Basin B2 (filter area 500m² at RL12.0) treats parts of Stage 1 and 3 (west) development as well as Stages 4 and 5. The basin is proposed to be located within the footprint of the existing QUT research facility at the southern end of the site. This area, covering approximately 6,500m², is due to be decommissioned in 2020.

This treatment site could be incorporated as part of a future stormwater reuse scheme, by directing treated stormwater from the bioretention basin to an adjacent storage pond, which can then be used to supply harvested water for sports field irrigation.

Detail designs have now been completed for this bioretention. A general arrangement is shown in Figure 7.

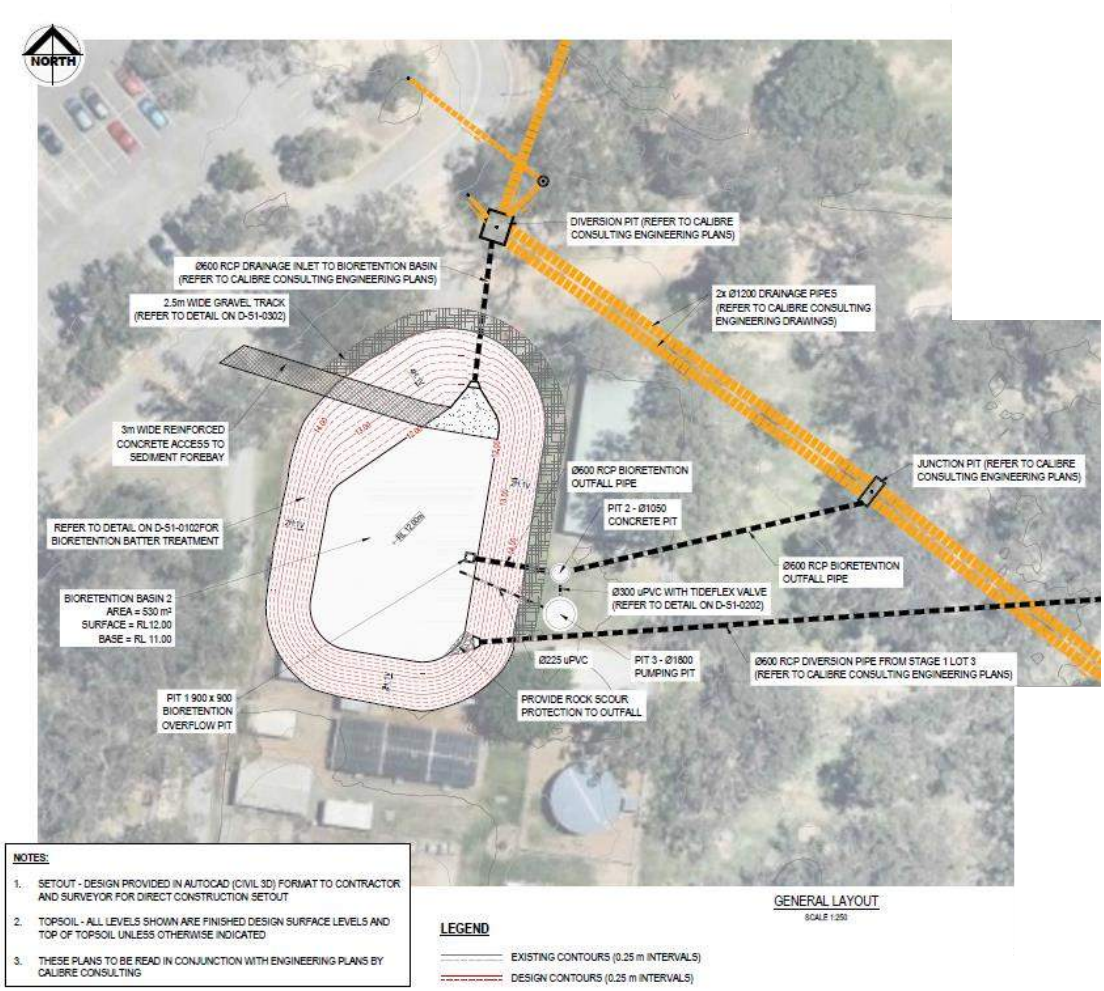


Figure 7 Bioretention basin B2 general arrangement

A diversion pit will direct development low flows to the bioretention basin at the northern end. In addition, a diversion pipe (600mm dia) will direct drainage from Stage 1 Lot 3 (1.07ha) to the bioretention basin at the southern end. High flows will continue to the drainage outfall to Cabbage Tree Creek via twin 1200mm dia pipes.

Treated outflows and bioretention overflows will be piped from the bioretention basin to the proposed 2x1200 mm dia drainage outfall pipes to Cabbage Tree Creek. A dia 1800mm pit is included with the bioretention basin works to facilitate connection to a future stormwater harvest scheme, should this proceed. This will allow the retrofit of future pumping infrastructure within this pit to pump bioretention treated outflows to a future holding pond. Regardless, the bioretention basin can operate under gravity to drain treated flows and overflows to the outfall of Cabbage Tree Creek i.e. the bioretention basin is not reliant on the inclusion of a stormwater harvest scheme and can operate entirely independently and under gravity.

Swale S1 (~230m)

Swale S1 (~230m) represents the drainage reserve formed at the eastern boundary of the development. Drainage from part of Stages 1 to 3 and Stage 4 will discharge to this

drainage reserve. This area is a minimum 10m wide and will be grassed and treed to form a buffer to the rail corridor. Drainage gradients along this zone are typically flat (~0.3%).

Swale S2 (~150m)

Swale S2 receives and treats drainage from the Stage S sports fields and directs this drainage to Bioretention Basin B1. This swale is turfed with 6H:1V batters. Drainage gradients are typically 0.6%.

Swale S3 (~230m)

Swale S3 connects drainage from the eastern half of the development zone to Cabbage Tree Creek. To minimise the impact on vegetation within the Cabbage Tree Creek riparian zone, batter slopes of 3H:1V are used. Drainage gradients along this zone are typically 0.6%. The swale will be vegetated with a mix of groundcovers and riparian vegetation to provide a treatment function and aid stability.

3.2 FLOOD MANAGEMENT

The majority of development runoff is directed southward to discharge to Cabbage Tree Creek. Development earthworks are configured to facilitate overland flows eastward and southward to allow the majority of development drainage to Cabbage Tree Creek. Developed lots are above 1% AEP levels (Q100), however the sports field earthworks allow flooding of the sports fields in events higher than the 5% AEP (Q20) . This aids in offsetting loss of flood storage as a result of development and avoids flood impacts along Cabbage Tree Creek.

A new swale along the eastern boundary of the site drains stormwater from the eastern half of the site to Cabbage Tree Creek. A 1200mm dia culvert is included along this swale with a one-way flap valve to minimise backwatering effects of Cabbage Tree Creek flows into the development from this new swale.

A flood barrier is also included along the eastern boundary of the site to contain development flows within the site and avoid impacts along the rail corridor. This flood barrier can take the form of a low block wall (~1m high) and/or bund and can be incorporated with the future acoustic fence along this boundary. Further details are provided in Section 5.2.2.

4 STORMWATER QUALITY TREATMENT ASSESSMENT

MUSIC modelling was conducted to quantitatively assess the stormwater treatment performance of the proposed stormwater treatment strategy. MUSIC version 6.3 was used for the assessment and the parameters have been established in accordance with the MUSIC Modelling Guidelines for South East Queensland (Water by Design, 2010).

Details of the modelling assumptions, parameters used and results are presented in the following sections.

4.1 MODEL STRUCTURE

The structure of the MUSIC model is shown in Figure 8 with the general data upon which the model is based provided in Table 4.

Catchments have been derived from the proposed masterplan layout, considering the pipe drainage system that would apply (refer to Figure 5 previously). Only areas under development are included in the model.

The model adopts a lumped catchment approach.

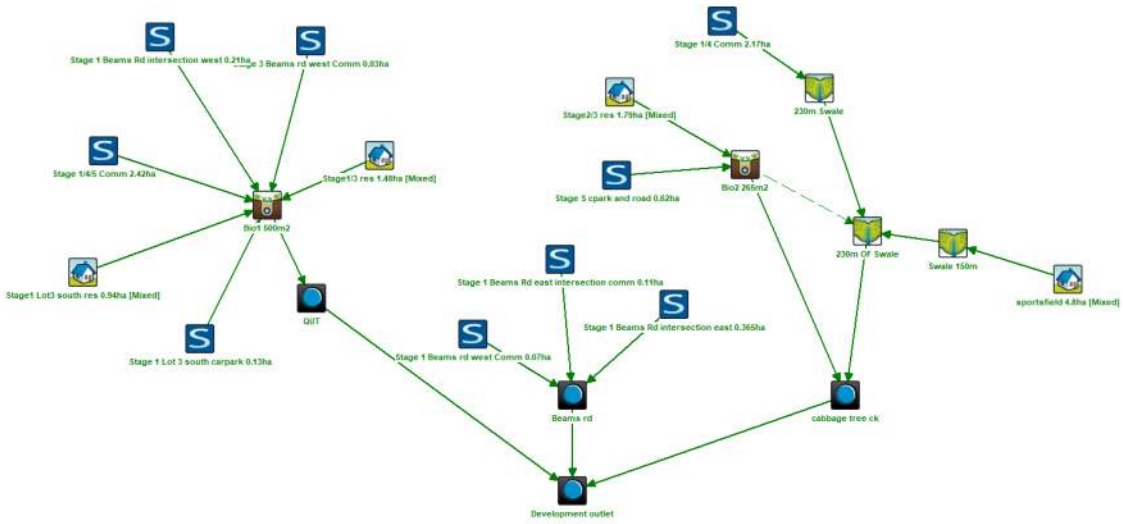


Figure 8 MUSIC model

Table 4 MUSIC model data summary

Parameter	Value
Source Data	
Rainfall data set	1990-1900 – Brisbane Aero Station No. 40223
Modelled time step	6 minute
Mean annual rainfall 1980--1990	1155 mm (for the period used)
Potential evapotranspiration	1,526mm (Table 3.1 Music modelling guidelines for SEQ)
Soil properties (runoff generation parameters)	Table 3.7 Music Modelling Guidelines for SEQ
Pollutant concentrations (base and storm flow concentration parameters)	Table 3.9 Music Modelling Guidelines for SEQ
Percent impervious	Table 3.6 Music Modelling Guidelines for SEQ Residential/mixed use (50dw/ha): 80% impervious Retail/commercial: 90% impervious Road: 90% impervious
Treatment Devices	
Bioretention	Filter media depth = 0.6 m Extended detention depth = 0.3 m Seepage = 0 mm/hr Saturated hydraulic conductivity 200mm/hr TN content[1] 400 mg/kg Orthophosphate content[1] 30mg/kg
Swale	Base width = 1m Top width = 10m Depth = 0.5m (S1 and S2); 1.5m (S3) Vegetation height = 0.05m (S1 and S2); 0.25m (S3) Slope 0.3% (S1); 0.6% (S2 and S3)

Note:

1. Water By Design have recently completed a review of important default values for bioretention basins. In terms of bioretention the parameters adopted are consistent with new values for filter media OP and TN content recently adopted by Healthy Waterways

4.2 RESULTS

The results of the MUSIC modelling are presented in Table 5.

Table 5 Summary of MUSIC modelling – Carseldine Urban Village

Treatment ID	Pollutant	Inflows (kg/yr)	Outflows (kg/yr)	Reduction achieved (%)	Water quality objective
CARSELDINE URBAN VILLAGE					
Bio B1 Filter area 265m²	TSS TP TN	5720 10.8 65.6	802 2.2 26.7	86.0 79.7 59.2	Water quality objective applies to the combined site discharge
Bio B2 Filter area 500m²	TSS TP TN	11000 25.0 151	1910 6.08 66.7	82.6 75.7 55.8	
Swale S1 Length = 230m	TSS TP TN	4660 12.2 70.5	535 3.44 50.4	88.5 71.9 28.5	
Swale S2 Length = 150m	TSS TP TN	1570 4.06 32.6	654 2.48 27.6	58.2 39.1 15.3	
Swale S3 Length = 230m	TSS TP TN	1950 7.75 94.5	1200 6.41 86.2	38.4 17.3 8.8	
Stage 1 – Beams Rd 0.54ha untreated	**TSS** **TP** **TN**	1820 3.45 17.4	1820 3.45 17.4	**0** **0** **0**	
TOTAL	**TSS** **TP** **TN**	**24700** **55.6** **337**	**4970** **16.3** **181**	**80.0** **70.7** **46.4**	**80** **60** **45**

The results demonstrate that load based objectives are achieved for the Carseldine Urban Village Development with the proposed stormwater treatment strategy.

5 FLOOD ASSESSMENT

Flood modelling has been based on Brisbane City Council (BCC) supplied URBS and TUFLOW regional flood models for Cabbage Tree Creek. These models have been updated as necessary to make suitable for an impact assessment of the Carseldine Urban Village development.

The following describes model updates made to the Council supplied URBS and TUFLOW models to complete assessments on the impacts of the development.

5.1 URBS

URBS has been used to generate flows for the pre-developed and developed case scenarios for incorporation into TUFLOW. The following describes the model updates and assumptions used.

5.1.1 Pre-developed catchments

The Council supplied URBS model includes 70 sub catchments that delineate the approximate 43.1km^2 Cabbage Tree Creek catchment. URBS catchments covering the Carseldine Urban Village development zone within the Cabbage Tree Creek catchment have been refined to allow better representation of local catchment flooding characteristics in and around the development.

Sub-catchment 29 in the URBS model covers the proposed Carseldine Urban Village development zone. This has been split into 5 sub-catchments (291 to 295) to represent in finer detail site drainage based on existing topography obtained from Council supplied DEM model and ground truthing of current drainage.

Pervious and impervious fractions have been updated for these catchments, together with catchment slopes. Catchment slopes have been updated and estimated using the equal area method for each new sub catchment modelled.

All other URBS catchments have been retained as per the original Council supplied model setup, including catchment slopes.

Figure 9 shows the predeveloped catchments relevant to the Carseldine Urban Village development. Table 6 provides a summary of sub-catchment land uses, areas and slopes modelled in and around the development. URBS model land use is applied by using various land use categories within each sub-catchment. URBS model land use categorisation has been adopted in accordance with the BCC model. Land use categories and associated fractions impervious values are:

- Urban Low Density (10% Impervious)
- Urban Medium Density (50% Impervious)
- Urban High Density (90% Impervious)
- Rural (0% Impervious)

Table 6 Pre-developed catchments

ID	Area	Land use (%)				Catchment
	ha	Low density	Medium density	High density	Rural	Slope %
291	18.63	0%	0%	18.0%	82.0%	1.14
292	6.57	0%	0%	9.7%	90.3%	2.04
293	6.52	0%	0%	3.6%	96.4%	0.63
294	5.09	0%	0%	0%	100%	0.55
295	82.15	0%	19.3%	38.3%	42.4%	0.70
32	36.52	0%	83.3%	3.8%	12.8%	1.30

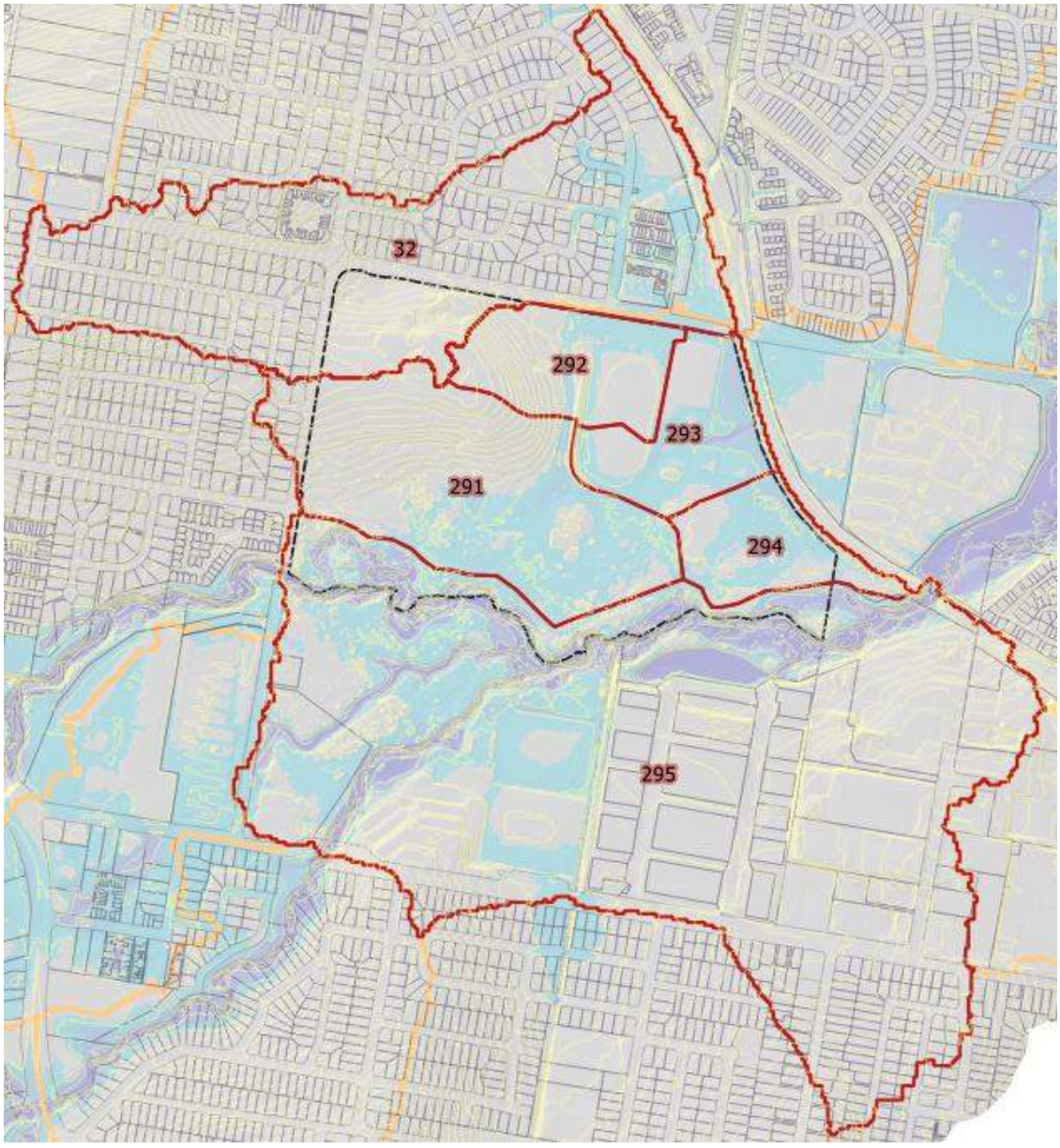


Figure 9 Refined URBS sub-catchments relevant to the development – base case

5.1.2 Developed case catchments

Sub-catchments where development applies were adjusted to represent the proposed development for Carseldine Urban Village. This applies to sub catchments 291, 292, 293, 294 and 32. These sub-catchments are shown in Figure 10.

Catchment land uses have been adjusted to account for the increased impervious area associated with the development. Adjustments to sub-catchment boundaries have also been applied, where necessary to align with the drainage strategy of the developed site.

Sub-catchments 293 and 294 drain southwards to Cabbage Tree Creek via a new drainage swale between the railway line and the development. Sub-catchments 291 and 292 will drain to Cabbage Tree Creek via stormwater pipes that will discharge in the vicinity of the two existing outfalls. The final details of this drainage configuration will be undertaken as part of future detail design phases.

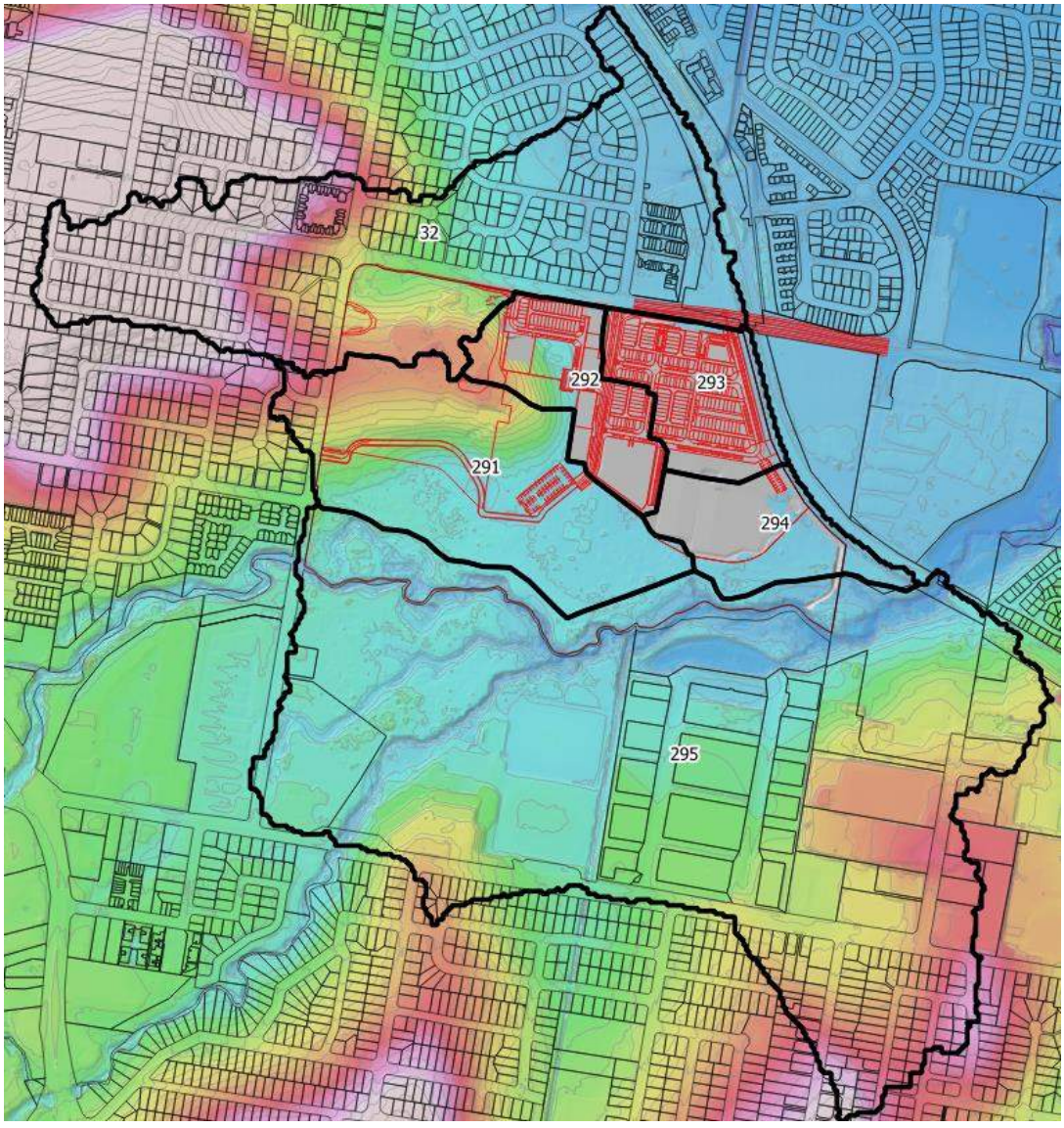


Figure 10 Developed case sub-catchments

Pervious and impervious areas were derived based on expected fraction impervious values for the various land uses. Percent impervious values applied to each land use were based on recommended values in QUDM (2007). The following values have been applied:

- pre-developed vegetation: 0%
- Urban residential: 90%
- Retail/commercial: 90%
- Sports fields: 0%

Modelled catchment areas and slopes for post developed conditions are summarised in Table 7.

Table 7 Carseldine Urban Village development - modelled catchment areas and slopes

ID	Area	Land use (%)				Catchment
	ha	Low density	Medium density	High density	Rural	Slope %
291	17.98	0%	0%	16.11%	83.89%	1.14
292	6.63	0%	0%	88.00%	12.00%	2.04
293	6.47	0%	0%	87.83%	12.17%	0.63
294	6.01	0%	0%	1.78%	98.22%	0.55
295	82.15	0%	19.28%	38.3%	42.4%	0.70
32	36.24	0%	83.98%	3.87%	12.15%	1.30

5.1.3 Rainfall

Design event modelling has been undertaken using Australian Rainfall and Runoff (ARR, 1987) industry standard approach of modelling multiple design rainfall burst durations and extracting the maximum values from these events.

Rainfall parameters were based on the following:

- Temporal Patterns were based on the Australian Rainfall and Runoff (1987) publication. Zone 3 is applied to this site.
- Rainfall Intensity Frequency Duration (IFD) data used is consistent with that used in previous modelling, based on AR&R.

Design storms for the 39%, 20%, 10%, 5%, 2% and 1% AEP events have been modelled for the 60, 90, 120, 180 and 360 minute duration storms.

Design event rainfall is retained as per the Council supplied URBS model.

Rainfall losses and roughness values

Loss rates are retained as per the Council supplied URBS model. The following loss rates are used for the pervious areas for all events modelled:

- initial loss – 10 mm
- continuing loss – 0mm/hr

Zero initial and continuing loss is applied to the impervious fractions.

5.2 TUFLOW

Flood modelling has been carried out using a refined version of BCC's Cabbage Tree Creek TUFLOW model. The following updates have been made to the model for this investigation:

- The model has been updated to a recent version of TUFLOW (2016-03-AE_64 _iSP_w64)
- Inflow hydrographs have been extracted from the refined URBS sub-catchments.
- TUFLOW 'gully' lines have been incorporated to improve model representation of local gullies in the study area. In particular, the existing drain adjacent to the railway has been modelled using a 'gully' line.
- Inflow hydrographs from the refined URBS sub-catchments have been applied using 2d_sa polygons that have been trimmed to control where flows are input to the TUFLOW model.
- The major drainage pipes associated with the two existing outfalls to Cabbage Tree Creek have been incorporated using 1D pipe elements

Existing stormwater drainage pipes and inlets pits within the site have been incorporated into the pre-developed case TUFLOW model as shown in Figure 11. This is based in recent survey of the existing pipe infrastructure (June 2019). Pipe diameters are shown in metres in Figure 11.

All other model parameters and assumptions remain unchanged.

