Structural Civil Flood

Engineering Services Report

St George Community Housing Limited C/- Colab Projects

41 & 49 Plaza Place

Carseldine

Job Reference Number – 10898

Date: 21 August 2024

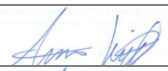
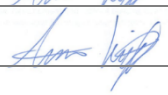
PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2024/1537

Date: 25 November 2024

Queensland Government

Document Status

Rev No	Author	Reviewer	Approved for Issue			
			Name	Signature	Date	RPEQ #
01	C. Omlid	A. Knight	A. Knight		19.07.24	
02	C. Omlid	A. Knight	A. Knight		16.08.24	28220
03	C. Omlid	A. Knight	A. Knight		24.08.24	28220

Distribution

Rev No	Date	Issue	Issued To	Format
01	19.07.24	Draft	Buildcorp, Colab Projects	PDF / E
02	16.08.24	For Approval	Buildcorp, Colab Projects	PDF / E
02	24.08.24	For Approval	Buildcorp, Colab Projects	PDF / E

TABLE OF CONTENTS

APPENDICES

APPENDIX A – ARCHITECTURAL PLANS

APPENDIX B – SURVEY PLAN

APPENDIX C – CIVIL WORKS DRAWINGS

APPENDIX D – ESTATE STORMWATER DOCUMENTATION

APPENDIX E – EROSION HAZARD ASSESSMENT

APPENDIX F – BRISBANE CITY COUNCIL CODES

1 Introduction

1.1. Purpose and Scope

Inertia Engineering has been commissioned by St George Community Housing Limited C/- Colab Projects to prepare an Engineering Services Report for the proposed development at 41 & 49 Plaza Place, Carseldine (the subject site). This report will support the development application submitted for the proposed development. The site layout and elevations are shown on the architectural plans in Appendix A.

This report addresses stormwater management (quality and quantity) during the construction and operational phases of the proposed development. It also demonstrates conceptually how the development can be serviced by water, sewer, and other infrastructure such as gas, electricity, and telecommunications. Responses to relevant Brisbane City Council (BCC) codes have been prepared.

The required detailed design for the service infrastructure will be subject to the conditions (if any) attached to the Development Approval to be provided by Council and any nominated referral agencies.

This report has been prepared in accordance with the *State Planning Policy* (SPP, 2017), *Queensland Urban Drainage Manual Fourth Edition 2016* (QUDM, 2016) and Brisbane City Council's City Plan (2014).

Throughout this report the developable area is referred to as the ‘site’ which is Lot 2049 & 2050 on SP311913.

1.2. Report Limitations

This report has been prepared by Inertia Engineering Pty Ltd for St George Community Housing Limited C/- Colab Projects and may only be used and relied on by St George Community Housing Limited C/- Colab Projects for the purpose agreed between Inertia Engineering and St George Community Housing Limited C/- Colab Projects as detailed within this report.

Inertia Engineering otherwise disclaims responsibility to any person other than St George Community Housing Limited C/- Colab Projects arising in connection with this report. Inertia Engineering also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by Inertia Engineering in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Inertia Engineering has no responsibility or obligation to update this report to account for events or changes occurring after the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Inertia Engineering described in this report. Inertia Engineering disclaims liability arising from any of the assumptions being incorrect.

Inertia Engineering has prepared this report based on information provided by St George Community Housing Limited C/- Colab Projects and others who provided information to Inertia Engineering (including Government authorities), which Inertia Engineering has not independently verified or checked beyond the agreed scope of work. Inertia Engineering does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2 Site Characteristics

The land contained within the site is described as follows:

Title Details:	Lot 2049 & 2050 on SP311913
Street Address:	41 & 49 Plaza Place, Carseldine
Area:	Total: 4270 m^2

Refer to Appendix B for Survey Plan / BYDA information.

2.1. Location

The subject site is located in Carseldine, approximately 13km north from Brisbane CBD. The site occupies a total of 4270m^2 and lies within Emerging Community zone. The site is bound by car parking to the south, vegetation to the north and west, and Plaza Place to the east.

Figure 2-1 - Location Plan

2.2. Topography

The site sits generally between 14.5m and 15m AHD, with a small portion in the middle of the site at 16m AHD.

2.3. Existing Services

Detailed survey by Land Partners, 'Before You Dig Australia' (BYDA) data and as-constructed data covering the existing infrastructure services and utilities for the site and surrounding area has been obtained to determine any infrastructure required for the development. This existing infrastructure is outlined in the following sections.

2.3.1. Stormwater

Stormwater infrastructure has been constructed as part of the estate masterplan. The drainage within Plaza Place fronting the site includes two kerb inlet pits draining via a 375mm dia connection to the twin 1350mm dia stormwater pipes running along Plaza Place. The survey has not identified any stormwater infrastructure within the site.

Note that the location of the stormwater network external to the site has been determined from estate civil plans, included in Appendix D.

2.3.2. Sewer

There is an existing 160mm PE sewer line in Plaza Place with two 160mm sewer property connections, one for each lot.

Note that the location of the sewer network external to the site has been determined from the BCC Urban Utilities mapping service.

2.3.3. Water

There is a 150mm PE water main along Plaza Place. Urban Utilities mapping does not identify water property connections.

Note that the location of the water network external to the site has been determined from the BCC Urban Utilities mapping service and Stage 5 civil drawings, included in Appendix D.

2.3.4. Electrical/Gas/Telecommunications

There is NBN, TPG, and Energex within close proximity to the site.

Note that the location of infrastructure external to the site has been determined from BYDA data.

3 Proposed Development

The proposed site consists of two six-storey towers with a total of 152 units across both towers. Refer to Figure 3-1 for the proposed development layout.

Refer to Appendix A for the proposed site layout and elevations.

Figure 3-1 - Proposed Development

4 Flooding

The subject site is mapped as being subject to BCC creek/waterway flood planning areas 5, 4, and 3 as per Council flood overlays. This flood overlay is now out of date since the estate has been developed, which included filling within the mapped overlays. Flood modelling has been completed on the Carseldine Village development, conducted as per the DesignFlow stormwater management plan (2019). This report details a redirection of flows around the site as part of the development masterplan, and as a result the site is considered to be flood-free. Refer to Appendix D for technical memorandums and flood reports previously completed on the site.

Notwithstanding, the site is situated near an overland flow path. Under the estate civil works, a drainage channel which runs along the rear of the site which was constructed. Refer to Appendix D for the drainage channel drawings. The site's minimum levels have been set to provide flood immunity to the overland flow in this drainage channel. According to Table 8.2.11.3.L of the BCC Planning Scheme for overland flow, this sets the minimum flood levels as per Table 4-1.

Table 4-1 - Minimum Floor Level Requirements

Category	Minimum level requirement	2% AEP Flood level (m AHD)	Minimum Floor level (m AHD)
Habitable floor level	2% AEP flood level + 500mm	15.38	15.88
Car parking	2% AEP flood level	15.38	15.38

The floor levels requirements noted above are based upon the upstream chainage of the overland flow path. There is opportunity to adopt lower FFLs at the lower reaches of the overland flow path.

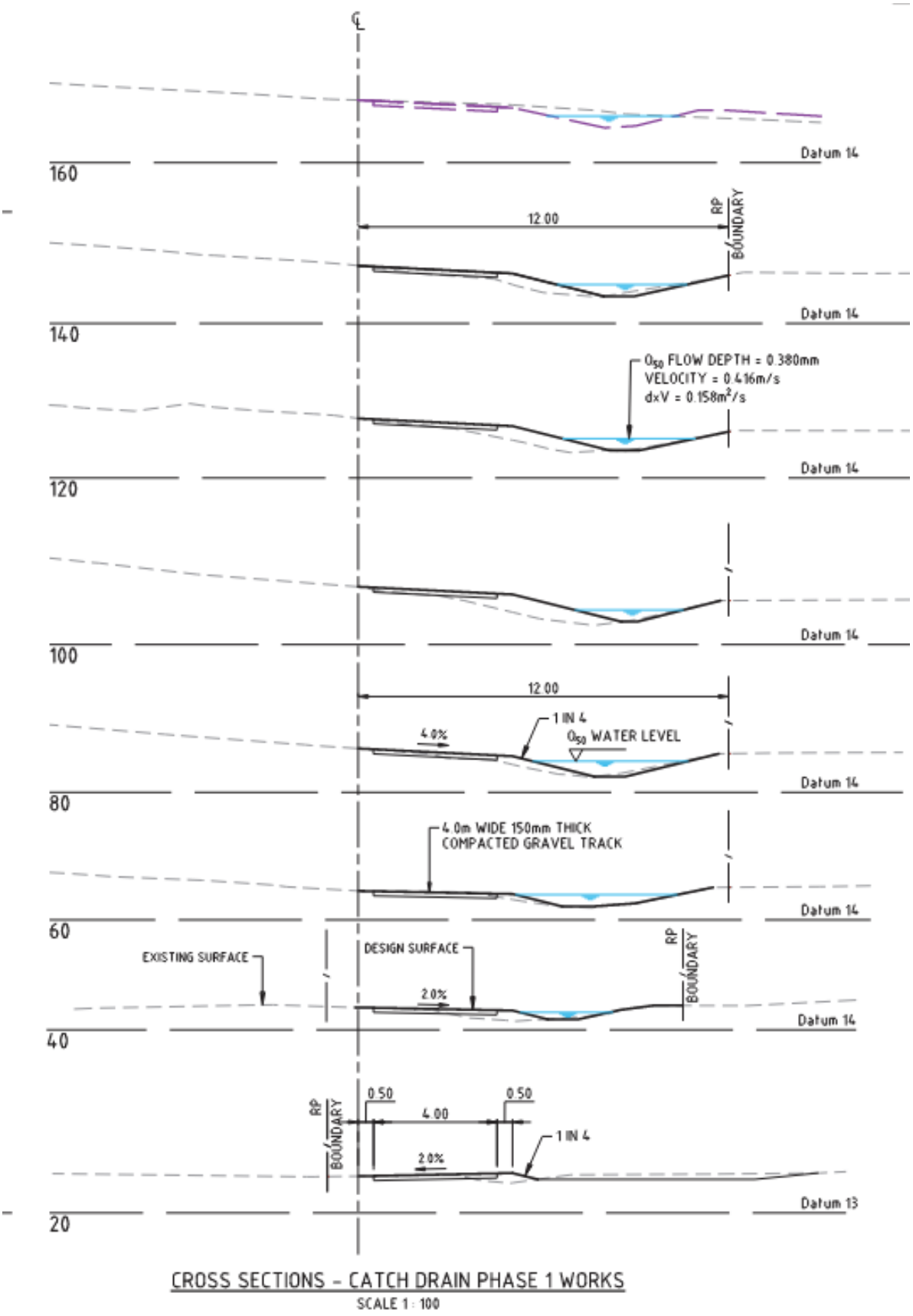


Figure 4-1 - Drainage channel (Drawing No: 22-106-07 Rev A KN Group)

5 Filling and Excavation

5.1. Earthworks

It is proposed that after adequate pre-construction sediment and erosion control measures have been implemented, the required demolition will occur with the safe removal of any material off site. Earthworks for the proposed development will occur with batters preferred (where possible) in place of retaining walls. Any required retaining walls are proposed to be reinforced block work or as nominated by the architectural design drawings. Any proposed fill retaining walls are recommended to be offset half the height of the wall from any site boundary.

The proposed pad level for the building is RL 15.90m and will require a maximum of approximately 1.0m of fill to achieve the design levels. Refer to Appendix C which shows a schematic of the earthworks proposed for the site.

In all situations where earthworks are proposed and any ground is disturbed by construction works, sediment and erosion control measures will be implemented in accordance with the following documents:

- Relevant BCC sediment and erosion control guidelines;
- International Erosion Control Association (IECA) Sediment and Erosion Control Guidelines; and
- Australian Standards AS 3798-2007.

Given that the site is below RL 20m AHD, the proposed development is considered to be prospective land for the existence of acid sulphate soils (ASS). As such, an acid sulphate soil investigation will need to be carried out by a geotechnical/environmental engineer for the site to confirm the potential presence of acid sulphate soils. If present, an acid sulphate soils management plan will be prepared.

As a Material Change of Use application is required, any filling and excavation including retaining works is to comply with BCC's Filling and Excavation code. Responses to BCC's Filling and Excavation Code are shown in Appendix E.

5.2. Erosion and Sediment Control Measures

5.2.1. Pre-Development

Prior to construction, the following erosion and sediment control measures will be implemented to minimise disturbance and ensure water quality is maintained:

- Set out transport routes to ensure minimal vegetation disturbance;
- Construct entry/exit areas that comprise a designed gravel pad or hardwood logs in accordance with the IECA (2001); and
- Install sediment fences around the proposed bulk earthworks site (along toe of batter alignment).

5.2.2. Bulk Earthworks

- Earthworks areas are to be protected against wind and water erosion;
- Silt fences are to be erected around the base of the earthworks and material stockpiles;
- Stockpiles and construction material are not permitted to be stored within the road reserve; and,
- Diversion drains to be provided at upstream catchments to reduce flows onto earthworks areas.

5.2.3. Construction

The following measures will be undertaken to mitigate water quality impacts during the construction phase:

- Sediment fences to be erected at the base of all batters and stockpiles to prevent sediment transportation off site;
- Grass filter strips to be placed along all road verges;
- Re-vegetation of all disturbed areas within two weeks of completion;
- All sediment control structures to be maintained in an effective manner and inspected after each storm event. No structure is to accumulate sediment above 40% of its capacity;
- Dust producing areas to be swept to remove silt/dust and wetting of roads is only permitted where sweeping has failed; and
- At least one bin or litter trap is to be provided for waste material.

5.2.4. Post-Development-Maintenance Period

Sediment fences are to remain in place until the landscaping has established.

5.2.5. Performance Objectives and Indicators

The State Planning Policy July 2017 states the desired stormwater outcomes shown in Table 1. stormwater runoff during the construction phase must be in accordance within the concentration ranges shown in Table 5-1 below.

Table 5-1 - Construction Phase Objectives

Issue	Desired outcomes
Drainage control	1. Manage stormwater flows around or through areas of exposed soil to avoid contamination. 2. Manage sheet flows in order to avoid or minimise the generation of rill or gully erosion. 3. Provide stable concentrated flow paths to achieve the construction phase stormwater management design objectives for temporary drainage works. 4. Provide emergency spillways for sediment basins to achieve the construction phase stormwater management design objectives for emergency spillways on temporary sediment basins.
Erosion control	1. Stage clearing and construction works to minimise the area of exposed soil at any one time. 2. Effectively cover or stabilise exposed soils prior to predicted rainfall. 3. Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised using methods which will achieve effective short-term stabilisation.
Sediment control	1. Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk. 2. All exposed areas greater than 2500 metres^2 must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).
Litter, hydrocarbons and other contaminants	1. Remove gross pollutants and litter. 2. Avoid the release of oil or visible sheen to released waters. 3. Dispose of waste containing contaminants at authorised facilities.
Waterway stability and flood flow management	1. Where measures are required to meet post-construction waterway stability objectives (specified in table B), these are either installed prior to land disturbance and are integrated with erosion and sediment controls, or equivalent alternative measures are implemented during construction. 2. Earthworks and the implementation of erosion and sediment controls are undertaken in ways which ensure flooding characteristics (including stormwater quantity characteristics) external to the development site are not worsened during construction for all events up to and including the 1 in 100 year ARI (1% AEP).

5.3. Monitoring and Maintenance

The following monitoring and maintenance procedures are to be undertaken by the site supervisor during all phases of the development:

- Restrict all work activities to designated construction areas;
- Earthworks and site cleaning are undertaken in accordance with the Erosion and Sediment Control plans;
- Inspections of Stormwater and Sediment and Erosion Controls are to be conducted at the end of each construction day and after each rainfall event (>25mm); and
- Any failure to the stormwater system shall be immediately rectified to prevent uncontrolled discharge from the site.

6 Stormwater Management

6.1. Objectives

The stormwater management objectives have been set in accordance with QUDM (2016) and BCC City Plan (2014), including but not limited to:

- The proposed development shall ensure that all stormwater drainage is directed to a lawful point of discharge in accordance with QUDM Section 3.9 (2016);
- No adverse impact on adjoining or downstream properties; and
- Water quality treatment to achieve the SPP water quality objectives.

6.2. Overall Stormwater Management

The overall stormwater management strategy consists of the following:

- Estate stormwater is treated by biobasins as part of the larger development. Stage 3 (the development site) is to be treated by bioretention basin B2 to the south, discharging to Cabbage Tree Creek, meeting the state water quality targets for the site.
- Stormwater runoff for a fully developed site was considered as part of the estate flood modelling. Modelling shows improved flooding conditions due to the site draining directly to the creek and other flood mitigation measures (such as flood barriers and the use of the sports field as flood storage). Therefore, no stormwater detention is proposed.
- Minor flows to be taken by underground pipes, and overland flows for major events as per Calibre Group drawings (refer to Appendix D).

Refer to "Carseldine Urban Village Updated Stormwater Management Plan" (2019) by DesignFlow included in Appendix D for further details.

6.3. Lawful Point of Discharge

The nominated lawful point of discharge for the site is the two existing kerb inlet pits within Plaza Place. Refer to Appendix D for the stormwater infrastructure drawings.

6.4. Stormwater Quantity Management

6.4.1. Stormwater Quantity Calculations

The Rational Method was used to estimate the site flow for both the existing and developed site conditions.

Existing Conditions

The subject site consists of two catchments.

- EX1 (0% impervious, 2250m^2) – Ground discharging to the drain along the rear of the site as sheet flow

- EX2 (0% impervious, 1720m^2) – Ground discharging to Plaza Place as sheet flow

The total fraction impervious for the existing catchment is 0%. Note that the existing catchment includes the site only and does not include any external areas.

Table 6-1 – Existing Site Flows (EX1 to rear of site)

Parameters	Units	Design Storm Event (yr ARI)						
		1	2	5	10	20	50	100
Catchment Area	ha	0.255						
Time of Concentration	min	19.0						
Runoff Coefficient (Cy)		0.53	0.56	0.63	0.66	0.69	0.76	0.79
Rainfall Intensity (Iy)	mm/hr	71.24	80.41	108.82	127.81	146.15	170.05	188.08
Peak Flow	L/s	27	32	48	60	72	91	106

Table 6-2 – Existing Site Flows (EX2 to Plaza Place)

Parameters	Units	Design Storm Event (yr ARI)						
		1	2	5	10	20	50	100
Catchment Area	ha	0.172						
Time of Concentration	min	20.0						
Runoff Coefficient (Cy)		0.53	0.56	0.63	0.66	0.69	0.76	0.79
Rainfall Intensity (Iy)	mm/hr	69.42	78.35	106.05	124.57	142.47	165.81	183.44
Peak Flow	L/s	18	21	32	39	47	60	69

Developed Conditions

Under developed conditions, there are two internal catchments:

- C1 (90% impervious, 2106m^2) – Northern portion of the site discharging to Plaza Pl stormwater infrastructure
- C2 (90% impervious, 2164m^2) – Southern portion of the site discharging to Plaza Pl stormwater infrastructure

The total fraction impervious of the developed catchment is 90%. Note that the developed catchment includes the site only and does not include any external areas.