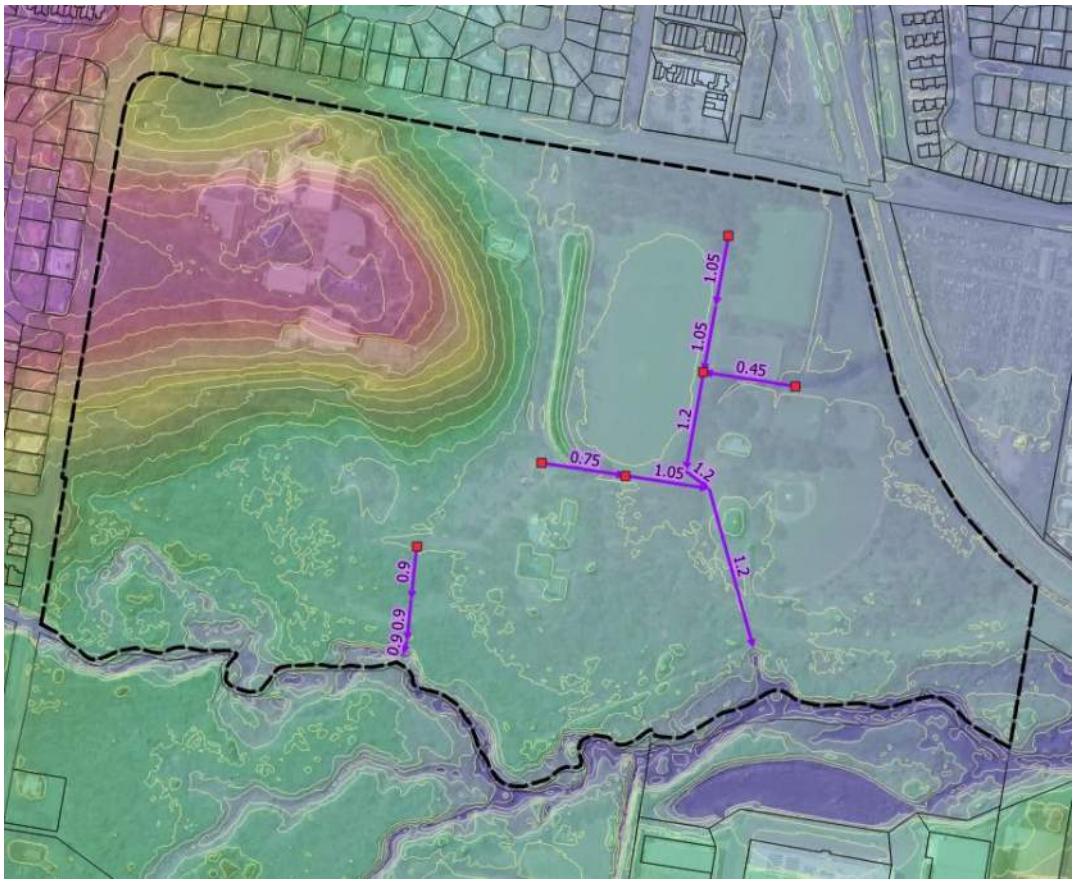


Figure 11 Existing site pipe drainage

5.2.1 Development earthworks

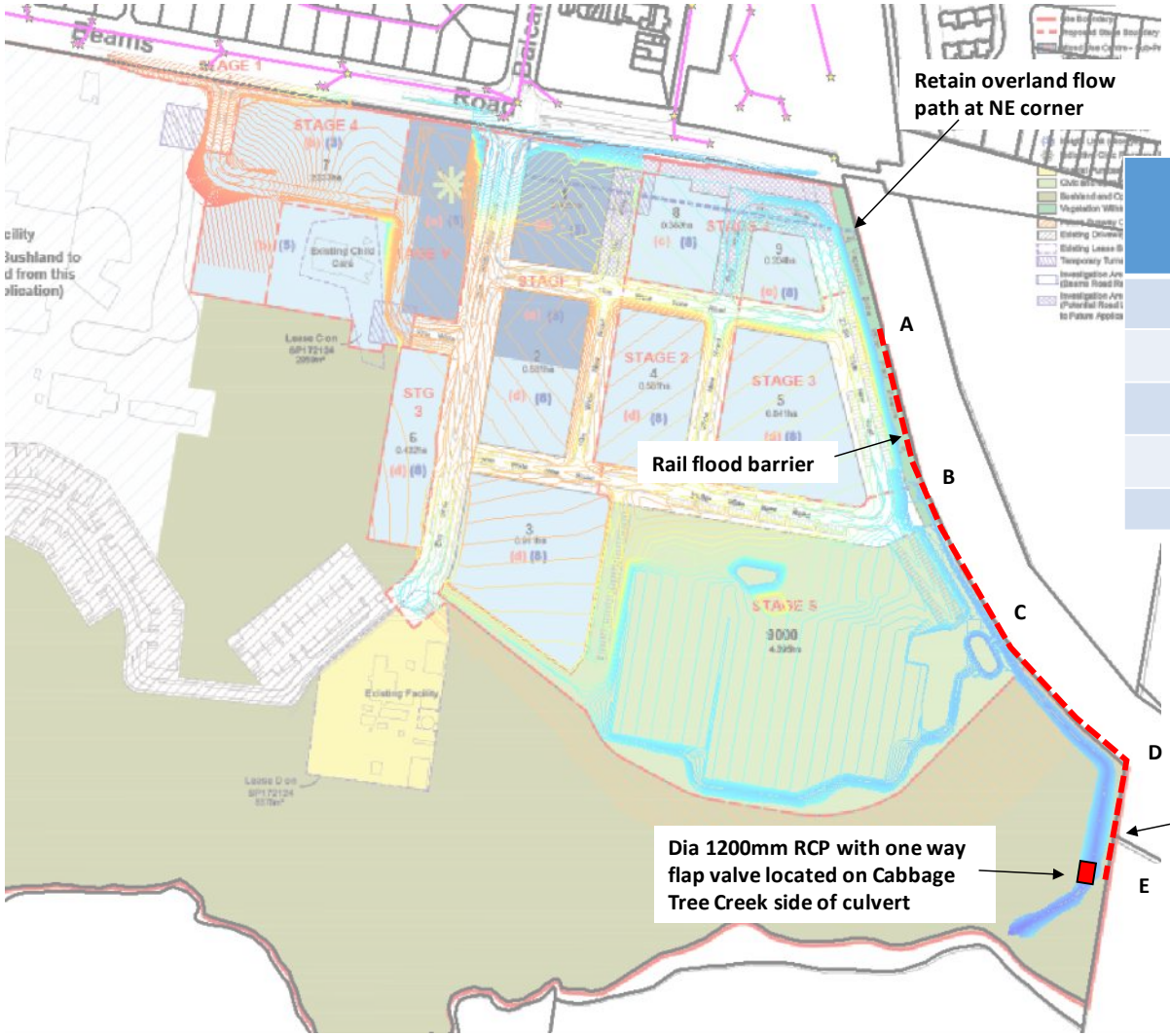
The proposed development has been incorporated into the TUFLOW model based on the latest earthworks design tin provided by the project civil engineers (Calibre Consulting).

5.2.2 Mitigation measures

Extensive iterative model assessments identified the following mitigation measures were required to avoid impacts external to the site:

- Sports field earthworks are designed to allow flooding during less frequent events (5% AEP and above)
- A 1200mm diameter culvert with a flood valve is included along the proposed eastern swale to minimize backwatering from Cabbage Tree Creek into the development via this swale – this minimizes the impacts of Cabbage Tree Creek flows into the site via this new connection to Cabbage Tree Creek.
- The rail corridor external to the property boundary will be protected from any increase in flood levels through the incorporation of an engineered flood barrier (~1m high) along the eastern boundary of the site - this avoids increases in flood levels external to the site adjacent to the rail line.

Details of the above mitigation measures are provided in Figure 12.



Pt ID	Ground Height (mAHD)	1% AEP Peak Flood Level (mAHD)	Suggested rail flood barrier top level mAHD
A	13.0	13.56	13.86
B	12.9	13.78	14.08
C	13.0	13.83	14.13
D	13.1	13.83	14.13
E	13.7	13.83	14.13

Figure 12 Proposed mitigation measures

The proposed rail flood barrier along the eastern boundary can take the form of a low blockwork wall and/or an earthen bund where space permits. This barrier can be combined with the future acoustic fence along the eastern boundary of the site e.g. the bottom of the acoustic fence takes the form of a blockwork wall with the acoustic fence installed above.

The extent and minimum flood levels for the flood barrier are provided Figure 12. This provides a 300mm freeboard to the expected 100 year developed flood levels. It should be noted that the flood barrier extends to the 1200mm dia culvert at the southern end and not to Cabbage Tree Creek to avoid constraining Cabbage Tree Creek flood flows and causing flood impacts downstream. The existing overland flow path at the north eastern end of the site is retained i.e. the rail flood barrier does not extend all to way to Beams Road.

5.3 RESULTS

Table 8 summarises peak flows immediately upstream of the Railway Bridge at Cabbage Tree Creek (reporting point 10), whilst Table 9 summarises peak water levels for pre and post conditions at various reporting location both within and external to the site. Figure 13 provides locations of reporting points.

Appendix A provides flood depth and impact maps for model runs. These include:

- Figure A1: Base case 39%AEP (Q2) flood depth
- Figure A2: Base case 5% AEP (Q20) flood depth
- Figure A3: Base case 1% (Q100) flood depth
- Figure A4: Developed case 39% AEP (Q2) flood depth
- Figure A5: Developed case 5% AEP (Q20) flood depth
- Figure A6: Developed case 1% AEP (Q100) flood depth
- Figure A7: Flood impact map 39% AEP (Q2)
- Figure A8: Flood impact map 20%AEP (Q5)
- Figure A9: Flood impact map 10% AEP (Q10)
- Figure A10: Flood impact map 5% AEP (Q20)
- Figure A11: Flood impact map 2% AEP (Q50)
- Figure A12: Flood impact map 1% AEP (Q100)
- Figure A13: Regional flood impact map 39% AEP (Q2)
- Figure A14: Regional flood impact map 1% AEP (Q100)

Table 8 Peak flows – Cabbage Tree Creek - Railway Bridge (Point 10)

AEP	Peak flow (m^3/s)			Difference
	Pre	Post	Difference	%
39% (Q2)	74.80	74.66	-0.14	-0.2%
20% (Q5)	103.39	103.54	0.15	0.1%
10% (Q10)	122.74	122.59	-0.15	-0.1%
5% (Q20)	146.77	147.19	0.42	0.3%
2% (Q50)	176.57	176.68	0.11	0.1%
1% (Q100)	202.1	202.8	0.70	0.3%

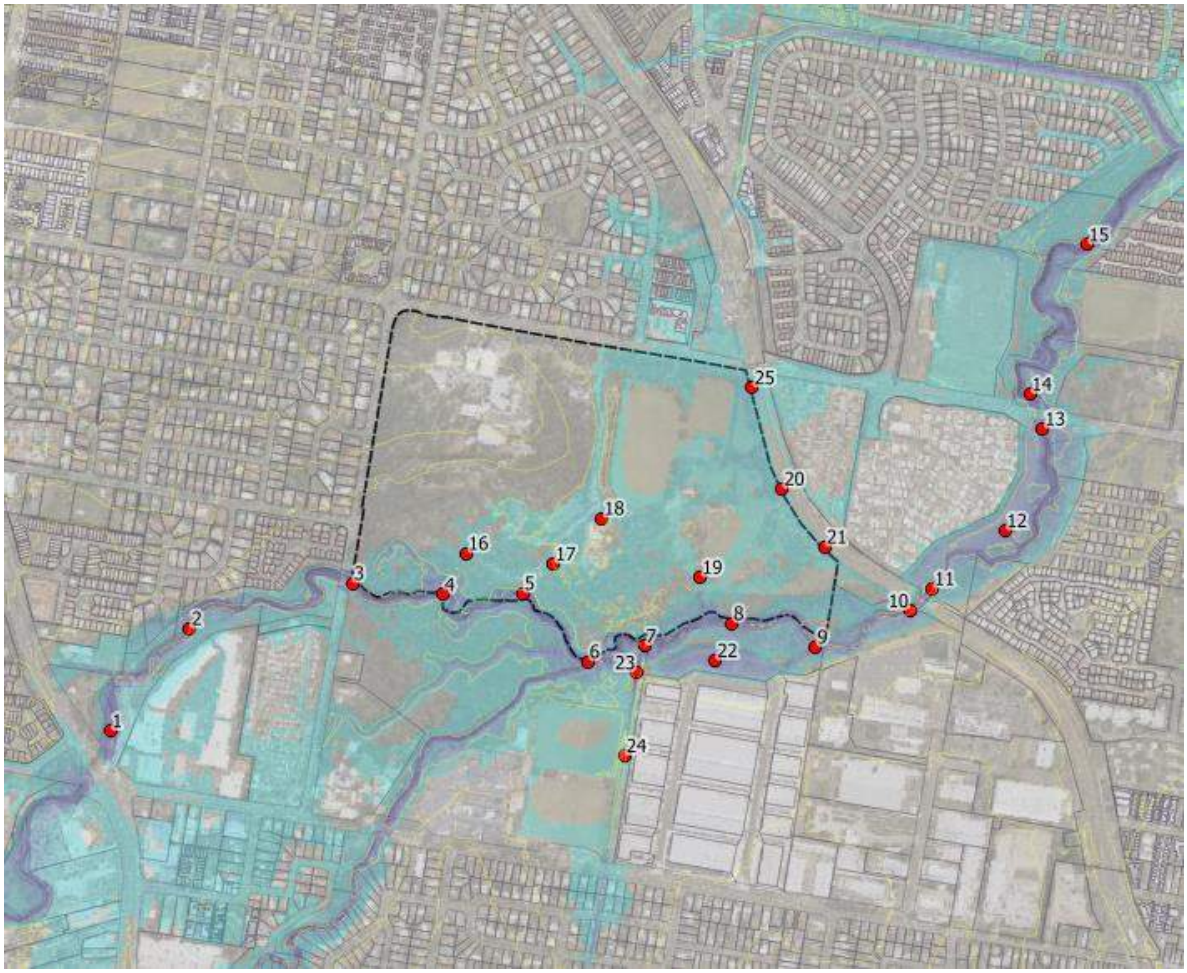


Figure 13 Reporting locations

Table 9 Peak water levels

ID	Water levels (mAHD)																	
	39%AEP			20%AEP			10%AEP			5%AEP			2%AEP			1%AEP		
	pre	post	difference	pre	post	difference	pre	post	difference	pre	post	difference	pre	post	difference	pre	post	difference
1	17.791	17.791	0.000	18.270	18.270	0.000	18.53221	18.5323	0.000	18.804	18.804	0.000	18.999	18.999	0.000	19.077	19.077	0.000
2	16.866	16.866	0.000	17.364	17.364	0.000	17.638	17.639	0.000	17.941	17.942	0.000	18.169	18.169	0.000	18.262	18.262	0.000
3	15.475	15.476	0.001	16.008	16.010	0.002	16.272	16.274	0.001	16.542	16.543	0.001	16.717	16.717	0.000	16.779	16.779	0.000
4	15.165	15.167	0.002	15.693	15.696	0.003	15.953	15.955	0.002	16.217	16.218	0.001	16.372	16.373	0.001	16.428	16.428	0.000
5	14.553	14.557	0.004	15.083	15.090	0.006	15.318	15.322	0.004	15.543	15.545	0.002	15.703	15.705	0.002	15.796	15.797	0.001
6	13.739	13.742	0.003	14.217	14.222	0.006	14.462	14.467	0.005	14.734	14.739	0.005	15.044	15.048	0.004	15.267	15.270	0.003
7	13.387	13.388	0.001	13.831	13.835	0.004	14.064	14.067	0.004	14.331	14.337	0.006	14.635	14.638	0.003	14.875	14.879	0.004
8	12.934	12.932	-0.002	13.306	13.306	-0.001	13.499	13.498	-0.001	13.715	13.718	0.004	13.961	13.964	0.003	14.191	14.197	0.007
9	12.299	12.301	0.002	12.664	12.663	-0.002	12.867	12.859	-0.008	13.126	13.122	-0.004	13.443	13.437	-0.006	13.739	13.740	0.001
10	11.684	11.683	-0.002	12.084	12.086	0.002	12.338	12.335	-0.002	12.692	12.695	0.003	13.098	13.101	0.003	13.462	13.470	0.009
11	11.405	11.402	-0.002	11.799	11.800	0.001	12.039	12.037	-0.002	12.309	12.311	0.002	12.565	12.567	0.002	12.755	12.759	0.004
12	11.134	11.131	-0.003	11.573	11.575	0.001	11.835	11.834	-0.002	12.120	12.122	0.002	12.376	12.378	0.002	12.561	12.565	0.004
13	11.029	11.027	-0.002	11.484	11.485	0.001	11.750	11.748	-0.002	12.035	12.038	0.002	12.286	12.288	0.002	12.464	12.468	0.004
14	10.955	10.953	-0.002	11.395	11.396	0.001	11.643	11.642	-0.002	11.901	11.903	0.002	12.118	12.119	0.002	12.272	12.275	0.003
15	9.854	9.851	-0.003	10.346	10.346	0.001	10.596	10.594	-0.001	10.846	10.848	0.002	11.067	11.071	0.005	11.244	11.245	0.001
16	dry	dry	NA	dry	dry	NA	dry	dry	NA	16.109	16.109	0.000	16.240	16.240	0.001	16.282	16.282	0.000
17	dry	dry	NA	dry	dry	NA	dry	dry	NA	15.037	15.039	0.001	15.148	15.148	0.001	15.206	15.207	0.001
18	dry	dry	NA	dry	dry	NA	dry	dry	NA	dry	dry	NA	14.824	14.753	-0.071	14.919	14.849	-0.070
19	dry	dry	NA	dry	dry	NA	dry	dry	NA	dry	dry	NA	dry	dry	NA	14.252	14.307	0.055
20	12.810	dry	NA	12.911	dry	NA	13.037	dry	NA	13.213	12.865	-0.347	13.426	13.175	-0.251	13.529	13.481	-0.048
21	12.401	dry	NA	12.618	12.041	-0.577	12.791	12.310	-0.482	13.095	12.690	-0.406	13.383	13.122	-0.261	13.520	13.457	-0.063
22	11.961	11.964	0.003	12.720	12.717	-0.003	12.942	12.934	-0.008	13.254	13.254	-0.001	13.692	13.692	0.001	14.024	14.030	0.007
23	13.402	13.403	0.001	13.855	13.861	0.005	14.103	14.107	0.005	14.385	14.390	0.005	14.715	14.718	0.003	14.979	14.984	0.005
24	14.969	14.969	0.000	15.222	15.228	0.006	15.275	15.285	0.010	15.318	15.313	-0.005	15.357	15.358	0.000	15.403	15.403	0.000
25	12.860	dry	NA	13.061	dry	NA	13.118	12.992	-0.126	13.247	13.234	-0.013	13.442	13.401	-0.040	13.518	13.467	-0.051

5.3.1 Peak flows

Peak flows upstream at the Railway Bridge over the range of storm events up to the 1% AEP (100yr ARI) are effectively retained at predeveloped levels (+0.3% to -0.2%). For the 1% AEP a minor increase is observed and represents a 0.3% increase. No adverse impacts downstream of the Bridge are observed in all events tested.

5.3.2 Flood inundation – existing case

Existing case flood inundation maps indicate flooding of low-lying areas at the north eastern corner of the site occurs on a frequent basis. Existing drainage within the site directs this more frequent drainage to the existing drainage outfalls to Cabbage Tree Creek. No flooding of Beams Rd is expected for the more frequent flood events. Figure 14 shows inundation mapping for the minor 39% AEP (2 yr) event.

At the 5% AEP (20 yr ARI event - see Figure 15) breakout from Cabbage Tree Creek occurs along the northern bank at the western end of the site. These breakout flows are then predicted to flow generally in a north-east direction at shallow depths through the site. Inundation in the north-east of the site is constrained west of the rail corridor. Shallow flooding of Beams Road is expected in this case and is anticipated to extend north of Beams Road.

In the 1% AEP event (refer to Figure 16) there is a significant increase in the inundation area of breakout flows through the site. While there is a large increase in the inundation extent, the actual flood depths predicted over most of this area remain typically less than 250mm. Inundation is also predicted to occur across the rail corridor at the north eastern boundary of the site and extends along Beams Road and adjacent existing developed areas to the north and east. Flow depths are noted to be mostly less than 250mm in this case, except for low lying areas adjacent to the rail corridor.

Flooding across the site resulting from Cabbage Tree Creek breakout flows is characterised by shallow (typically less than 250mm), conveyance dominated flows. Consequently, flood storage influences are expected to be minor. For this reason, it would be expected that a loss of floodplain storage in these areas would be unlikely to cause significant adverse flood impacts. This is discussed in the following sections.

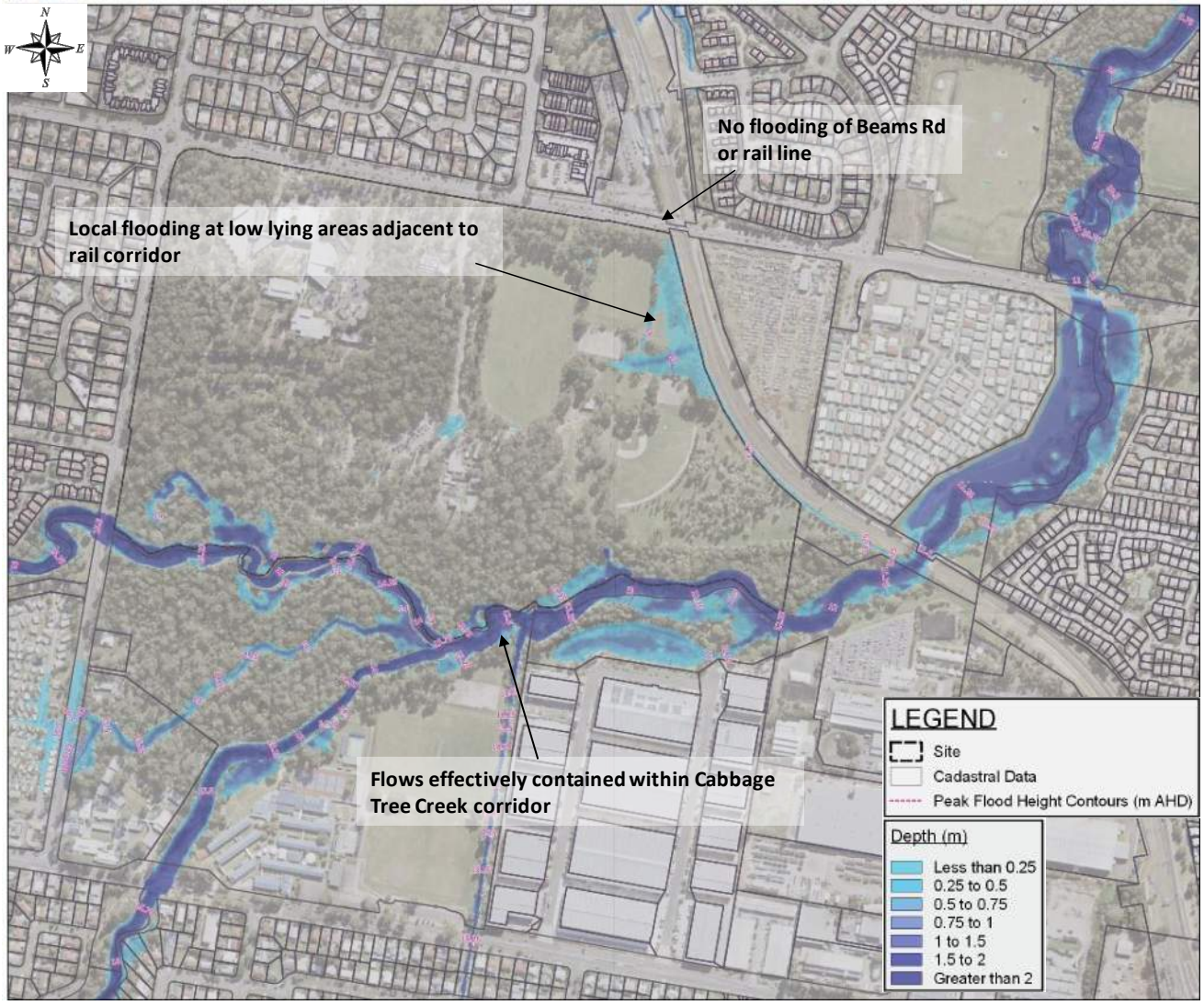


Figure 14 39% AEP flood inundation - existing conditions

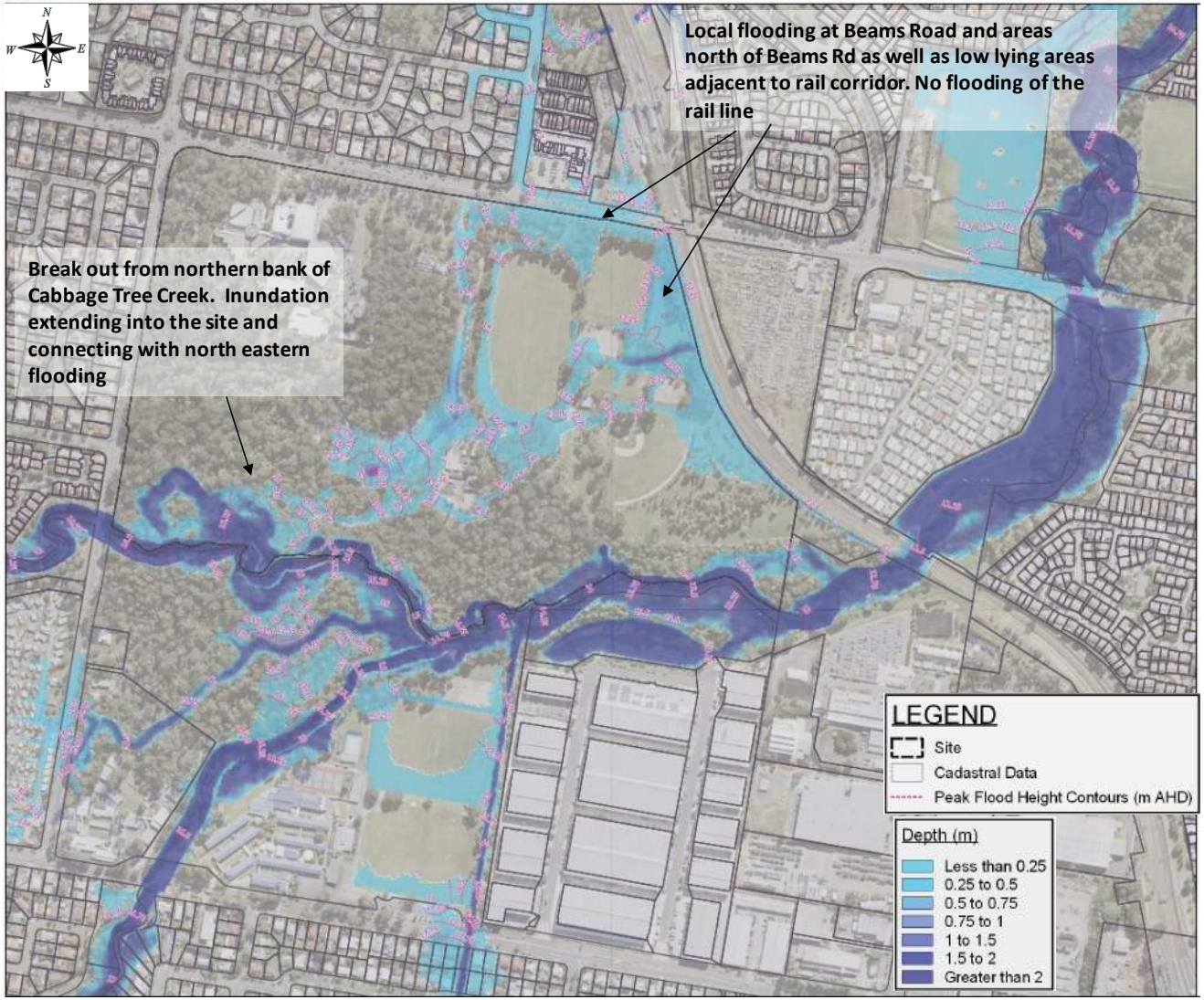


Figure 15 5% AEP flood inundation - existing conditions

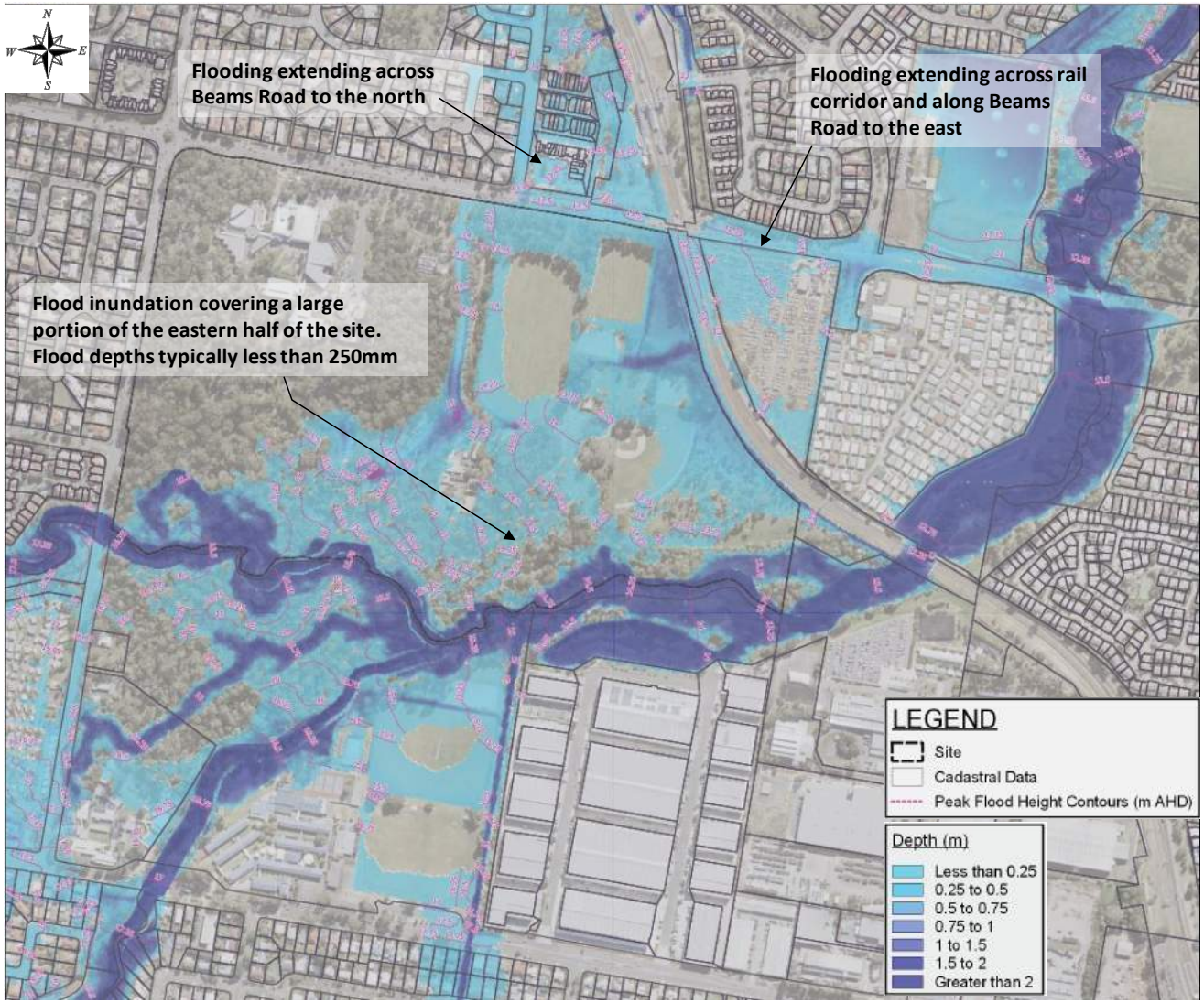


Figure 16 1% AEP flood inundation - existing conditions

5.3.3 Flood impacts

Table 9 previously summarises peak water levels for pre and post conditions at various reporting locations for the 39% AEP to 1% AEP model runs. Flood impacts maps for the 39% AEP to 1% AEP are included in Appendix A.

Flood impact maps demonstrate no significant adverse impacts occurring external to the site as a result of the development, with the proposed mitigation measures included.

Improved flood conditions are observed at Beams Road and the rail line at the north-east corner of the site. This is because much of the site drainage is directed to Cabbage Tree Creek as part of the development. Furthermore, during larger magnitude events, the proposed development filling restricts Cabbage Tree Creek breakout flow from entering this area.

Impacts noted on the afflux maps are typically contained within the site boundary and are associated with flooding of the sports fields (above 5% AEP event) and the operation of the development drainage swales. This is expected. Other low-lying riparian bushland areas already subject to flooding within the site also experience localised increases in flooding south west of the sports fields, however this does not impact on any existing facilities or infrastructure. Increases in flooding within the site as described above help offset loss of flood storage. Commercial and residential lots are protected from flooding during the 1% AEP (100 year ARI) event.

Minor impacts (typically up to 50mm) external to the site at the south eastern boundary are noted, however these occur in a low-lying bushland area currently subject to flooding from Cabbage Tree Creek and is not considered an actionable nuisance.

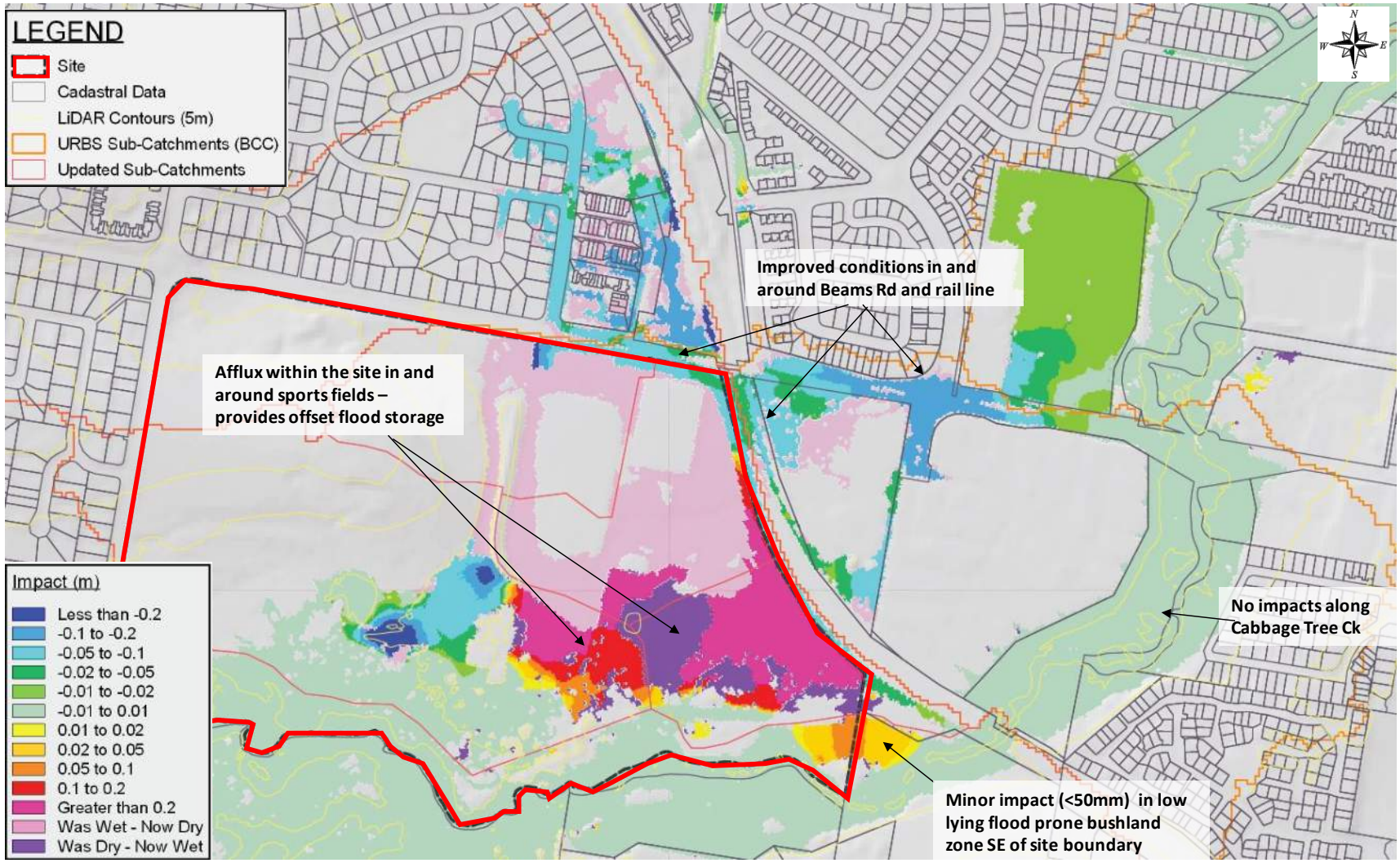


Figure 17 1% AEP flood impacts

5.3.4 Flood storage

An assessment of the impacts of development on flood storage has been completed for the 1% AEP event. This is to review compensatory earthworks, in line with BCC compensatory earthworks planning scheme policy for developments within mapped creek corridors.

Flood storage volumes within the site boundary have been calculated for the existing case and developed case scenarios. Table 10 summarises the estimated flood storage volumes, based on the current model assumptions.

Table 10 Flood storage volumes – 1% AEP

Scenario	Flood storage (m^3)
Existing conditions	44,929
Developed case	38,208
Loss in storage	6,721

Overall, the flood modelling predicts that a loss of flood storage will occur (~15%). Despite this, the modelling also demonstrates that no significant adverse offsite flood impacts are expected to occur along Cabbage Tree Creek and improved flood conditions can be expected at both Beams Road and the rail line at the north east of the site. This is because the storage loss is relatively minor in the context of the regional floodplain and the site largely serves a flood conveyance (or overland flow) function as opposed to a flood storage function for Cabbage Tree Creek floodwaters.

6 MAINTENANCE

WSUD infrastructure such as bioretention basins require ongoing inspection and maintenance to ensure they establish and operate in accordance with the design intent. Potential problems associated with WSUD as a result of poor maintenance include:

- Decreased aesthetic amenity;
- Reduced functional performance;
- Public health and safety risks; and
- Decreased habitat diversity (dominance of exotic weeds).

6.1 MAINTENANCE PLAN

A Maintenance Plan will be required prior to handover of WSUD assets. The plan will provide detailed guidance around maintenance of WSUD assets, as well as frequency of maintenance activities. The manual will include performance inspection checklists. The document will be consistent with the methodologies and principles detailed in Maintaining WSUD Assets (Water by Design, 2012).

The maintenance plan and checklists will be a living document and can be refined where required in collaboration with Council assets and maintenance departments to ensure the structure and frequency of maintenance is consistent with current Council procedures. This will also provide an opportunity for transfer of knowledge in this regard to allow Council to effectively operate the sediment ponds and bioretention basin.

6.1.1 Bioretention basins

Typical maintenance of bioretention systems during operation will involve:

- Routine inspection of the bio-retention system profile to identify any areas of obvious increased sediment deposition, scouring from storm flows, rill erosion of the batters from lateral inflows, damage to the profile from vehicles and clogging of the bio-retention system (evident by a 'boggy' filter media surface).
- Routine inspection of inflows systems, overflow pits and under-drains to identify and clean any areas of scour, litter build up and blockages.
- Removal of sediment where it is smothering the bio-retention system vegetation.
- Repairing any damage to the profile resulting from scour, rill erosion or vehicle damage by replacement of appropriate fill (to match onsite soils) and revegetating.
- Tilling of the bioretention system surface, or removal of the surface layer, if there is evidence of clogging.
- Regular watering/ irrigation of vegetation until plants are established and actively growing.
- Removal and management of invasive weeds (herbicides should not be used).

- Removal of plants that have died and replacement with plants of equivalent size and species as detailed in the plant schedule.
- Pruning to remove dead or diseased vegetation material and to stimulate growth.
- Vegetation pest monitoring and control.

Maintenance should only occur after a reasonably rain free period when the soil in the bioretention system is dry. Inspections are also recommended following large storm events to check for scour and other damage.

7 CONCLUSION

An updated stormwater management strategy has been developed for the Carseldine Urban Village to meet the requirements of the *State Planning Policy* (DLGIP, 2017), QUDM and *Brisbane City Council Planning Scheme*.

STORMWATER TREATMENT

The updated strategy includes two (2) bioretention basins that treat development runoff prior to discharge to Cabbage Tree Creek:

- Bioretention Basin B1 265m² filter area treating Stages 2, 3 (part of) and S
- Bioretention Basin B2 500m² filter area total treating the remainder of the development (Stages 1,3 (part of), 4 and 5)

Drainage swales along the eastern boundary of the site and at the southern boundary of the Stage S sports fields also provide additional treatment.

FLOODING

Flood impact assessment demonstrates no significant impacts occurring external to the site as a result of development. Some afflux (~50mm) is observed immediately south east of the development boundary, however this afflux occurs within a low-lying flood prone bushland area and is not considered an actionable nuisance.

Improved flood conditions are observed at Beams Road and the rail line at the north-east end of the site. This is because much of the site drainage will be directed to Cabbage Tree Creek. Furthermore, during larger magnitude events, the proposed development fill restricts Cabbage Tree Creek breakout flow from entering this area.

Required mitigation measures to manage flood impacts external to the site include:

- Providing flood storage over the sports field zone for events greater than the 5% AEP (20 year ARI)
- incorporation of a 1200mm dia pipe with one-way flap valve along the new drainage swale draining the eastern half of the development – this minimizes the impacts of Cabbage Tree Creek flows into the site via this new connection to Cabbage Tree Creek
- inclusion of a flood barrier along the eastern boundary of the site (~1m high) – this avoids increases in flood levels external to the site adjacent to the rail line

Updated regional modelling and detailed local modelling will occur as part of continuing design development for the site.

8 REFERENCES

Australian Rainfall and Runoff (1987). *A Guide to Flood Estimation*. Engineers Australia

Calibre (2017). *Flood Impact Assessment & Concept Stormwater Management Plan – Carseldine Urban Village (Master Plan).* Prepared for Economic Development Queensland.

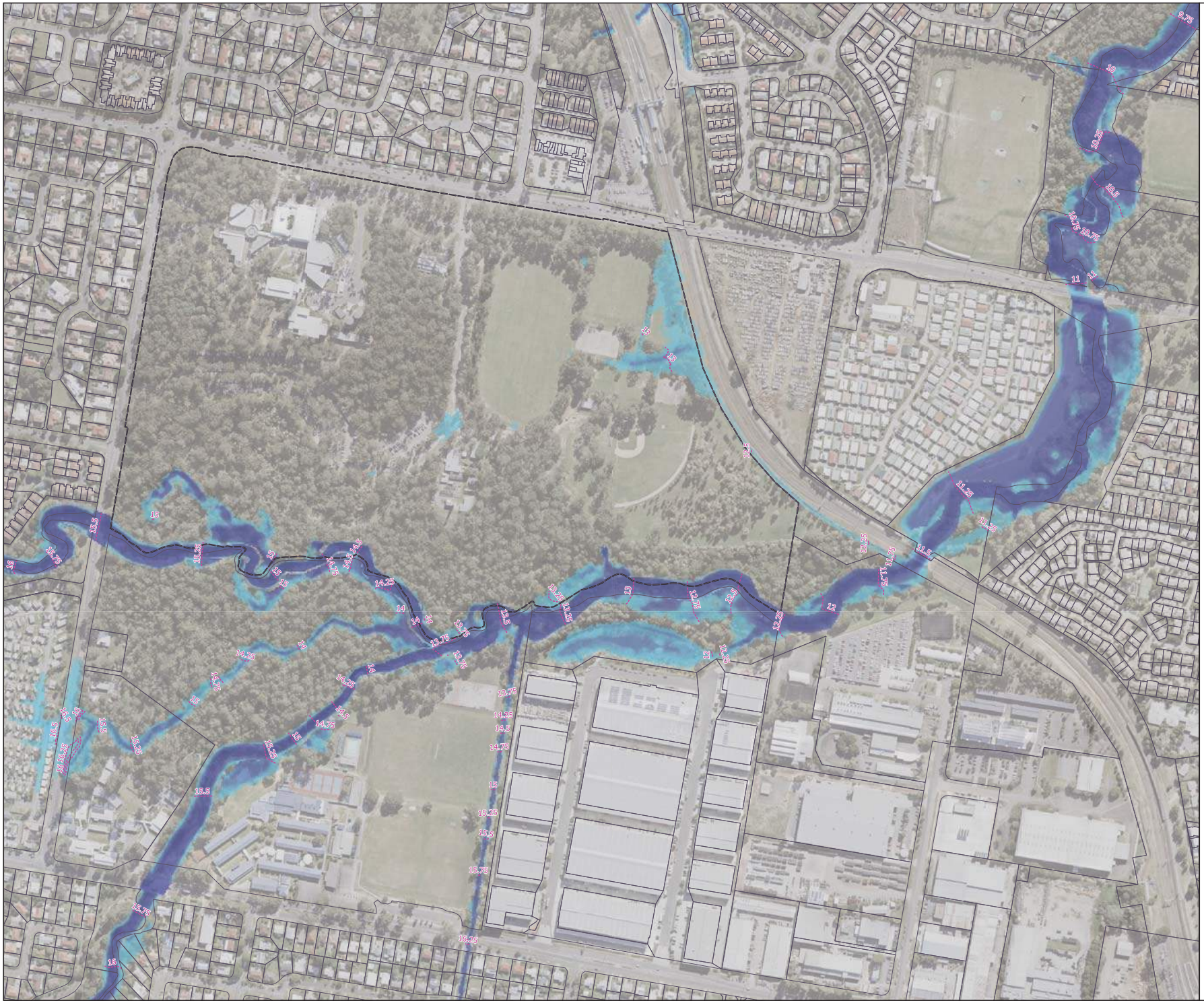
DLGIP (2017). *State Planning Policy*

Healthy Waterways (2010). *MUSIC Modelling Guidelines*

QUDM (2007). *Queensland Urban Drainage Manual*. Second Edition 2007. Department of Natural Resources and Water

SGS (2017). *Geotechnical Investigation Report – Carseldine Urban Village, Beams Road, Carseldine.* Prepared for Economic Development Queensland.

APPENDIX A – TUFLOW MODEL OUTPUTS



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A1

N

50 0 50 100 m

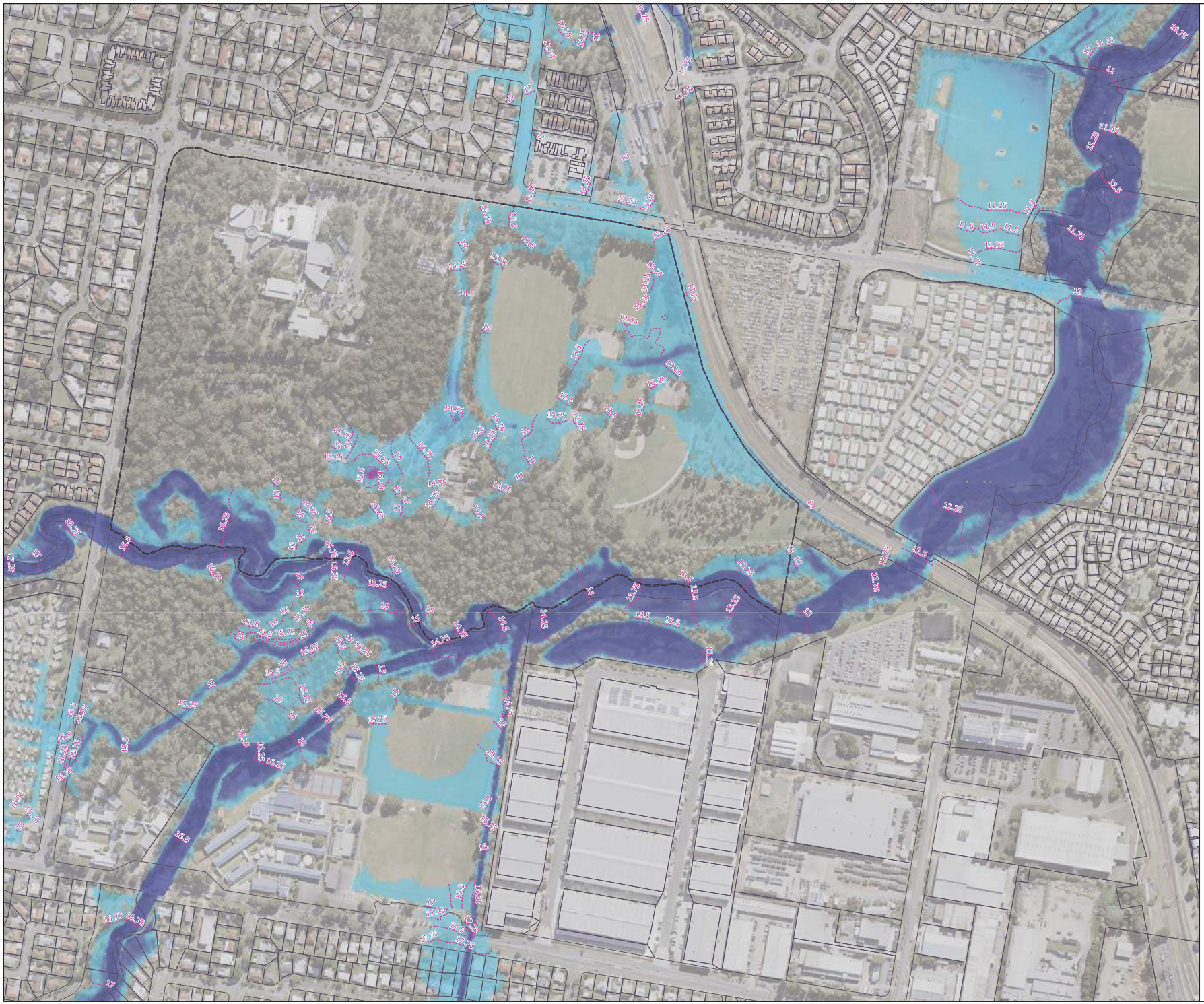
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Existing Case (TUFLOW ID B01d)

39%AEP Event (Q002)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A2

N

50 0 50 100 m

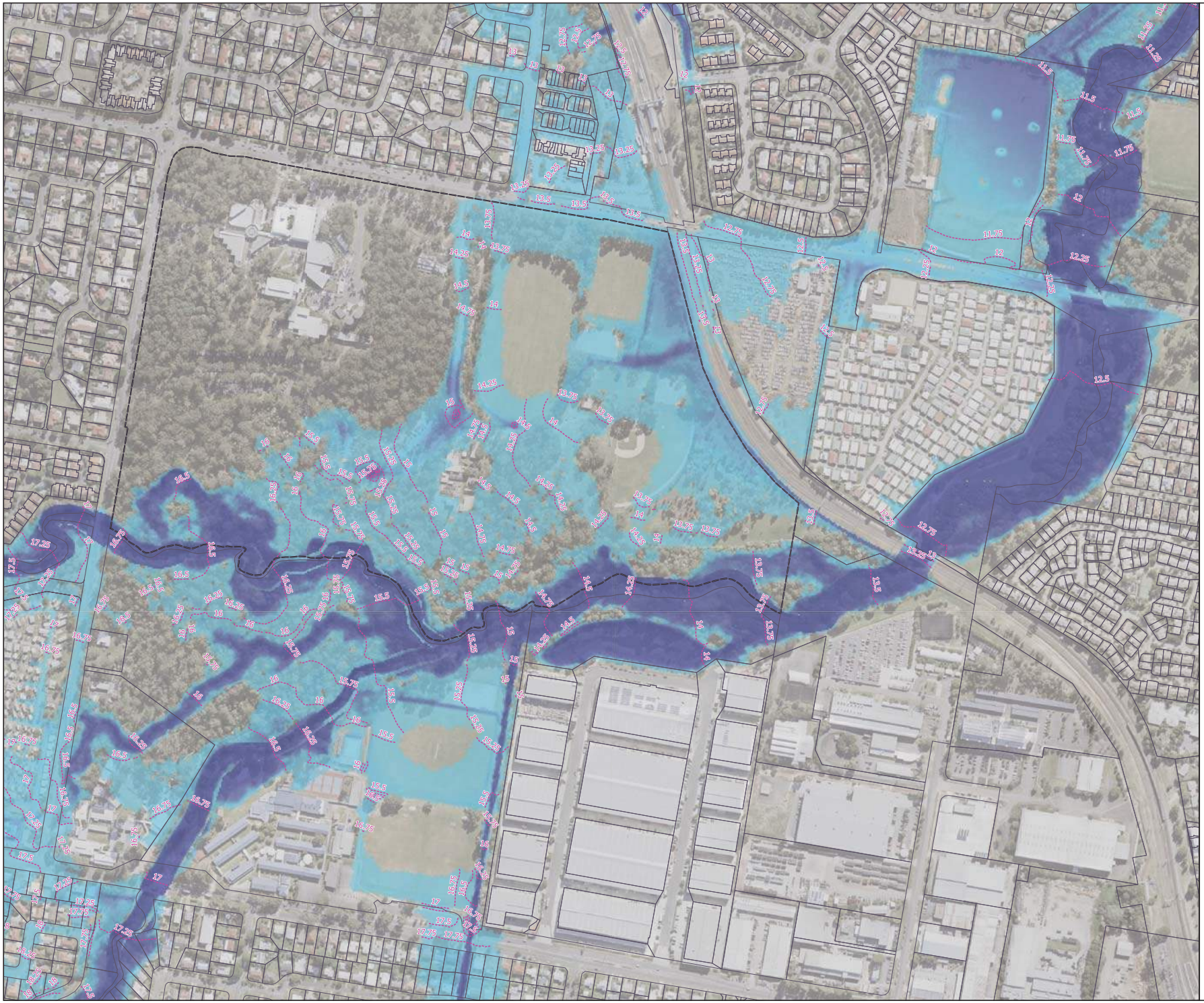
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Existing Case (TUFLOW ID B01d)

5%AEP Event (Q020)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A3

N

50 0 50 100 m

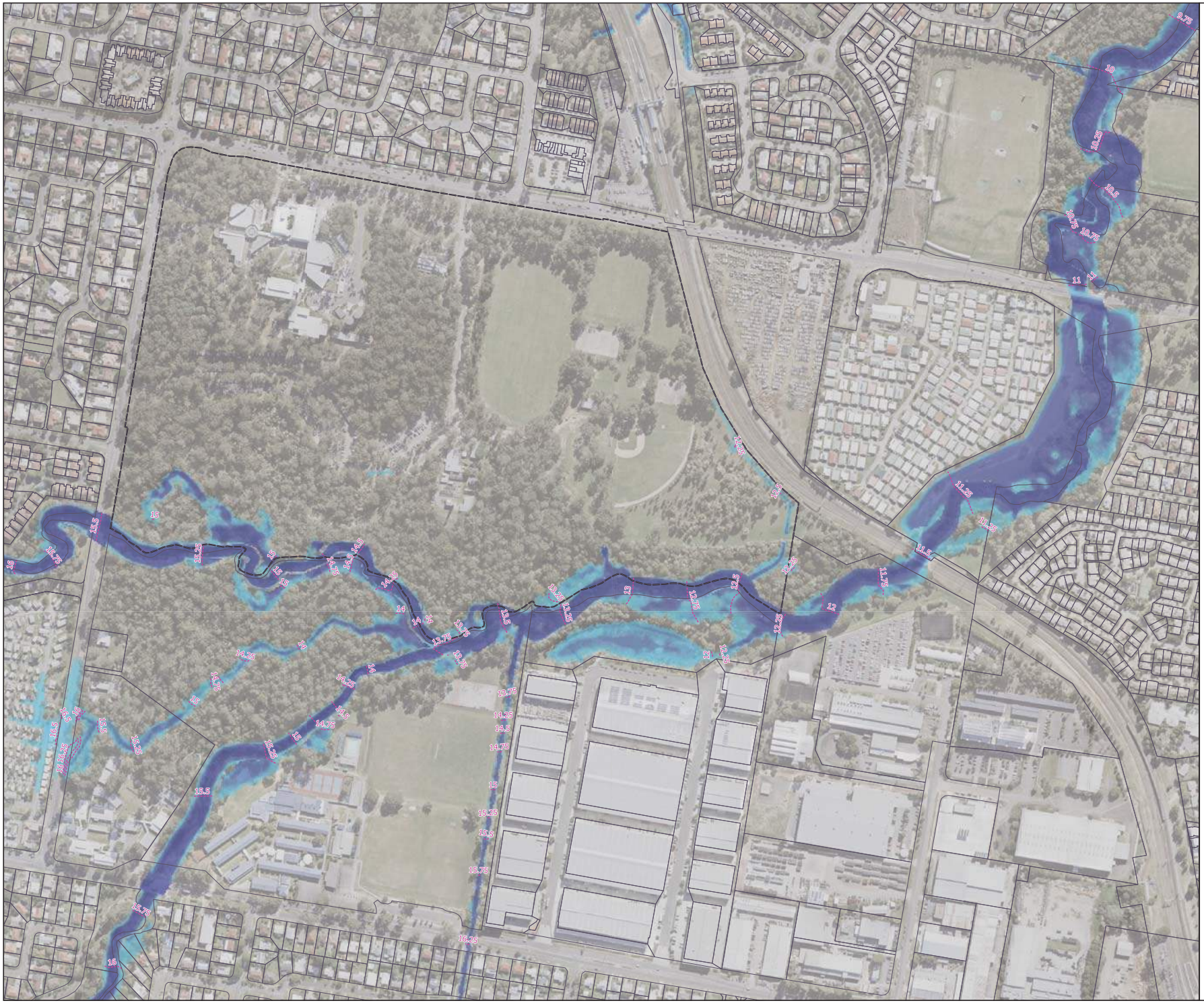
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Existing Case (TUFLOW ID B01d)

1%AEP Event (Q100)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND
- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)
- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A4