Table 6-3 – Developed Site Flows (C1)

Parameters	Units	Design Storm Event (yr ARI)						
		1	2	5	10	20	50	100
Catchment Area	ha	0.211						
Time of Concentration	min	6.0						
Runoff Coefficient (Cy)		0.68	0.73	0.81	0.86	0.90	0.98	1.00
Rainfall Intensity (Iy)	mm/hr	109.75	123.89	167.96	197.63	226.47	264.38	293.22
Peak Flow	L/s	44	53	80	99	119	152	172

Table 6-4 – Developed Site Flows (C2)

Parameters	Units	Design Storm Event (yr ARI)						
		1	2	5	10	20	50	100
Catchment Area	ha	0.216						
Time of Concentration	min	6.0						
Runoff Coefficient (Cy)		0.68	0.73	0.81	0.86	0.90	0.98	1.00
Rainfall Intensity (Iy)	mm/hr	109.75	123.89	167.96	197.63	226.47	264.38	293.22
Peak Flow	L/s	45	54	82	102	122	156	176

External Upstream Catchments

There are no upstream catchments due to the installation of the concrete drain to the rear of the site, which diverts any upstream flows from the existing vegetation around the site.

6.4.2. Stormwater Detention Requirements

In accordance with the BCC City Plan Schedule 6 - Section 7.5.2 (2014), stormwater detention may be required under three specific conditions:

- When a development is likely to increase run-off to such an extent that the downstream drainage (both piped and overland) cannot cater for the additional capacity or adverse impacts are created;
- Where there is no practical way to increase the downstream system capacity; and
- If the increase in flows from the development would cause adverse flooding impacts to adjacent or downstream properties.

The BCC City Plan (2014) then continues to state that stormwater detention requirements may be waived where:

- The development will not cause adverse impacts or actionable nuisance to surrounding properties;
- The site discharges directly into the lower catchments of creeks or major drains where it would generally be undesirable to have detention where it may allow peak flows from the site to coincide with the wider catchment flood peak;
- The proposal is for residential development where stormwater is disposed to Council's kerb and channel or piped stormwater system and major flows from the site would drain to Councils road reserve.

Flood modelling for the "Carseldine Urban Village Updated Stormwater Management Plan" (2019) by DesignFlow (refer to Appendix D) has accounted for a 90% impervious area developed area for the catchment in which 41 & 49 Plaza Street sits. As the proposed developed case for the site is 90% impervious, this sits within the assumptions made within the 2019 stormwater management report. As per Section 5.3.3, *"Flood impact maps demonstrate no significant adverse impacts occurring*

external to the site as a result of the development". Despite the overall loss of flood storage across the development of Carseldine Village, flood modelling indicates no adverse impacts due to the site's relatively minor impact compared to the creek catchment and other flood mitigation devices such as using the sports field as flood storage.

Therefore, as the site discharges directly into the lower catchments of Cabbage Creek and flood modelling has indicated no adverse impacts due to development, no stormwater detention is proposed.

6.4.3. Stormwater Infrastructure

Stormwater infrastructure was constructed as part of the larger Carseldine Urban Village development. Refer to Appendix D for Calibre Group stormwater drainage plans.

This stormwater infrastructure includes two connection points of 375mm dia pipes, one for each existing lot. These connect to twin 1530mm dia pipes within Plaza Place, which discharge to the biobasin to the south. These pipes have been designed for a 90% impervious developed site. According to the Calibre Group drawings, these stormwater pipes have been designed for the Q2 event. A capacity assessment has been completed as per Table 4-1 to show the existing stormwater infrastructure has sufficient capacity to convey post-developed site runoff. Refer to Calibre Group stormwater drawing *1401-RevB* in Appendix D for further details of the existing stormwater infrastructure.

Table 6-5 - Pipe Capacity Check

Pipe ID	Size (mm dia)	Slope	Capacity at Grade (L/s)	Calculated Inflow (10% AEP)
G1/AH (LPOD1)	375	2.03%	250	99*
6/AA (LPOD1)	2x1350	0.2%	4600	2782**
G1/AG (LPOD2)	375	1.39%	207	102*
5/AA (LPOD2)	2x 1350	0.2%	4600	2940**

**Rational method calculations from Section 6.4.1*

*** From Calibre Group Stormwater drawings*

6.5. Stormwater Quality Management

6.5.1. Introduction

The operational phase of the management plan focuses on appropriate consideration of Stormwater Quality Improvement Devices and Water Sensitive Urban Design (WSUD) principles to be incorporated into the total water cycle management of the developed site.

The State Planning Policy (2017) states for a proposed material change of use that involves a site area greater than 2,500m^2 and will result in an impervious area greater than 25% a Site Based Stormwater Quality Management Plan is required.

6.5.2. Pollutants

Pollutants typically generated during the operational phase of the development are shown below (BCC, 2015).

Table 6-6 – Pollutants typically generated during the operational phase

Pollutant	Sources
Litter	Construction, construction, food waste materials
Sediment	Exposed soils and stockpiles
Oxygen demanding substances	Organic or chemical matter
Nutrients (N & P)	Nitrogen, phosphorus
Pathogens / Faecal coliforms	Sewerage
Hydrocarbons	Fuel and oil spills
Heavy metals (with fine sediment)	Sediment runoff
Surfactants	Detergents from car washing, cleansing agents
Organochlorines & organophosphates	Pesticides, herbicides
Thermal pollution	Heat (i.e. runoff from impervious areas)
pH altering substances	Washwaters

6.5.3. Water Quality Objectives

The State Planning Policy (2017) sets out the following water quality objectives for South East Queensland in order to protect downstream receiving waters:

- Total Suspended Solids (TSS) 80% reduction
- Total Phosphorus (TP) 60% reduction
- Total Nitrogen (TN) 45% reduction
- Gross Pollutant (>5mm) 90% reduction

The percent reductions listed above are the target reductions for comparing mitigated site annual pollutant loads with unmitigated site annual pollutant loads. The proposed treatment strategy selected for the development will ensure these objectives are met for all pollutants.

6.5.4. Proposed Treatment Strategy

As per the "Carseldine Urban Village Updated Stormwater Management Plan" (2019) stormwater management report by DesignFlow, the site is treated as part of the development as a whole, with the site runoff being treating by bioretention basin B2 to meet the state planning policy water quality objectives, located to the south of the site. This bioretention basin discharges to Cabbage Tree Creek.

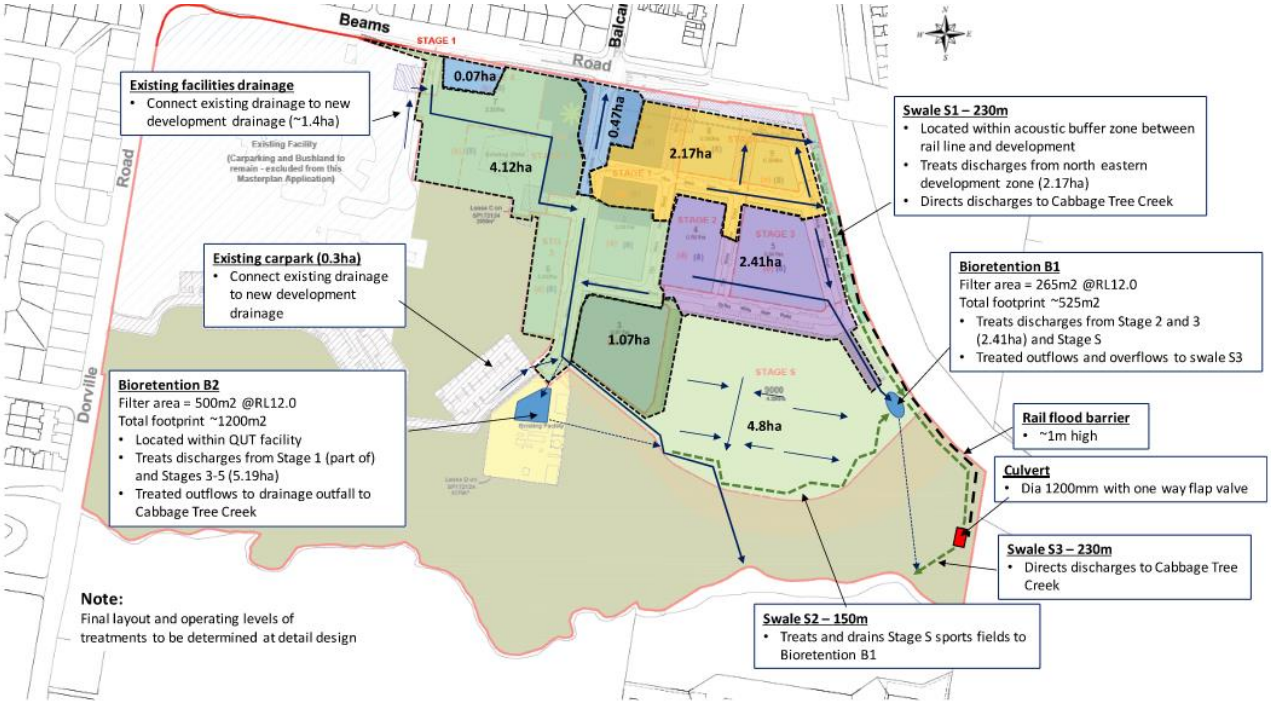


Figure 5 Stormwater Management Strategy Carseldine Urban Village

Figure 6-1 - Carseldine Urban Village Overall Stormwater Management Plan (DesignFlow 2019)

As such, no further on-site stormwater quality management is proposed for the development.

7 Services, Works, and Infrastructure

7.1. Policies

The internal sewerage and water reticulation works proposed within the development will comply with the following documents:

- AS 3500.2 Plumbing and Drainage – Sanitary plumbing and drainage; and
- AS 3500.1 Plumbing and Drainage – Water Services.

All privately owned water supply infrastructure will be designed in accordance with the relevant plumbing and drainage standards to ensure adequate connection to the UU owned water reticulation main. Any live works will comply with the following documents:

- Relevant UU development guidelines & standard drawings;
- SEQ WS&S D&C Code – Amendment to Sewerage Code of Australia; and
- Water Association of Australia (WSAA) Sewerage Code of Australia guidelines and standard drawings.

7.2. Sewerage Reticulation

The site is to connect to the existing 160mm dia. sewer property connections, serviced by the existing 250mm dia. PE water within Plaza Place.

A 2018 SAN placed with UU by Calibre Consulting, refer to Appendix D, for connection to the existing sewer network as well as a wastewater network report for the Carseldine Village development. The SAN shows the network had adequate capacity for the development.

Note that the suitability of this proposed connection point is subject to discussions with UU to be undertaken at the Operational Works stage.

Detailed sewer reticulation drawings will be provided as part of the future Operational Works for civil works application once the development application has been approved by Council.

Please refer Appendix C which illustrates the schematic services layout.

7.3. Water Reticulation

A 250mm PE water main is under construction as part of Stage 5 to the north of the site. A new property connection is to be constructed to connect to this proposed main to service the development.

A 2018 SAN placed with UU by Calibre Consulting, refer to Appendix D, for connection to the existing water network as well as a wastewater network report for the Carseldine Village development. The SAN shows the network had adequate capacity for the development.

Note that the suitability of this proposed connection point is subject to discussions with UU to be undertaken at the Operational Works stage.

Any works connections to the existing water main shall be carried out by UU at the cost of the applicant unless written permission is granted for connection to be made by a nominated contractor. The contractor shall take all precautions to minimise inconvenience to the residences serviced by the existing water infrastructure.

Detailed water reticulation drawings will be provided as part of a future Operational Works for civil works application once the development application has been approved by Council.

Please refer to Appendix C which illustrates the proposed services layout.

7.4. Electricity, Communications and Gas

Electricity, gas, and telecommunication infrastructure is available in the near vicinity of the subject site. Although the capacity of these existing services has not been determined, it is anticipated that the availability of these services and the required capacity for the proposed development should not pose an issue to the completion of the project.

The developer or an electrical consultant should contact the NBN during the Operational Works phase to confirm their requirements for the development.

Please refer to Appendix C for an illustration of the proposed services layout.

8 Conclusions and Recommendations

This Engineering Services Report has assessed the stormwater management, earthworks, and service infrastructure for the proposed development at 41 & 49 Plaza Place, Carseldine. Earthworks, erosion, and sediment control solutions required on site can be performed using common and accepted methods. It is noted that the proposed earthworks will trigger retaining works which will have to be constructed according to BCC codes.

The stormwater management strategy has the following components:

- Site to discharge to existing stormwater infrastructure in Plaza Place. The infrastructure within Plaza Place has been designed to accommodate the developed site flows.
- Site stormwater is treated by the existing bioretention basin to the south, constructed as part of the estate works.
- Flood modelling for the entire estate considers a fully developed site and shows no adverse impacts on the downstream creek flooding, and thus no stormwater detention is proposed.

The proposed civil services strategy has the following components:

- Re-use of the existing sewer connections to infrastructure available within Plaza Place.
- Construct new property service connection to the water main to the north of the site under construction as part of Stage 5.

Service supply points for water and sewer reticulation, electricity, telecommunications and gas are located within close proximity to the proposed development and should not present any major connection issues.

This report has demonstrated that the proposed development proposal provides an acceptable solution for all engineering services and has been designed to comply with BCC's City Plan (2014).

9 References

AS/NZS (2003) Australian Standards/New Zealand Standards, 'Plumbing and Drainage – Part 1: Water Services', 2003

AS/NZS (2003) Australian Standards/New Zealand Standards, 'Plumbing and Drainage – Part 2: Sanitary Plumbing and Drainage', 2003

BCC (2014) Brisbane City Council, Guidelines and Standards

- Filling and Excavation Code
- Infrastructure Design Code
- Stormwater Code

Department of State Development, Infrastructure and Planning (2017), State Planning Policy

Institute of Public Works Engineering Australasia, Queensland Division (2016), Queensland Urban Drainage Manual Fourth Edition 2016 – Provisional

SEQ WS&S D&C Code (2013), 'South East Queensland Water Supply & Sewer Design & Construction Codes – Amendments to Water & Sewerage Codes of Australia, 2013

WSAA (2002) Water Services Association of Australia, 'Water Supply Code of Australia – Part 1: Planning and Design', 2002

WSAA (2002) Water Services Association of Australia, 'Sewerage Code of Australia – Part 1: Planning and Design', 2002

Appendices

Appendix A – Architectural Plans

DKO

41-49 Plaza Place Carseldine

DEVELOPMENT APPLICATION
19/08/2024

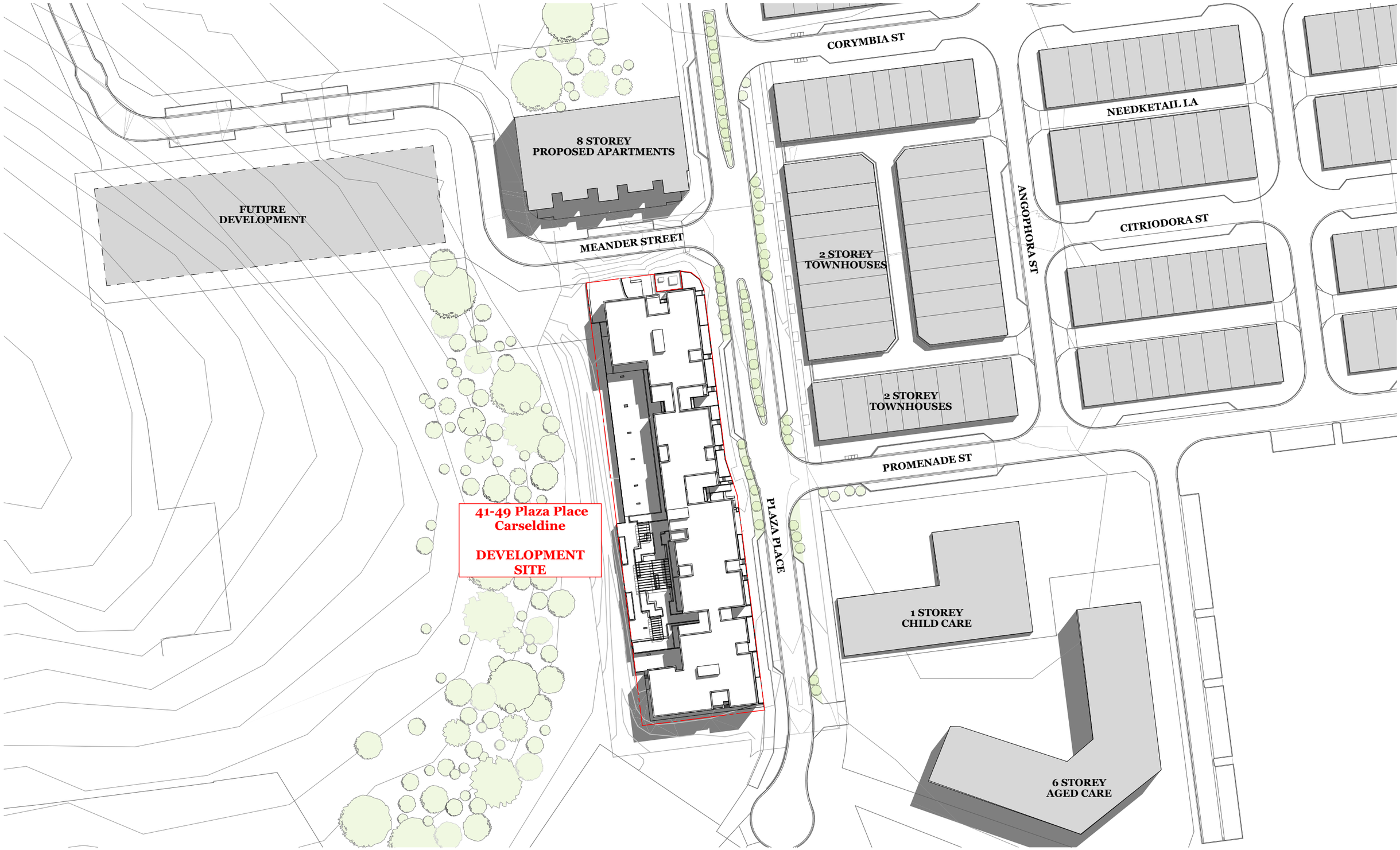
DKO

DKO Architecture (QLD) Pty Ltd
Level 3, 232 Adelaide Street
Brisbane, QLD 4000
ABN: 61413783636

T +61 7 3726 9588
info@DKO.com.au
www.DKO.com.au

Project Name	CARSELDINE COMMUNITY HOUSING
Project Number	00013408
Date	19/08/2024
Scale	@A3
Drawing Name	Indicative Massing
Drawing Number	**DA220**
Revision	**A**