N

50 0 50 100 m

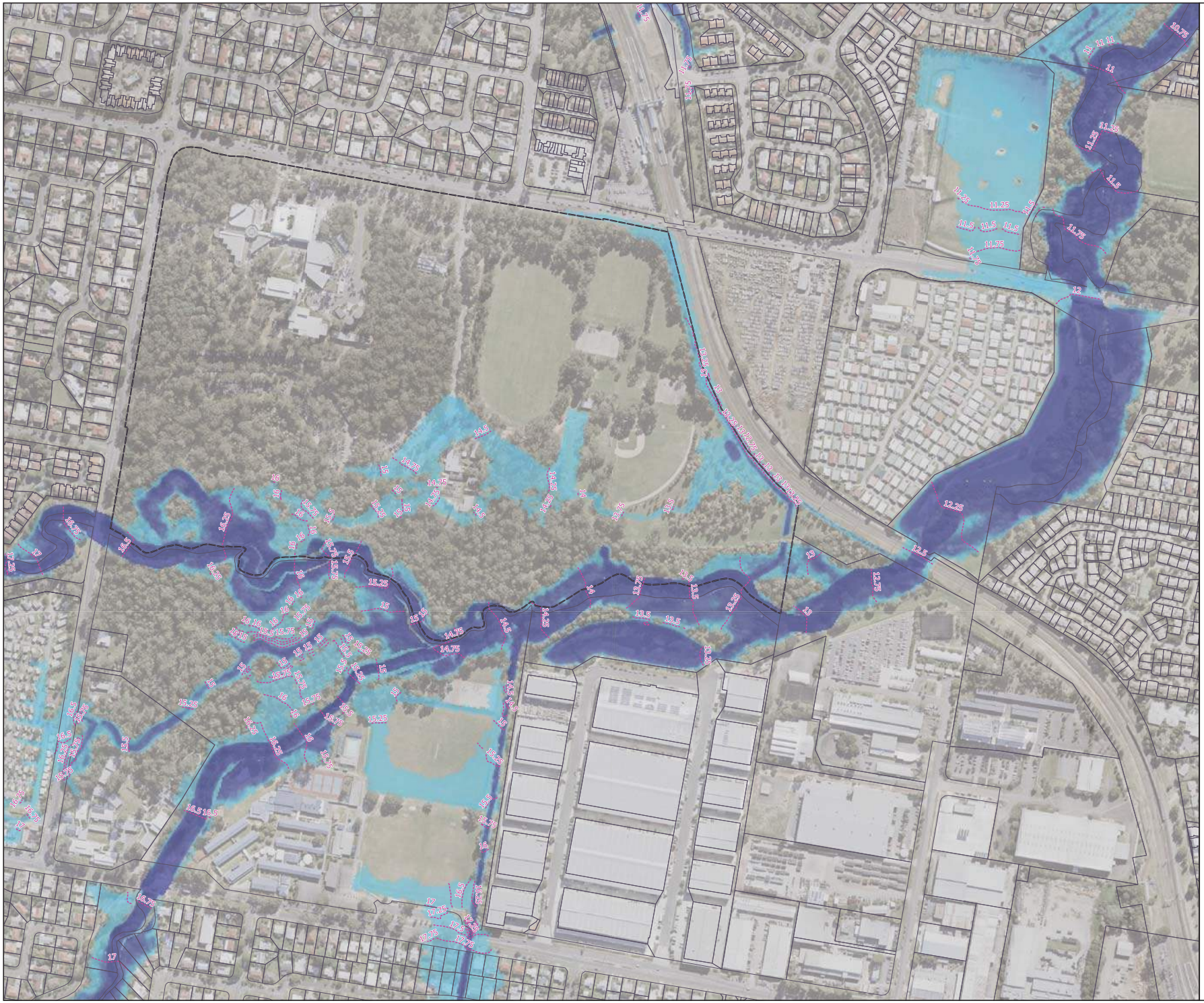
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Proposed Case (TUFLOW ID P02j)

39%AEP Event (Q2)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND
- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)
- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A5

N

50 0 50 100 m

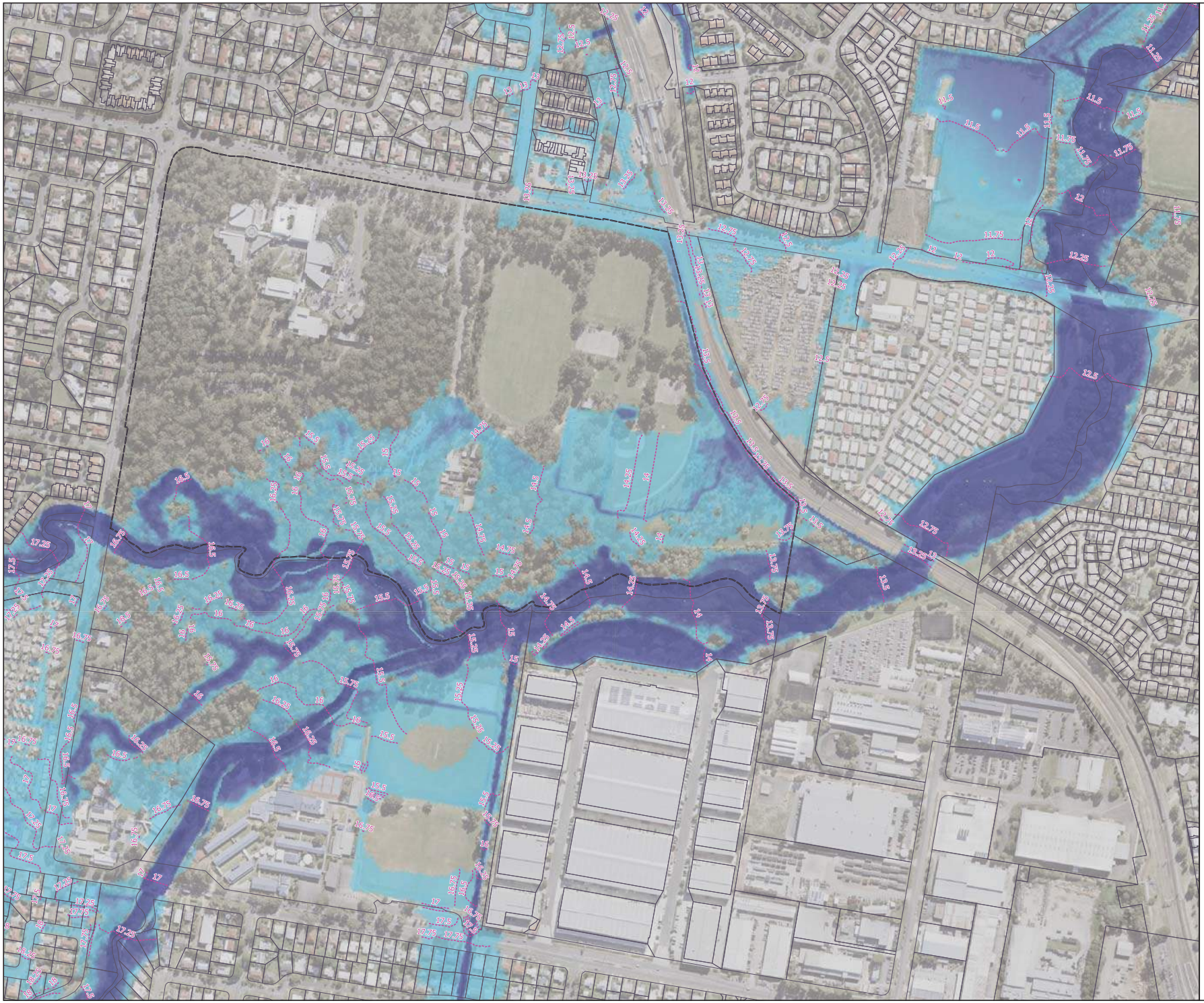
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Proposed Case (TUFLOW ID P02j)

5%AEP Event (Q20)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A6

N

50 0 50 100 m

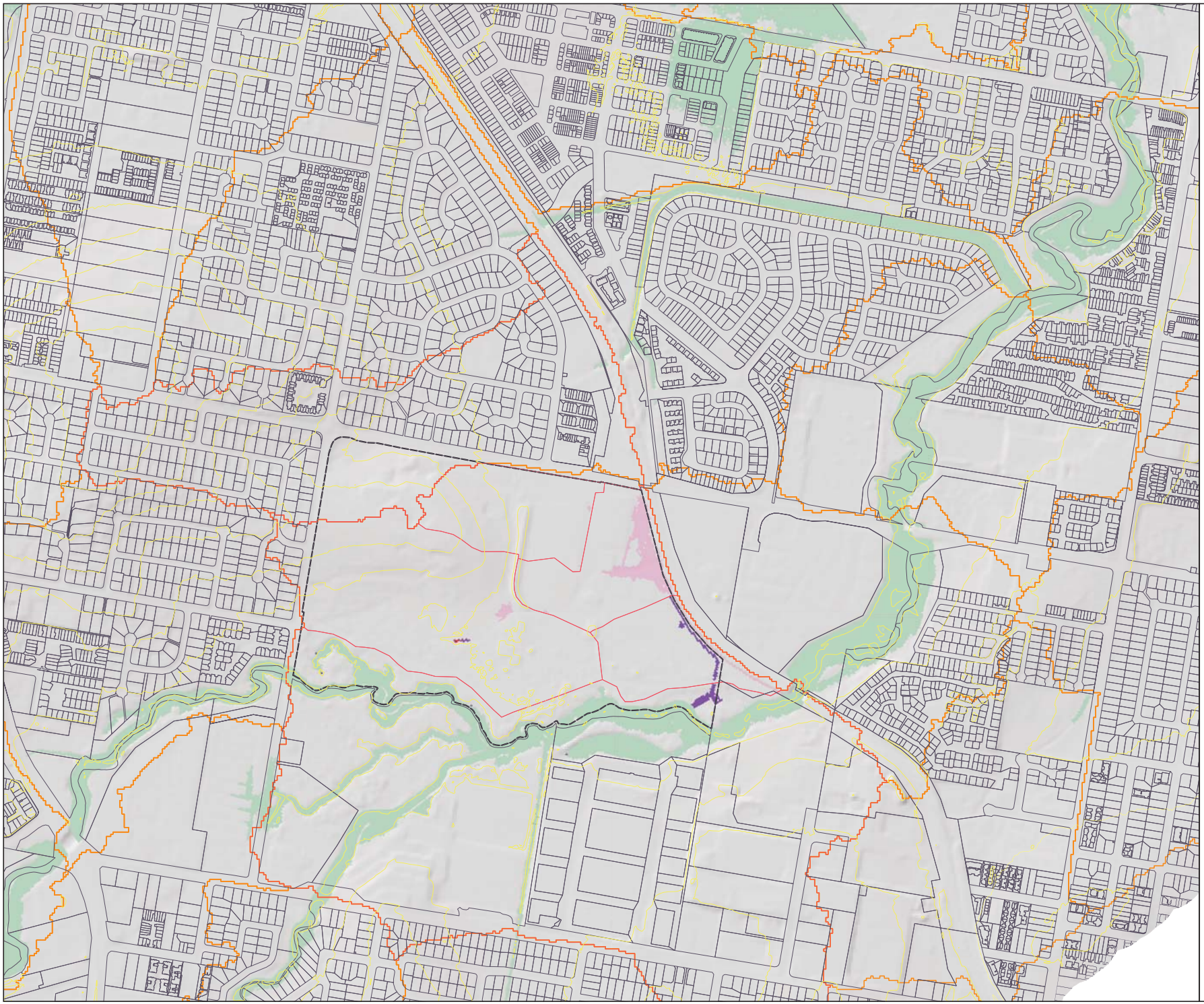
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Proposed Case (TUFLOW ID P02j)

1%AEP Event (Q100)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A7

80 0 80 160 m

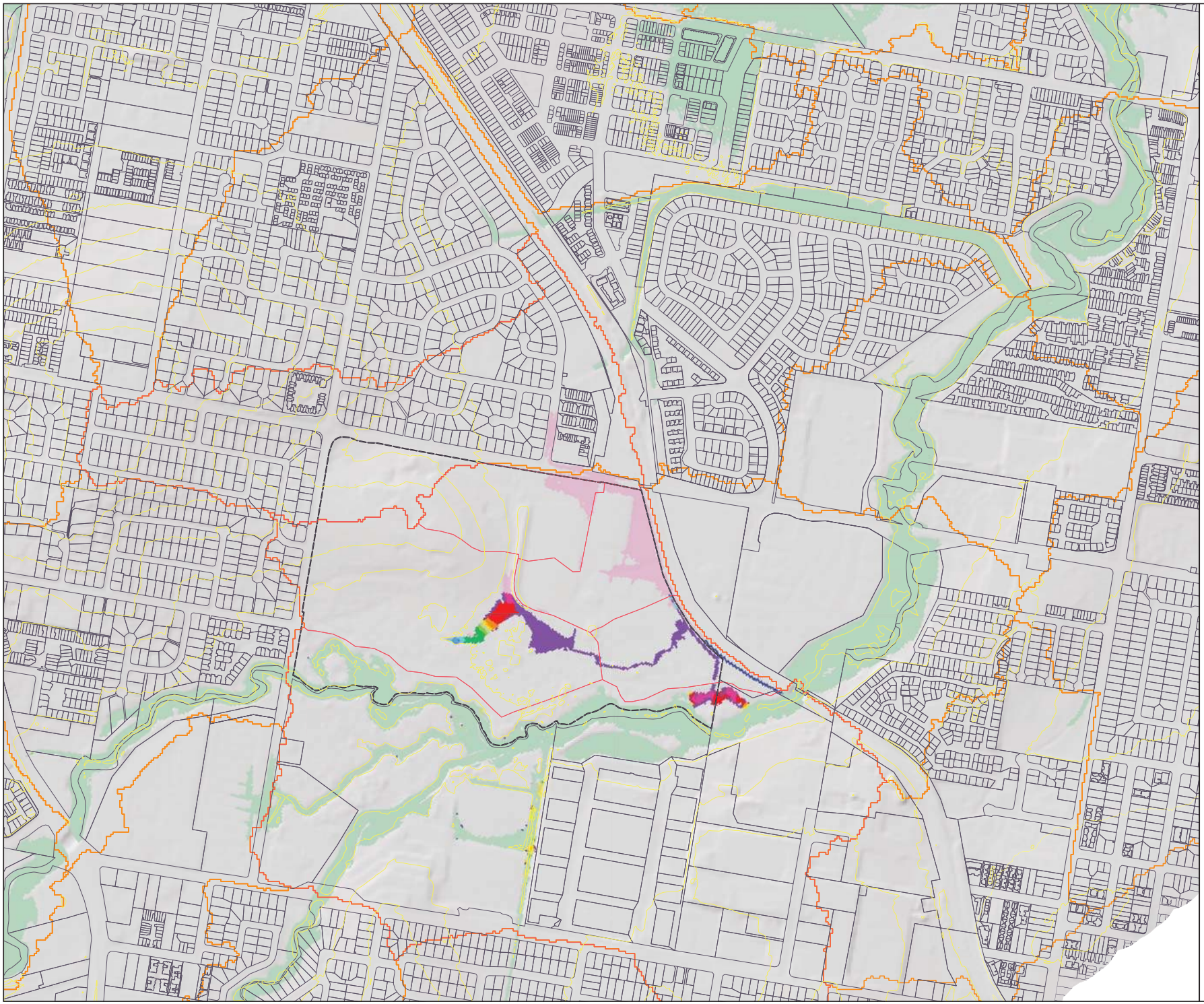
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

39%AEP Event (Q002)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A8

80 0 80 160 m

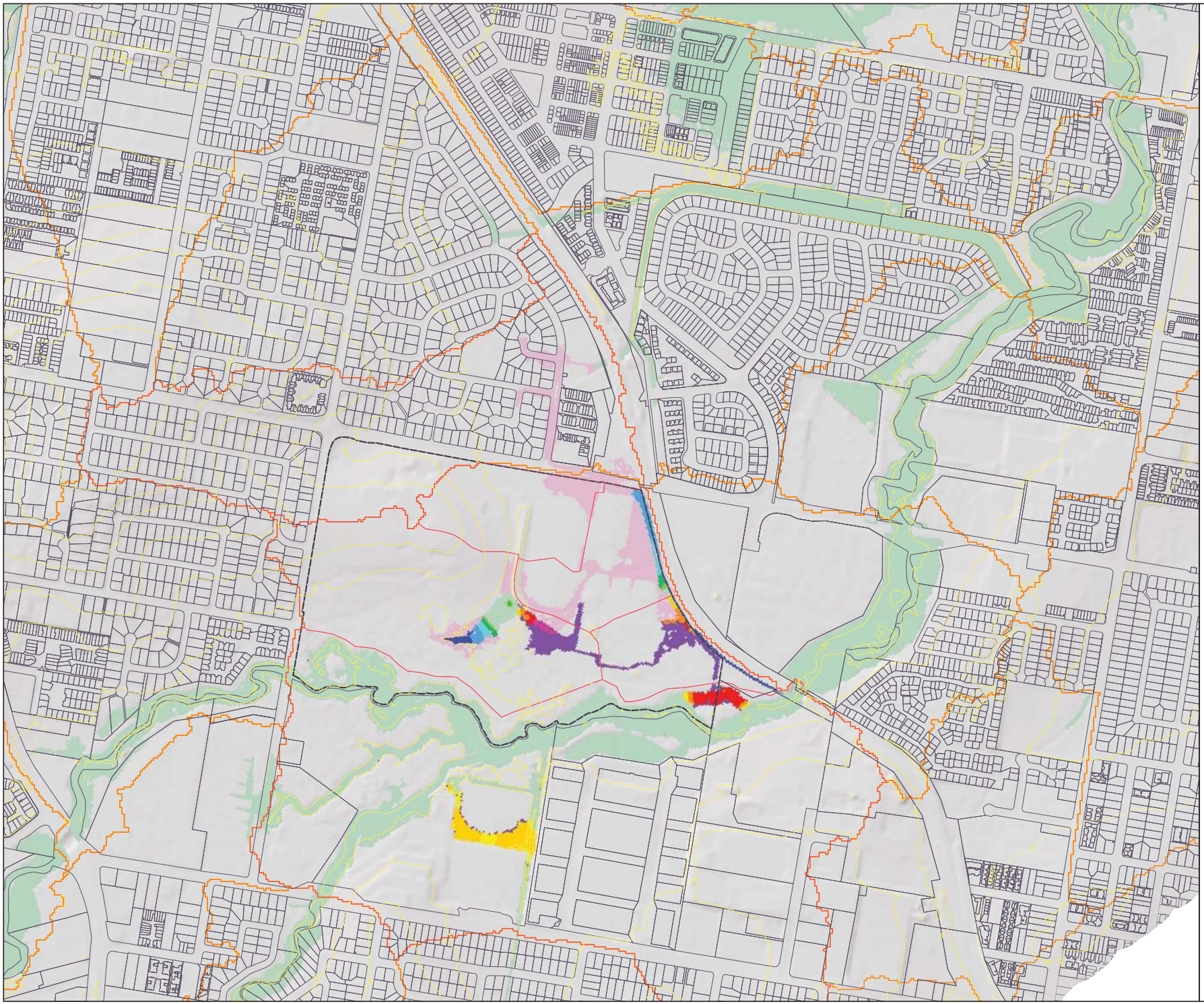
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

20%AEP Event (Q5)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A9

80 0 80 160 m

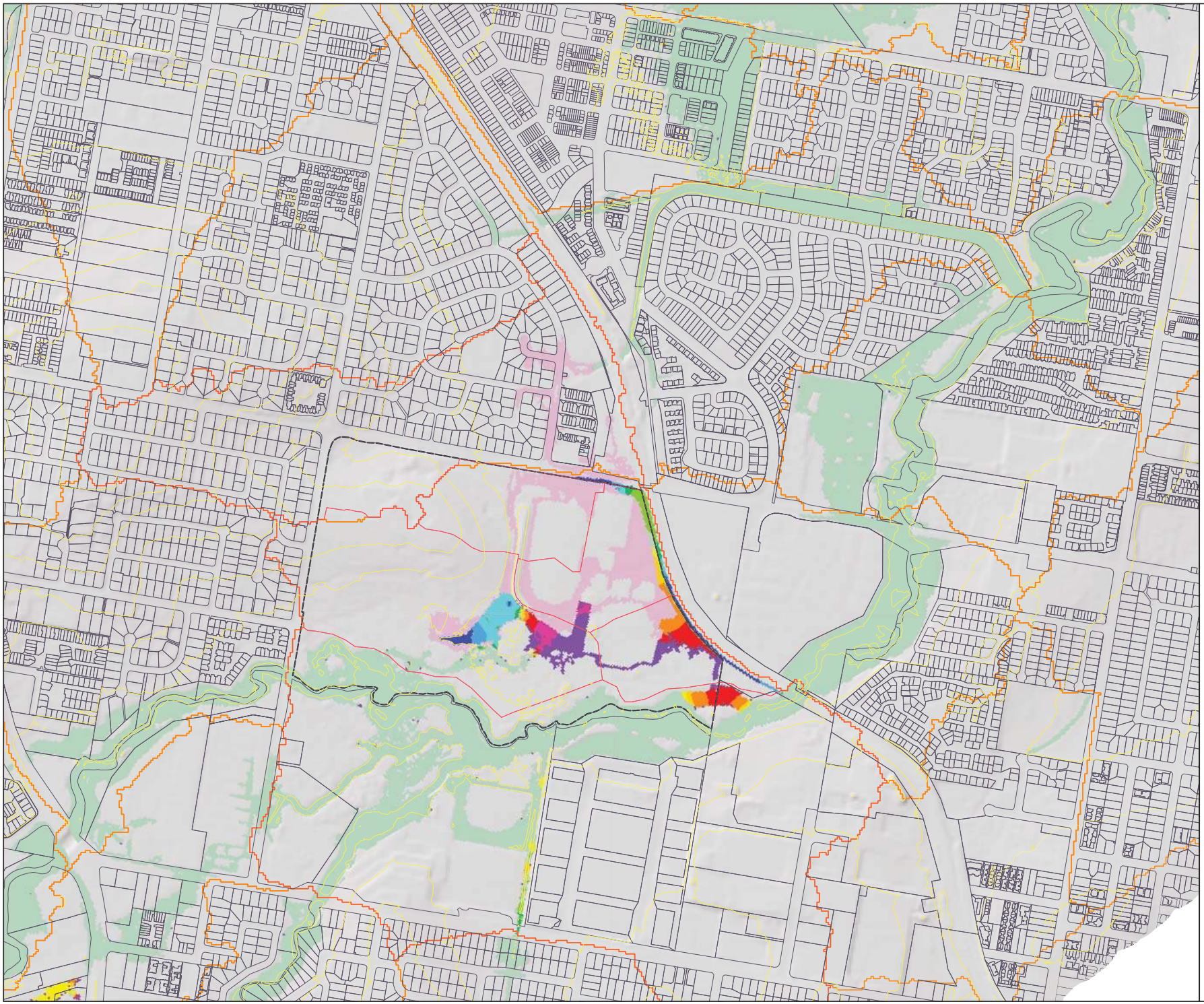
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

10%AEP Event (Q10)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A10

80 0 80 160 m

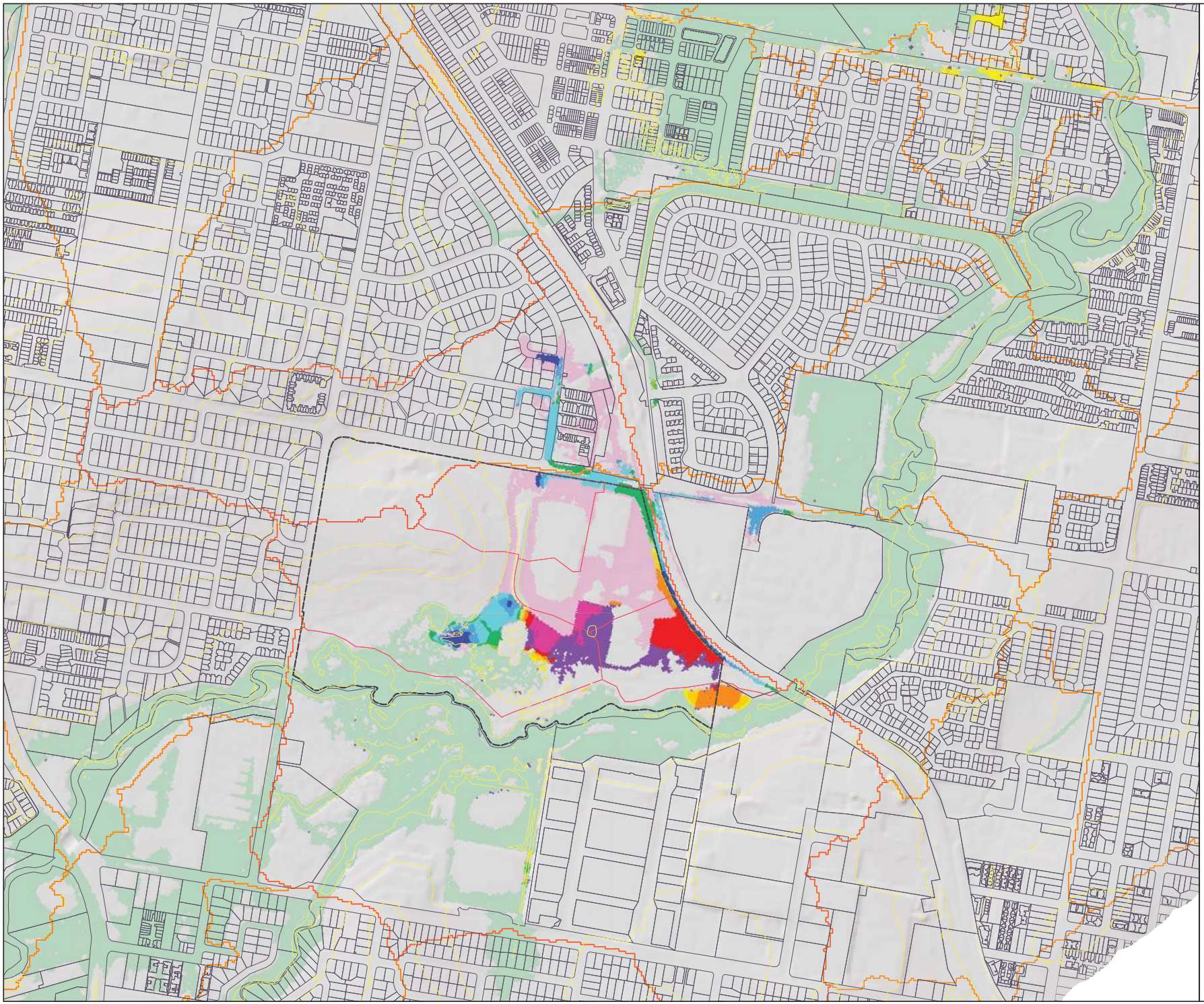
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