Plans
Site Plan

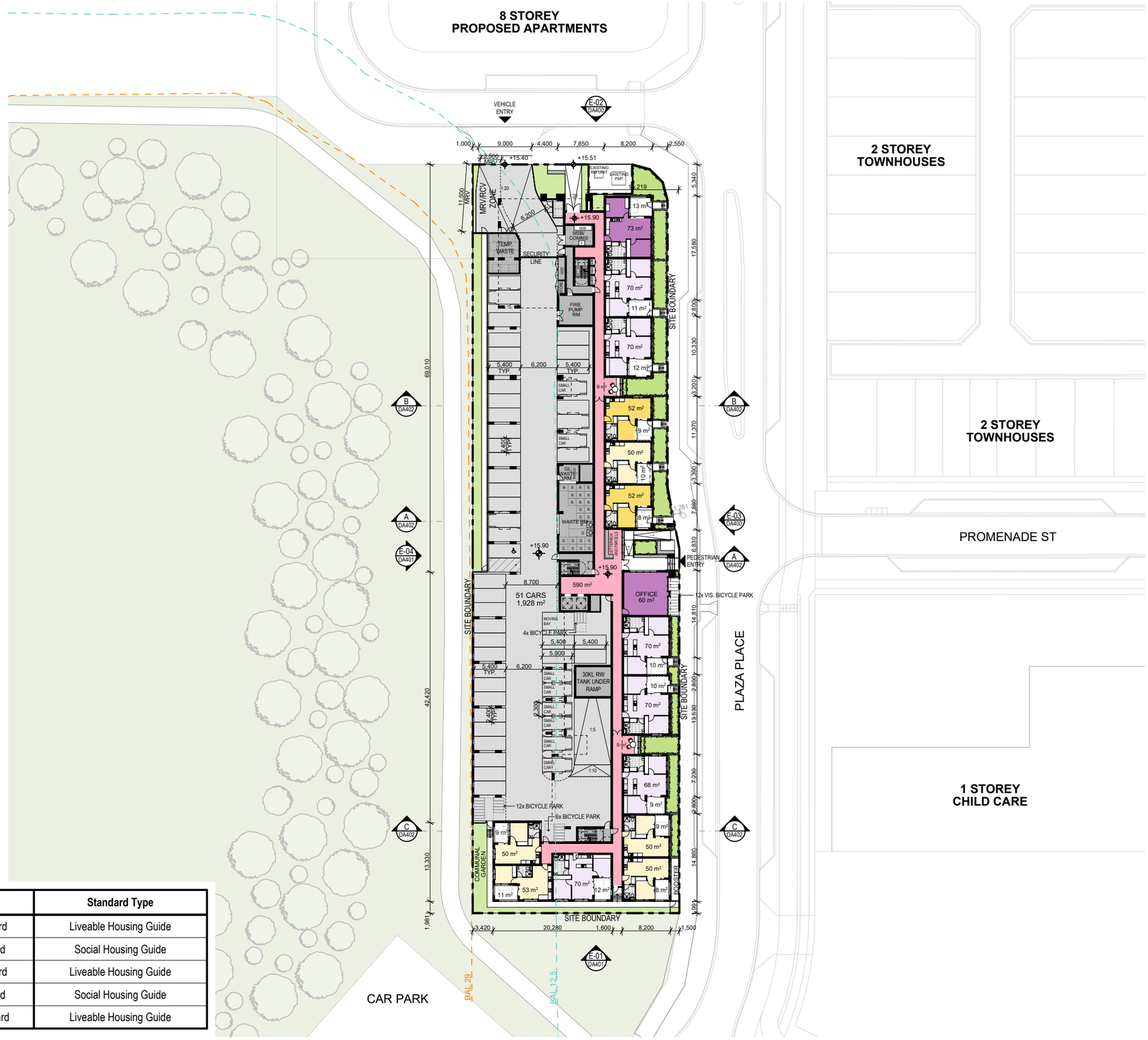


DKO Architecture (QLD) Pty Ltd
Level 3, 232 Adelaide Street
Brisbane, QLD 4000
ABN: 61413783636

T +61 7 3726 9588
info@DKO.com.au
www.DKO.com.au

Project Name	CARSELDINE COMMUNITY HOUSING
Project Number	00013408
Date	19/08/2024
Scale	1:1000@A3
Drawing Name	Site Plan
Drawing Number	**DA301**
Revision	**A**

Plans
Ground Floor Plan



	Unit Type	Unit Standard	Standard Type
	1 Bed 1 Bath	Silver Standard	Liveable Housing Guide
	1 Bed 1 Bath	Gold Standard	Social Housing Guide
	2 Bed 1 Bath	Silver Standard	Liveable Housing Guide
	2 Bed 1 Bath	Gold Standard	Social Housing Guide
	3 Bed 1.5 Bath	Silver Standard	Liveable Housing Guide

DKO Architecture (QLD) Pty Ltd
Level 3, 232 Adelaide Street
Brisbane, QLD 4000
ABN: 61413783636

T +61 7 3726 9588
info@DKO.com.au
www.DKO.com.au

Project Name	CARSELDINE COMMUNITY HOUSING
Project Number	00013408
Date	19/08/2024
Scale	1:700, 1:50@A3
Drawing Name	Ground Floor Plan
Drawing Number	DA302
Revision	A

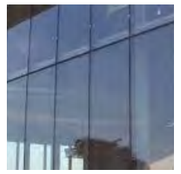
Elevations & Sections
N & E Elevations

EF-01
LIGHT BRICK

EF-02
DARK BRICK

EF-03
CONCRETE FINISH 1

EF-04
CONCRETE FINISH 2



EF-05
GLAZING

EF-06 DARK CLADDING

EF-07 DARK POWDERCOAT FINISH

EF-08 GREY POWDERCOAT FINISH

EF-09 LIGHT POWDERCOAT FINISH

01 Elevation North
1:400

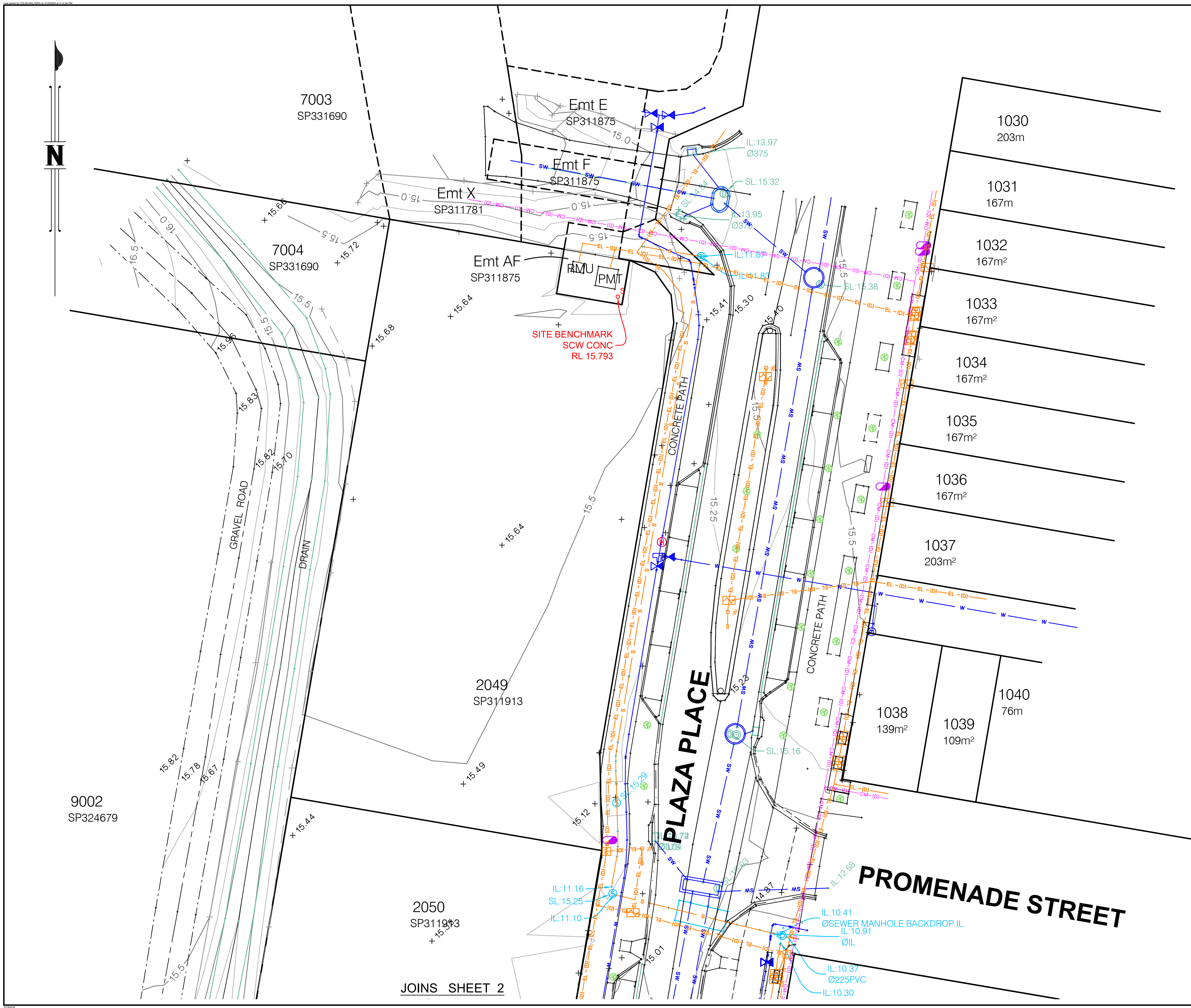
02 Elevation East
1:400

DKO Architecture (QLD) Pty Ltd
Level 3, 232 Adelaide Street
Brisbane, QLD 4000
ABN: 61413783636

T +61 7 3726 9588
info@DKO.com.au
www.DKO.com.au

Project Name	CARSELDINE COMMUNITY HOUSING
Project Number	00013408
Date	19/08/2024
Scale	1:400@A3
Drawing Name	N & E Elevations
Drawing Number	**DA400**
Revision	**A**

Appendix B – Survey Plan



CLIENT

ST GEORGE COMMUNITY HOUSING LIMITED

PROJECT

DETAIL SURVEY

OF

LOTS 2049 & 2050 ON SP311913

(41 & 49 PLAZA PLACE, CARSELDINE)

NOTES

(i) The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

(ii) Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.

(iii) Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

1	CGW	21/05/24	ORIGINAL ISSUE

SCALE BAR

0m 5 10 15 20m

SCALE 1:400 (A3)

LANDPARTNERS surveyors and planners

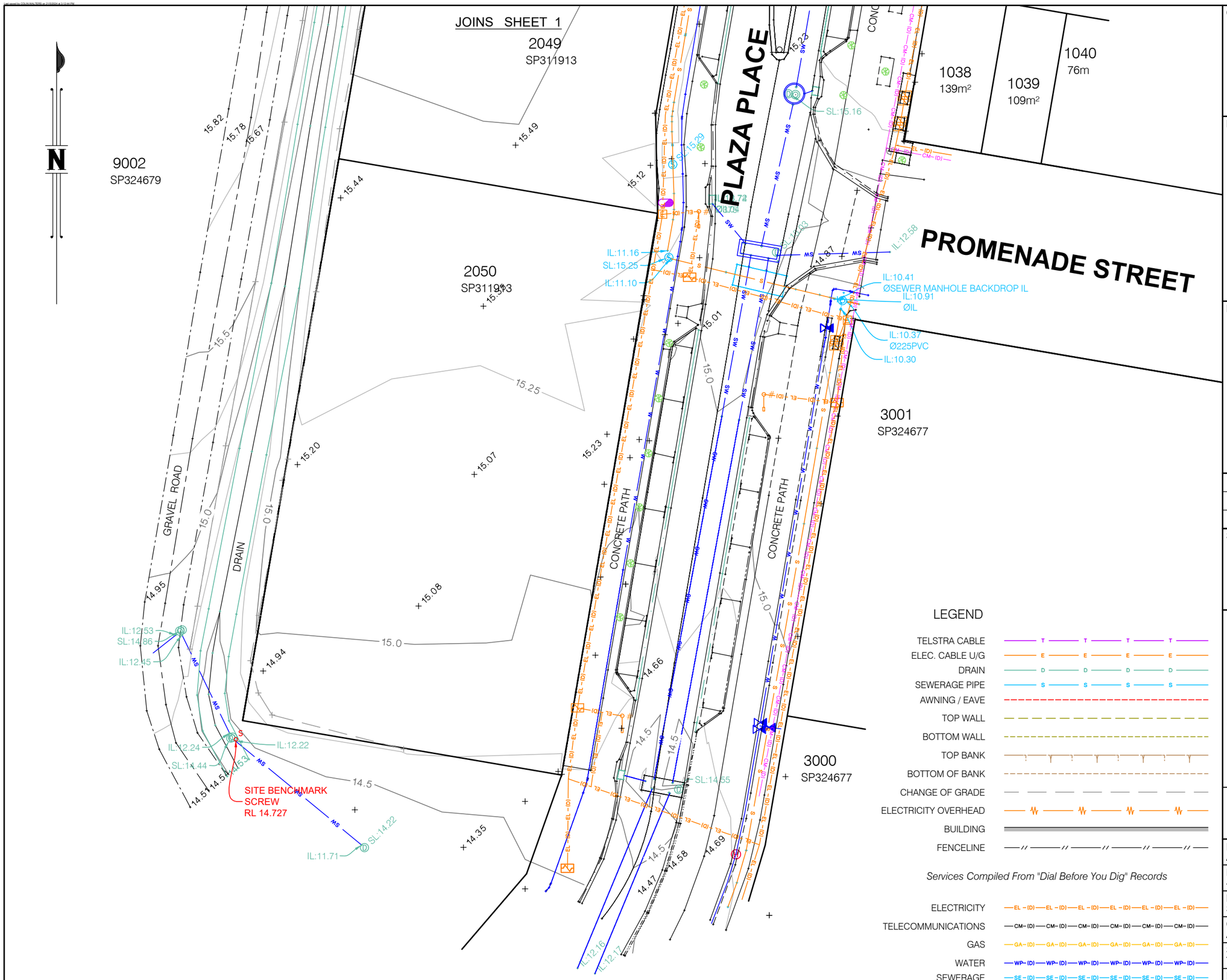
Brisbane Office
Level 1
18 Little Cribb Street
Milton QLD 4064

PO Box 1399
Milton
QLD 4064

p: (07) 3842 1000
f: (07) 3842 1001
e: info@landpartners.com.au
w: www.landpartners.com.au

HEIGHT DATUM AHD D		LOCAL AUTHORITY BRISBANE C.C.	
HEIGHT ORIGIN -		SCALE 1:400 (A3)	
MERIDIAN SP311913		CONTOUR INTERVAL 0.25 Metre	
CO-ORD SYSTEM Arbitrary Plane		DRAWN CGW	DATE 21/05/2024
SURVEYOR TJN	SURVEY DATE 14/05/24	CHECKED LHS	DATE 21/05/2024
FIELD FILE BRLS5464-SCH-3-1		APPROVED LHS	DATE 21/05/2024
UDN		SHEET 1 OF 2	

BRLS5464-SCH-5-1



LEGEND

- TELSTRA CABLE
- ELEC. CABLE U/G
- DRAIN
- SEWERAGE PIPE
- AWNING / EAVE
- TOP WALL
- BOTTOM WALL
- TOP BANK
- BOTTOM OF BANK
- CHANGE OF GRADE
- ELECTRICITY OVERHEAD
- BUILDING
- FENCELINE

Services Compiled From "Dial Before You Dig" Records

- ELECTRICITY
- TELECOMMUNICATIONS
- GAS
- WATER
- SEWERAGE
- DRAIN

CLIENT

ST GEORGE COMMUNITY HOUSING LIMITED

PROJECT

DETAIL SURVEY

OF

LOTS 2049 & 2050 ON SP311913

(41 & 49 PLAZA PLACE, CARSELDINE)

NOTES

(i) The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

(ii) Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.

(iii) Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

1	CGW	21/05/24	ORIGINAL ISSUE

SCALE BAR

0m 5 10 15 20m

SCALE 1:400 (A3)

LANDPARTNERS surveyors and planners

ISO 9001 Quality Management Systems CERTIFIED — ISO 45001 Occupational Health and Safety Management CERTIFIED

CERTIFIED LOCATOR

Brisbane Office
Level 1
18 Little Cribb Street
Milton QLD 4064

PO Box 1399
Milton
QLD 4064

p: (07) 3842 1000
f: (07) 3842 1001
e: info@landpartners.com.au
w: www.landpartners.com.au

HEIGHT DATUM AHD D	LOCAL AUTHORITY BRISBANE C.C.
HEIGHT ORIGIN -	SCALE 1:400 (A3)
MERIDIAN SP311913	CONTOUR INTERVAL 0.25 Metre
CO-ORD SYSTEM Arbitrary Plane	DRAWN CGW — DATE 21/05/2024
SURVEYOR TJN — SURVEY DATE 14/05/24	CHECKED LHS — DATE 21/05/2024
FIELD FILE BRLS5464-SCH-3-1	APPROVED LHS — DATE 21/05/2024

UDN

SHEET 2 OF 2

BRLS5464-SCH-5-1

Appendix C – Civil Works Drawings

LEGEND

	EXISTING PROPERTY BOUNDARY
	PROPOSED PROPERTY BOUNDARY
8.0	EXISTING CONTOURS (AT 0.25m INTERVALS)
8.0	DESIGN CONTOURS (AT 0.10m INTERVALS)
	EXISTING KERB
	EXISTING ROAD CENTRELINE
	EXISTING EDGE OF BITUMEN
SWD	EXISTING STORMWATER
S	EXISTING SEWER
W	EXISTING WATER
	EXISTING BATTER TOP
	EXISTING BATTER TOE
	PROPOSED RETAINING WALL
XX.XXm	RETAINING WALL HEIGHTS
FFLXX.XXm	FINISHED FLOOR LEVEL
XX.XXX ×	FINISHED SURFACE LEVEL
XX.XXX ×	EXISTING SURFACE LEVEL
X.X%	FINISHED SURFACE SLOPE

CUT & FILL LEGEND

EXCAVATION	FILLING
0.01m - 0.30m	
0.30m - 0.60m	
0.60m - 0.90m	
0.90m - 1.20m	
1.20m - 1.50m	
1.50m - 1.80m	
1.80m - 2.10m	
2.10m - 2.40m	
2.40m - 2.70m	

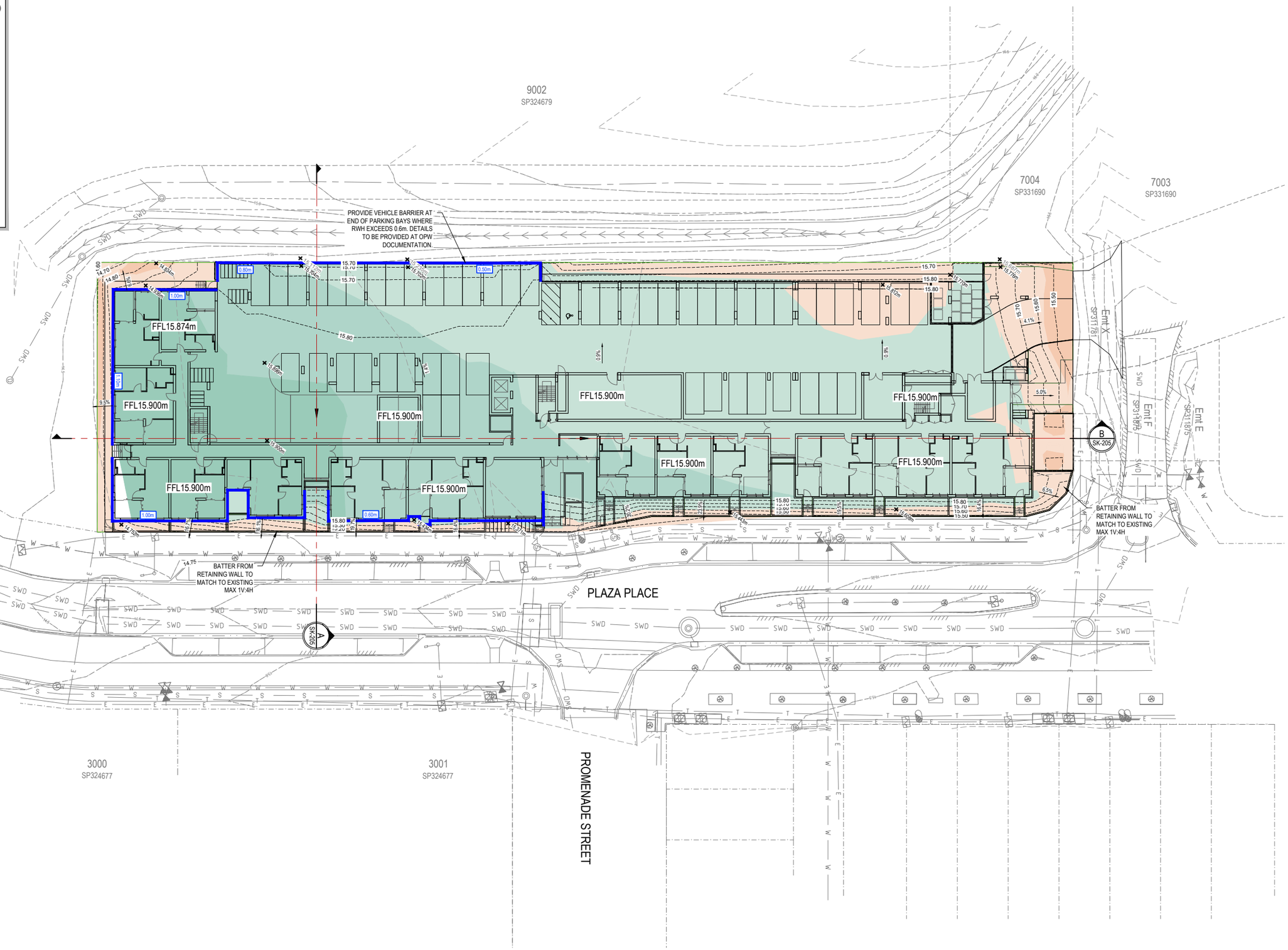
EARTHWORKS VOLUMES

(STRIPPED EXISTING SURFACE TO EARTHWORKS SURFACE, ALLOWANCE FOR 150mm SLAB AND 150mm TOPSOIL STRIP)

TOTAL CUT	22m³
TOTAL FILL	1927m³
IMPORT MATERIAL	1904m³

NOTE

THE ORIGINAL OF THIS DRAWING WAS PRODUCED USING COLOUR SEPARATION FOR GREATER CLARITY. WORKING WITH A BLACK AND WHITE COPY MAY CAUSE ERRORS. IF THIS DRAWING IS NOT COLOUR THEN YOU DO NOT HAVE THE CORRECT PRESENTATION AND SHOULD CONTACT INERTIA ENGINEERING ON (07) 3857 7868.



BEFORE YOU DIG www.byda.com.au

REV	DESCRIPTION	DATE	DRAWN	REVIEW
D	ISSUED FOR APPROVAL	21.08.24	HF	AK
C	ISSUED FOR APPROVAL	16.08.24	HF	AK
B	ISSUED FOR INFORMATION	13.06.24	HF	AK
A	ISSUED FOR INFORMATION	23.05.24	HF	AK

DESIGNER: C. OMLID
DRAFTING QA:
DESIGN QA:
QA CHECKED:

Inertia
ABN 82 115 498 023
Phone: 3857 7868
E-mail: info@inertiaeng.com.au

CLIENT: St George Community Housing

ARCHITECT: DKO

NORTH POINT:

SCALE BARS: 0 2 4 6 8 10 12m
SCALE 1:250 (A1) 1:500 (A3)

THIS DRAWING IS TO BE PRINTED IN COLOUR REPRODUCTION OR READING OF THIS DRAWING IN OTHER THAN FULL COLOUR MAY IMPART FALSE OR MISLEADING INFORMATION

PROJECT: PROPOSED DEVELOPMENT
41-49 PLAZA PLACE
CARSELDINE, QLD, 4034

DRAWING TITLE: BULK EARTHWORKS CONCEPT LAYOUT PLAN

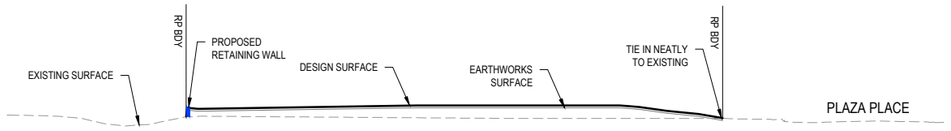
FOR APPROVAL

JOB No	DWG No	REV
10898	SK-200	D

V:\10001-11000\10898\5 Digital\CAD

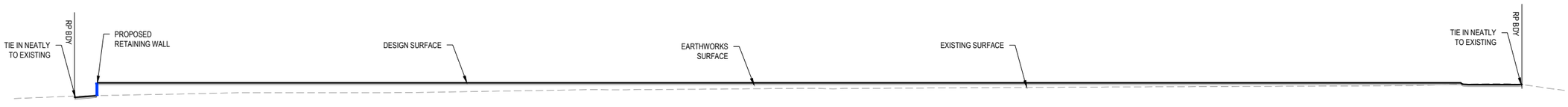
LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EARTHWORKS SURFACE
- PROPOSED RETAINING WALL



DATUM 9.000

SECTION A
SCALE: 1:200
SK-200



DATUM 9.000

SECTION B
SCALE: 1:200
SK-200

BEFORE YOU DIG www.byda.com.au

REV	DESCRIPTION	DATE	DRAWN	REVIEW
A	ISSUED FOR APPROVAL	16.08.24	HF	AK

DESIGNER: C. OMLID
DRAFTING QA:
DESIGN QA:
QA CHECKED:

Inertia
ABN 82 115 498 023
Phone: 3857 7868
E-mail: info@inertiaeng.com.au

CLIENT: St George Community Housing

ARCHITECT: DKO

NORTH POINT:

SCALE BARS: 0 2 4 6 8 10 12m
SCALE 1:250 (A1) 1:500 (A3)

THIS DRAWING IS TO BE PRINTED IN COLOUR REPRODUCTION OR READING OF THIS DRAWING IN OTHER THAN FULL COLOUR MAY IMPART FALSE OR MISLEADING INFORMATION

PROJECT: PROPOSED DEVELOPMENT
41-49 PLAZA PLACE
CARSELDINE, QLD, 4034

DRAWING TITLE: BULK EARTHWORKS
CONCEPT SITE SECTIONS

FOR APPROVAL

JOB No	DWG No	REV
10898	SK-205	A

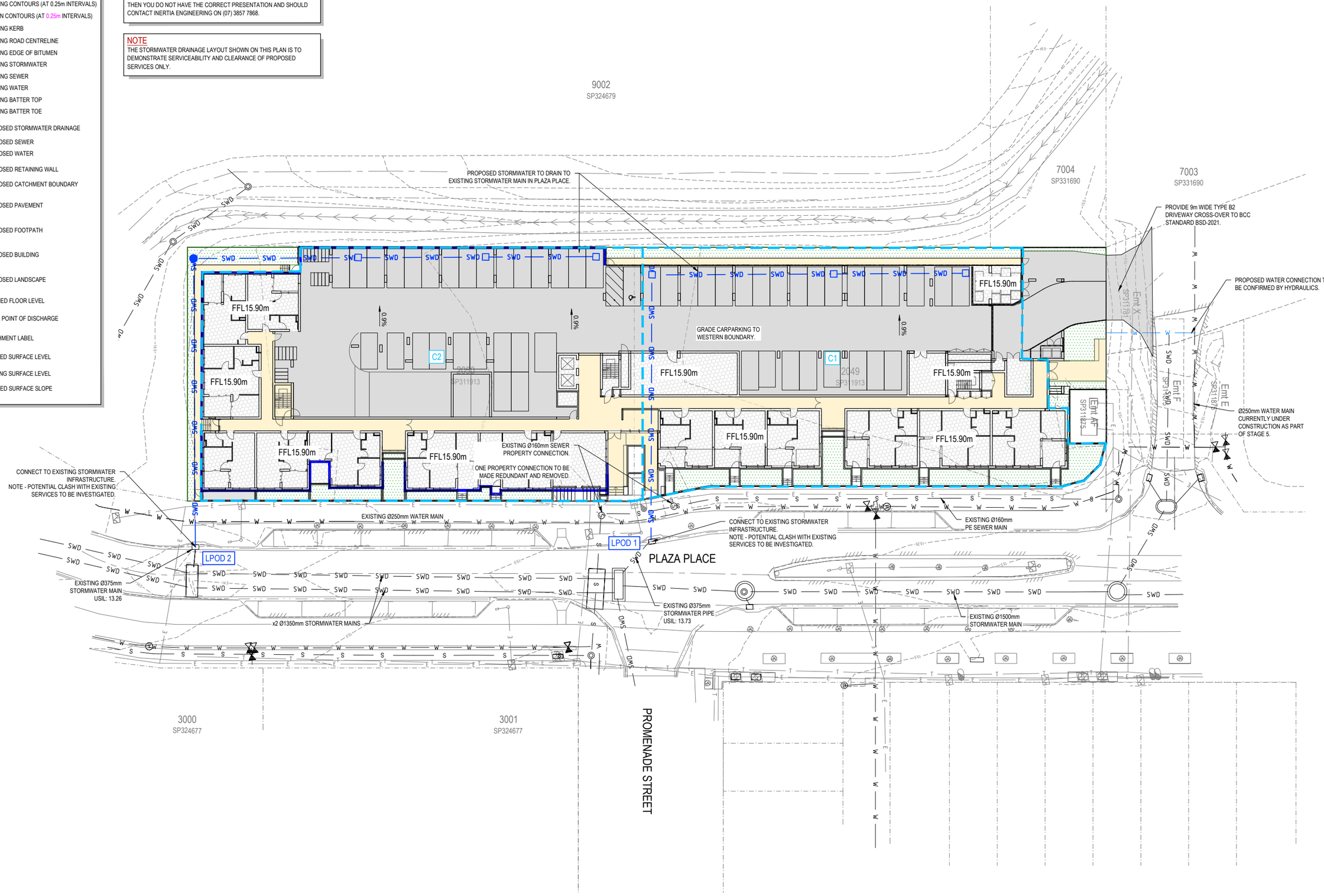
V:\10001-11000\10898\5_Digital\CAD\

LEGEND

- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- EXISTING CONTOURS (AT 0.25m INTERVALS)
- DESIGN CONTOURS (AT 0.25m INTERVALS)
- EXISTING KERB
- EXISTING ROAD CENTRELINE
- EXISTING EDGE OF BITUMEN
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER
- EXISTING BATTER TOP
- EXISTING BATTER TOE
- PROPOSED STORMWATER DRAINAGE
- PROPOSED SEWER
- PROPOSED WATER
- PROPOSED RETAINING WALL
- PROPOSED CATCHMENT BOUNDARY
- PROPOSED PAVEMENT
- PROPOSED FOOTPATH
- PROPOSED BUILDING
- PROPOSED LANDSCAPE
- FFLXX.XXm — FINISHED FLOOR LEVEL
- LPOD — LEGAL POINT OF DISCHARGE
- C1 — CATCHMENT LABEL
- XX.XXX — FINISHED SURFACE LEVEL
- XX.XXX — EXISTING SURFACE LEVEL
- X.X% — FINISHED SURFACE SLOPE

NOTE
THE ORIGINAL OF THIS DRAWING WAS PRODUCED USING COLOUR SEPARATION FOR GREATER CLARITY. WORKING WITH A BLACK AND WHITE COPY MAY CAUSE ERRORS. IF THIS DRAWING IS NOT COLOUR THEN YOU DO NOT HAVE THE CORRECT PRESENTATION AND SHOULD CONTACT INERTIA ENGINEERING ON (07) 3857 7868.

NOTE
THE STORMWATER DRAINAGE LAYOUT SHOWN ON THIS PLAN IS TO DEMONSTRATE SERVICEABILITY AND CLEARANCE OF PROPOSED SERVICES ONLY.



REV	DESCRIPTION	DATE	DRAWN	REVIEW
C	ISSUED FOR APPROVAL	21.08.24	HF	AK
B	ISSUED FOR APPROVAL	16.08.24	HF	AK
A	ISSUED FOR INFORMATION	17.07.24	CO	AK

DESIGNER: C. OMLID
DRAFTING QA:
DESIGN QA:
QA CHECKED:

Inertia
ABN 82 115 498 023
Phone: 3857 7868
E-mail: info@inertiaeng.com.au

CLIENT: St George Community Housing

ARCHITECT: DKO

NORTH POINT:

SCALE BARS: 0 2 4 6 8 10 12m
SCALE 1:250 (A1) 1:500 (A3)

THIS DRAWING IS TO BE PRINTED IN COLOUR REPRODUCTION OR READING OF THIS DRAWING IN OTHER THAN FULL COLOUR MAY IMPART FALSE OR MISLEADING INFORMATION

PROJECT:
PROPOSED DEVELOPMENT
41-49 PLAZA PLACE
CARSELDINE, QLD, 4034

DRAWING TITLE:
SITE SERVICES
CONCEPT LAYOUT PLAN

FOR APPROVAL

JOB No	DWG No	REV
10898	SK-600	C

V:\10001-11000\10898\5. Digital\CAD\

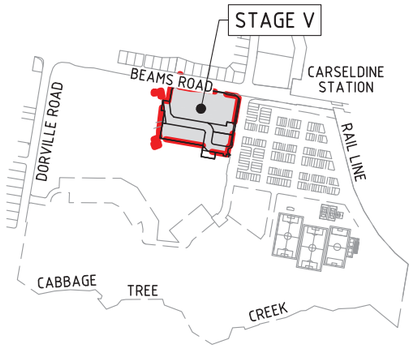
Appendix D – Estate Stormwater Documentation

CARSELDINE VILLAGE

STAGE V

(23-PNT-65389)

B



LOCALITY PLAN
SCALE 1:7500

PLAN
SCALE 1:1000

DRAWING INDEX

DRAWING NO.	DRAWING TITLE
21-121-51	GENERAL - SEWER AND WATER - LOCALITY PLAN AND - DRAWING INDEX
21-121-52	SEWERAGE - LAYOUT PLAN - STAGE V
21-121-53	SEWERAGE - NOTES - SHEET 1
21-121-54	SEWERAGE - NOTES - SHEET 2
21-121-55	SEWERAGE - CATCHMENT PLAN
21-121-56	SEWERAGE - LONGITUDINAL SECTIONS
21-121-57	WATER RETICULATION - LAYOUT PLAN - STAGE V
21-121-58	WATER RETICULATION - NOTES
21-121-59	WATER RETICULATION - LIVE CONNECTION DETAILS
21-121-60	WATER RETICULATION - LONGITUDINAL SECTIONS
21-121-61	WATER RETICULATION - LAYOUT PLAN - CH 00 TO CH 60
21-121-62	WATER RETICULATION - WATER MAIN CONNECTION - DETAILS SHEET 1
21-121-63	WATER RETICULATION - WATER MAIN CONNECTION - DETAILS SHEET 2
21-121-64	WATER MAIN CONNECTION - NON-CONFORMANCE TABLE

SCALE 10 5 0 10 20 30 40 50 60 70 80 90 100m
1 : 1000 (A1 UNREDUCED)

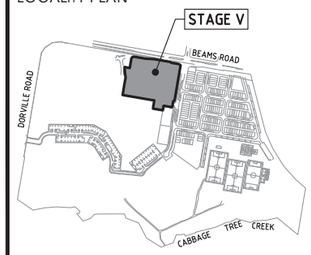
SCALE 100 50 0 100 200 300 400 500 600 700 800 900 1000m
1 : 7500 (A1 UNREDUCED)

C:\Users\rw\AppData\Local\Temp\AtPublish_56044\21-121-51-COVER.dwg Plotted by: RW on 21/11/2023 8:35:19 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:18+10'00'

Drawing Title
GENERAL - SEWER AND WATER LOCALITY PLAN AND DRAWING INDEX

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	51 of 20

A1	Drawing No	Revision
	21-121-51	B

LEGEND

- CONSTRUCTION BOUNDARY
- PROPOSED SEWER MAIN DN160 PE100 SDR21
- PROPOSED STORMWATER MAIN
- PROPOSED WATER MAIN
- EXISTING SEWER MAIN
- EXISTING STORMWATER
- EXISTING WATER MAIN
- EXISTING ELECTRICAL
- DESIGN SURFACE CONTOURS (0.1m)
- DEFINES CONNECTION REQUIRED BY UU - REFER LIVE SEWER WORKS TABLE ON KN DWG 20-180-54
- CONTROL POINT
- FLOW ARROW

SEWER MANHOLE LEGEND

MH 01/01	MANHOLE	MH 01/01	EXISTING MANHOLE
MS 01/01	MAINTENANCE SHAFT	MS 01/01	EXISTING MAINTENANCE SHAFT
BEND HB1/01	BEND	BEND HB1/01	EXISTING BEND
END E/01	END OF LINE	END 01/01	EXISTING END OF LINE
JUNC 01/01	JUNCTION	JUNC 01/01	EXISTING JUNCTION

NOTE:
ENSURE MINIMUM BENDING RADIUS OF PE PIPE IS AS PER THE POP202 GUIDELINE

NOTE:
- ALL LIVE WORKS MUST BE UNDERTAKEN BY THE DEVELOPER'S LICENSED CONTRACTOR IN ACCORDANCE WITH A VALID URBAN UTILITIES NETWORK ACCESS PERMIT, UNDER THE SUPERVISION OF URBAN UTILITIES, AT THE DEVELOPERS EXPENSE.
- LIVE WORKS MAY NOT COMMENCE UNTIL ALL RELEVANT TEST CERTIFICATES HAVE BEEN PROVIDED TO AND ACCEPTED BY URBAN UTILITIES, AND ALL ADJOINING WORKS HAVE BEEN ACCEPTED BY URBAN UTILITIES.
- ONLY STAGE V PART OF THIS APPLICATION. OBTAIN SEPARATE APPROVAL FOR OTHER STAGES.

SEWERAGE LAYOUT PLAN
SCALE 1:250

DANGER
HIGH VOLTAGE
UNDERGROUND CABLES

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step.

NOTE
ALL PROPERTY CONNECTIONS HAVE A 1.0m OFFSET FROM BOUNDARY U.N.O.

NOTE
PROPERTY CONNECTIONS SHALL BE CLEAR OF RETAINING WALLS IN ACCORDANCE WITH SEQ CODE AND BUILD OVER ASSET REQUIREMENTS. OBTAIN SEPARATE BUILD OVER ASSET APPROVAL AS NECESSARY.

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

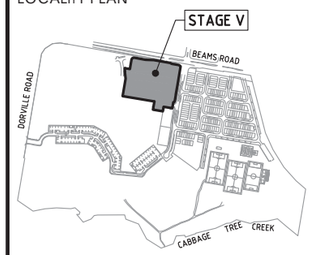
PROPERTY CONNECTIONS HAVE BEEN DESIGNED TO CONTROL THE REQUIRED SERVICE AREA OF EACH LOT AT A GRADE OF 1:60 AND A MAXIMUM DEPTH OF PROPERTY CONNECTION AT 1.5m. UNLESS OTHERWISE STATED. FOR JUNCTION DETAILS REFER SEQ-SEW-1106-1 TO SEQ-SEW-1106-6.