%A QEP Event (5 20)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A11

80 0 80 160 m

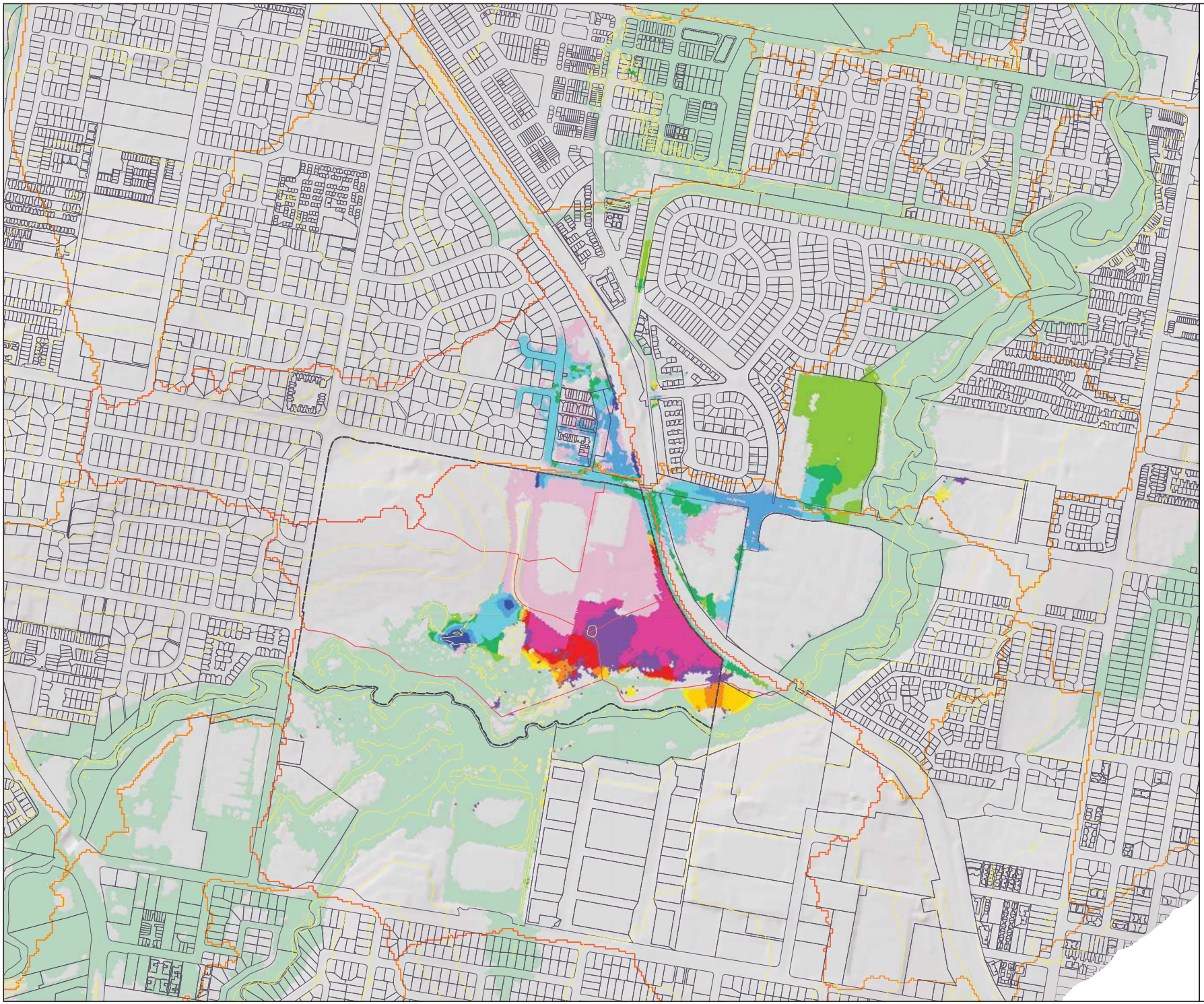
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

2%AEP Event (Q050)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A12

80 0 80 160 m

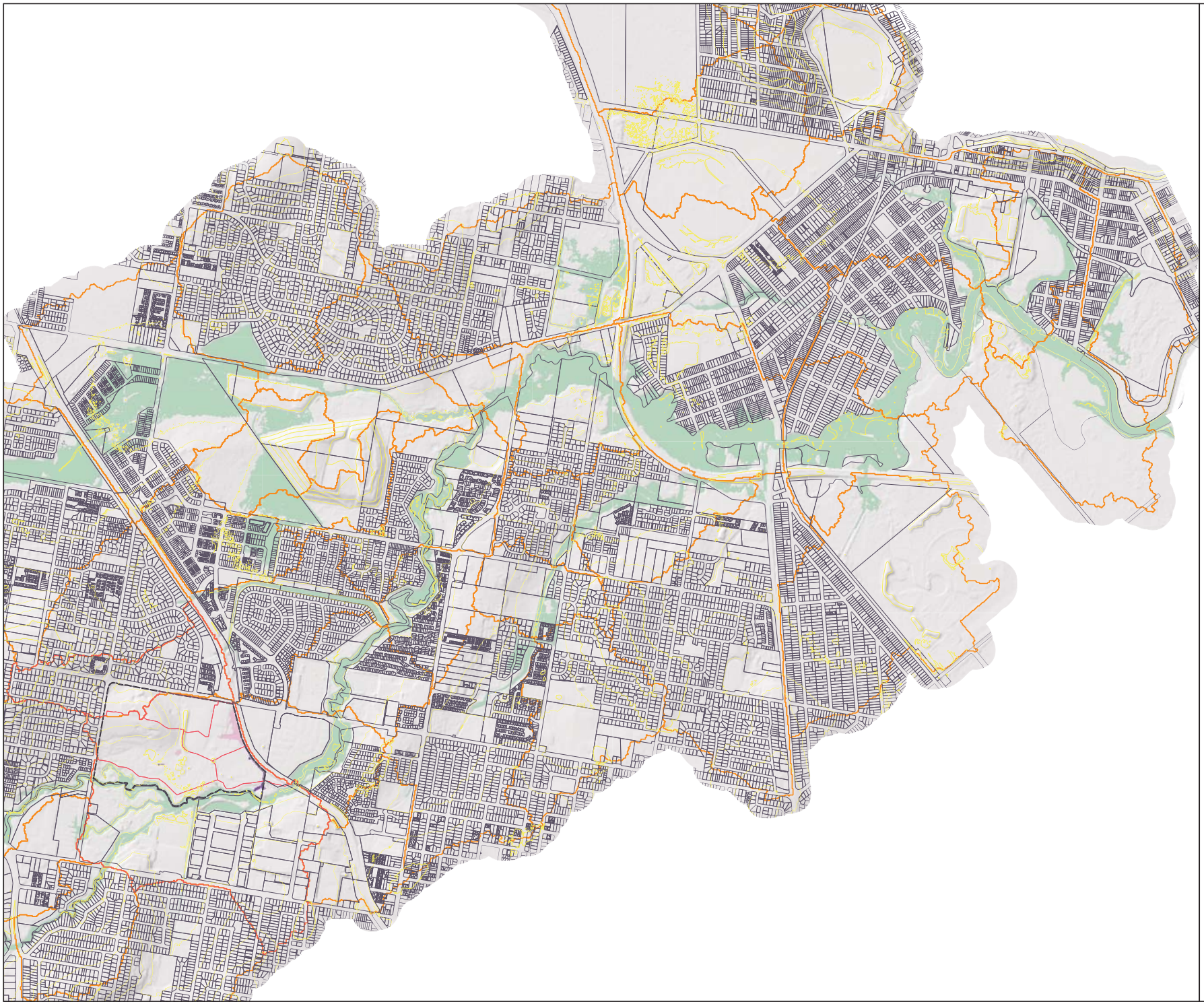
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

1%AEP Event (Q100)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A13

200 0 200 400 m

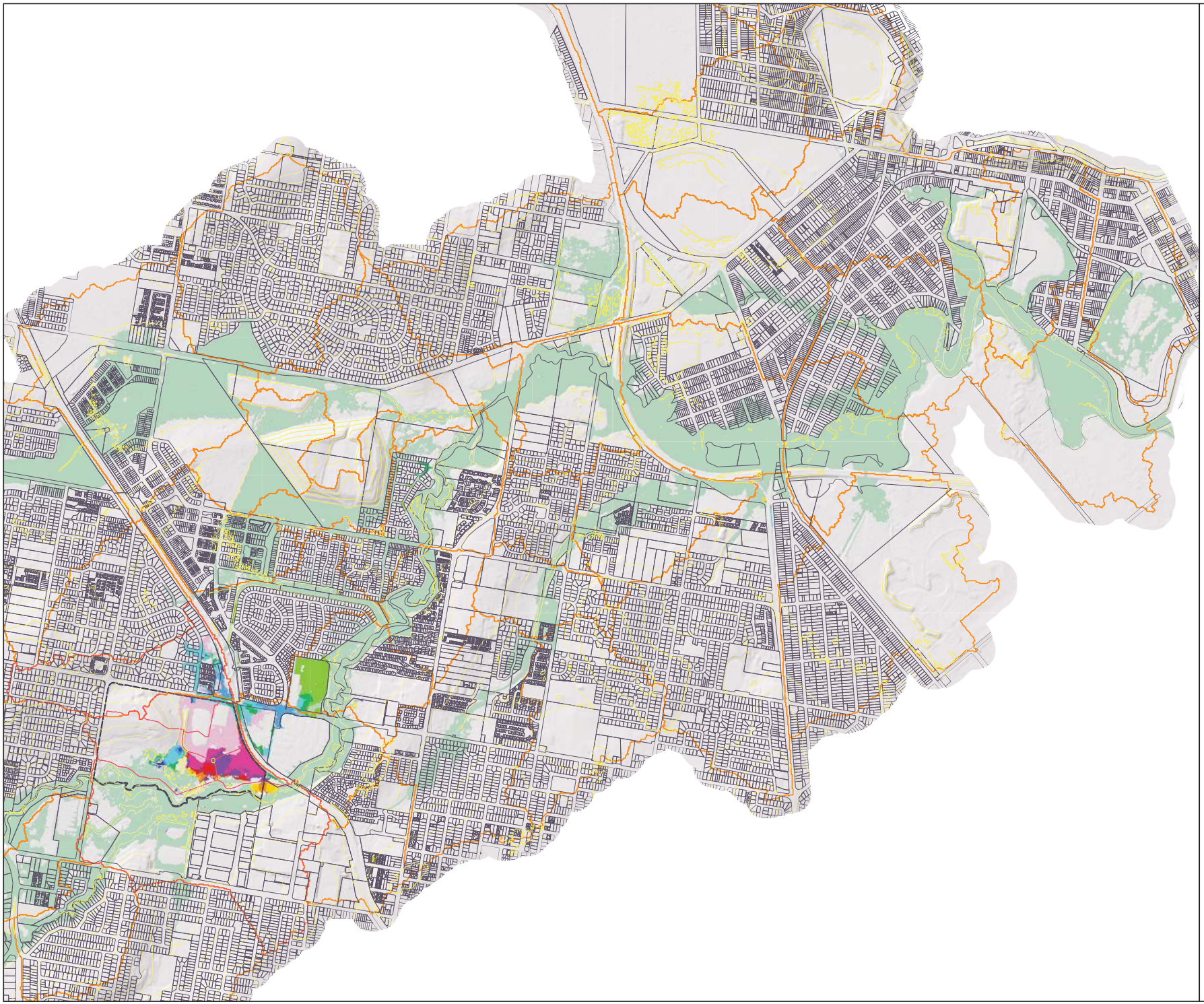
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

39%AEP Event (Q2)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A14

200 0 200 400 m

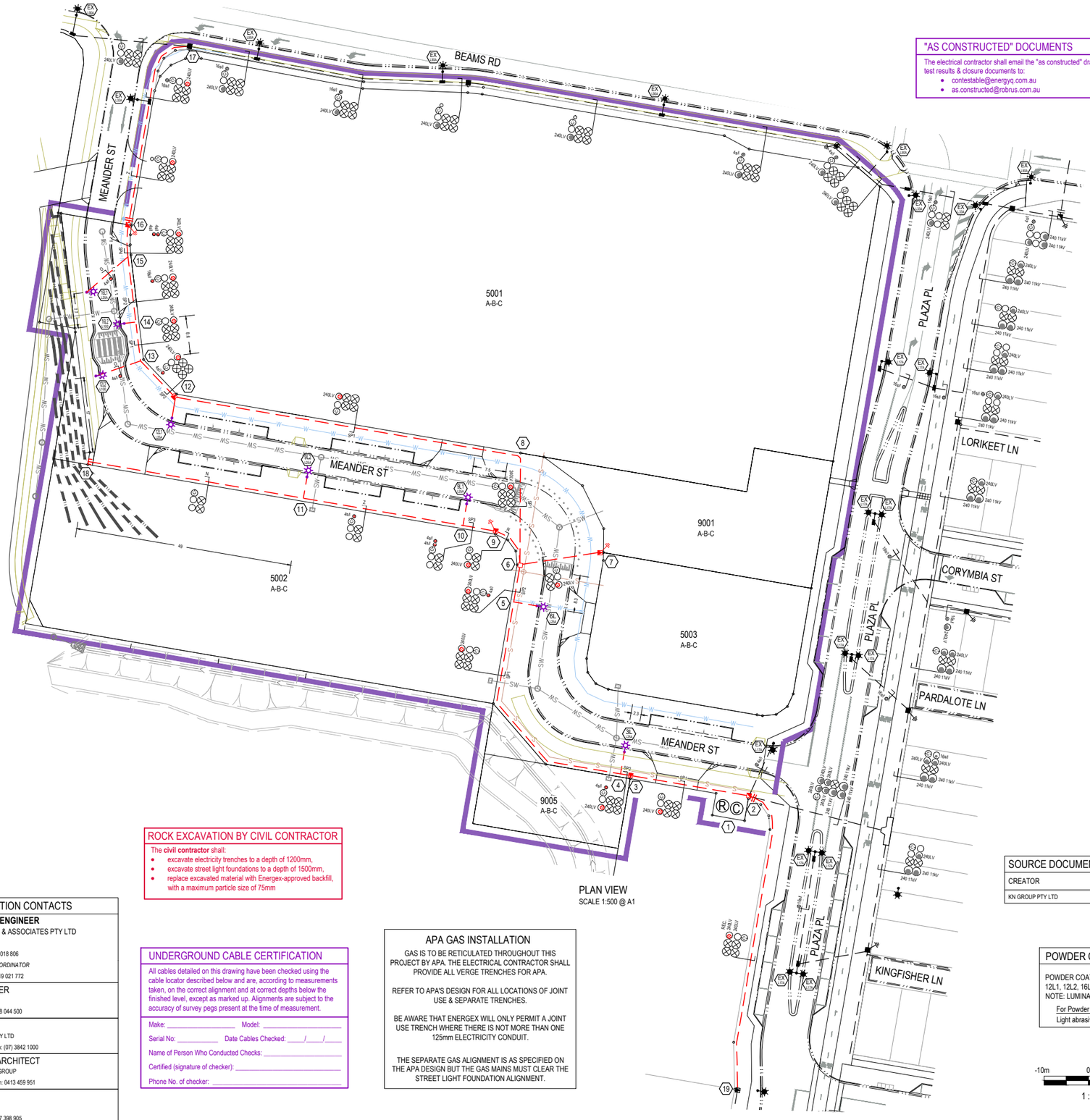
Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

1%AEP Event (Q100)

Client: Economic Development Queensland



PLAN VIEW
SCALE 1:500 @ A1

"AS CONSTRUCTED" DOCUMENTS

The electrical contractor shall email the "as constructed" drawing, test results & closure documents to:

- contestable@energyq.com.au
- as.constructed@robrus.com.au

GENERAL NOTES

In the event of conflict between this works plan and drawings and specifications of the relevant future asset owner, i.e. Energex, Ergon, local authority, Department of Transport & Main Roads, NBN™, etc., the drawings and specifications of the future asset owner shall take precedence. Exceptions apply where RRA design documentation specify clearances, depths & separations greater than the minimum required by the authorities.

The contractor shall not accept a verbal instruction from any person to depart from the requirements of this works plan or RRA General Specification. Any departure from the works plan or specification must first be authorised in writing by the Contract Superintendent.

ELECTRICAL CONTRACTOR

The works detailed on this drawing shall be constructed in accordance with Robin Russell & Associates' General Specification for Installation of Electricity Reticulation and Street Lighting - Issue 'AA'.

CIVIL CONTRACTOR

The installation of all electrical conduits shall be supervised by the holder of an electrical work licence - Electrical Safety Act 2002.

Energex conduits and transformer site retaining walls shall be installed strictly in accordance with Energex's specifications (see below). They will be inspected for compliance upon completion.

Where road-crossing conduits are installed deeper than usual (under culverts or pipes) they must rise to a depth of not more than 1200mm at each end. If uncertain, seek advice from RRA Construction Coordinator.

The civil contractor shall install enveloping conduits under retaining walls behind pillars - two 100mm conduits into each lot (one for Electricity, one for Communications), 500mm deep behind the pillar, near ground level inside the lot.

Relevant specifications in Energex's Underground Distribution Construction Manual are found at -

Section C1: Conduits
Section C2: Excavation
Section C3: Transformer Sites

These sections of the manual can be downloaded from the following Energex web site:
https://swp.energex.com.au/service_providers/technical_docs/asp/technical_documents.asp
Civil engineers who have registered for access to the following RRA website may download extracts from Energex's manual at:
http://www.robrus.com.au

The civil contractor shall ensure that all conduits have been installed before constructing retaining walls, paths, driveways & water services. The civil contractor shall please inform the electrical contractor of any 'as constructed' departures from the civil design.

Care: Existing street lights shall not be recovered unless replacement street lights will be commissioned before nightfall. Lighting of new or altered existing roads might not comply with specified standards until new road lighting has been commissioned. The civil contractor shall apply appropriate risk management. e.g. warning signs, speed restrictions, temporary lighting, etc.

ON-SITE SERVICES CHECKS

Robin Russell & Associates gives no warranty regarding the presence or location of buried services, including newly-installed services. "As Constructed" locations may differ from what is drawn on this works plan. Contractors shall be responsible to identify and locate all buried services. Initial identification can be obtained from:

Dial Before You Dig Service

Telephone 1100
Fax 1300 652 077

On-line enquiries can be made at:
http://www.1100.com.au.

Having determined which services may be present, on-site locations should then be arranged with relevant service authorities.

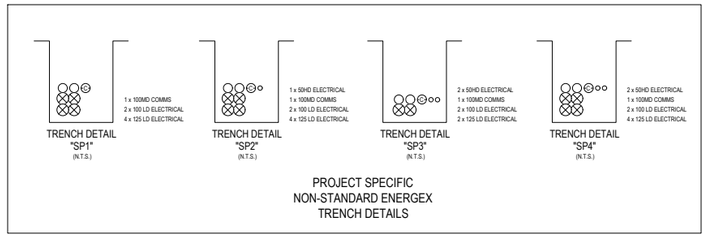
Sewerage and water plans for the subdivision may be obtained on request from the Superintendent.

INSTALLATION OF RRA DESIGNED TELECOMMUNICATIONS CONDUITS

Telecoms conduits and pits shall be supplied and installed by the civil and electrical contractors as specified on the associated RRA works plan.
In *residential* subdivisions, Telecommunications conduits shall be installed generally in shared trenches, directly above the electrical conduits.
In *commercial* subdivisions or other situations where this is not possible, Telecommunications conduits shall be installed in a separate trench on the specified communications alignment.

LEGEND: ELECTRICAL

- EXISTING UNDERGROUND CABLE
- PROPOSED UNDERGROUND CABLE
- FUTURE UNDERGROUND CABLE
- BORED CONDUIT
- STATION NUMBERS
- PADMOUNT TRANSFORMER, EXISTING / PROPOSED / FUTURE
- RING MAIN UNIT, EXISTING / PROPOSED / FUTURE
- POLE TRANSFORMER, EXISTING / PROPOSED / FUTURE
- CABLE FAULT INDICATOR
- SERVICE PILLAR, EXISTING / PROPOSED / FUTURE
- LINK PILLAR, EXISTING / PROPOSED / FUTURE
- LV LINKS (OPEN), EXISTING / PROPOSED / FUTURE
- LV LINKS (CLOSED), EXISTING / PROPOSED / FUTURE
- EXISTING OVERHEAD ELECTRICITY MAINS
- PROPOSED OVERHEAD ELECTRICITY MAINS
- FUTURE OVERHEAD ELECTRICITY MAINS
- HV POLE, EXISTING / PROPOSED / FUTURE
- HV + LV POLE, EXISTING / PROPOSED / FUTURE
- LV POLE, EXISTING / PROPOSED / FUTURE
- EARTH, EXISTING / PROPOSED / FUTURE
- STREET LIGHT, EXISTING / PROPOSED / FUTURE
- EXISTING RATE 3 STREETLIGHT CABLE
- PROPOSED RATE 3 STREETLIGHT CABLE
- FUTURE RATE 3 STREETLIGHT CABLE
- RATE 3 STREET LIGHT, EXISTING / PROPOSED / FUTURE
- RATE 3 SWITCHBOARD, EXISTING / PROPOSED
- EXISTING CONSUMERS UNDERGROUND CABLE
- PROPOSED CONSUMERS UNDERGROUND CABLE
- TO BE RECOVERED
- CABLE, EXISTING / PROPOSED
- 32/40mm HD CONDUIT
- 80/100mm LD CONDUIT
- 100mm WHITE ENERGEX COMMS. CONDUIT
- 125mm LD CONDUIT
- "ENERGEX ELECTRIC CABLE" MARKER PLATE



PROJECT SPECIFIC
NON-STANDARD ENERGEX
TRENCH DETAILS

ROCK EXCAVATION BY CIVIL CONTRACTOR

The **civil contractor** shall:

- excavate electricity trenches to a depth of 1200mm,
- excavate street light foundations to a depth of 1500mm,
- replace excavated material with Energex-approved backfill, with a maximum particle size of 75mm

SOURCE DOCUMENTS

CREATOR	DRAWING	DWG. NO.	REV. NO.	DATE
KN GROUP PTY LTD	CIVIL BASE	x20-150-base.dwg	-	27/06/2023

CONSTRUCTION CONTACTS

ELECTRICAL ENGINEER
ROBIN RUSSELL & ASSOCIATES PTY LTD
DESIGNER
N.MAMALIS Ph: 0488 018 806
CONSTRUCTION COORDINATOR
SHANE HYDE Ph: 0419 021 772

CIVIL ENGINEER
KN GROUP PTY LTD
MARK SHAW Ph: 0488 044 500

SURVEYOR
LAND PARTNERS PTY LTD
ROSS McDOWALL Ph: (07) 3842 1000

LANDSCAPE ARCHITECT
SAUNDERS HAVILL GROUP
ROBERT McILROY Ph: 0413 459 951

GAS
APA GROUP
SILVIA HART Ph: 0477 398 905

UNDERGROUND CABLE CERTIFICATION

All cables detailed on this drawing have been checked using the cable locator described below and are, according to measurements taken, on the correct alignment and at correct depths below the finished level, except as marked up. Alignments are subject to the accuracy of survey pegs present at the time of measurement.

Make: _____ Model: _____
Serial No: _____ Date Cables Checked: ____/____/____
Name of Person Who Conducted Checks: _____
Certified (signature of checker): _____
Phone No. of checker: _____

APA GAS INSTALLATION

GAS IS TO BE RETICULATED THROUGHOUT THIS PROJECT BY APA. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL VERGE TRENCHES FOR APA.

REFER TO APA'S DESIGN FOR ALL LOCATIONS OF JOINT USE & SEPARATE TRENCHES.

BE AWARE THAT ENERGEX WILL ONLY PERMIT A JOINT USE TRENCH WHERE THERE IS NOT MORE THAN ONE 125mm ELECTRICITY CONDUIT.

THE SEPARATE GAS ALIGNMENT IS AS SPECIFIED ON THE APA DESIGN BUT THE GAS MAINS MUST CLEAR THE STREET LIGHT FOUNDATION ALIGNMENT.

POWDER COATING OF COLUMNS & OUTREACHES

POWDER COAT COLUMNS & OUTREACHES AT STATIONS 3L, 6L, 9L1, 9L2, 12L1, 12L2, 16L1 & 16L2
NOTE: LUMINAIRES MUST NOT BE PAINTED.

For Powder Coating:
Light abrasive blast, followed by powder coating in COLOUR BLACK

-10m 0 10 20 30m
1 : 500 (A1 - NOT REDUCED)

TELECOMMUNICATIONS INFRASTRUCTURE

CONDUITS & PITS	to be designed by:	Robin Russell & Associates
	to be installed by:	civil & electrical contractors
	to be owned by:	
TELECOMMUNICATIONS INFRASTRUCTURE	to be provided by:	NBNCo Limited

SITE INFORMATION

TOTAL NUMBER OF LOTS
5

PROPERTY DESCRIPTION
LOTS 5001-5003, 9001 & 9005 CANCELLING PART OF LOT 7002 ON SP311913 & PART OF LOT 322 ON SP311781

DATE	REV	REVISION	APP.
10/08/2023	A	PRELIMINARY ISSUE	RR

CURRENT REVISION CHANGES:
Rev A- Preliminary design for review & issue.

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL
SUBDIVISION ELECTRICAL SERVICES
204/6 Babarra Street, Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DESIGNED	N.MAMALIS
COUNCIL REF	DEV2022/1321	DRAWN	N.MAMALIS
UBD REF	Map 109 Grid Q18	CHECKED	D.LLOYD RPEQ 5060
DWT REV.	V53-6 20211124	APPROVED	ROBIN RUSSELL RPEQ 1546
DATE	10/08/2023	SIGNED	

DESCRIPTION
ELECTRICITY RETICULATION - RESIDENTIAL

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

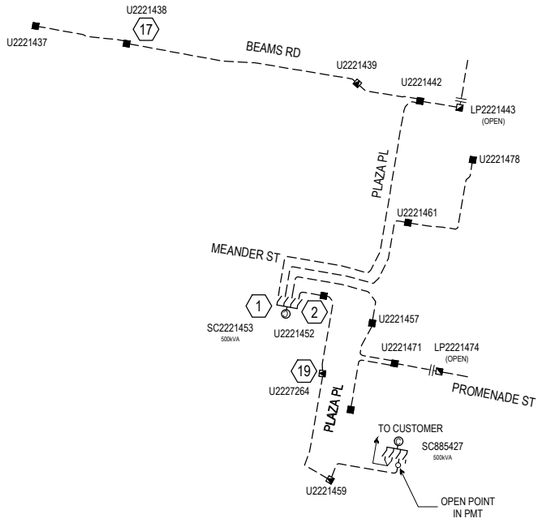
LOCATION
CARSLENDINE VILLAGE - STAGE V
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No.
D726-01A

ENERGEX PROJECT No.
S0107346

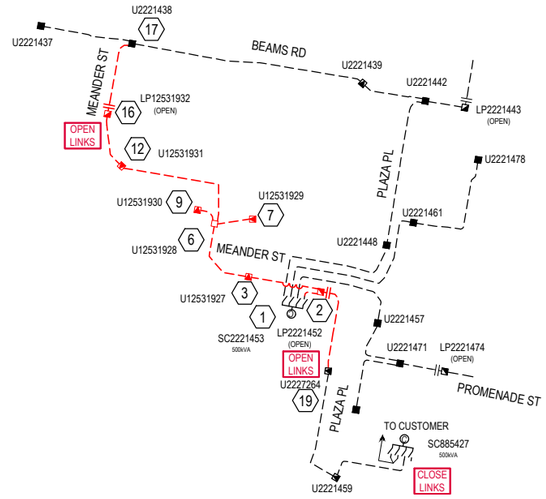
SHEET No.
1 OF 6



EXISTING LV SCHEMATIC

SCALE 1:2500

ALL NEW LV CABLES TO BE 4c 240mm Al XLPE
(UNLESS NOTED OTHERWISE)



PROPOSED LV SCHEMATIC

SCALE 1:2500

ALL NEW LV CABLES TO BE 4c 240mm Al XLPE
(UNLESS NOTED OTHERWISE)

CONDUIT BENDING RADIUS (mm)			
LOCATION	50mm Ø	100mm Ø	125mm Ø
HORIZONTAL BEND	600	1830	1830
PILLAR - MAIN CABLE	-	1200	-
PILLAR - X-ROAD CABLE	-	450	-
PILLAR - STREET LIGHT CABLE	600	-	-
STREET LIGHT	300	-	-
POLE TERMINATION	300	1200	1830
TRANSFORMER	no bends required		

LABELS

The contractor shall check label details against existing labels on site. Report any discrepancies immediately to the Contract Superintendent.

PROPOSED COMMISSIONING PLAN

Tentative only; subject to amendment by ENERGEX outage coordinator.

SWITCHING ONE - Commission extension of SC2221453 Circuit 1

- *1 x LV Only Switching*
- Check open LV Link Pillar LP2221443 Beams Rd
- Open CCT 1 SC2221453 Meander St
- Check open CCT 3 SC885427 Plaza Pl
- Check open LV Link Pillar LP2221452 Meander St
- Check open LV Link Pillar LP12531932 Meander St
- Following a satisfactory site specific Risk Assessment by the Electrical Contractor install new cabling and associated LV equipment.
- Following a satisfactory site specific Risk Assessment by the Electrical Contractor terminate new 240mm Al. LV Cable at existing **LIVE** LV pillar Stn 17 U2221438.
- Carry out commissioning checks and reverse switching, making sure CCT 3 out of SC88547 will now be in the closed position.

Where interruptions to existing consumers are required, they shall be notified in line with ENERGEX policies.