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	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:18+10'00'

Drawing Title
SEWERAGE LAYOUT PLAN STAGE V

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	52 of 20

	Drawing No	Revision
A1	21-121-52	B

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-52-55-SEW-LAYOUT.dwg Plotted by: RW on 21/11/2023 8:35:21 AM

GENERAL

NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT SOUTH EAST QUEENSLAND SEWERAGE CODE SPECIFICATIONS AND STANDARDS.
2. UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.
3. THE CONSTRUCTION OF THE SEWERAGE WORK SHOWN ON THIS DRAWING SHALL BE SUPERVISED BY AN ENGINEER WHO HAS RPEQ REGISTRATION. SEWERAGE WORKS NOT COMPLYING WITH THIS REQUIREMENT WILL NOT BE PERMITTED TO CONNECT INTO THE URBAN UTILITIES SEWERAGE SYSTEM.
4. ALL WORK ASSOCIATED WITH LIVE SEWERS OR MAINTENANCE HOLES SHALL BE CARRIED OUT BY THE APPLICANTS CONTRACTOR AT THE DEVELOPER'S COST IN ACCORDANCE WITH A VALID NETWORK ACCESS PERMIT UNDER THE SUPERVISION OF URBAN UTILITIES.
5. ALL PIPES AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE "ACCEPTED PRODUCTS AND MATERIALS" LIST.
6. EACH ALLOTMENT SHALL BE SERVED BY A DN110 PE PROPERTY CONNECTION. FOR ALLOTMENTS OTHER THAN SINGLE RESIDENTIAL, A DN160 PE PROPERTY CONNECTION SHALL BE PROVIDED.
7. PROPERTY CONNECTIONS SHALL BE LOCATED WITHIN THE PROPERTY AS SHOWN IN THE DRAWINGS.
8. PROPERTY CONNECTION BRANCHES SHALL EXTEND INTO THE PROPERTY A MINIMUM OF 300 mm AND A MAXIMUM OF 750 mm.
9. WHERE PIPES ARE LAID IN FILL, THE FILLING SHALL BE CARRIED OUT IN LAYERS NOT EXCEEDING 300 mm (LOOSE) IN DEPTH AND SHALL BE COMPACTED UNTIL THE COMPACTION IS NOT LESS THAN 95% OF THE MATERIALS MAXIMUM COMPACTION WHEN TESTED IN ACCORDANCE WITH A.S. 1289 (MODIFIED COMPACTION). TESTING SHALL BE CARRIED OUT AFTER EACH ALTERNATE LAYER. IN ALL SUCH CASES APPROVAL OF CONSTRUCTED SEWERS WILL NOT BE ISSUED BY THE SEQ SERVICE PROVIDER UNLESS CERTIFICATES ARE PRODUCED CERTIFYING THAT THE REQUIRED COMPACTION HAS BEEN ACHIEVED.
10. WHERE SEWERS HAVE A GRADE OF 1 IN 20 OR STEEPER, TRENCHSTOPS/BULKHEADS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SEQ SEWER CODE & SEQ-SEW-1206-1 TO SEQ-SEW-1207-1.
11. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF EXISTING SERVICES WITH RELEVANT AUTHORITIES BEFORE COMMENCING WORKS.
12. SEWERS SHALL BE DISUSED IN ACCORDANCE WITH PROCEDURES SET OUT IN THE SEQ SEWER CODE.
13. BENCH MARK AND LEVELS TO AHD. REFER TO KNg DRAWING 21-160-51 FOR DETAILS.
14. CONSTRUCT EMBEDMENT AND TRENCHFILL TO SEQ-SEW-1200-2, 1201-1 TO 1205-1 (TYPE 4 SUPPORT UNLESS GEOTECHNICAL INVESTIGATIONS DEMONSTRATE THAT TYPE 3 SUPPORT IS ADEQUATE. TYPE 4 SUPPORT TO BE USED WHERE MIGRATORY NATIVE SOILS (OR SAND OR FINE CLAY MATERIAL) ARE ENCOUNTERED ADJACENT TO THE EMBEDMENT ZONE AND SINGLE SIZE AGGREGATE IS USED) AND BRISBANE CITY COUNCIL STANDARDS FOR ROADWAYS, WHICHEVER IS ONEROUS.
15. CONSTRUCT MHS TO SEQ-SEW-1301-1, 1301-2 TO -7 (TYPE G), 1301-8 TO -13 (TYPE F), 1301-14 TO -25 (TYPE X), 1301-26 (TOP SLABS), 1301-27 (LADDERS), 1304-1, 1305-1, 1307-4 (STUB CUT-IN), 1313-1 (CONNECTION) AND 1502- 1 (INSERTION MH AND REPAIR SYSTEM).
16. CONSTRUCT MAINTENANCE SHAFTS AND TERMINAL ENTRY POINT TO SEQ-SEW-1315-1 AND 1316-1 AND 1502-1 (INSERT MS).
17. INSTALL MH/MS TYPE B COVERS TO SEQ-SEW-1308-2 TO 1308-7.
18. INSTALL MH/MS TYPE D COVERS TO SEQ-SEW-1308-8 TO 1308-11.
19. CONSTRUCT PROPERTY CONNECTIONS TO SEQ-SEW-1106-1 TO 1106-6.
20. INSTALL DETECTABLE MARKER TAPE ON ALL SEWER MAINS AND PROPERTY CONNECTIONS.
21. ALL WORKS TO BE STRICTLY IN ACCORDANCE WITH SEQ CODE AND IPAM LIST.

ENVIRONMENTAL CONDITIONS

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

VEGETATION PROTECTION

A. TREES LOCATED ALONG THE FOOTPATH SHALL BE, TRANSPLANTED PRIOR TO CONSTRUCTION, OR REPLACED IF DESTROYED.
B. WHEN WORKING WITHIN 4 m OF TREES, RUBBER OR HARDWOOD GIRDLES SHALL BE CONSTRUCTED WITH 1.8 m BATTENS CLOSELY SPACED AND ARRANGED VERTICALLY FROM GROUND LEVEL. GIRDLES SHALL BE STRAPPED TO TREES PRIOR TO CONSTRUCTION AND REMAIN UNTIL COMPLETION.
C. TREE ROOTS SHALL BE TUNNELLED UNDER, RATHER THAN SEVERED. IF ROOTS ARE SEVERED THE DAMAGED AREA SHALL BE TREATED WITH A SUITABLE FUNGICIDE. CONTACT RELEVANT COUNCIL ARBORIST FOR FURTHER ADVICE.
D. ANY TREE LOPPING REQUIRED SHOULD BE UNDERTAKEN BY AN APPROVED ARBORIST.

SOIL

A. TOPSOIL AND SUBSOIL SHALL BE STOCKPILED SEPARATELY.
B. CARE SHALL BE TAKEN TO PREVENT SEDIMENT FROM ENTERING THE STORMWATER SYSTEM. THIS MAY INVOLVE PLACING APPROPRIATE SEDIMENT CONTROLS AROUND STOCKPILES.

CREEK CROSSINGS

A. SILTATION CONTROL MEASURES SHALL BE PLACED DOWNSTREAM OF ANY EXCAVATION WORK.
B. APPROPRIATE SEDIMENT CONTROLS SHALL BE USED TO PREVENT SEDIMENT FROM ENTERING THE CREEK.
C. NO SOIL SHALL BE STOCKPILED WITHIN 5 m OF THE CREEK.

REHABILITATION

A. PREDISTURBANCE SOIL PROFILES AND COMPACTION LEVELS SHALL BE REINSTATED.
B. PREDISTURBANCE VEGETATION PATTERNS SHALL BE RESTORED.

SAFETY

A. THE DESIGN AND CONSTRUCTION OF THE WORKS SHALL COMPLY WITH ALL QUEENSLAND LEGISLATION.

MAINTENANCE HOLES

DESIGN REQUIREMENTS

1. DESIGN AND CONSTRUCTION OF ALL SEWERAGE INFRASTRUCTURE SHALL BE RPEQ CERTIFIED.
2. TOP SLABS HAVE BEEN DESIGNED FOR THE FOLLOWING LOADS AND LOCATIONS.

LOCATION	LIVE LOAD	ACCESS COVERS TO AS 3996
RESERVES, RESIDENTIAL ALLOTMENTS, FOOTPATHS AND VERGES	25 kN	CLASS RATING B
ROADWAYS AND DRIVEWAYS; COMMERCIAL, NDUSTRIAL AND NON-RESIDENTIAL ALLOTMENTS	80 kN	CLASS RATING D

- DESIGN LIFE 100 YEARS
- DEAD LOAD AS DETERMINED FROM SEQ SEWER CODE STANDARD DRAWINGS.
- LIVE LOADS TO AS 1170.1 AND AS 5100-2.

3. DURABILITY CLASSIFICATION

STRUCTURE	COVER LOCATION	EXPOSURE CLASSIFICATION AS 3600, AS 3735	REINFORCEMENT COVER (mm)
SLABS	TOP	B2 TO AS 3600	40
	BOTTOM	B2 TO AS 3735	50 (MIN. COVER MUST EXCLUDE PE LINER LUG PENETRATION)

4. SEQ CODE SEWER MH STANDARD DRAWINGS THAT ARE APPLICABLE TO URBAN UTILITIES HAVE ASSUMED THAT A MINIMUM SOIL BEARING PRESSURE OF 50 KPA CAN BE ACHIEVED.

GENERAL

1. THESE NOTES RELATE TO ALL TOP SLABS AND CAST-INSITU MAINTENANCE HOLES FOR URBAN UTILITIES.
2. MAINTENANCE HOLE TOP SLABS SHALL BE PRECAST ELEMENTS.
3. DIMENSIONS IN MILLIMETRES.
4. DIMENSIONS NOT TO BE SCALED FROM DRAWINGS.
5. VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCING WORK ON SITE.
6. MATERIALS AND WORKMANSHIP TO COMPLY WITH THE CURRENT STANDARDS AUSTRALIA CODES, BUILDING CODE OF AUSTRALIA, WSAA PRODUCT SPECIFICATIONS, BY-LAWS AND ORDNANCES OF RELEVANT BUILDING AUTHORITIES.
7. EXISTING STRUCTURES TO BE MAINTAINED IN A STABLE CONDITION AND NO PART TO BE OVER-STRESSED DURING CONSTRUCTION.

MAINTENANCE HOLES

1. MAINTENANCE HOLES SHALL BE LOCATED CENTRALLY OVER SEWERS AS PER SEQ DRAWINGS UNLESS SPECIFIED OTHERWISE. REFER DRAWINGS SEQ-SEW-1304-1 AND SEQ-SEW-1305-1.
2. OBVERT LEVEL OF THE UPSTREAM SEWER PIPE SHALL ALWAYS BE ABOVE THE OBVERT LEVEL OF THE DOWNSTREAM SEWER PIPE UNLESS APPROVED OTHERWISE.
3. ALL CONSTRUCTION JOINTS SHALL INCLUDE HYDROPHILIC SEALS INSTALLED TO MANUFACTURER'S SPECIFICATIONS.
4. MAINTENANCE HOLE CONNECTORS, INCLUDING HYDROPHILIC SEALS AND PUDDLE FLANGES SHALL BE THE PRE-FABRICATED TYPE AS PER URBAN UTILITIES IPAM LIST.
5. ENDS OF SEWER PIPES SHALL FINISH FLUSH WITH THE INSIDE FACE OF MAINTENANCE HOLE WALL.
6. FINISHED BENCHING SHALL PROVIDE A SMOOTH NON-TURBULENT FLOW.
7. SAFETY CHAINS AND ALL CONNECTIONS SHALL BE STAINLESS STEEL GRADE 316.
8. PROPERTY CONNECTION JUNCTIONS SHALL NOT BE CONSTRUCTED ON SHORT PIPES AT MAINTENANCE HOLES OR BULKHEADS.
9. FOR CONSTRUCTION OF MAINTENANCE HOLE AND OR MAINTENANCE SHAFT OVER EXISTING SEWER REFER TO SEQ-SEW-1502-1

MAINTENANCE HOLE CIRCULAR ACCESS COVERS

1. CIRCULAR ACCESS COVERS AND FRAMES SHALL BE RATED TO CLASS RATING B OR CLASS RATING D TO AS 3996.
2. PRODUCT CERTIFICATION TO AS 3996 SHALL BE SUPPLIED FOR EACH COVER ASSEMBLY.
3. COVERS, FRAMES AND RISER RINGS, WHERE REQUIRED, SHALL BE SUPPLIED ASSEMBLED.
4. COVERS SHALL BE SOLID TOP.
5. COVERS SHALL HAVE IDENTIFICATION TAGS DETAILING, SEWER / VACUUM SEWER / CLASS RATING B, D / SEALED / COVER PATTERN DETAIL /SEQ-SP NAME / WEIGHT.
6. BOLT DOWN COVERS SHALL BE PROVIDED IN FLOOD PRONE AREAS, STORM SURGE AREAS, SURCHARGING SEWERS AND WHERE SPECIFIED IN THE DESIGN.
7. BOLT DOWN COVER FRAMES TO BE FIXED TO THE TOP SLAB WITH 4 M16 STAINLESS STEEL CHEMICAL ANCHORS. EMBEDMENT LENGTH SHALL BE MINIMUM 110 MM UNLESS APPROVED OTHERWISE.

SAFETY IN DESIGN

1. THE SAFETY IN DESIGN, DESIGN AND RISK MITIGATION MEASURES FOR THESE DRAWINGS DO NOT NECESSARILY ACCOUNT FOR ALL DESIGN, CONSTRUCTION, OPERATION, MAINTENANCE AND DEMOLITION ASSESSMENTS. IT DOES NOT REDUCE OR LIMIT THE OBLIGATIONS OF THE CONSTRUCTOR, USER, OPERATOR, MAINTAINER AND DEMOLISHER TO PERFORM THEIR OWN SAFETY IN DESIGN RISK ASSESSMENT.
2. DEVELOP CONSTRUCTION AND INSTALLATION SAFE WORK METHOD STATEMENTS TO ELIMINATE AND MINIMISE INSTALLATION RISKS.

CONCRETE

1. CONCRETE WORKMANSHIP AND MATERIALS TO COMPLY WITH AS 3600 AND AS 3610.
2. CONCRETE TO COMPLY WITH AS 1379, AS 1478.1, AS 1478.2, AS 3582.1 AS 3582.2, AS 3582.3 AND AS 3972.

NOTES:

1. STEP IRONS ARE REQUIRED PER SL SERIES NOTES ON DRAWING SEQ-SEW-1101-4
2. PROPOSED MH WALL PIPE PENETRATIONS MUST BE AS PER DRAWING SEQ-SEW-1313-1

3. SLUMP TO BE AS REQUIRED FOR PLACEMENT, COMPACTION AND FINISHING. A SAMPLE OF FRESH CONCRETE SHALL BE TESTED FOR SLUMP AND STRENGTH UPON ARRIVAL ON SITE.
4. WATER NOT TO BE ADDED TO CONCRETE AFTER TRUCK HAS LEFT BATCHING PLANT UNLESS APPROVED OTHERWISE.
5. TEST SLUMP OF EACH BATCH OF CONCRETE DELIVERED.
6. DESIGN, CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF FORMWORK BY CONTRACTOR.
7. CONCRETE CONSTRUCTION TOLERANCES TO AS 3610.
8. CONCRETE SIZES DO NOT INCLUDE FINISHES. SIZES NOT TO BE REDUCED OR PENETRATIONS ADDED.
9. CONDUITS, PIPES, ETC. NOT TO BE PLACED IN CONCRETE COVER TO THE REINFORCEMENT.
10. EXPOSED EDGES AND RE-ENTRANT CORNERS TO HAVE 25 MM CHAMFERS OR FILLETS UNLESS NOTED OTHERWISE.
11. CONSTRUCTION JOINTS AS DETAILED AND LOCATED ON DESIGN DRAWINGS.
12. CONCRETE SURFACE FINISHES TO AS 3610.
    - FORMED EXPOSED SURFACES CLASS 2
13. CONCRETE TEMPERATURE NOT TO EXCEED TEMPERATURES STATED BELOW.

CONCRETE STRUCTURE	CONCRETE STRENGTH F'C	TEMPERATURE LIMIT
CONCRETE SECTIONS LESS THAN 600 MM THICK.	EQUAL TO OR MORE THAN 40MPA.	35°C
CONCRETE SECTIONS EQUAL TO OR GREATER THAN 600MM THICK.	EQUAL TO OR MORE THAN 40MPA.	27°C

14. CONCRETE CURING TO AS3600 AS SOON AS POSSIBLE AFTER PLACING AND FINISHING.
15. CONCRETE GRADE S40.

TYPE OF AGGREGATE	CALCAREOUS
COMPRESSIVE STRENGTH AT 28 DAYS	40 MPa
MINIMUM CEMENT CONTENT	380 kg/m^3
MAXIMUM CEMENTITIOUS MATERIAL	25%
MAXIMUM WATER/CEMENT RATIO	0.5
NOMINAL SLUMP	80mm±15
DRYING SHRINKAGE AT 21 DAYS	500 x 10^{-6}
MAXIMUM AGGREGATE SIZE	20 mm
MINIMUM AGGREGATE SIZE	10 mm

16. CONCRETE SHALL BE SPECIAL CLASS TO WSA-PS 358 WITH CALCAREOUS AGGREGATE.
17. BENCHING FINISH SHALL CONSIST OF EQUAL PARTS OF CEMENT AND SAND.

REINFORCEMENT

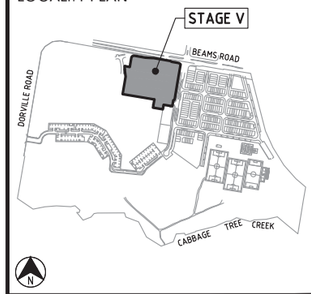
1. REINFORCEMENT FOR THE TOP SLABS SHALL BE A PRE-FABRICATED ELEMENT.
2. REINFORCEMENT TO COMPLY WITH AS 4671.
3. SYMBOLS ON DRAWINGS FOR GRADE AND TYPE OF REINFORCEMENT ARE:
    - R -STRUCTURAL GRADE 250 PLAIN ROUND BARS
    - N - HOT ROLLED GRADE 500 DEFORMED BAR, DUCTILITY CLASS N
    - L - HOT ROLLED GRADE 500 DEFORMED BAR, DUCTILITY CLASS L
    - SL - HARD DRAWN WIRE GRADE 500 MESH, DUCTILITY CLASS L
    - RL - HARD DRAWN WIRE GRADE 500 MESH, DUCTILITY CLASS L
    - W - STEEL REINFORCING WIRE GRADE 500
4. REINFORCEMENT DESIGNATION AS FOLLOWS (E.G. 14N16-250 EF)
    - 14 -NUMBER OF BARS
    - N - BAR GRADE AND DUCTILITY CLASS
    - 16 - BAR DIAMETER IN MM
    - 250 - SPACING OF BARS IN MM
    - EF - LOCATION
5. ABBREVIATIONS TO REINFORCEMENT LOCATION.
    - EW - EACH WAY
    - EF - EACH FACE
    - B - BOTTOM
    - T - TOP
    - CP - CENTRALLY PLACED
6. REINFORCEMENT IS SHOWN DIAGRAMMATICALLY ONLY AND NOT NECESSARILY IN TRUE PROJECTION.
7. REINFORCEMENT TO BE FIXED SECURELY AND SUPPORTED ON PROPRIETY CONCRETE, METAL OR PLASTIC SUPPORTS.
8. REINFORCEMENT TO BE SPLICED AS SHOWN ON PROJECT DRAWINGS. LAP LENGTHS TO COMPLY WITH AS 3600 AND TABLE BELOW U.N.O.