LV LINK PILLAR LABELS — AT MEANDER ST (STN 16) LP12531932

CIRCUIT DIRECTION	LABEL SIZE	LABEL COLOUR	LETTER SIZE	LABEL INFORMATION
CABLE TOWARDS STN 17	150x50	WB	5	TO MEANDER ST SC2221453 / BEAMS RD LP2221443 / PLAZA PL & SERVICES
CABLE TOWARDS STN 2	150x50	WB	5	TO MEANDER ST SC2221453 / LP2221452 & SERVICES

LV LINK PILLAR LABELS — AT BEAMS RD LP2221443

CIRCUIT DIRECTION	LABEL SIZE	LABEL COLOUR	LETTER SIZE	LABEL INFORMATION
CABLE TOWARDS NORTH	150x50	WB	5	[EXISTING]
CABLE TOWARDS STN 1	150x50	WB	5	TO MEANDER ST SC2221453 / LP12531932 / BEAMS RD / PLAZA PL & SERVICES

LV LINK PILLAR LABELS — AT MEANDER ST (STN 2) LP2221452

CIRCUIT DIRECTION	LABEL SIZE	LABEL COLOUR	LETTER SIZE	LABEL INFORMATION
CABLE TOWARDS STN 1	150x50	WB	5	TO MEANDER ST SC2221453 / LP12531932 & SERVICES
CABLE TOWARDS SOUTH	150x50	WB	5	TO PLAZA PL SC885427 & SERVICES

LV SWITCHBOARD LABELS — AT MEANDER ST (STN 1) SC2221453

CIRCUIT No.	LABEL SIZE	LABEL COLOUR	LETTER SIZE	LABEL INFORMATION
TRANSF. ISOLATOR	80x35	WB	6	TRANSFORMER ISOLATOR
1	80x35	WB	5	TO MEANDER ST LP2221452 / LP12531932 & SERVICES
2	80x35	WB	5	[EXISTING]
3	80x35	WB	5	[EXISTING]
4	80x35	WB	5	TO PLAZA PL U2221448 DIRECT THEN BEAMS RD LP2221443 / MEANDER ST LP12531932 & SERVICES

LV SWITCHBOARD LABELS — PLAZA PL SC885427

CIRCUIT No.	LABEL SIZE	LABEL COLOUR	LETTER SIZE	LABEL INFORMATION
TRANSF. ISOLATOR	80x35	WB	6	TRANSFORMER ISOLATOR
1	80x35	WB	5	[EXISTING TO CUSTOMER DIRECT]
2	80x35	WB	5	[EXISTING TO CUSTOMER DIRECT]
3	80x35	WB	5	TO MEANDER ST LP2221452 & SERVICES
4	80x35	WB	5	[SPARE]

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
10/08/2023	A	PRELIMINARY ISSUE	RR					Rev A- Preliminary design for review & issue.

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL

SUBDIVISION ELECTRICAL SERVICES
204/6 Babarra Street, Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DESIGNED	N.MAMALIS
COUNCIL REF	DEV2022/1321	DRAWN	N.MAMALIS
UBD REF	Map 109 Grid Q18	CHECKED	D.LLOYD RPEQ 5060
DWT REV.	V53-6 20211124	APPROVED	ROBIN RUSSELL RPEQ 1546
DATE	10/08/2023	SIGNED	

DESCRIPTION
ELECTRICITY RETICULATION - RESIDENTIAL

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

LOCATION
CARSLENDINE VILLAGE - STAGE V
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No.
D726-02A

ENERGEX PROJECT No.
S0107346

SHEET No.
2 OF 6

URD CONDUIT SCHEDULE - ROADWAYS - BY CIVIL CONTRACTOR

LOCATION	STATIONS FROM - TO		CONDUIT LENGTH (m)							PVC CABLE PROTECTION (m)	X-SECTION (m)		KERB MARK 'E'	REMARKS	TRENCH BY CIVIL
			50mm HD	No	100mm LD	No	125mm LD	No	ENERGEX 100mm Comms MD		EXCAV/ TAPE	TRENCH DETAIL			
MEANDER ST	6	7			18	2	18	2	18	18	18	N	2		18
	6	8			25	2	25	4	25	25	25	SP1	2		25
	13	12L2	11	1						11	11	O	2		11
	15	16L1	12	1						12	12	O	2		12
TOTAL			**23**		**86**		**136**		**43**	**66**	**66**		**192**		**66**

NOTES

1. ROAD CROSSING CONDUITS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE ENERGEX *UNDERGROUND DISTRIBUTION CONSTRUCTION (UDC) MANUAL*.
2. ROAD CROSSING CONDUITS SHALL HAVE A MINIMUM COVER OF **800mm** AT ALL PLACES UNDER THE ROAD, EXCEPT UNDER STATE-CONTROLLED "MAIN" ROADS, WHERE CONDUITS SHALL HAVE A MINIMUM COVER OF **1200mm**.
3. CONDUITS SHALL EXTEND TO WITHIN 900mm OF PROPERTY ALIGNMENT; PVC PROTECTIVE COVER STRIPS SHALL BE LAID ABOVE ALL ROAD-CROSSING CONDUITS FOR THEIR FULL LENGTH.
4. REFER ENERGEX *UDC MANUAL* SECT. C2 FOR CROSS-SECTION DETAILS.
5. BRASS "E" MARKERS SHALL BE INSTALLED IN KERBS DIRECTLY ABOVE ELECTRICITY CONDUITS.
6. **CAUTION: DO NOT CONSTRUCT RETAINING WALLS, CONCRETE PATHS OR WATER SERVICES UNTIL FOOTPATH CONDUITS HAVE BEEN INSTALLED.**

URD CONDUIT SCHEDULE - FOOTPATHS - BY **ELECTRICAL** CONTRACTOR

LOCATION	STATIONS FROM - TO		CONDUIT LENGTH (m)							PVC CABLE PROTECTION (m)	X-SECTION (m)		KERB MARK 'E'	REMARKS	TRENCH
			50mm HD	No	100mm LD	No	125mm LD	No	ENERGEX 100mm Comms MD		EXCAV/ TAPE	TRENCH DETAIL			
MEANDER ST	2	3			28	2	28	4	28		28	SP1			28
	3	4	3	1	3	2	3	4	3		3	SP2			3
	4	3L	5	1						5	5	O			5
	4	5			57	2	57	4	57		57	SP1			57
	5	6L	5	1						5	5	O			5
	5	6	9	1	9	2	9	4	9		9	SP2			9
	6	9			10	2	10	2	10		10	N			10
	9	10	8	2	8	2	8	2	8		8	SP3			8
	10	9L1	5	1						5	5	O			5
	10	11	46	1	46	2	46	2	46		46	Z			46
	11	9L2	5	1						5	5	O			5
	11	18			40	2	40	2	40		40	N		CAP CONDUITS	40
	8	12			79	2	79	4	79		79	SP1			79
	12	12L1	5	1						5	5	O			5
	12	13	11	1	11	2	11	4	11		11	SP2			11
	13	14			9	2	9	4	9		9	SP1			9
	14	16L2	3	1						3	3	O			3
	14	15	15	1	15	2	15	4	15	4	15	SP2			15
	15	16	8	2	8	2	8	4	8		8	SP4		TURN UP EXISITNG LV CONDUIT INTO NEW STN 16 PILLAR	8
ALL STREETS	AT PILLARS & POLES													PVC COVER STRIP AT PILLARS AND TO LIGHT POLES	
TOTAL			**144**		**646**		**1084**		**323**	**32**	**351**				**351**
ENERGEX TOTAL															

NOTES

1. **CONDUITS SHALL BE INSTALLED WITHIN A CORRIDOR 300-900mm FROM PROPERTY ALIGNMENT, IN ACCORDANCE WITH ENERGEX *UNDERGROUND DISTRIBUTION CONSTRUCTION (UDC)* MANUAL.**
2. FOOTPATH CONDUITS SHALL HAVE MINIMUM 700mm COVER, REGARDLESS OF ENERGEX'S REQUIREMENTS.
3. CONNECT EXISTING CONDUITS, INCLUDING ROAD CROSSING CONDUITS, TO NEW FOOTPATH CONDUITS
4. **TELECOMMUNICATION CONDUITS SHALL BE INSTALLED ON A SEPARATE ALIGNMENT FROM THE PROPERTY BOUNDARY.**

UNDERGROUND CABLE SCHEDULE

LOCATION	STATIONS FROM	TO	VOLTS	EX	REC	IN	CABLE SIZE/TYPE	MODEL ID	ROUTE LENGTH (m)	CABLE LENGTH (m) NEW	CABLE LENGTH (m) REC	REMARKS
MEANDER ST	1	2	LV	*	*		240mm² Al 4C XLPE/PVC	SCS820364	5		5	REFER NOTE 2
	-	-	LV			*	240mm² Al 4C XLPE/PVC	SCS820364	5	8		
	2	19	LV	*	*		240mm² Al 4C XLPE/PVC	SCS820364	68		68	REFER NOTE 2
	-	-	LV			*	240mm² Al 4C XLPE/PVC	SCS820364	68	71		
	2	17	LV			*	240mm² Al 4C XLPE/PVC	SCS820364	287	302		Via Stn 3, 6, 12 & 16
	6	7	LV			*	240mm² Al 4C XLPE/PVC	SCS820364	20	23		
	6	9	LV			*	240mm² Al 4C XLPE/PVC	SCS820364	10	13		
	3	3L	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	8	12		
	6	6L	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	14	18		
	9	9L1	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	13	17		
	9	9L2	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	59	63		
	12	12L1	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	5	9		
	12	12L2	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	23	27		
	16	16L1	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	22	26		
	16	16L2	SL			*	4mm² Cu 2C PVC/PVC	LVC24PVPV	26	30		
ALL STREETS	AT PILLARS		LV			*	16mm² Cu 4C XLPE/PVC	SCS820365		12		BRIDGING
VARIANCE	**5 %**											
TOTALS							**240mm² Al 4C XLPE/PVC**	**SCS820364**		**438**	**73**	
							16mm² Cu 4C XLPE/PVC	**SCS820365**		**13**		
							4mm² Cu 2C PVC/PVC	**LVC24PVPV**		**213**		

NOTES:

1. THE CONTRACTOR SHALL MEASURE ACTUAL CABLE LENGTHS REQUIRED, AFTER INSTALLATION OF CONDUITS, THEN ORDER CABLE ACCORDINGLY.
2. INSTALL 240LV IF CABLE EXTENSION IS NOT UTILISED AS CABLES MAY NOT REACH NEW TERMINAL PANEL.

EQUIPMENT SCHEDULE - SERVICE PILLARS

LOCATION	STN NO.	SITE I.D.	EX	REC	IN	SIZE AND DESCRIPTION	COMP I.D.	CU/SC/ CONST. CODE	QTY	REMARKS
MEANDER ST	2	U2221452	*	*		2 WAY PILLAR & S/L	PI1	LVSP4-6SL		2x240 (Existing)
	-	LP2221452				2 WAY LINK PILLAR, MEN & S/L	PI1	LVSP14-6SL	1	2x240
					*			1037-1	1	
						(L) LETTER		17319	1	
	-				*	240mm² PHASE TERMINATION		1036-1	3	1x240(Added)
						240mm² NEUTRAL TERMINATION		1035-5	1	
	3	U12531927			*	2 WAY C&I PILLAR, CFS & S/L	PI1	LVSP17-CFS	1	2x240
								1043-3	1	
	6	U12531928			*	4 WAY PILLAR & S/L	PI1	LVSP21-6SL	1	4x240
	7	U12531929			*	1 WAY C&I PILLAR, CFS, MEN	PI1	LVSP17-CFS	1	1x240
								1037-1	1	
	9	U12531930			*	1 WAY C&I PILLAR, CFS, MEN & S/L	PI1	LVSP17-CFS	1	1x240. USE SPARE LV
								1043-3	1	FUSE FOR ADDITIONAL SL
								1037-1	1	
	12	U12531931			*	2 WAY C&I PILLAR, CFS & S/L	PI1	LVSP17-CFS	1	2x240. USE SPARE LV
								1043-3	1	FUSE FOR ADDITIONAL SL
	16	LP12531932			*	2 WAY LINK PILLAR, MEN & S/L	PI1	LVSP14-6SL	1	2x240. USE SPARE LV
								1037-1	1	FUSE FOR ADDITIONAL SL
						(L) LETTER		17319	1	
	17	U2221438	*		*	2 WAY PILLAR & S/L	PI1	LVSP4-6SL		2x240 (Existing)
	-					1/2 WAY - 3 WAY PILLAR CONVERSION		LVSPC2W3	1	1x240(Added)
VARIOUS LOCATIONS						SL SERVICE DIRECT FROM PILLAR (FUSE)		SUG SL PIL	9	
						ADDITIONAL EARTH		ADE	4	

EQUIPMENT SCHEDULE - TFMR & JOINT

LOCATION	STN NO.	SITE I.D.	EX	REC	IN	SIZE & DESCRIPTION	COMP I.D.	CU/SC	QTY	REMARKS
MEANDER ST	1	SC2221453	*			500kVA PADMOUNT CFC HV FUSE LINK	TR1	2475044 DSHVF5SLK		
			*	*	*	240mm² LV PADMOUNT TERM		LVPT4C240	1	RECOVER & REPLACE
					*	CONCRETE SURROUND			1	CUT & RE-INSTATE AS REQUIRED

STREET LIGHT SCHEDULE - Rate 2

LOCATION	STN No.	SITE I.D.	POLE OR COMPONENTS								LANTERN								OUTREACH BRACKET					MOUNT HT (m)	REMARKS
			COMP I.D.	EXIST (m)	REC (m)	POLE + O/R CODE	ACTION	ERECT (m)	POLE TYPE	ASSY	ALIGN (mm)	COMP I.D.	EXIST	RECOVER LANTERN	RECOVER CUST.	LUMINAIRE CODE	INST	ERECT LANTERN	ERECT CUST.	ASSY / SC	EXIST (m)	REC (m)	ACTION	ERECT (m)	ASSY		
MEANDER ST	3L	P12531933	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK
	6L	P12531934	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK
	9L1	P12531935	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK
	9L2	P12531936	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK
	12L1	P12531937	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK
	12L2	P12531938	P01			S B 90 1 15 U CI1	INST	7.0	BPM	809-6	800 NFK	SL1				SLED PH 0985 F	INST	L100F L2	BCC	2479871			INST	1x1.5	808-1	9.0	PAINT BKT & POLE BLACK
	16L2	P12531939	P01			S B 90 1 15 U CI1	INST	7.0	BPM	809-6	800 NFK	SL1				SLED PH 0985 F	INST	L100F L2	BCC	2479871			INST	1x1.5	808-1	9.0	PAINT BKT & POLE BLACK
	16L1	P12531940	P01			S B 75 1 15 CI	INST	5.5	BPM	872-4	800 NFK	SL1				SLED PH 0257 A	INST	L25A L2	BCC	SEE NOTE 4			INST	1x1.5	815-1	7.5	PAINT BKT & POLE BLACK

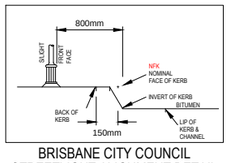
TOTAL

NOTES

1. ALL LIGHTS TO BE CONNECTED ON ENERGEX Rate 2.
2. CHECK CLEAR OF ALL SERVICES BEFORE EXCAVATING.
3. "NFK" ALIGNMENT MEASURED FROM NOMINAL FACE OF KERB (AS PER BCC BSD-2001 KERB PROFILE) TO FACE OF POLE.
4. **ELECTRICAL CONTRACTOR TO SOURCE & SUPPLY STREET LIGHT LUMINAIRE + PE CELL (MANUFACTURE PART No. BRP391 LED36/NW 25W DWP PSD P7 ANZ911401667606 + SC5502)**

TOTALS

S B 75 1 15 CI	6	SLED PH 0257 A	6
S B 90 1 15 U CI1	3	SLED PH 0985 F	2



BRISBANE CITY COUNCIL
STREETLIGHT ALIGNMENT DETAIL
NTS

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
10/08/2023	A	PRELIMINARY ISSUE	RR					Rev A- Preliminary design for review & issue.

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL

SUBDIVISION
ELECTRICAL SERVICES
204/6 Babarra Street,
Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DESIGNED	N.MAMALIS
COUNCIL REF	DEV2022/1321	DRAWN	N.MAMALIS
UBD REF	Map 109 Grid Q18	CHECKED	D.LLOYD RPEQ 5060
DWT REV.	V53-6 20211124	APPROVED	ROBIN RUSSELL RPEQ 1546
DATE	10/08/2023	SIGNED	

DESCRIPTION
ELECTRICITY RETICULATION - RESIDENTIAL

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

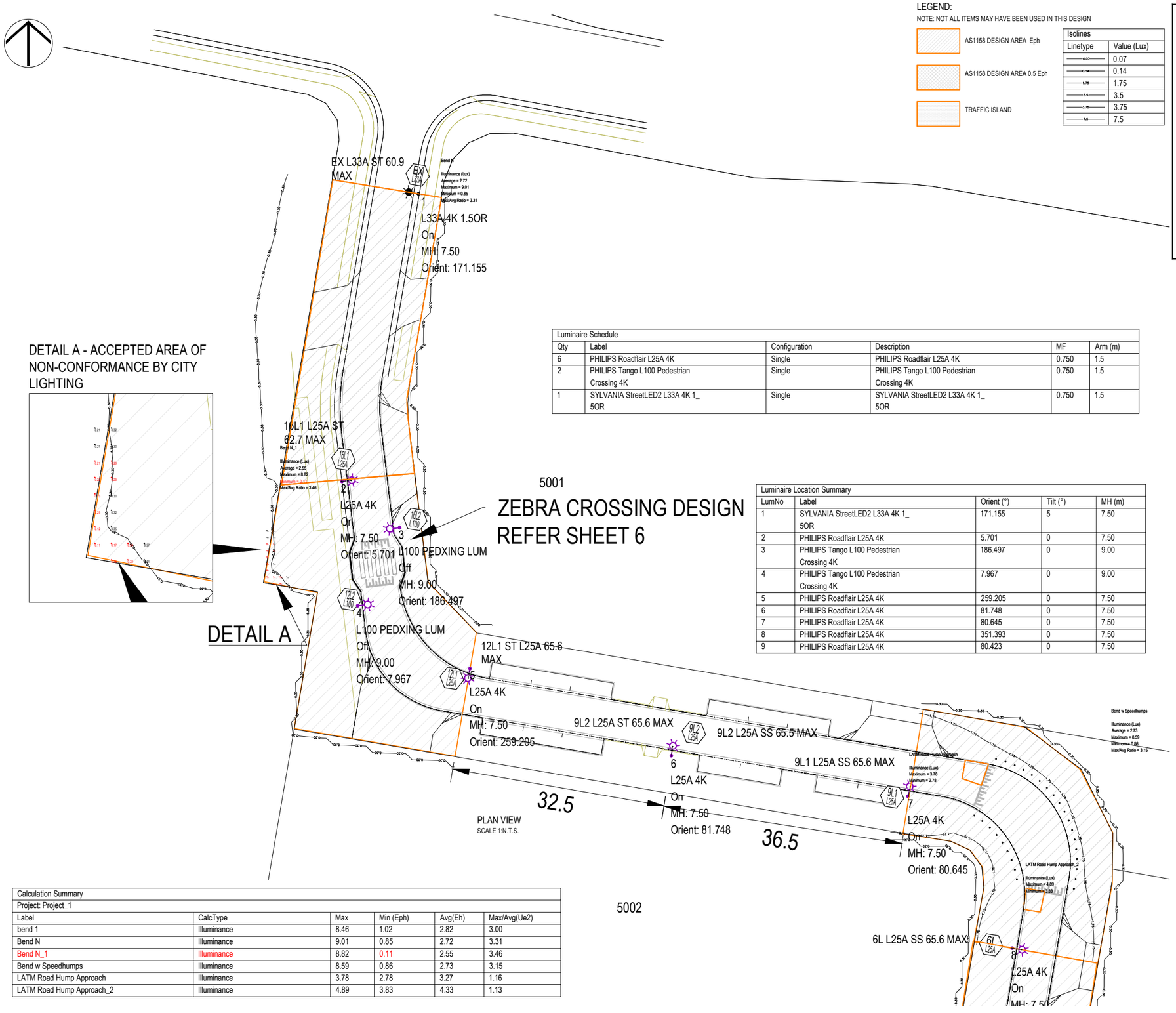
LOCATION
CARSLENDINE VILLAGE - STAGE V
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No.
D726-03A

ENERGEX PROJECT No.
S0107346

SHEET No.
3 OF 6



DETAIL A - ACCEPTED AREA OF NON-CONFORMANCE BY CITY LIGHTING

LEGEND:

NOTE: NOT ALL ITEMS MAY HAVE BEEN USED IN THIS DESIGN

AS1158 DESIGN AREA Eph

AS1158 DESIGN AREA 0.5 Eph

TRAFFIC ISLAND

Isolines	
Linetype	Value (Lux)
0.07	0.07
0.14	0.14
1.75	1.75
3.5	3.5
3.75	3.75
7.5	7.5

GENERAL NOTES:

CALCULATIONS WITHIN THIS DESIGN ARE SUBJECT TO THE TOLERANCES OUTLINED IN AS/NZS 1158.2 & AS/NZS 3827.1.

ILLUMINANCE CALCULATION FIELDS USE A 1m X 1m HORIZONTAL GRID ARRAY.

SETTINGS HAVE BEEN ADJUSTED TO ENSURE ALL CALCULATIONS ARE UNDERTAKEN TO A MINIMUM OF 2 DECIMAL PLACES.

LINEAR ILLUMINANCE ARRAYS CREATED HAVE BEEN SET UP WITH A MAXIMUM SPACING OF 2.0m.

ISOLUX VALUES, WHERE SHOWN ON DIAGRAMS, HAVE BEEN ROUNDED TO 2 DECIMAL PLACES TO ENSURE CLARITY.

LUMINAIRES MAY BE MOVED BY UP TO 200mm IN EITHER DIRECTION LATERALLY, AND/OR AWAY FROM THE PATHWAY, WHILE REMAINING COMPLIANT.

DEFINITIONS:

OFFSET: THE HORIZONTAL DISTANCE BETWEEN THE PHOTOMETRIC CENTRE OF A LUMINAIRE AND THE RP BOUNDARY OR EDGE OF PATH.

OVERHANG: THE HORIZONTAL DISTANCE BETWEEN THE PHOTOMETRIC CENTRE OF A LUMINAIRE AND THE ADJACENT KERB OR CARRIAGEWAY EDGE.

OUTREACH: THE HORIZONTAL DISTANCE BETWEEN THE PHOTOMETRIC CENTRE OF A LUMINAIRE, TO—

(a) THE CENTRE OF THE POLE (E.G. STANDALONE STREET LIGHT POLES); OR

(b) THE FACE OF POLE FOR BRACKET ARMS (E.G. TIMBER POWER POLES).

Luminaire Schedule					
Qty	Label	Configuration	Description	MF	Arm (m)
6	PHILIPS Roadflair L25A 4K	Single	PHILIPS Roadflair L25A 4K	0.750	1.5
2	PHILIPS Tango L100 Pedestrian Crossing 4K	Single	PHILIPS Tango L100 Pedestrian Crossing 4K	0.750	1.5
1	SYLVANIA StreetLED2 L33A 4K 1_ 5OR	Single	SYLVANIA StreetLED2 L33A 4K 1_ 5OR	0.750	1.5

Luminaire Location Summary				
LumNo	Label	Orient (°)	Tilt (°)	MH (m)
1	SYLVANIA StreetLED2 L33A 4K 1_ 5OR	171.155	5	7.50
2	PHILIPS Roadflair L25A 4K	5.701	0	7.50
3	PHILIPS Tango L100 Pedestrian Crossing 4K	186.497	0	9.00
4	PHILIPS Tango L100 Pedestrian Crossing 4K	7.967	0	9.00
5	PHILIPS Roadflair L25A 4K	259.205	0	7.50
6	PHILIPS Roadflair L25A 4K	81.748	0	7.50
7	PHILIPS Roadflair L25A 4K	80.645	0	7.50
8	PHILIPS Roadflair L25A 4K	351.393	0	7.50
9	PHILIPS Roadflair L25A 4K	80.423	0	7.50

5001

ZEBRA CROSSING DESIGN REFER SHEET 6

5002

Calculation Summary					
Project: Project_1					
Label	CalcType	Max	Min (Eph)	Avg(Eh)	Max/Avg(Ue2)
bend 1	Illuminance	8.46	1.02	2.82	3.00
Bend N	Illuminance	9.01	0.85	2.72	3.31
Bend N_1	Illuminance	8.82	0.11	2.55	3.46
Bend w Speedhumps	Illuminance	8.59	0.86	2.73	3.15
LATM Road Hump Approach	Illuminance	3.78	2.78	3.27	1.16
LATM Road Hump Approach_2	Illuminance	4.89	3.83	4.33	1.13

PROJECT SPECIFIC DETAILS:
THIS DESIGN IS COMPLIANT WITH AND PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF:

AS/NZS 1158.4-2015 APPENDIX D
AS/NZS 1158.3.1:2020 APPENDIX C

LIGHTING SUBCATEGORIES:
MEANDER WAY. - PR3
ZEBRA CROSSING - PX3

APPLICABLE CLAUSES:
P CATEGORY

S4.2.2(c) FOR CURVED SECTIONS OF ROAD AND BENDS.
S4.5.2.4 OTHER LOCAL AREA TRAFFIC MANAGEMENT (LATM) DEVICES/FIGURE 4.7(b)

PX CATEGORY
S3.2.1 FOR GENERAL REQUIREMENTS/FIGURE 3.1 & 3.2
TABLE A1 FOR HORIZONTAL DISTANCE FROM PEDESTRIAN CROSSING LUMINAIRES TO CROSSING CENTRE-LINE

COUNCIL REQUIREMENTS:
BCC S9.3.5.5(2) LIGHTING OF LOCAL AREA TRAFFIC MANAGEMENT DEVICES
-Luminaires to be spaced at no more than 65m, unless agreed with City Lighting prior to design submission
-Lighting not to be spaced at S/2 or less, unless otherwise unavoidable.
-Min. avg horiz illuminance at noses of LATMD's

DESIGN METHODS:
SPACING TABLES AND DESIGN RULES FOR ROADWAYS.
ALL LUMINAIRES WITHIN THIS DESIGN ARE WITHIN THE MAXIMUM ALLOWABLE SPACING FOR THEIR CATEGORY.

ILLUMINANCE DESIGN FOR LATMD'S, ZEBRA CROSSING & CURVES/BENDS.

ROAD SURFACE REFLECTION CHARACTERISTICS:
R3

COMPUTER PROGRAM DETAILS
Name of Computer Program - Perfect Lite v5.06 & AGi32 v20.9
Source of program - Constant Energy & Lighting Analysts
Compliance - AS1158.2.2005

NON-CONFORMANCES:
PLEASE NOTE THAT THIS DESIGN CONTAINS EIGHT (8) CALCULATION POINTS OF NON CONFORMANCE TO S4.2.2 Eph REQUIREMENTS (≥0.30). THIS AREA OF NON CONFORMANCE HAS BEEN ACCEPTED BY CITY LIGHTING. REFER EMAIL "Carseldine Village Stage 5 - S0107346 - DEV2022/1321 - D726 - Non-conformance Consideration.msg"

THE LOCATION OF THIS NON-CONFORMANCE HAS BEEN LABELED HAS BEEN LABELED 'DETAIL-A'

IF THE 2X L100 FLOOD LIGHTS ARE FACTORED INTO THIS STUDY,
COMPLIANCE TO S4.2.2 IS MET WITH THE FOLLOWING LTP'S:
Bend N_1
Illuminance (Lux)
Average=21.10 Maximum=74.68 Minimum=0.77 Max/Avg=3.54

ROAD LIGHTING MAINTENANCE SCHEDULE:
THE MAINTENANCE FACTOR AND THE MAINTENANCE REGIME ARE THE RESPONSIBILITY OF THE ASSET OWNER (ENERGEX QUEENSLAND).

THIS DESIGN UTILISES A MAINTENANCE FACTOR OF 0.75 BASED ON THE IP RATING OF 6X & 0.7 BASED ON THE IP RATING OF 5X AS SPECIFIED BY ENERGY QUEENSLAND.

NOTE: THIS CERTIFICATION IS ONLY APPLICABLE IF LUMINAIRES ARE REPLACED WITH EXACT EQUIVALENTS AND MAINTENANCE IS UNDERTAKEN AS SPECIFIED.

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
10/08/2023	A	PRELIMINARY ISSUE	R.R.					

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL

SUBDIVISION ELECTRICAL SERVICES
204/6 Babarra Street, Stafford, QLD 4053
Tel: (07) 3872 5565
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DWT REV.	V53-3 20210504
COUNCIL REF	DEV2022/1321		
DESIGNED	AC	DRAWN	
CHECKED	DARREN LLOYD	APPROVED	DARREN LLOYD RPEQ 5060
DATE	10/08/2023	SIGNED	

DESCRIPTION: **ROAD LIGHTING DESIGN**

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

LOCATION: **CARSLENDINE VILLAGE - STAGE V**
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No. **D726-L-04A**

ENERGEX PROJECT No. **S0107346**

SHEET No. 4 OF 6

LEGEND:

NOTE: NOT ALL ITEMS MAY HAVE BEEN USED IN THIS DESIGN

AS1158 DESIGN AREA Eph

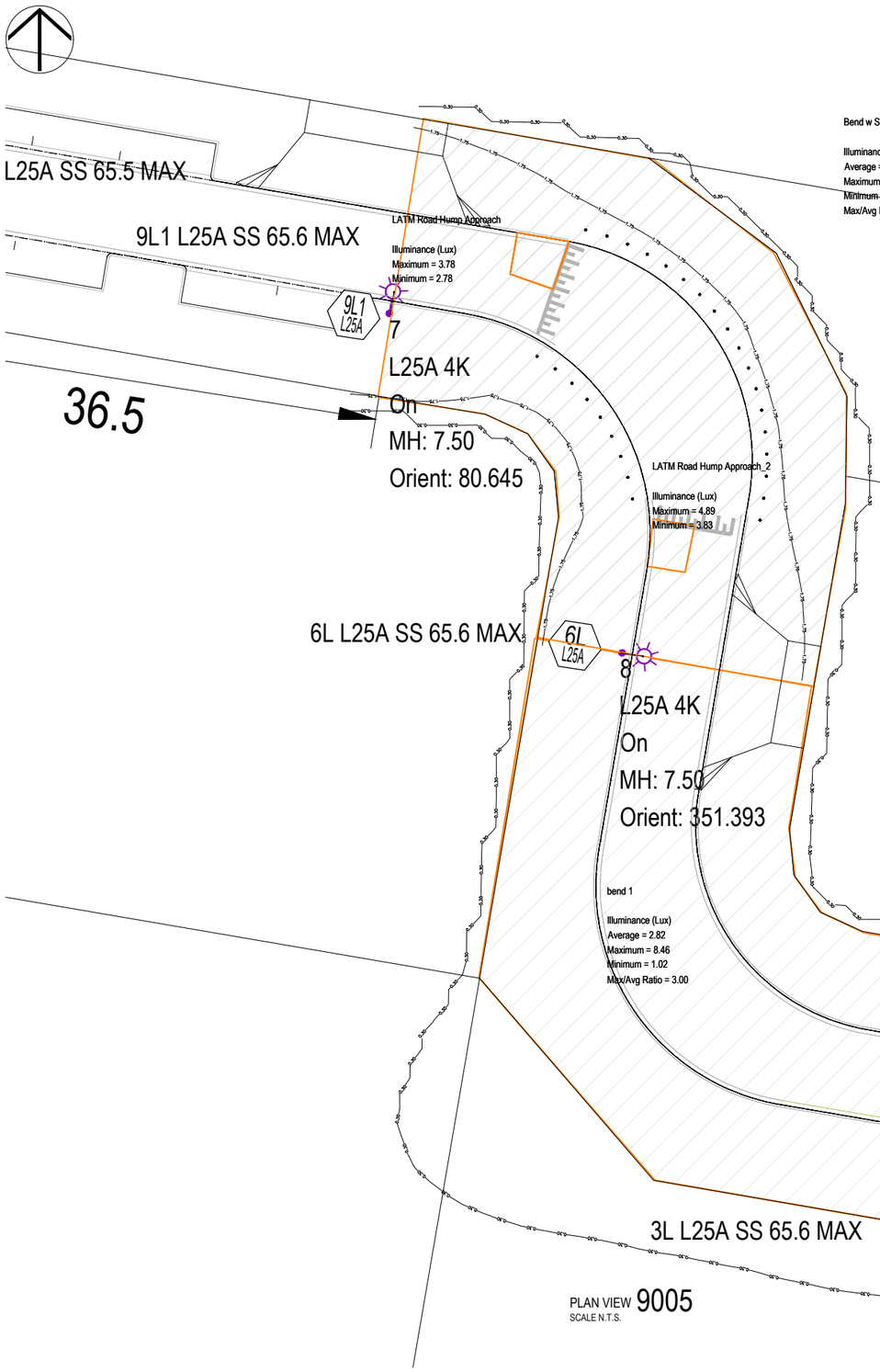
AS1158 DESIGN AREA 0.5 Eph

TRAFFIC ISLAND

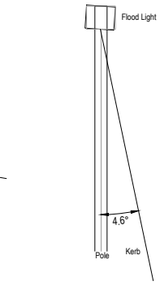
Isolines	
Linetype	Value (Lux)
0.07	0.07
0.14	0.14
1.75	1.75
3.5	3.5
3.75	3.75
7.5	7.5

Bend w Speedhumps

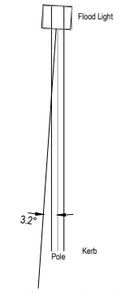
Illuminance (Lux)
Average = 2.73
Maximum = 8.59
Minimum = 0.86
Max/Avg Ratio = 3.15



PLAN VIEW 9005
SCALE N.T.S.



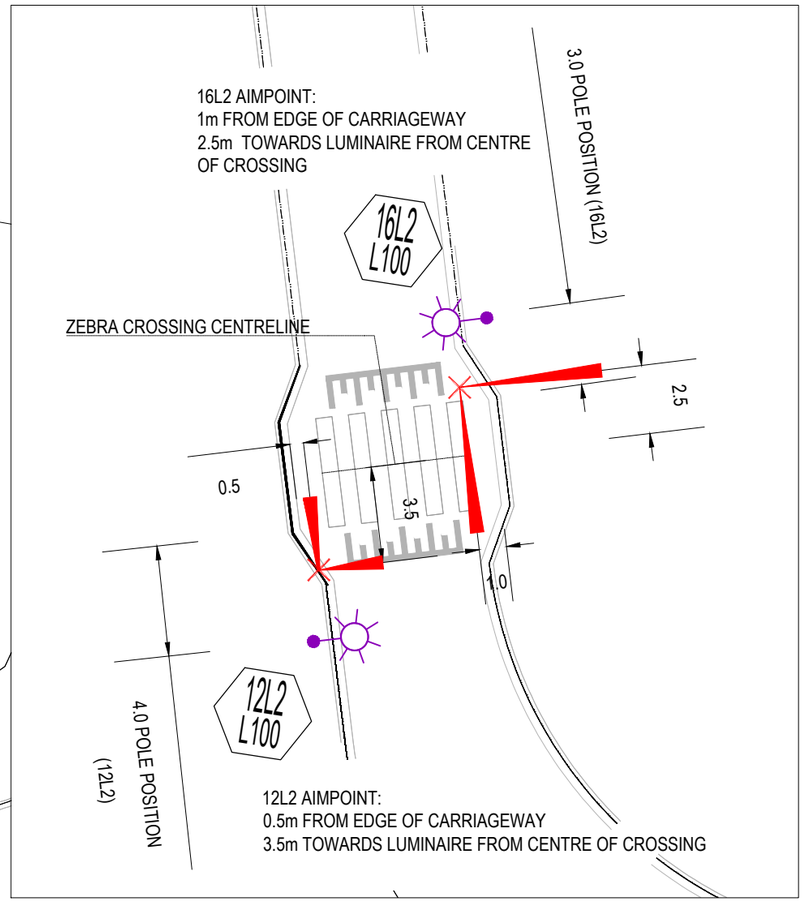
STN 16L2 - NORTH FL



STN 12L2 - SOUTH FL

DETAIL B
ZEBRA CROSSING

For questions concerning the aiming of the pedestrian crossings, contact lighting designer (Anthony Curameng) at Ph: (07) 3872 5555



PLAN VIEW
SCALE N.T.S.

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
10/08/2023	A	PRELIMINARY ISSUE	R.R.					

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL

SUBDIVISION ELECTRICAL SERVICES
204/6 Babarra Street, Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DWT REV.	V53-3 20210504
COUNCIL REF	DEV2022/1321		
DESIGNED	AC	DRAWN	
CHECKED	DARREN LLOYD	APPROVED	DARREN LLOYD RPEQ 5060
DATE	10/08/2023	SIGNED	

DESCRIPTION: **ROAD LIGHTING DESIGN**

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

LOCATION: **CARSLENDINE VILLAGE - STAGE V**
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No. **D726-L-05A**

ENERGEX PROJECT No. **S0107346**

SHEET No. 5 OF 6

EX
L33A

I-table Filename: O:\Lighting\iTables\Energy Queensland Consolidated Itables\Minor Road\CIE\StreetLED2 28W 4K AERO - 1 80262PH.CIE
Job Name: MEANDER WAY - PR3 - L33A - 4.25m P2221404 STAG
Luminaire Description: StreetLED2 28W 4K AERO use 3467 lms
Initial Lamp Flux: 3467 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 5 degrees
Arrangement: Staggered
Offset Distance: 4.85 m
Upward Waste Light Ratio: .1 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified
Lighting Category: User Defined
Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed
Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2
Mounting Maximum Spacing for different
Height Road Reserve Widths
--------- ----------

16.8 19.0
+----------+
7.5 | 65.2 60.9 |
+----------+

16L1
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 16L1 ST

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Staggered
Offset Distance: 11.23 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 62.7 |
+--------+

12L1
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 12L1 ST

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Staggered
Offset Distance: 7.32 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

9L2
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 9L2 ST

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Staggered
Offset Distance: 7.37 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

9L1
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 9L1 SS

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Single Side
Offset Distance: 7.52 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

6L
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 6L SS

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Single Side
Offset Distance: 7.57 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

EX
L17A

I-table Filename: O:\Lighting\iTables\Energy Queensland Consolidated Itables\old\Minor Road\CIE\StreetLED3 17W 4K AERO 180805PH.cie
Job Name: MEANDER WAY - PR3 - L17A - P2221417 STAG
Luminaire Description: StreetLED3 17W 4K AERO 180805PH use 2009
Initial Lamp Flux: 2009 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 5 degrees
Arrangement: Staggered
Offset Distance: 5.834 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified
Lighting Category: User Defined
Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed
Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2
Mounting Maximum Spacing for different
Height Road Reserve Widths
--------- ----------

19.0
+--------+
7.5 | 33.4 |
+--------+

3L
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 3L ST

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Staggered
Offset Distance: 7.52 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

3L
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 3L SS

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Single Side
Offset Distance: 7.52 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

9L2
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 9L2 SS

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Single Side
Offset Distance: 7.37 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.5 |
+--------+

6L
L25A

I-table Filename: \\RR-NAS1\RedirectedFolders\ac\Desktop\Standards\BRP391 P category CIE\BRP391 LED36NW 25W DWP PSD P7.cie

Job Name: 6L ST

Luminaire Description: BRP391L36WW25WDWP 3600 lms
Initial Lamp Flux: 3600 lms
Maintenance Factor: 0.75
Stores Code:
Upcast Angle: 0 degrees
Arrangement: Staggered
Offset Distance: 7.57 m
Upward Waste Light Ratio: .0 %
Light Source: LED - Light Emitting Diode
Luminaire Classification: Not specified

@B Lighting Category: User Defined

Illuminance Criteria: Average Illuminance (Eav) >= 1.75 lx
(Maintained values) Minimum Illuminance (Eph) >= 0.30 lx
Illuminance Uniformity (Up) <= 8
Minimum Illuminance (Epv) >= NOT assessed

Calculation Grid: 20 x 11 points - Figure 3.7 of AS/NZS 1158.2

@B Mounting Maximum Spacing for different
@B Height Road Reserve Widths
@B -------- ----------

19.0
+--------+
7.5 | 65.6 |
+--------+

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
10/08/2023	A	PRELIMINARY ISSUE	R.R.					

Robin Russell
& ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL

SUBDIVISION
ELECTRICAL SERVICES
204/6 Babarra Street,
Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ/BCC	DWT REV.	V53-3 20210504
COUNCIL REF	DEV2022/1321		
DESIGNED	AC	DRAWN	
CHECKED	DARREN LLOYD	APPROVED	DARREN LLOYD RPEQ 5060
DATE	10/08/2023	SIGNED	

DESCRIPTION
ROAD LIGHTING DESIGN

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

LOCATION
CARSLENDINE VILLAGE - STAGE V
520 & 532 BEAMS RD
CARSELDINE Q 4034

A1

DRAWING No.
D726-L-05A

ENERGEX PROJECT No.
S0107346

SHEET No.
6 OF 6

PLAN VIEW
SCALE 1:500

-10m 0 10 20 30m

1 : 500 (A1 - NOT REDUCED)
Note: Pits and FDH plinths are not drawn to scale.

SITE INFORMATION

TOTAL NUMBER OF LOTS
5

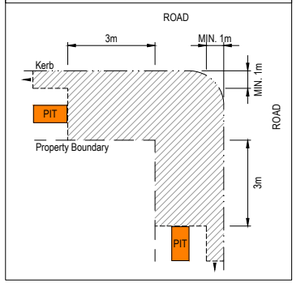
PROPERTY DESCRIPTION
Proposed lots 5001-5003, 9001 & 9005
Cancelling part of lot 7002 on SP311913 & part of lot 322 on SP311781

ORIGINAL ISSUE

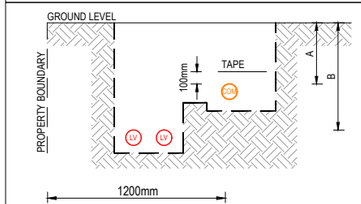
NBNCo Limited

- Telecommunications infrastructure will be provided by NBN™
- NBN™ will own the conduits and pits.
- This installation shall comply with NBN-TE-CTO-194 V11.0

DETAIL B - NO PITS IN THE SHADED AREA



TRENCH DETAIL - NBN



MINIMUM CONDUIT DEPTH *		
LOCATION	A	B
Verge	450mm	750mm
Local Road	600mm	Energex 800mm; Ergon 900mm
DTMR Road	800mm	1200mm

* supercedes Energex/Ergon requirements

LEGEND: NBN CONDUITS & PITS

- Fibre Access Node (FAN) site
- Fibre Distribution Hub (FDH) site - 1m x 1m
- Proposed 100mm Main Conduit
- Proposed 50mm Lateral Conduit
- Proposed 23mm Service Drop
- Proposed length of bored conduit
- Conduits by Civil Contractor
- Proposed shared trench
- Service Drop Access Pit
- Local Network Pit Premises Connection (Houses an MPT)
- Boundary Pit Cross-Road & Other Premises Connection (No MPT)
- Local Network Connection Pit Premises Connection & Fibre Splice Closure
- Distribution / Local Network Connection Pit at entry/exit to estate; @ 250m ccs on distribution conduit
- Fibre Distribution Hub (FDH) Pit Within 5m of FDH Site
- Multi Dwelling Unit (MDU)
- Marker Post (Post to be numbered)
- Depth over alignment indicator (used with every Marker Post)
- Descriptor Box (Description of type of work & Quantity involved)
- Transformer Pad Mount / Pole Mount
- Existing Telstra conduit trench layout (Proposed conduit indicated for comms cable)
- Existing NBN 100mm conduit
- Existing Telstra P100 conduit
- Existing or proposed Energex pole (& pole ID)
- Existing Telstra Exchange
- Existing Telstra Pits (size 2,3,4,5,6,7,8 or 9)
- Existing Telstra Manholes (Access Chambers)
- Existing Traffic Signals Box
- Existing network item to be removed/replaced
- 'C' communications marker plate

NBN CONDUIT SCHEDULE - CIVIL CONTRACTOR

CODE	ITEM	Refer: AS/NZS 1477:2006 - Table 4.2(A) WALL THICKNESS	MEAN OUTSIDE DIA.	MEAN INSIDE DIA.	QUANTITY (metres)
P20	SDU service drop	PN12	27mm	24mm	-
P50	MDU service drop	PN12	60mm	54mm	-
P50	road crossing	PN12	60mm	54mm	18
P100	road crossing	PN9	114mm	104mm	25
P100	footpath conduits adj. retaining walls	PN9	114mm	104mm	-
Additional trenching					43

NBN CONDUIT SCHEDULE - ELECTRICAL CONTRACTOR

CODE	ITEM	Refer: AS/NZS 1477:2006 - Table 4.2(A) WALL THICKNESS	MEAN OUTSIDE DIA.	MEAN INSIDE DIA.	QUANTITY (metres)
P50	MDU service drop	PN12	60mm	54mm	9
P100	MDU service drop	PN9	114mm	104mm	6
P50	footpath	PN12	60mm	54mm	5
P100	footpath	PN9	114mm	104mm	325
P100	distribution network	PN9	114mm	104mm	-
Additional trenching					330

NBN PIT SCHEDULE - ELECTRICAL CONTRACTOR

PIT CODE	ITEM	NOMINAL EXTERNAL DIMENSIONS	QUANTITY
2	service drop access pit	650 x 280 x 565mm	-
5	service/boundary pit (single lid)	700 x 450 x 650mm	3
6	local network connection pit (dual lid)	1360 x 555 x 650mm	3
8	distribution/local network connection pit (dual lid)	1360 x 555 x 860mm	1

SOURCE DOCUMENTS

CREATOR	DRAWING	DWG. NO.	REV. NO.	DATE
Robin Russell & Associates	Electrical Reticulation	D726	A	02/08/2023
KN Group	Civil Base	x20-150-base.dwg		27/06/2023
PE Consulting Engineers	Adjacent Stage NBN	STG-M000046994		-

NOTES - NBN

NBN conduits and pits shall be installed in compliance with NBN Co specification: NBN-TE-CTO-194 V 11.0 *New Developments: Deployment of the NBN Co Conduit and Pit Network - Guidelines for Developers.* This can be downloaded at: *http://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/design-build-install/pit-and-pipe-build-process.html*

Additional requirements and explanatory information are contained in Robin Russell & Associates' *General Specification for Installation of Electricity Reticulation and Street Lighting - Issue 'AA'.*

For details of trenching and electrical conduits, refer associated RRA works plan.

In *residential* subdivisions, NBN conduits shall be laid in shared trenches, above electricity conduits. The Civil Contractor shall install road-crossing conduits and other conduits as shown (see legend).

In *commercial* subdivisions, or where no electricity conduit is present, NBN conduits shall be laid on the standard telecommunications alignment, as specified.

On State roads, the required cover of 1200mm precludes the use of shared trenches.

The installation of white warning tape is NOT required. If conduit is not installed in a shared trench with electricity, brass "C" markers shall be installed in the kerbs directly above road-crossing conduits.

Contractors shall not access existing Telstra pits or conduits.

Pits shall be installed relative to the property boundary as shown, immediately outside the exclusion zone of the electricity pillar.

The Electrical Contractor shall ascertain final verge levels from the Civil Contractor before installing conduits & pits.

The Electrical Contractor shall give the Superintendent written notice (a) 10 business days before it anticipates achieving Practical Completion of the conduit and pit installation, and (b) on achieving Practical Completion, to allow the required notices to be given to NBN Co.

Conduit lengths are nominal horizontal distances only. Fibre lengths shall be verified in advance by actual measurement.

The electrical contractor shall perform mandrel testing of all telecommunications conduits, including cross-road and lead-in conduits installed by the civil contractor.

"AS CONSTRUCTED" DOCUMENTS

The electrical contractor shall email the "as constructed" drawing, test results & closure documents to:

- as.constructed@robrus.com.au

'AS CONSTRUCTED' CERTIFICATION

I certify as follows:

The installation of NBN conduits and pits has been completed in accordance with this drawing & NBN specification *NBN-TE-CTO-194*, subject to any changes marked up in red.
Mandrel testing of all conduits has been preformed as detailed on the attached Mandrel Test Report.
The minimum depths of conduits are as specified, except as marked up in red.

signature of certifier:

name of authorised certifier:

date of certification:

name of company:

CONSTRUCTION CONTACTS

ELECTRICAL ENGINEER
ROBIN RUSSELL & ASSOCIATES PTY LTD
ELECTRICAL DESIGNER
Nick Mamalis Ph. 0448 018 806
COMMS CONDUIT DESIGNER
Shane Mills Ph. 07 3353 4660
CONSTRUCTION COORDINATOR
Shane Hyde Ph. 0419 021 772

CIVIL ENGINEER
KN Group
Mark Shaw Ph. 07 3017 1900

SURVEYOR
LandPartners
Ross McDowall Ph. 07 3842 1000

LANDSCAPE ARCHITECT
Saunders Havill Group
Robert McIlroy Ph. 07 3251 9444

DATE	REV	REVISION	APP.	DATE	REV	REVISION	APP.	CURRENT REVISION CHANGES:
03/08/2023	A	INITIAL ISSUE	RR					:

Robin Russell & ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS - ELECTRICAL
SUBDIVISION ELECTRICAL SERVICES
204/6 Babarra Street, Stafford, QLD 4053
Tel: (07) 3872 5555
Fax: (07) 3872 5566
Email: rr@robrus.com.au
www.robrus.com.au
A.B.N. 78 010 589 661

COUNCIL	EDQ - BRISBANE	DESIGNED	SHANE MILLS	DESCRIPTION: TELECOMMUNICATION
COUNCIL REF	DEV2022/1321	DRAWN	SHANE MILLS	
UBD REF	Map 109 Grid Q18	CHECKED	K.R.	
DWT REV	V48 20210504	APPROVED BY	ROBIN RUSSELL RPEQ 1546	CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND
DATE	03/08/2023	SIGNED		

LOCATION
CARSELDINE VILLAGE - STAGE V
520 & 532 BEMS ROAD
CARSELDINE, 4034

A1

DRAWING No.
D726-N-01A

NBN ID REQUEST No./TELSTRA AFR: STG-M000097169

SHEET No.: 1 OF 1

FloodWise Property Report

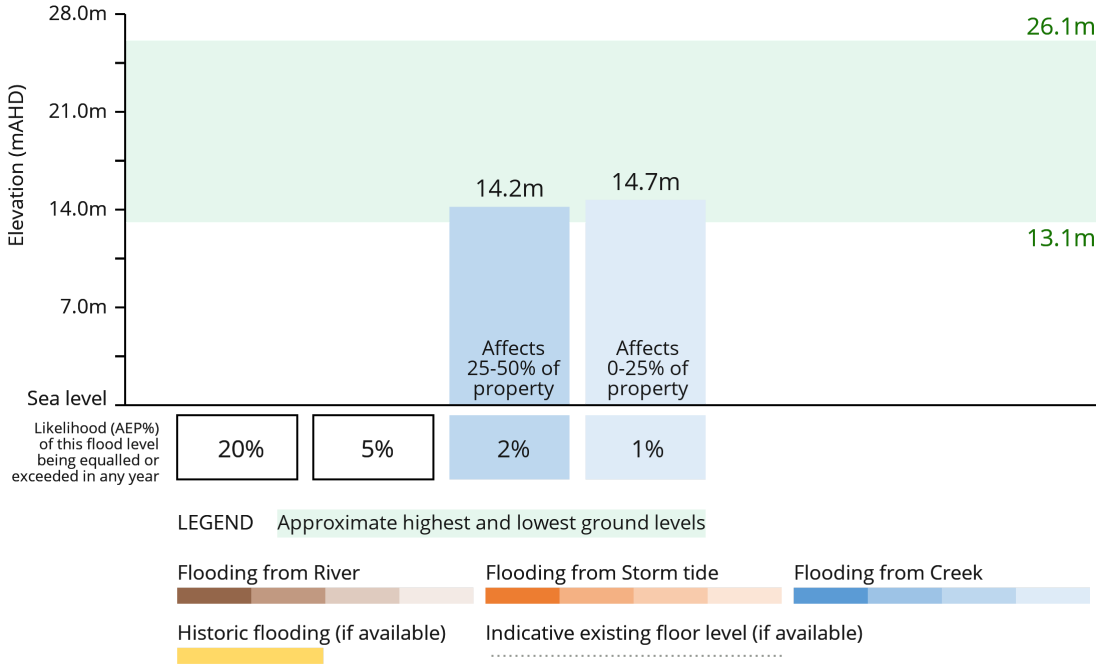
520 BEAMS RD, CARSELDINE 4034
Lot 7003 on SP331690

Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report **provides technical flood planning information** including estimated flood levels, habitable floor level requirements and more. **This report uses the adopted flood planning information in CityPlan**, that guides how land in Brisbane is used and developed for the future. Find out more about planning and building. To understand how to be **resilient and prepare for floods**, visit Council's Be Prepared webpage. Find more information about how to read a FloodWise Property Report.

Graph showing only the highest source/type of flooding for 1%, 2%, 5% and 20% likelihoods. Also shows historic flood levels. Other flood types and levels may be present and will be listed in the Flood Planning Information table below. This graph does not include overland flow flooding. If applicable, overland flow information is shown in the Planning and Development Information section below. **NOTE:** See Useful Definitions section to explain terminology.



Combined 1% AEP for river, creek and storm tide flood extent (if applicable). Aerial map shows river and creek flooding extent from the adopted CityPlan. Read more about CityPlan.

Are you resilient and ready for flood?

- Sign up to the Brisbane Severe Weather Alert at **brisbane.qld.gov.au/beprepared**
- Visit bom.gov.au for the latest weather updates.
- Have an evacuation plan, emergency kit and important phone numbers ready.
- Observe where water flows from and to during heavy rain.
- Consider how flood-resilient building techniques will have you home faster and with less damage.

Life threatening emergencies **000** Police/fire/ambulance (mobiles **000** and **112**)

State Emergency Service (SES) **132 500**
Energex **13 19 62**
Brisbane City Council **3403 8888**

Technical Summary

This section of the FloodWise Property Report contains more detailed flood information for this property so **surveyors, builders, certifiers, architects, and engineers can plan and build** in accordance with Council's planning scheme.

Find more information about planning and building in Brisbane or talk to a Development Services Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

Property Information Summary

The following table provides a summary of flood information for this property. More detailed flood level information is provided in the following sections of this report.

Property Summary	Level (mAHD) / Comment	Data Quality Code
Minimum ground level	13.1	C
Maximum ground level	26.1	C
Source of highest flooding	Creek/Waterway	

Flood Planning Information

The table below displays the peak estimated flood levels by probability for this property. Estimated flood level data should be used in conjunction with applicable planning scheme requirements - Refer to Flood Planning and Development Information section below for further information.

Note this table does not include overland flow. If overland flow is applicable to this property, refer to the Flood Planning and Development section below for further information.

Likelihood / Description	Level (mAHD)	Source
20%	N/A*	
5%	N/A*	
2%	14.2	Creek/Waterway (Cabbage Tree Creek)
1%	14.7	Creek/Waterway (Cabbage Tree Creek)
0.2%	14.7	Creek/Waterway (Cabbage Tree Creek)
Minimum Habitable Floor Level (dwelling house)	N/A*	

* Council does not have this data available. Customers are recommended to engage a Registered Professional Engineer of QLD for further advice.

Flood Planning and Development Information

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

Flood overlay code

The Flood overlay code of Council's planning scheme uses the following information to provide guidelines when developing properties. The table below summarises the flood planning areas (FPAs) that apply to this property. Development guidelines for the FPAs are explained in Council's planning scheme.

Flood planning areas (FPA)		
River	**Creek / waterway**	**Overland flow**
	FPA4	Not Applicable
	FPA5	

To find more information about Council's flood planning areas (FPAs) for Brisbane River and Creek/waterway flooding to guide future building and development in flood prone areas, please review Council's Flood Planning Provisions.

Coastal hazard overlay code

The Coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new developments. The table below summarises the coastal hazard categories that apply to this property. Development guidelines for the following Coastal hazard overlay sub-categories are explained in Council's planning scheme.

Coastal hazard overlay sub-categories
There are currently no Coastal hazard overlay sub-categories that apply to this property.