BAR SIZE	LAP LENGTH (mm)
N12	350
N16	500
N20	600
N24	700
N28	850
N32	950

9. REINFORCEMENT NOT TO BE WELDED UNLESS SHOWN ON PROJECT DRAWINGS OR APPROVED OTHERWISE.
10. REINFORCEMENT NOT TO BE BENT, CUT OR HEATED ON SITE UNLESS APPROVED OTHERWISE.
11. REINFORCEMENT TO BE CLEAN, FREE OF MILL SCALE, RUST, OIL, GREASE ETC.
12. DOWEL LOCATION TOLERANCE SHALL BE +/- HALF THE DIAMETER OF THE DOWEL. THE ALIGNMENT TOLERANCE SHALL BE 2 MM IN 300 MM.

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW

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: 2023.11.21 10:54:19+10'00'

Drawing Title
SEWERAGE NOTES SHEET 1

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	53 of 20

	Drawing No	Revision
A1	21-121-53	A

PRECAST CONCRETE - TOP SLABS ONLY

1. PRECAST CONCRETE MEMBERS TO COMPLY WITH AS 3850.1 AND AS 3850.2
2. PRECAST MEMBERS ARE DESIGNED FOR THE FINAL INSTALLED CONDITIONS ONLY. PRECAST MANUFACTURER TO DESIGN THE PRECAST MEMBERS INCLUDING CONNECTIONS,FIXING DETAILS, JOINTS, FIRE RESISTANCE, ETC. FOR STABILITY, SERVICEABILITY AND STRENGTH REQUIREMENTS REQUIRED DURING MANUFACTURE, TRANSPORT, LIFTING, ERECTION AND INSTALLATION.
3. PRECAST MANUFACTURER TO PROVIDE THEIR SHOP DRAWINGS AND RPEQ CERTIFICATION FOR CONSTRUCTION OF THE PRECAST SLAB TO THE DESIGNS PROVIDED IN MAINTENANCE HOLE DRAWINGS INCLUDING DESIGN AND CONSTRUCTION CERTIFICATION FOR CONNECTIONS AND FIXING REQUIRED FOR MANUFACTURE, TRANSPORT, ERECTION AND INSTALLATION. (FORM 15 AND 16)
4. PRECAST CONCRETE MEMBERS TO BE SUPPLIED AND CONSTRUCTED BY A PRECAST CONCRETE CONSTRUCTOR.
5. ADEQUATELY DESIGNED TEMPORARY BRACING, AS REQUIRED, TO BE PROVIDED DURING ERECTION AND INSTALLATION.
6. MINIMUM CHARACTERISTIC COMPRESSIVE STRENGTH OF CONCRETE AT REMOVAL FROM MOULDS SHALL BE 15MPA.
7. ALL INSERTS IN PRECAST CONCRETE MEMBERS TO BE STAINLESS STEEL.
8. ALL STRUCTURAL STEELWORK CONNECTIONS TO PRECAST CONCRETE MEMBERS TO BE HOT DIP GALVANISED TO AS 4680 SYSTEM DESIGNATION HDG600.
9. PROVIDE 15 MM CHAMFERS OR FILLETS AT EDGES AND CORNERS OF PRECAST MEMBERS EXCEPT AT UNDERSIDE OF MH SLAB ACCESS OPENING UNLESS APPROVED OTHERWISE.
10. PRECAST CONCRETE MEMBERS NOT TO BE ERECTED ON REINFORCED CONCRETE STRUCTURES UNTIL THE REINFORCED CONCRETE STRUCTURES HAVE BEEN CURED TO ACHIEVE 28 DAYS STRENGTH.
11. WEIGHT OF TOP SLAB TO BE STAMPED ON THE SLAB.
12. CONCRETE TO BE SPECIAL CLASS S40 TO WSA PS-358 WITH CALCAREOUS AGGREGATE.
13. APPROVED LIFTING PLAN IS TO BE AVAILABLE ON REQUEST.

STAINLESS STEEL

1. STAINLESS STEEL TO COMPLY TO ASTM A240/A240M AND ASTM A480/ A480M.
2. FABRICATION BY MANUFACTURERS ASSDA ACCREDITED OR APPROVED EQUIVALENT.
3. STAINLESS STEEL TO BE GRADE 316 OR 316L U.N.O.
4. STORAGE, FABRICATION AND WELDING TO BE IN APPROVED DEDICATED AREAS.
5. WELDING, CLEANING, PICKLING AND PASSIVATION TO COMPLY TO AS 1554.6 AND WTIA TECHNICAL NOTE 16 WELDING OR STAINLESS STEEL.
6. SURFACE FINISH TO BE 2B OR BETTER TO ASTM A480.
7. MEMBERS TO BE ACID PASSIVATED AFTER FABRICATION.
8. ANTI GALLING COMPOUND "DURALAC" OR URBAN UTILITIES APPROVED EQUIVALENT REQUIRED ON ALL FASTENERS UNLESS APPROVED OTHERWISE.

POLYETHYLENE LINER (PE LINER)

1. THE PE LINER SHALL FORM A COMPLETELY SEALED AND WELDED ROBUST CONTINUOUS MEMBRANE SYSTEM. THE PE LINER SHALL BE BUILT TO THE MH CONSTRUCTION TOLERANCES WITHOUT ANY DEFECTS SUCH AS BULGING, WARPING, PINCHING, OVERLAPPING.
2. THE PE SHEETS SHALL:
   - HAVE A MINIMUM THICKNESS OF 2.5 MM.
   - ACHIEVE A MECHANICAL BOND BETWEEN THE CONCRETE AND LINER.
   - BE INSTALLED BY AN ACCREDITED APPLICATOR APPROVED BY THE MANUFACTURER.
   - BE TENSIONED OVER THE FORMWORK WITHIN THE YIELD ELONGATION LIMIT PRIOR TO SECURING TO THE FORMWORK.
3. PREPARATION, APPLICATION AND INSTALLATION TO COMPLY WITH THE MANUFACTURER'S SPECIFICATION.
4. POURED CONCRETE TO BE AT A COOLER AMBIENT TEMPERATURE THAN THE TEMPERATURE WHEN THE PE SHEETS WERE ATTACHED TO THE FORMWORK.
5. EXTRUSION WELDING AND WELD TESTING AT SEAMS TO BE UNDERTAKEN BY THE APPROVED APPLICATOR TO THE MANUFACTURER'S SPECIFICATION. PL
6. ENCAPSULATION OF ANCHORS TO BE CHECKED BY TAPPING THE SURFACE TO DETECT HOLLOW SOUNDS THAT INDICATE VOIDS. VOIDS TO BE FILLED BY INJECTION GROUT AND PE SHEET REPAIRED BY EXTRUSION WELDING OVER THE INJECTION HOLE.

STRUCTURAL STEEL

1. STRUCTURAL STEEL WORKMANSHIP AND MATERIALS TO COMPLY WITH AS 4100.
2. STEEL TO COMPLY WITH:
   - AS 1163 GRADE C350 FOR RECTANGULAR AND HOLLOW SECTIONS.
   - AS 3678 FOR PLATES AND FLOOR PLATES.
   - AS 3679.1 GRADE 300 OR BHP GRADE 300 PLUS FOR PARALLEL FLANGE CHANNELS.
   - AS 3679.2 GRADE 300 FOR WELDED BEAMS AND COLUMNS.
   - OTHER SECTIONS TO COMPLY WITH AS 3678 OR AS 3679 GRADE 250.
3. WELDS TO AS 1554.
   - WELD CATEGORY SP.
   - BUTT WELDS TO BE FULL PENETRATION WELDS.
   - WELDS TO BE 6 MM CONTINUOUS FILLET WELDS ALL ROUND INTERFACES.
   - ELECTRODES TO AS 1554 CLASSIFICATION E48XX.
4. BOLTS TO AS 1275. COMMERCIAL GRADE 4.6/S TO AS 1111 AND AS 1112. HIGH STRENGTH STRUCTURAL BOLTS TO AS 1252.
   - BOLTS, NUTS AND WASHERS M16 AND LARGER TO GRADE 8.8/S. M12 TO BE GRADE 4.6/S.
   - STRUCTURAL CONNECTIONS TO BE 2 M16 8.8/S WITH 10 MM THICK CLEAT PLATE UNLESS NOTED OTHERWISE.
   - INSTALL WASHERS UNDER BOLT HEAD AND NUT. INSTALL TAPERED WASHERS AS REQUIRED.
   - BOLT PROJECTION BEYOND NUT TO BE MINIMUM TWO THREADS AND MAXIMUM 10 MM.
5. HOLD DOWN BOLTS TO BE GRADE 4.6/S UNLESS NOTED OTHERWISE. HOLD DOWN BOLTS GROUPS TO BE RIGIDLY TIED FOR CORRECT SET-OUT AND LOCATION.
6. SEAL WELD HOLLOW SECTIONS WITH 3 MM THICK CAP PLATE UNLESS NOTED OTHERWISE.
7. GROUT BASE PLATES WITH HIGH STRENGTH NON-SHRINK PRE-MIXED GROUT BEFORE COLUMNS ARE LOADED.

STEEL WORK PROTECTIVE COATING

1. STEELWORK TO BE HOT DIP GALVANISED TO AS 4680 SYSTEM DESIGNATION HDG600 AND THREADED FASTENERS TO AS 1214.
2. DAMAGED GALVANISED COATING REPAIR:
   - POWER CLEAN TO AS 1627.2
   - SOLVENT CLEAN/ DEGREASE TO AS 1627.1
   - APPLY TIN/ZINC TO PRE-HEATED STEEL OVERLAPPING THE GALVANISING COATING.

REPAIR OF EXPOSED REINFORCEMENT AND CONCRETE AROUND NEW PIPE PENETRATION IN EXISTING CONCRETE

1. EXPOSED REINFORCEMENT AND CONCRETE REPAIRED AS FOLLOWS:
   - CORE HOLES ON EACH CORNER OF AREA TO BE CUT.
   - SAW CUT CONCRETE, PERPENDICULAR TO CONCRETE SURFACE, 15 MM DEEP AROUND PERIMETER OF THE OPENING.
   - BREAKOUT REMAINING CONCRETE AROUND THE OPENING WITHOUT DAMAGING REINFORCEMENT.
   - CUT EXPOSED REINFORCEMENT SO THAT IS 30 MM CLEAR OF THE PIPE.
   - CLEAN CONCRETE SURFACE AND REMOVE ALL LOOSE MATERIAL.
   - ABRASIVE BLAST CLEAN EXPOSED REINFORCEMENT. IF IT IS CORRODED AND APPLY "NITOPRIME" ZINC RICH PRIMER UNLESS APPROVED OTHERWISE.
   - THOROUGHLY SOAK SUBSTRATE WITH CLEAN WATER FOR A MINIMUM OF TWO HOURS.
   - PLACE N12 CIRCULAR TRIMMER ON BOTH SIDES OF THE PIPE FLANGE.
   - INSTALL HYDROTITE CJ-07-25 SEAL ON PIPE 50 MM FROM CONCRETE SURFACE UNLESS APPROVED OTHERWISE.
   - APPLY "NITOBOND HAR" PRIMER TO CONCRETE SURFACE UNLESS APPROVED OTHERWISE.
   - POUR CONCRETE/GROUT UNDER PRESSURE TO FILL OPENING.
   - FILL CONCRETE/GROUT TO SUPPLIER REQUIREMENTS.

REPAIR OF EXPOSED REINFORCEMENT AND ANCHOR AT CONCRETE SURFACE

1. ALL EXPOSED REINFORCEMENT AND MILD STEEL ANCHORED TO BE REPAIRED AS FOLLOWS:
   - SAW CUT OR CHISEL CUT CONCRETE, PERPENDICULAR TO CONCRETE SURFACE, 15 MM DEEP AROUND REINFORCEMENT/ANCHOR.
   - BREAKOUT CONCRETE AROUND REINFORCEMENT/ANCHOR TO A DEPTH OF 60 MM.
   - CUT EXPOSED REINFORCEMENT/ANCHOR AT A MINIMUM DEPTH OF 50 MM FROM CONCRETE SURFACE.
   - CLEAN CONCRETE SURFACE AND REMOVE ALL LOOSE MATERIAL.
   - ABRASIVE BLAST CLEAN EXPOSED REINFORCEMENT/ANCHOR. APPLY "NITOPRIME" ZINC RICH PRIMER TO REINFORCEMENT/ ANCHOR UNLESS APPROVED OTHERWISE. THOROUGHLY SOAK SUBSTRATE WITH CLEAN WATER.
   - APPLY "NITOBOND HAR" PRIMER TO CONCRETE UNLESS APPROVED OTHERWISE.
   - APPLY "RENDEROC HB40" TO FILL OPENING UNLESS APPROVED OTHERWISE.

ADDITIONAL NOTES

1. SEWERS SHALL BE DISUSED IN ACCORDANCE WITH PROCEDURES SET OUT IN THE SEQ SEWER CODE.
2. BENCH MARK LEVELS ARE AS SHOWN ON KNg DWG No 21-121-52.
3. THE CONTRACTOR SHALL VERIFY FINISH SURFACE LEVELS ON SITE BEFORE CONSTRUCTION OF SEWERS AND PROPERTY CONNECTION BRANCHES.
4. F.S.L. SHOWN ON THE LONGITUDINAL SECTIONS ARE INDICATIVE ONLY. MANHOLE COVERS TO BE CONSTRUCTED AS PER STD DWG No SEQ-SEW-1308-1.
5. VACUUM TESTING OF ALL SEWER MANHOLES AND PIPELINES ARE REQUIRED TO THE SEQ WSA 02-2014-3.4 21.4.
6. PRIOR TO COMMENCING WORKS/CONSTRUCTIONS TO LIVE SEWERS KN IS TO BE NOTIFIED OF PROPOSED TIMING TO ALLOW NOTIFICATION TO URBAN UTILITIES **REPRESENTATIVES.**
7. DETECTABLE MARKER TAPE TO BE INSTALLED OVER ALL SEWER MAINS.
8. PIPE EMBEDMENT SHALL BE CONSTRUCTED AS PER STD DWG No. SEQ-SEW-1201-1 TO SEQ-SEW-1205-1.
9. PROPERTY CONNECTION BRANCHES SHALL BE CONSTRUCTED AS PER STD DWG No SEQ-SEW-1106-1 TO SEQ-SEW-1106-6.
10. CCTV FOOTAGE TO URBAN UTILITIES REQUIREMENTS TO BE PROVIDED. KN TO REVIEW/REPORT FOOTAGE FOR EACH SEWER LINE.
11. TANGENT POINT SET-OUT INFORMATION FOR HORIZONTAL BENDS IS TO BE INCLUDED ON AS-CONSTRUCTED DRAWINGS.
12. ALL PE-PE CONNECTIONS SHALL BE WELDED. WELDING REQUIREMENTS SHALL BE IN ACCORDANCE WITH WSA 02-2014-3.1 CLAUSE 4.7.1 . CLASS PN10/SDR17 PE FITTINGS SHALL BE UTILISED THROUGHOUT.
13. ALL CONNECTIONS TO LIVE SEWER TO BE UNDERTAKEN BY CONTRACTOR UNDER SUPERVISION OF URBAN UTILITIES, AND AT THE DEVELOPERS EXPENSE IN ACCORDANCE WITH AN APPROVED NETWORK ACCESS PERMIT.
14. ALL LRB RADII SHALL BE 35 TIMES THE OUTSIDE DIAMETER OF AN SDR21 PE PIPE AND 25 TIMES THE OUTSIDE DIAMETER OF AN SDR17 PE100 PIPE. BENDING OF PE MUST BE AS PER PIPA GUIDELINES. MOULDED PVC FITTING ARE NOT PERMITTED
15. LEVELS FOR EXISTING SEWER HAVE BEEN OBTAINED FROM AS-CONSTRUCTED INFORMATION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM EXISTING LEVELS ON SITE.
16. CUT-INS TO EXISTING MHs MUST COMPLY WITH THE DETAILS IN DRAWING SEQ-SEW-1307-4

DURING ANY CONSTRUCTION ACTIVITY AT LEAVE ONE PERSON ON SITE MUST HAVE COMPLETED A PIPE LAYING TRAINING COURSE APPROVED BY THE PIPE SUPPLIER OR MANUFACTURER AND APPROPRIATE TO THE PIPELINE UNDER CONSTRUCTION. THE TRAINING COURSE MUST HAVE BEEN COMPLETED WITHIN THE LAST TEN YEARS.

ALL SITE AND FACTORY PE WELDING SHALL BE CARRIED OUT BY A PERSON WHO HAS COMPLETED RELEVANT NATIONALLY ACCREDITED TRAINING COURSES FOR BUTT WELDING/ELETROFUSION AND HOLD A VALID WELDING CERTIFICATE IN ACCORDANCE WITH AS/NZS2033.

THE CONTRACT SHALL PROVIDE DOCUMENTED EVIDENCE OF ACCEPTABLE QUALIFICATIONS TO URBAN UTILITIES.

ALL SEWERS AND MAINTENANCE STRUCTURES SHALL BE INSPECTED BY CCTV. THE FIRST CCTV INSPECTION SHALL BE MADE PRIOR TO COMMISSIONING AFTER ALL BACKFILLING OPERATIONS HAVE BEEN SATISFACTORILY COMPLETED AND ALL JUNCTIONS HAVE BEEN INSTALLED.

A SECOND CCTV INSPECTION IS REQUIRED PRIOR TO BUT NOT MORE THAN 2 WEEKS BEFORE THE ONSITE INSPECTION FOR OFF MAINTENANCE CERTIFICATION.

CCTV EQUIPMENT IN ACCORDANCE WITH SECTION 21.8 OF THE SEQ SEWER CODE AND THE WSAA CONDUIT INSPECTION REPORTING CODE OF AUSTRALIA WSA 05 AND THE RESULTS SUBMITTED TO URBAN UTILITIES FOR COMPLIANCE CHECKING.

PIPE MINIMUM PIPE TRENCH WIDTHS

SOIL DESCRIPTION	APPROXIMATE NATIVE SOIL MODULUS (MPa)	SDR	PE 100 DN160 TRENCH WIDTH (mm)	MAX DEPTH (mm)
SOFT CLAY	0.9	21	600	4300
		17	600	5000
		17	900	6000

NOTES:
1. EMBEDMENT MATERIAL TO BE SINGLE SIZED CRUSHED ROCK, NOMINAL 5mm TO 7mm SIZE OR AS NOMINATED IN THE CURRENT SEQ ACCEPTED PRODUCTS AND MATERIALS LIST
2. THE CONTRACTOR MUST CONFIRM THE TRENCH SUBGRADE INSITU MATERIAL CHARACTERISTICS EQUAL OR EXCEED A MINIMUM NATIVE SOIL MODULUS OF 0.9 MPa AND SUBMIT TO THE SUPERINTENDENT FOR APPROVAL, PRIOR TO PROGRESSING WITH CONSTRUCTION.

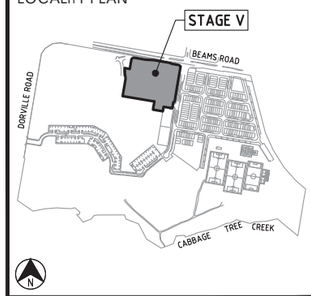
NAME OF ESTATE		CARSELDINE VILLAGE - STAGE V
SUBDIVIDER		EDQ
APPLICATION No.		23-PNT-65389
SP DELEGATE APPROVAL DATE		01/10/2021
DRAWING PLAN No.		21-121-52 TO 56
No. OF ALLOTMENTS		4
AREA IN ha.		2.4303 ha
LENGTH OF SEWERS	DN160 PE100	141.456m

LIVE SEWER WORKS TABLE

No.	DESCRIPTION	DIA. SEWER	EXISTING ASSET ID AT CONNECTION	MH/MS TYPE	COVER TYPE	LOT No.	F.S.L.	E.S.L.	I.L.	CONNECTION DEPTH TO INVERT	ALTERATION TO EXIST. MH BENCHING REQ'D
1(A)	3m FROM STUB END CAP, CONSTRUCTOR TO LAY NEW LINE 7. AFTER TESTING AND INSPECTING, NOTIFY URBAN UTILITIES. (B)	DN160PE21	TE/7	F	D	-	15.439	15.474	11.932	3.507	N
1(B)	CONTRACTOR TO REMOVE TEMPORARY END CAP ON LINE 7 AND MAKE LIVE CONNECTION AFTER SUCCESSFUL "ON MAINTENANCE" INSPECTION UNDER SUPERVISION OF URBAN UTILITIES.										

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:19+10'00'

Drawing Title
SEWERAGE NOTES SHEET 2

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	54 of 20

	Drawing No	Revision
A1	21-121-54	B

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-52-55-SEW-LAYOUT.dwg Plotted by RW on 21/11/2023 8:35:21 AM

SEWERAGE CATCHMENT PLAN
SCALE 1:500

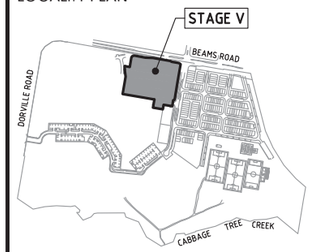
SCALE
10 5 0 10 20 30 40 50m
1 : 500 (A1 UNREDUCED)

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-52-55-SEW-LAYOUT.dwg Plotted by: RW on 21/11/2023 8:35:23 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:19+10'00'

Drawing Title

SEWERAGE CATCHMENT PLAN

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	55 of 20

	Drawing No	Revision
A1	21-121-55	B

MAINTENANCE HOLE/SHAFT No.

MH/MS COVER TYPE	
MH/MS TYPE	
MH/MS DROP TYPE	
BRANCH LINE No.	
HC TYPE	
HC DEPTH	
HC CH. TO DS MH/MS/ FITTING	
HC INVERT LEVEL	
HC LOT No.	

LEGEND:

G = CONCRETE 0.900Ø MH
F = CONCRETE 1.200Ø MH
X = CONCRETE 1.200Ø MH
@ = PE LINED SEQ-SPS-1407-1A & 2B
& = CONNECTION FROM MANHOLE
MS = MAINTENANCE SHAFT

B = CLASS B NON-TRAFFICABLE
D = CLASS D TRAFFICABLE

NOTES:

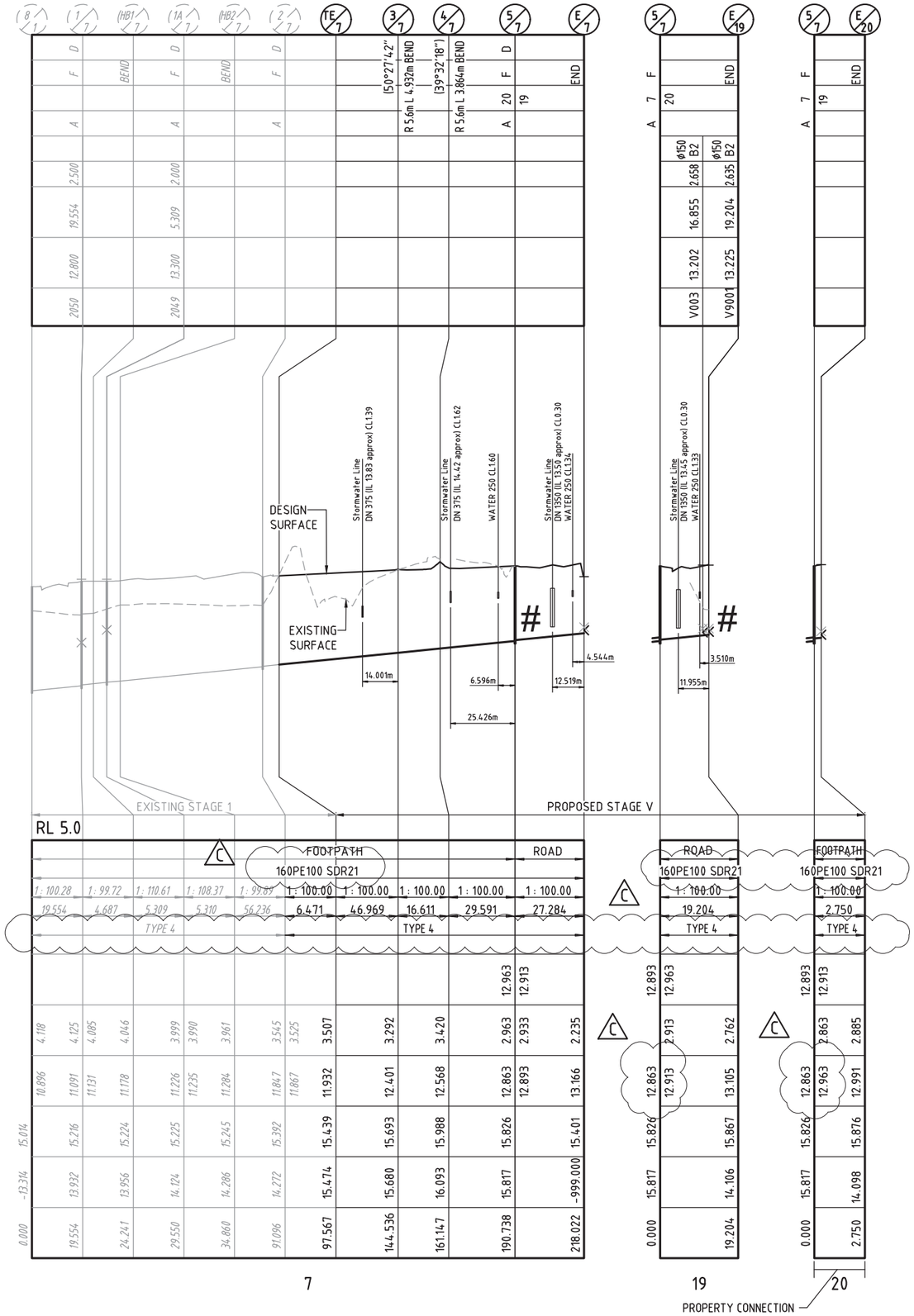
1. PROPERTY CONNECTION TYPE/DETAILS REFER SEQ-SEW-1106 DWG SERIES.
2. MANHOLE TYPE/DETAILS REFER SEQ-SEW-1301-1 to 1301-21, 1304-1 to 1305-1, 1308-2 to 1308-11,1313-1, 1316-1.
3. WHERE CLASS "D" COVERS ARE SPECIFIED FOR MH OR MS, INCREASE TOP SLAB THICKNESS FROM 150mm TO 175mm.
4. COMPLETE ALL END OF LINE WITH A ELECTROFUSION STOP END OR BUTT WELDED CAP. REFER WSAA GRAVITY SEWERAGE CODE OF AUSTRALIA - SEQ-EDITION - VERSION 2.1 (SEPTEMBER 2021)

# DENOTES BRIDGING STRUCTURE BETWEEN STORMWATER AND SEWER MAIN REFER TYPICAL BRIDGING DETAIL ON GC STRUCTURAL ENGINEERS DWG 23ST368_S001

DATUM RL

LOCATION PIPE DIAMETER GRADE LENGTH EMBEDMENT TYPE	
JUNCTION INVERT LEVEL	
DEPTH OF INVERT BELOW FSL	
INVERT LEVEL (IL)	
FINISHED SURFACE LEVEL (FSL)	
EXISTING SURFACE LEVEL (ESL)	
CHAINAGE (CH)	

LINE



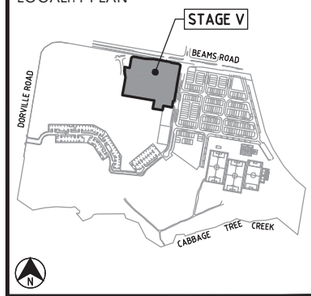
SCALE A 1:1000 (Horiz.) 10 5 0 10 20 30 40 50 60 70 80 90 100m
B 1:100 (Vert.) 1 0.5 0 1 2 3 4 5 6 7 8 9 10m
(A1 UNREDUCED)

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step.

DANGER
HIGH VOLTAGE
UNDERGROUND CABLES

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW
C	QUU RFI REVISION	14.12.2023	RW

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
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2023.12.14 15:07:34 +10'00'

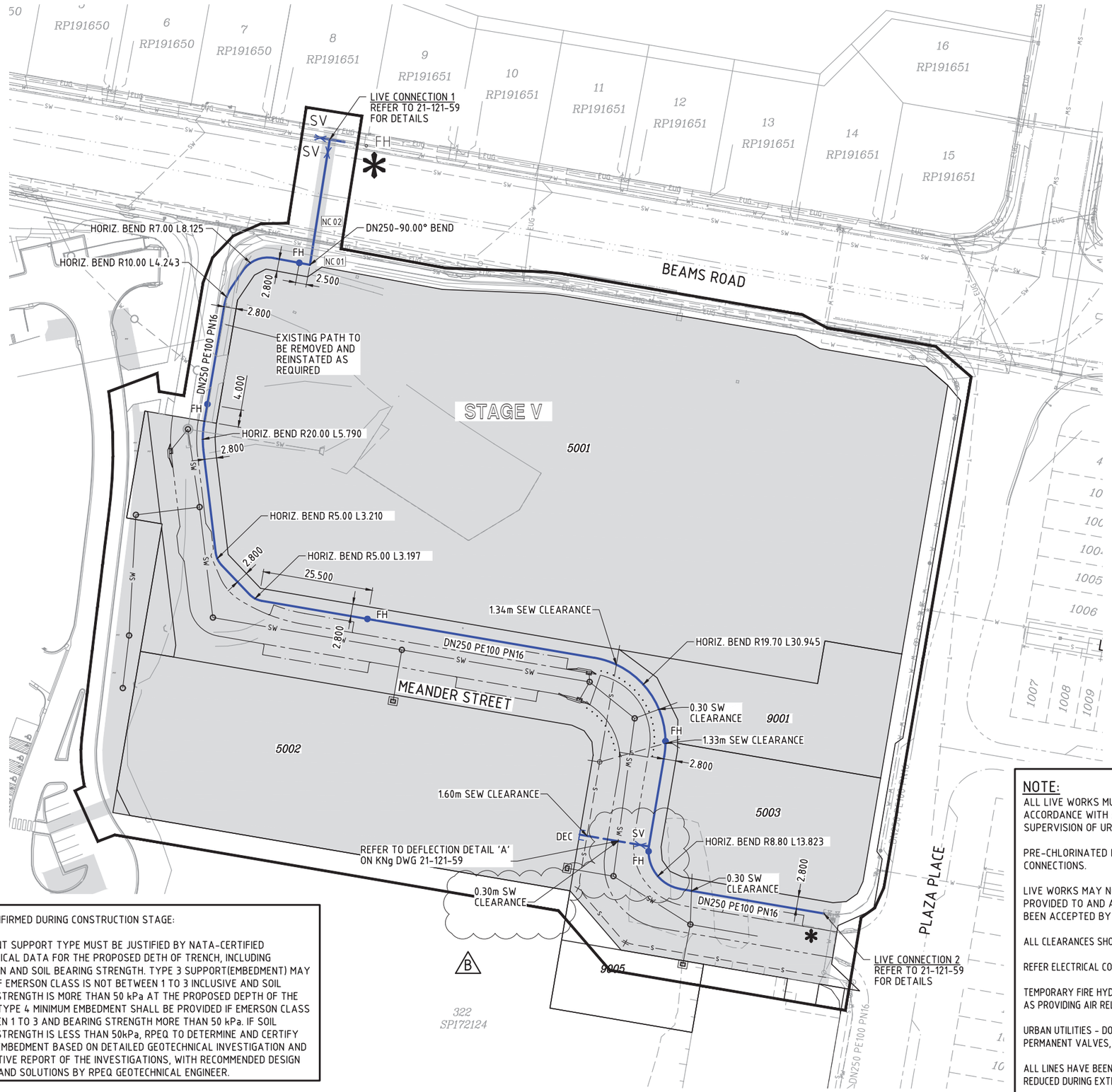
Drawing Title
SEWERAGE LONGITUDINAL SECTIONS

Drawn	Designed	Checked	Date
RW	BK	MS	OCT '23

Scale	Sheet
AS SHOWN	56 of 20

A1	Drawing No	Revision
	21-121-56	C

C:\Users\rw\AppData\Local\Temp\AcPublish_11156\21-121-56-SEW-LONG.dwg Plotted by: RW on 14/12/2023 3:58:22 PM



LEGEND

- CONSTRUCTION BOUNDARY
- PROPOSED DN250 PE100 PN16 WATER MAIN
- PROPOSED DN125 PE100 PN16 WATER MAIN
- PROPOSED CONDUIT
- EXISTING WATER MAIN
- STORMWATER DRAINAGE
- SEWER MAIN
- EXISTING STORMWATER MAIN
- EXISTING SEWER MAIN
- EXISTING ELECTRICAL
- FIRE HYDRANT
- SECTION VALVE
- SCOUR VALVE
- REDUCER
- DEAD END CAP
- LIVE CONNECTION TO BE COMPLETED BY CONTRACTOR UNDER UU SUPERVISION

WATER RETICULATION LAYOUT PLAN

SCALE 1:500

TO BE CONFIRMED DURING CONSTRUCTION STAGE:

EMBEDMENT SUPPORT TYPE MUST BE JUSTIFIED BY NATA-CERTIFIED GEOTECHNICAL DATA FOR THE PROPOSED DETH OF TRENCH, INCLUDING DISPERSION AND SOIL BEARING STRENGTH. TYPE 3 SUPPORT(EMBEDMENT) MAY BE USED IF EMERSON CLASS IS NOT BETWEEN 1 TO 3 INCLUSIVE AND SOIL BEARING STRENGTH IS MORE THAN 50 kPa AT THE PROPOSED DEPTH OF THE SERVICE. TYPE 4 MINIMUM EMBEDMENT SHALL BE PROVIDED IF EMERSON CLASS IS BETWEEN 1 TO 3 AND BEARING STRENGTH MORE THAN 50 kPa. IF SOIL BEARING STRENGTH IS LESS THAN 50kPa, RPEQ TO DETERMINE AND CERTIFY TYPE OF EMBEDMENT BASED ON DETAILED GEOTECHNICAL INVESTIGATION AND INTERPRETIVE REPORT OF THE INVESTIGATIONS, WITH RECOMMENDED DESIGN CRITERIA AND SOLUTIONS BY RPEQ GEOTECHNICAL ENGINEER.

DIAL BEFORE YOU DIG www.1100.com.au

DANGER LIVE WIRES AND COMMUNICATION SERVICES

DANGER UNDERGROUND CABLES

NOTE:
ALL VALVES & HYDRANTS TO BE LOCATED CLEAR OF ROADWAYS AND CONCRETE HARDSTANDS. ALL WATER METERS & FIRE HYDRANTS TO BE MIN 1.1m CLEAR OF ENERGEX PILLARS.

NOTE:
ALL LIVE WORKS MUST BE UNDERTAKEN BY THE DEVELOPER'S LICENSED CONTRACTOR IN ACCORDANCE WITH A VALID URBAN UTILITIES NETWORK ACCESS PERMIT, UNDER THE SUPERVISION OF URBAN UTILITIES, AT THE DEVELOPERS EXPENSE.

PRE-CHLORINATED FITTINGS SHALL BE USED FOR WATER SUPPLY LIVE-WORKS CONNECTIONS.

LIVE WORKS MAY NOT COMMENCE UNTIL ALL RELEVANT TEST CERTIFICATES HAVE BEEN PROVIDED TO AND ACCEPTED BY URBAN UTILITIES, AND ALL ADJOINING WORKS HAVE BEEN ACCEPTED BY URBAN UTILITIES.

ALL CLEARANCES SHOWN BETWEEN OTHER SERVICES ARE VERTICAL CLEARANCE U.N.O

REFER ELECTRICAL CONSULTANTS DRAWINGS FOR ELECTRICAL PILLAR LOCATIONS.

TEMPORARY FIRE HYDRANTS HAVE BEEN UTILISED TO ALLOW FLUSHING TO END OF LINES AS WELL AS PROVIDING AIR RELEASE FOR MAINTENANCE IF REQUIRED.

URBAN UTILITIES - DO NOT ACCEPT SCOURS ON SYSTEM AND DUE TO THE LOCATION OF THE PERMANENT VALVES, BOTH FITTINGS HAVE BEEN REMOVED FROM THE END OF LINE TREATMENT

ALL LINES HAVE BEEN EXTENDED BY MIN. 5m PAST LAST LOT TO ENSURE FUTURE DISTURBANCE IS REDUCED DURING EXTENSION OF SERVICES

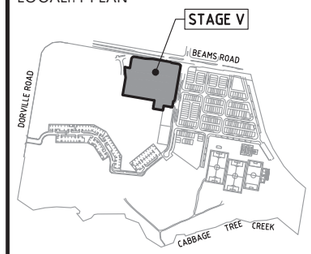
WATERMAIN TO BE JOINT-FREE FOR A LENGTH EQUAL TO THE DIAMETER OF THE MAINTENANCE STRUCTURE PLUS 1m EXTENDING FROM EACH SIDE.

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	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:20+10'00'

Drawing Title
WATER RETICULATION LAYOUT PLAN STAGE V

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	57 of 20

	Drawing No	Revision
A1	21-121-57	B

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:25 AM

ASSET REGISTER - WATER RETICULATION STAGE V

ESTATE/STAGE		CARSELDINE VILLAGE - STAGE V			
SITE ADDRESS		532 BEAMS ROAD			
FILE/APPLICATION		23-PNT-65389			
QUU DELEGATES APP. DATE		8/5/2023			
CLIENT		EDQ			
DRAWING PLAN No.		21-121-57 TO 61			
MAINS	DIAMETER	MATERIAL DESIGN	MATERIAL CONST	LENGTH DESIGN	LENGTH CONST
	DN63	PE100 PN16	-	-	-
	DN125	PE100 PN16	-	16.200m	-
	DN180	PE100 PN16	-	-	-
	DN250	PE100 PN16	-	305.413m	-
SERVICES	DIAMETER	MATERIAL DESIGN	MATERIAL CONST	LENGTH DESIGN	LENGTH CONST
	DN25	PE100 PN16	-	-	-
	DN32	PE100 PN16	-	-	-
	DN40	PE100 PN16	-	-	-
METERS	DIAMETER	NUMBER			
	20	16	-		
	32	1	-		
	40	16	-		

SERVICE DETAILS STAGE V

No.	SIZE	LOT NUMBERS
-	40mm	- △
-	32mm	- ◯
-	25mm	-

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

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

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

LOCALITY PLAN STAGE V
SCALE 1:1000

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT SOUTH EAST WATER SUPPLY CODE SPECIFICATIONS AND STANDARDS & URBAN UTILITIES TECHNICAL GUIDELINE: DESIGN AND DOCUMENTATION OF WATER RETICULATION AND WASTEWATER (SEWERAGE) INFRASTRUCTURE.
2. UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.
3. ADOPT LIP OF KERB OR SHOULDER OF ROAD AS PERMANENT LEVEL.
4. COVER OVER MAINS FROM PERMANENT LEVEL TO BE AS SHOWN IN STANDARD DRAWING No. SEQ-WAT-1200-2.
5. CONSTRUCT EMBEDMENT AND TRENCHFILL TO SEQ-WAT-1200-2, 1201-1 TO SEQ-WAT-1204-1 (TYPE D SUPPORT UNLESS GEOTECHNICAL INVESTIGATIONS DEMONSTRATE THAT TYPE C SUPPORT IS ADEQUATE AND IPSWICH CITY COUNCIL STANDARDS FOR ROADWAY CROSSINGS, WHICHEVER IS MORE ONEROUS.
6. CONSTRUCT THRUST BLOCKS ON ALL VALVES, BENDS, TEES, TAPERS, DEAD ENDS, AND TRANSITIONS TO UNRESTRAINED PIPEWORK TO SEQ-WAT-1205-1 TO SEQ-WAT-1207-1.
7. WATER SERVICES UNDER ROADS MUST BE PLACED WITHIN A ø100mm CONDUIT - REFER TO SEQ-WAT-1107-1
8. A WATER METER SUPPLIED AT THE DEVELOPER'S COST, IS TO BE INSTALLED AT THE SERVICE POINT OF EACH LOT IN ACCORDANCE WITH STANDARD DRAWING No. SEQ-WAT-1107-3.
9. ALL MATERIALS USED IN THE WORKS SHALL COMPLY WITH THE URBAN UTILITIES IPAM ACCEPTED PRODUCTS AND MATERIALS LIST

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

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

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

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

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

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

VEGETATION PROTECTION

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

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

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

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

SOIL

A. TOPSOIL AND SUBSOIL SHALL BE STOCKPILED SEPARATELY.

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

CREEK CROSSINGS

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

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

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

REHABILITATION

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

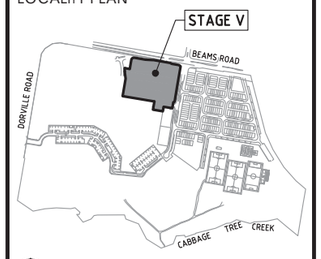
B. PREDISTURBANCE VEGETATION PATTERNS SHALL BE RESTORED.