Note: Where land is identified within one for more flood planning areas on the Flood overlay or is identified within one of the Storm tide inundation area sub-categories on the Coastal hazard overlay, the assessment criteria that provides the highest level of protection from any source of flooding applies.

Property development flags
Large allotment - This property is either a Large Allotment of over 1000 square metres or is located within a Large Allotment. Flood levels may vary significantly across allotments of this size. Further investigations may be warranted in determining the variation in flood levels and the minimum habitable floor level across the site. For more information or advice, please consult a Registered Professional Engineer of Queensland (RPEQ).

Useful Flood Information Definitions

Australian Height Datum (AHD) - The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

- **0.2% AEP** - A flood event of this size is considered rare but may still occur. A flood of size or larger has a 1 in 500 chance or a 0.2% probability of occurring in any year.
- **1% AEP** - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
- **2% AEP** - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
- **5% AEP** - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
- **20% AEP** - A flood of this size or larger has a 1 in 5 chance or a 20% probability of occurring in any year.

Data quality

- **Data Quality Code A** - Level data based on recent surveyor report or approved as-constructed drawings.
- **Data Quality Code B** - Level data based on ground-based mobile survey or similar.
- **Data Quality Code C** - Level data derived from Airborne Laser Scanning or LiDAR information.

Defined Flood Level (DFL) - The DFL is used for commercial and industrial development. The Defined flood level (DFL) for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m /s. DFL is only applicable for non-residential uses affected by Brisbane River flooding.

Flood planning area (FPA) - Council has developed five Flood planning areas (FPAs) as part of City Plan Flood overlay mapping for Brisbane River, Creek/waterway flooding and Overland flow to guide future building and development in flood prone areas. Storm tide flooding is mapped separately. The FPAs are designed to recognise the flood hazard for different flooding types. Flood hazard is a combination of frequency of flooding, the flood depth, and the speed at which the water is travelling. Find more information here.

Maximum and minimum ground level - Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum habitable floor level (dwelling house) - The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family, and rumpus rooms) must be constructed as required by the Brisbane City Plan.

Indicative existing floor level - The approximate level in metres AHD of the lowest habitable floor in the existing building. This data is sourced from a range of sources with varying accuracy levels.

Property - A property will contain 1 or more lots. The multiple lot warning is shown if you have selected a property that contains multiple lots.

Residential flood level (RFL) - This flood level for the Brisbane River equates to the 1% annual exceedance probability (AEP) flood level.

To learn more, visit Brisbane City Council's Flood Information Hub

Brisbane City Council's Online Flood Tools

Council provides several online flood tools:

- to guide planning and development
- to help residents and businesses understand their flood risk and prepare for flooding.

Council's online flood tools for planning and development purposes include:

- **FloodWise Property Report**
- **Flood Overlay Code**

For more information on Council's planning scheme and online flood tools for planning and development:

- phone (07) 3403 8888 and ask to talk to a Development Services Planning Information Officer

- visit brisbane.qld.gov.au/planning-building

Council's Planning Scheme - The City Plan (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Disclaimer

1. Defined flood levels and residential flood levels, minimum habitable floor levels and indicative existing floor levels are determined from the best available information to Council at the date of issue. These levels, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating levels.
2. Council makes no warranty or representation regarding the accuracy or completeness of a FloodWise Property Report. Council disclaims any responsibility or liability in relation to the use or reliance by any person on a FloodWise Property Report.

Planning to build or renovate?

For information, guidelines, tools and resources to help you track, plan or apply for your development visit brisbane.qld.gov.au/planning-building

You can also find the Brisbane City Plan 2014 and Neighbourhood Plans as well as other information and training videos to help, with your building and development plans.

APPENDIX D

BRISBANE CITY COUNCIL CODES

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
Section A - If for a material change of use, reconfiguring a lot, operational work or building work Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only				
PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: (a) minimise flooding; (b) protect environmental values of receiving waters; (c) maximise the use of water sensitive urban design; (d) minimise safety risk to all persons; (e) maximise the use of natural waterway corridors and natural channel design principles. *Editor's note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.*	**A01** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	✓	The proposal complies with the Infrastructure Design Planning Scheme Policy.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

P02 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	**AO2.1** Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises. **AO2.2** Development provides a stormwater management system which is designed in compliance with the standards in the **Infrastructure design planning scheme policy.**	✓ ✓	The proposal meets the requirements of Council's Infrastructure design planning scheme policy and does not result in an increase in flood level or flood duration on upstream, downstream or adjacent properties.	
PO3 Development ensures that the stormwater management system does not direct stormwater run-off through existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.	**AO3.1** Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage reserve, public pathway, park or waterway corridor. **AO3.2** Development provides a stormwater management system which is designed in compliance with the standards in the **Infrastructure design planning scheme policy.** **AO3.3** Development obtains a lawful point of discharge in compliance with the standards in the **Infrastructure design planning scheme policy.**	N/A ✓ ✓	The design demonstrates that a drainage network will be provided that will comply with Council's Infrastructure design planning scheme policy. Conceptual drainage requirements for the proposal are identified in the SBSMP.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

	AO3.4 Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	**N/A**		
PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.	**AO4.1** Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the **Infrastructure design planning scheme policy.** **AO4.2** Development provides sufficient area to convey run-off which will comply with the standards in the **Infrastructure design planning scheme policy.**	✓ ✓	The design demonstrates that a drainage network will be provided that will comply with Council's **Infrastructure design planning scheme policy** which safely conveys runoff taking into account increased runoff and flooding in local catchments.	
P05 Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.	**AO5** Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.	**N/A**	The proposed development does not have any channel, creek modification, bridge, culvert or major drain works.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

PO6 Development ensures that location and design of stormwater detention and water quality treatment: (a) minimises risk to people and property; (b) provides for safe access and maintenance; (c) minimises ecological impacts to creeks and waterways.	**AO6.1** Development locates stormwater detention and water quality treatment: (a) outside of a waterway corridor; (b) offline to any catchment not contained within the development.	A/S	This development is part of the Carseldine Village Heart Precinct which has "communal" bioretention basins that satisfy all criteria except Gross Pollutants Reduction Target. Only this gross pollutant reduction target is met on-site. The rest discharges to the stormwater mains that lead to the bioretention basin.	
PO7 Development is designed, including any car parking areas and channel works to: (a) reduce property damage; (b) provide safe access to the site during the defined flood event.	**AO7.1** Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D,Table 9.4.9.3.E and Table 9.4.9.3.F. *Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan).* **AO7.2** Development including the road network provides a stormwater management system that provides safe pedestrian and	✓	The proposed development design provides flood immunity levels in accordance with the **Infrastructure design planning scheme policy.** A SBSMP has been prepared and demonstrates this The proposed development design provides a stormwater management system that ensures the safe pedestrian and vehicle access in accordance with	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

	vehicle access in accordance with the standards in the **Infrastructure design planning scheme policy.**		the **Infrastructure design planning scheme policy.**	
PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.	**AO8.1** Development ensures natural waterway corridors and drainage paths are retained. **AO8.2** Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication **Natural channel design guidelines.** **AO8.3** Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the **Infrastructure design planning scheme policy.** **AO8.4** Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the **Infrastructure design planning scheme policy.**	N/A **N/A** **N/A** **N/A**	The proposed development stormwater designs are in accordance with the **Infrastructure design planning scheme policy.** The proposed development does not include any channel or creek modification works.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

PO9 Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.	**AO9** No acceptable outcome is prescribed.	**N/A**		
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. *Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.*	**AO10** No acceptable outcome is prescribed.	✓	The proposed development ensures there is sufficient site area to accommodate an effective stormwater management system. This is demonstrated in the SBSMP. The proposed development will comply with Council's **Erosion and Sediment Control Standard.** An Erosion and Sediment Control Plan will be submitted in the detailed design phase of the development. Strategies that will be implemented have been outlined in the SBSMP. A Detailed Erosion and Sediment Control Program will be prepared and submitted during the Operation Works phase of the development.	
PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the: (a) existing capacity of stormwater infrastructure within and external to	**AO11.1** Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge. **AO11.2**	N/A		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

the site, and any planned stormwater infrastructure upgrades; (b) safe management of stormwater discharge from existing and future up-slope development; (c) implication for adjacent and down-slope development.	Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the **Priority infrastructure plan** and the standards in the **Infrastructure design planning scheme policy.**			
PO12 Development provides stormwater infrastructure which: (a) remains fit for purpose for the life of the development and maintains full functionality in the design flood event; (b) can be safely accessed and maintained cost effectively; (c) ensures no structural damage to existing stormwater infrastructure.	**AO12.1** The stormwater management system is designed in compliance with the **Infrastructure design planning scheme policy.** **AO12.2** Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	✓ N/A		
PO13 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: (a) the environmental values and water	**AO13** No acceptable outcome is prescribed.	N/A		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

quality objectives of waters; (b) waterway hydrology; (c) the maintenance and serviceability of stormwater infrastructure. *Note—The Infrastructure design planning scheme policy outlines the appropriate measures to be taken into account to achieve the performance outcome*.				
PO14 Development ensures that: (a) unnecessary disturbance to soil, waterways or drainage channels is avoided; (b) all soil surfaces remain effectively stabilised against erosion in the short and long term.	**AO14** No acceptable outcome is prescribed	N/A		
PO15 Development does not increase: (a) the concentration of total suspended solids or other contaminants in stormwater flows during site construction; (b) run-off which causes erosion either on site or off site.	**AO15** No acceptable outcome is prescribed	N/A	Site less than 2500m2.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

Section B—Additional criteria which apply to high-risk development, being one or more of the following: (a) a material change of use for an urban purpose which involves greater than 2,500m^2 of land that: (i) will result in an impervious area greater than 25% of the net developable area; or (ii) will result in 6 or more dwellings. (b) reconfiguring a lot for an urban purpose that involves greater than 2,500m^2 of land and will result in 6 or more lots; (c) operational work for an urban purpose which involves disturbing greater than 2,500m^2 of land.				
PO16 Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values. *Note—Prescribed water contaminants are defined in the **Environmental Protection Act 1994.*** *Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.*	**AO16** Development provides a stormwater management system which is designed in compliance with the standards in the **Infrastructure design planning scheme policy.**	✓	See PO15	
PO17 Development ensures that: (a) the discharge of wastewater to a waterway or external to the site is avoided; or (b) if the discharge cannot practicably be avoided, the development minimises wastewater discharge through re-use, recycling, recovery and	**AO17** No acceptable outcome is prescribed.	✓		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this proposal

treatment. *Note—The preparation of a wastewater management plan can assist in demonstrating achievement of this performance outcome.* *Editor's note—This code does not deal with sewerage which is the subject of the Wastewater code.*				

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Section A—If for self-assessable or assessable development for a dwelling house including any secondary dwelling Note—Development for a dwelling house does not require assessment against any other sections of this code.				
PO1 Development involving any habitable or non-habitable part of a dwelling house, including any secondary dwelling, is located and designed to: (a) minimise the risk to people from flood hazard; (b) achieve acceptable flood immunity; (c) minimise property impacts from a flood event up to and including the defined flood event; (d) minimise disruption to residents, recovery time and rebuilding or restoration costs after a flood event up to and including the defined flood event.	**AO1.1** Development for a dwelling house including anysecondary dwelling: (a) is not located in the Brisbane River flood planning area 1, 2a or 2b sub-categories or the Creek/waterway flood planning area 1 or 2 sub-categories; or (b) is only located in these sub-categories, if a Registered Professional Engineer Queensland certifies that thedwelling house and any secondary dwelling are structurally designed to be able to resist hydrostatic and hydrodynamic loads associated with flooding up to and including thedefined flood event. **AO1.2** Development for a dwelling house and any secondary dwelling complies with the minimum flood planning levels inTable 8.2.11.3.B. Note—If located in an area that has no flood level information available from the Council such as an overland flow path, a Registered Professional Engineer of Queensland with expertise in undertaking flood studies is to certify	✓	**AO1.2 satisfied regarding basement**	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	that the flood level and development levels for the dwelling house and any secondary dwelling achieve the required flood planning levels in Table 8.2.11.3.B. **AO1.2** Development involving a building undercroft complies with the minimum clearance requirements in Table 8.2.11.3.E. Editor's note—For creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. Note—The Flood planning scheme policy provides guidance on undercroft design.			
PO2 Development within the Creek/waterway flood planning area sub-categories or Overland flow flood planning area sub-category: (a) maintains the conveyance of flood waters to allow them to pass predominantly unimpeded through the site; (b) does not concentrate, intensify or divert floodwater onto upstream, downstream or adjacent properties;	**AO2** Development: (a) is not located within the Creek/waterway flood planning area 1, 2 or 3 sub-categories or the Overland flow flood planning area sub-category; or (b) provides an open undercroft area from natural ground level to habitable floor level for any area inundated by the defined flood event; or ote—This undercroft area is not suitable	N/A	The site is currently within the flood planning area however, this development occurs after a subdivision that is currently being undertaken which brings the entire development above the flood planning level. This criteria would have been applicable to that subdivision development.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
(c) will not result in a material increase in flood levels or flood hazard on upstream, downstream or adjacent properties.	for providing non-habitable rooms, secure storage of valuables, or future enclosing for storage or car parking. The clear area may include structural elements such as columns and floor substructure. The Flood planning scheme policyprovides guidance on undercroft design. Editor's note—An open undercroft design may be achieved through a 'valance' treatment around the perimeter of an otherwise internally clear undercroft. Editor's note—For Creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council'sFloodWise Property Report. (c) report from a Registered Professional Engineer Queensland certifies that the development in the Creek/waterway flood planning area or Overland flow flood planning area sub-categories will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties. Note—Flood studies demonstrate that the development and engineering design methods conform to the			

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.			
Section B—If self-assessable or assessable development other than for a dwelling house or reconfiguring a lot Note—If self-assessable development complies with the acceptable outcomes of this part, no further assessment against this code is required.				
PO3 Development: (a) is compatible with flood hazard in a defined flood event; (b) minimises the risk to people from flood hazard; (c) does not reduce the ability of evacuation resources including emergency services to access and evacuate the site in a flood emergency, with consideration to the scale of the development; (d) minimises impacts on property from flooding; (e) minimises disruption to residents, business or site operations and recovery time due to flooding; (f) minimises the need to rebuild structures after a flood event greater than the defined flood event. Note—Where Table 8.2.11.3.C identifies that a flood risk assessment is required, compliance with this performance outcome can be achieved by submitting a	**AO3** Development for a material change of use complies with Table 8.2.11.3.C.	✓	Freeboard requirements for buildings are satisfied.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
flood risk assessment, which may be included within a flood study, addressing the criteria within this performance solution. Preparing flood risk assessments and flood studies is required to be in accordance with the Flood planning scheme policy. Note—An emergency management plan prepared in accordance with the Flood planning scheme policy, which sets out procedures for evacuation due to flooding may be used to demonstrate compliance with this performance outcome.				
PO4 Development for a park ensures that the design of a park and location of structures and facilities responds to the flood hazard and balances the safety of intended users with: (a) maintaining continuity of operations; (b) impacts of flooding on asset life and ongoing maintenance costs; (c) efficient recovery after flood events; (d) recreational benefits to the city; (e) availability of suitable land within the park.	**AO4.1** Development involving a building or structure in a park complies with the flood planning levels specified in Table 8.2.11.3.D. **AO4.2** Development involving a building or structure where Table 8.2.11.3.D does not apply: (a) is not located within the 20% AEP flood extent of any creek/waterway or overland flow path; or (b) is located above the 20% AEP flood level of any creek/waterway or overland	**N/A**	No park involved.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	flow path.			
Section C—If for assessable development other than for a dwelling house				
PO5 Development is located and designed to: (a) minimise the risk to people from flood hazard on the site; (b) minimise flood damage to the development and contents of buildings up to the defined flood event; (c) provide suitable amenity; (d) minimise disruption to residents, recovery time and the need to rebuild structures after a flood event up to and including the defined flood event.	**AO5.1** Development complies with the flood planning levels specified in Table 8.2.11.3.D. Note—If located in an area with no Council-derived flood levels such as an overland flow path, a Registered Professional Engineer Queensland with expertise in undertaking flood studies is to derive the applicable flood level and certify that the development meets the required flood planning levels in Table 8.2.11.3.D. The study is to demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO5.2** Development is: (a) not located in the: i. Brisbane River flood planning area 1, 2a, or 2b sub-categories; ii. Creek/waterway flood planning area 1 or 2 sub-categories; iii. Overland flow flood planning area sub-category; or	✓	Development complies with the flood planning levels specified in Table 8.2.11.3.D.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	(b) only located in these sub-categories if a Registered Professional Engineer Queensland with expertise in undertaking flood studies certifies that: i. the development design, siting and any mitigation measures will ensure the development is structurally adequate to resist hydrostatic, hydrodynamic and debris impact loads associated with flooding up to the defined flood event; and ii. the risk to people is managed to an acceptable level.			
PO6 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise flood recovery and economic consequences of damage during a flood.	**AO6.1** Development ensures that: (a) all areas containing essential electrical services comply with the flood planning levels in Table 8.2.11.3.D; or (b) if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors impermeable to the passage of water with all entry points and services located at or above the relevant flood planning level in Table 8.2.11.3.D. Note—A basement storage area does not include a bike storage room, change room, building maintenance storage and	✓		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	non-critical electrical services. **AO6.2** Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood provides a redundant pump system with a backup power source for those pumps.			
PO7 Development does not directly or indirectly create a material adverse impact on flood behaviour or drainage on properties that are upstream, downstream or adjacent to the development.	**AO7.1** Development: (a) does not block, or divert floodwaters for any area affected by creek/waterway or overland flow flooding, excluding storm-tide flooding and Brisbane River flooding sources; or (b) does not result in a material increase in flood level or hydraulic hazard on upstream, downstream or adjacent properties. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure	✓	The development will not cause adverse impact to upstream, downstream or adjacent properties. The development will discharge flows as per existing conditions and provide detention. Overland flow did not pass through the site prior to this development and is not expected to pass through as a consequence of this development.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	design planning scheme policy. **AO7.2** Development retains existing overland flow paths and does not rely wholly on piped solutions to manage major flows. **AO7.3** Development which creates a new overland flow path or significantly modifies an existing overland flow path via earthworks does not materially worsen hydraulic hazard on the site from existing conditions. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.			
PO8 Development for filling or excavation in an area affected by creek/waterway flooding does not directly, indirectly or cumulatively cause any material increase	**AO8** Development ensures that no filling or excavation greater than 100mm is located in the Creek/waterway flood planning area 1, 2 or 3 sub-categories if	✓	Note that this development is after the current subdivision that is occurring at the moment on site which lifts the whole site above the 1% AEP flood level.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the floodplain. Note—This can be demonstrated by undertaking earthworks in compliance with the Compensatory earthworks planning scheme policy. Note—This part of the code applies to all development other than a dwelling house and any secondary dwelling which involves filling or excavation, whether or not the development application comprises a separate development application for operational work involving filling or excavation.	contained in the 5% AEP flood extent of any Creek/waterway flood planning area sub-category for which no waterway corridor has been mapped in the Waterway corridors overlay.			
PO9 Development ensures that the building and site design: (a) maintains the conveyance capacity of existing overland flow paths and creek/waterways; (b) ensures floodwaters and flood debris can pass predominantly unimpeded under a structure or building to minimise property or building damage, including for a flood larger than the defined flood event; (c) mitigates flood impacts by ensuring	**AO9.1** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub-category: (a) complies with the minimum building undercroft clearance requirements in Table 8.2.11.3.E; (b) not located directly above any part of a waterway corridor as mapped in the Waterway corridors overlay.	✓	The development is not expected to affect the conveyance capacity of overland flow through the site.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
that filling, excavation and location of services are designed to allow for the conveyance of floodwater across the site. Note—The Flood planning scheme policy provides guidance on relevant considerations in determining minimum undercroft clearances and treatment of ground level in undercroft areas where floodwater conveyance is required underneath development.	**AO9.2** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub category: (a) has a ground level within the undercroft area is free draining; (b) does not involve excavation below ground level of more than 300mm within the undercroft area.			
PO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by flood hazard, in order to: (a) protect safety of users and emergency services personnel; (b) upport efficient emergency services access and site evacuation with consideration to the scale of development.	**AO10.1** Development for vulnerable uses, difficult to evacuate uses or assembly uses: (a) is not isolated in any event up to the relevant flood planning level specified in Table 8.2.11.3.L; or (b) has direct vehicle access to a critical route or interim critical route in the Critical infrastructure and movement network overlay for evacuation in a flood; or (c) can achieve vehicular evacuation to a suitable flood-free location.	**N/A**		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Note—A flood risk assessment may be required to address the performance outcomes or acceptable solutions which deal with evacuation and isolation arrangements, and the ability to take refuge. The Flood planning scheme policy provides information for undertaking flood risk assessments.	Note—A suitable flood-free location is of a size and nature sufficient to provide for the size and characteristics of the population likely to need evacuation to that area.			
PO11 Development has access which, having regard to hydraulic hazard, provides for safe vehicular and pedestrian movement and emergency services access to adjoining roads.	**AO11.1** Development provides an access or driveway into the site which is: (a) trafficable during the defined flood event; (b) not located in the Creek/waterway flood planning area 1 sub-category; (c) not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event; (d) the access or driveway is not inundated by a 10% AEP flood. **AO11.2** Development located in the Creek/waterway flood planning area 1, 2, 3 or 4 sub-categories locates any disabled access in the highest part of the site. Note—explanation of hydraulic hazard provided in the Flood planning scheme	A/S	The adjacent road may experience temporary overland flow blocking access to the site. This overland flow is expected to be temporary.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	policy.			
PO12 Development involving a new road, a bridge or culvert is designed to minimise impacts to flood behaviour, minimise disruption to traffic during a flood and allow for emergency access.	**AO12** Development involving a new road complies with the flood planning levels in Table 8.2.11.3.F.	**N/A**	The development does not involve a new road, a bridge or a culvert.	
PO13 Development for pedestrian and cyclist paths: (a) provides a suitable level of trafficability; (b) manages the impacts of flooding on asset life and ongoing maintenance costs; (c) balances route availability with recreational and transport connectivity benefits to the city.	**AO13.1** Development for cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, are located above the 39% AEP (2 year ARI) flood immunity from all flooding sources. Note—If the site is subject to more than one type of flooding, the requirement that affords the greatest level of protection will apply. **AO13.1** All new on-road cyclist and pedestrian facilities comply with the flood planning levels and trafficability standards for the applicable category of road in Table 8.2.11.3.F or Table 8.2.11.3.K.	**N/A**	Development of cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, will be located above the 39% AEP (2 year ARI) flood immunity from all flooding sources.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO14 Development which increases the residential population within the Brisbane River flood planning area sub-categories minimises the risk to people in all flood events with consideration to flood hazard, including warning time.	**AO14** Development in the Brisbane River flood planning area sub-categories in areas where the residential flood level is greater than 12.8m AHD involving: (a) an increase in the number of residential dwellings; or (b) additional residential lots; or (c) is not subject to an unsafe hydraulic hazard in the 0.2% AEP flood event. Note—Explanation of a hydraulic hazard is provided in the Flood planning scheme policy.	**N/A**		
Additional criteria for essential community infrastructure				
PO15 Development involving essential community infrastructure: (a) remains functional to serve community need during and immediately after a flood event, or is part of a network that is able to maintain the function of the essential community infrastructure when parts of the development are unable to function during or after a flood; (b) is designed, sited and operated to avoid adverse impacts on the community or the environment due to the impacts of flooding on infrastructure, facilities or access and egress routes;	**AO15** Development involving essential community infrastructure: (a) is ancillary to and not relied upon for the provision of the essential service during a flood; or (b) is located above the flood planning levels in Table 8.2.11.3.G; (c) has access to or provides the necessary back-up emergency electricity and communications supply in times of flood; (d) is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the flood event	**N/A**		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
(c) is able to remain functional or is part of a network which is able to remain functional even when other infrastructure or services (such as electricity supply) may be compromised in a flood event; (d) contains mitigation measures which are not entirely dependent on human activation to respond to a flood event. Note—Protection of function is required up to and including the flood event in Table 8.2.11.3.G.	listed for the development type in Table 8.2.11.3.G; (e) that services a local area: i. is able to be accessed in times of flood to service local community needs up to the event listed for that development type in Table 8.2.11.3.G; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood prone areas planning scheme policy and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood prone areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.			
Additional criteria if development involves the processes in Table 8.2.11.3.H				
PO16 Development involving the storage and handling of hazardous materials avoids or minimises risks to public health and safety and the environment, by: (a) protecting underground tanks for hazardous materials against the forces of	**AO16** (a) Development does not include the storage or handling of hazardous chemicals that are equivalent to or exceed the threshold quantities in Table 8.2.11.3.M. (b) Development involving the processes	**N/A**		

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
buoyancy, velocity flow and debris impacts; (b) securing above-ground tanks for hazardous materials against flotation and lateral movement; (c) preventing damage to hazardous materials pipework or entry of floodwater into hazardous materials pipework; (d) preventing damage to or off-site release of packages, drums or containers storing hazardous materials. Note—A chemical hazards flood risk report prepared in accordance with the Management of hazardous chemicals in flood prone areas planning scheme policy can assist in demonstrating achievement of this performance outcome. Note—A pump drainage system is not an acceptable measure to meet the performance outcome.	listed in Table 8.2.11.3.H: i. where located in the Flood overlay area, occurs only in the Creek/waterway flood planning area 5 sub-category or the Brisbane River flood planning area 5 sub-category; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood prone areas planning scheme policy and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood prone areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.			

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Additional criteria for reconfiguring a lot				
PO17 Development locates and designs all lots resulting from reconfiguring a lot to: (a) minimise the risk to people from flood hazard; (b) minimise damage to property from flood hazard; (c) facilitate safe and efficient evacuation. Note— • Consideration of all floods up to the probably maximum flood is relevant to minimising the risk to people. • Flood warning time is not considered sufficient in the Creek/waterway planning area sub-categories or the Overland flow flood planning area sub-category. • Filling above the flood planning level for a flood event greater than the defined flood event cannot be assumed to mitigate the flood hazard.	**AO17.1** Development creating new lots is to comply with Table 8.2.11.3.I. **AO17.2** Development provides for reconfiguring a lot design that achieves a road and lot layout which: (a) provides trafficable vehicular egress for evacuation during a defined flood event; (b) optimises hazard-free movement away from sources of flood hazard within the development. Note—Further advice on road and lot layout is contained in the Flood planning scheme policy. **AO17.3** Development which creates a new residential lot in an area subject to Brisbane River flooding, if the residential flood level is greater than 12.8m AHD is not subject to a hydraulic hazard greater than 0.6m^2/s DV or 0.6m deep in a 0.2% AEP flood. Note—Refer to the Flood planning scheme policy for further explanation on the 0.2% AEP flood.	**N/A**	No reconfiguration of a lot.	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO18 Development involving reconfiguring a lot: (a) minimises the risk to people from flood hazard; (b) creates safe evacuation routes or avoids isolation of the development during a flood greater than the defined flood event; (c) minimises damage to property and services; (d) provides lots and roads that are not frequently flooded or subject to nuisance ponding or seepage; (e) ensures lots created for park or private open space minimise the risk to people from flood hazard and are fit for purpose; (f) provides a lot that is not substantially burdened by flood mitigation infrastructure.	**AO18.1** Development involving reconfiguring a lot ensures: (a) all lots comply with the flood planning levels in Table 8.2.11.3.J; (b) a new road complies with the flood planning levels in Table 8.2.11.3.F. **AO18.2** Development involving reconfiguring a lot creating more than 6 residential lots or a lot for industry ensures the flood planning levels of a dedicated road fronting the development or providing primary access within 200m of the development: (a) complies with Table 8.2.11.3.K; or (b) has acceptable trafficability in accordance with the requirements in the Flood planning scheme policy and the Queensland Urban Drainage Manual. Note—The Flood planning scheme policy contains supporting information about trafficability on existing roads and serviceability during floods. **AO18.3** Development protects the conveyance of flood hazard area by providing an easement over the: (a) 2% AEP flood extent for overland flow	**N/A**	No reconfiguration of a lot	

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	flooding; (b) 1% AEP flood extent for creek/waterway flooding.			

1. Solution: ✓ = Acceptable Solution
A/S = Alternative Solution
N/A = Not applicable to this Proposal