SCALE
10 5 0 10 20 30 40 50 60 70 80 90 100m
1 : 1000 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:20+10'00'

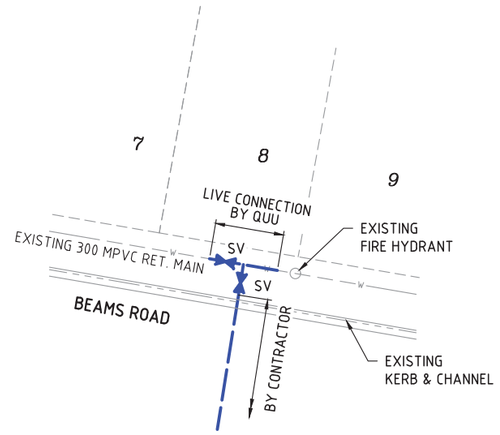
Drawing Title
WATER RETICULATION NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	58 of 20

	Drawing No	Revision
A1	21-121-58	B

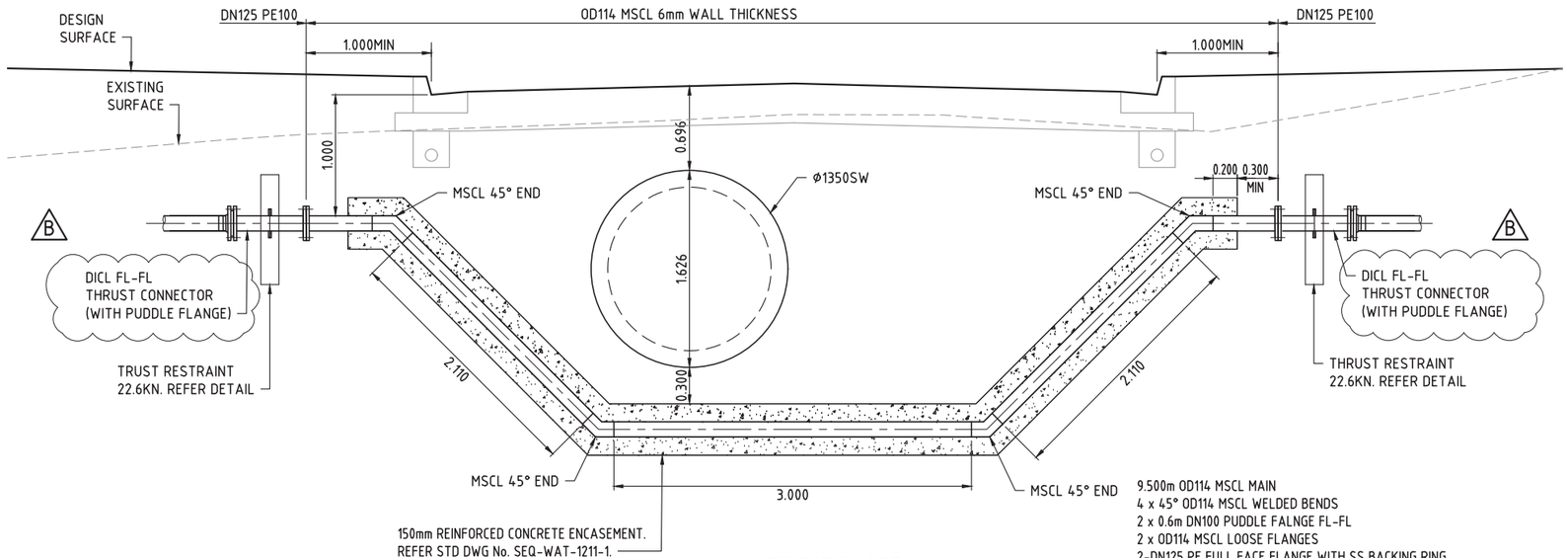
M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:27 AM



LIVE CONNECTIONS 1 – ADJACENT TO EXISTING LOT 8

SCALE NTS

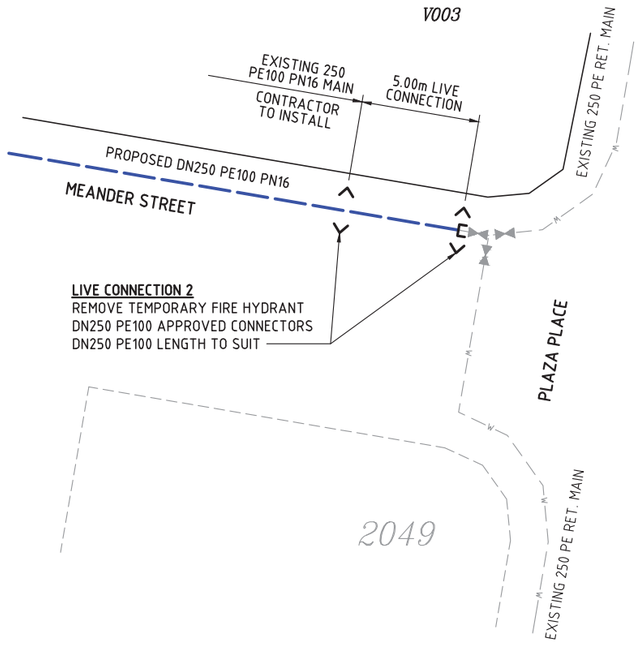
FOR DETAIL REFER KNG DRG 21-121-62



DEFLECTION DETAIL 'A'

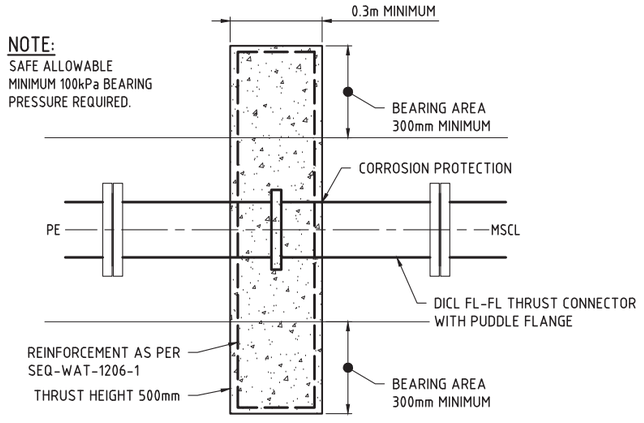
SCALE 1:25

9.500m OD114 MSCL MAIN
4 x 45° OD114 MSCL WELDED BENDS
2 x 0.6m DN100 PUDDLE FALNGE FL-FL
2 x OD114 MSCL LOOSE FLANGES
2-DN125 PE FULL FACE FLANGE WITH SS BACKING RING
MILD STEEL PIPE TO BE SINTAKOTED.
ALL FLANGED AND WELDED JOINTS TO BE PROTECTED WITH DENSO WRAPPING TAPE.



LIVE CONNECTIONS 2 – ADJACENT TO EXISTING LOT 2049

SCALE NTS



THRUST CONNECTOR RESTRAINT DETAIL

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)

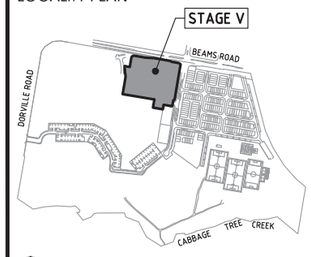
SCALE 0.5 0 0.5 1.0 1.5 2.0 2.5m

1 : 25 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:21+10'00'

Drawing Title

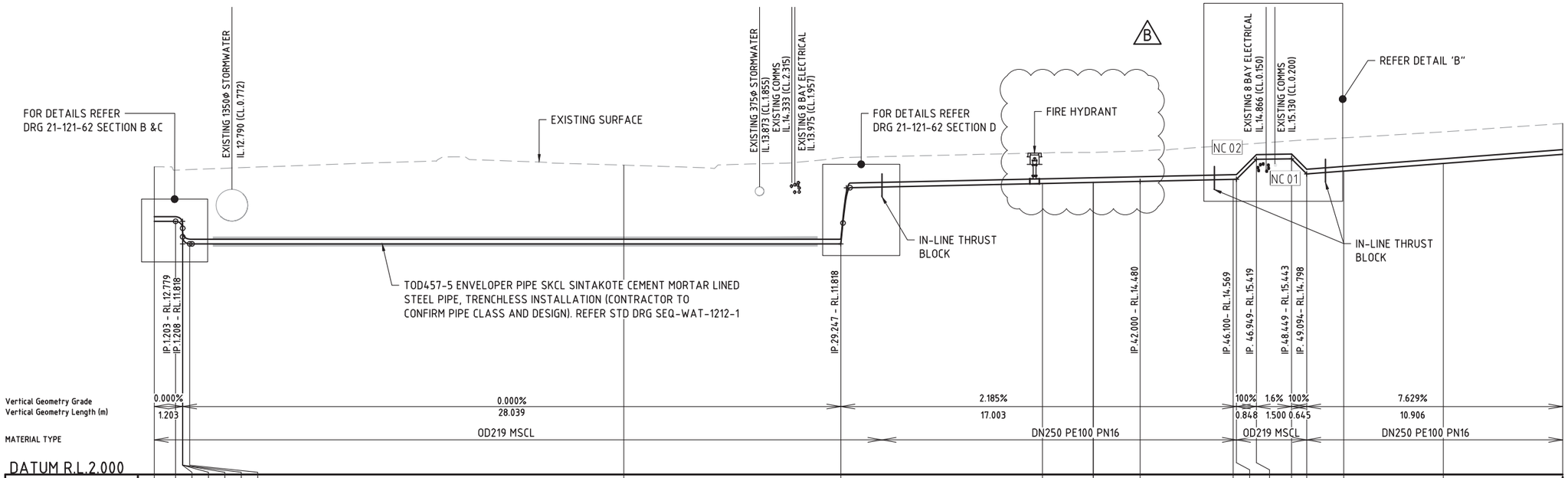
WATER RETICULATION
LIVE CONNECTION DETAILS

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	59 of 20

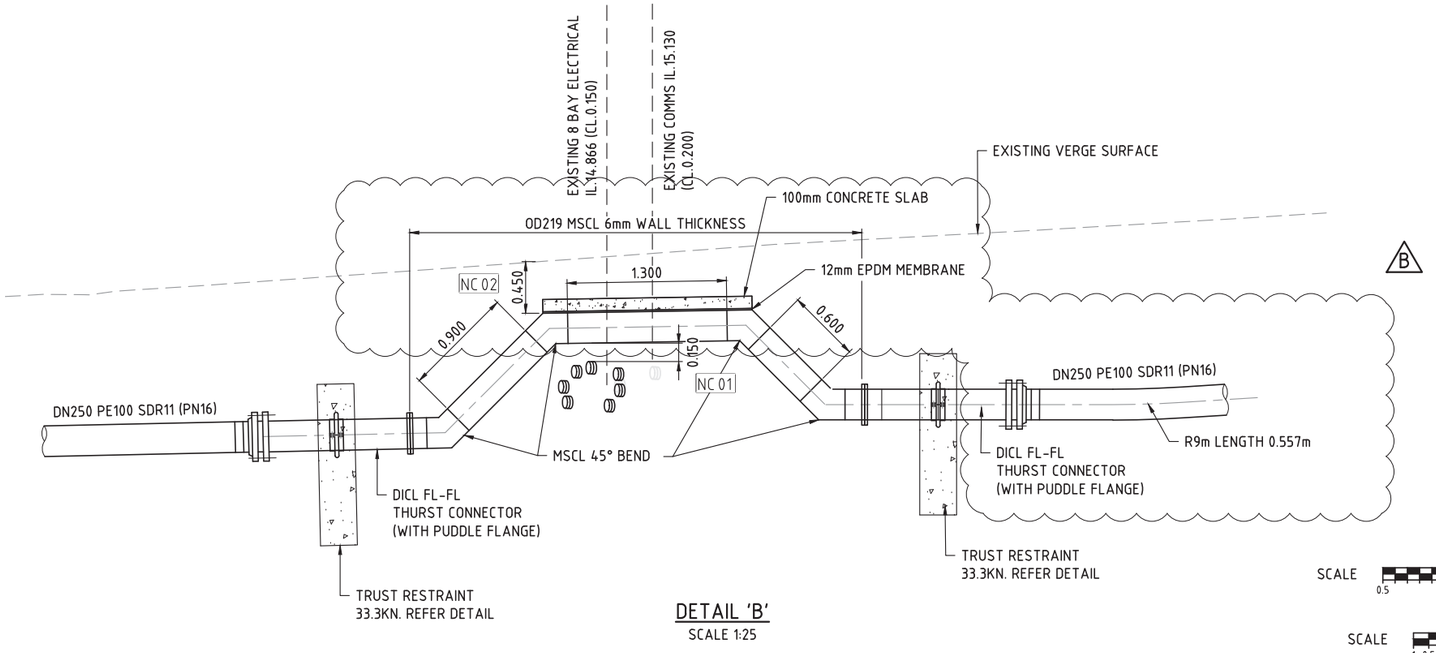
	Drawing No	Revision
A1	21-121-59	B

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:30 AM



LONGITUDINAL SECTION - WATER DN250

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



DETAIL 'B'

SCALE 1:25

SCALE 0.5 0 0.5 1.0 1.5 2.0 2.5m
1 : 25 (A1 UNREDUCED)

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

DIAL BEFORE YOU DIG www.1100.com.au

DANGER LIVE WIRES AND COMMUNICATION SERVICES

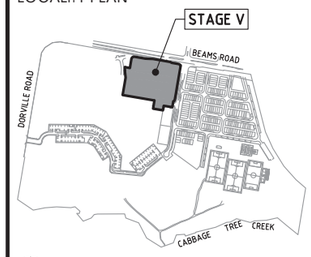
DANGER UNDERGROUND CABLES

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:33 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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: 2023.11.21 10:54:21+10'00'

Drawing Title
WATER RETICULATION LONGITUDINAL SECTIONS

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

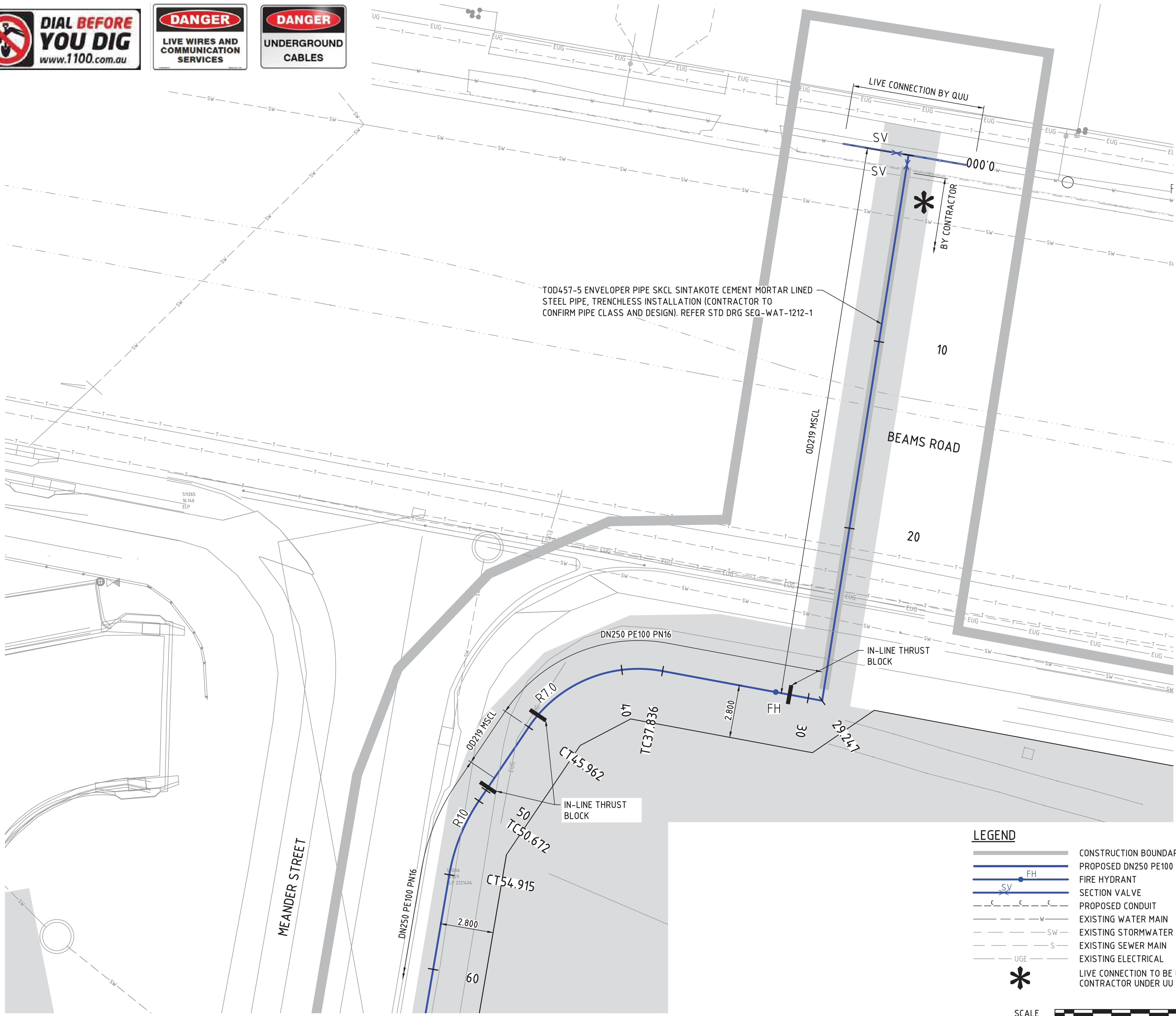
Scale	Sheet
AS SHOWN	60 of

	Drawing No	Revision
A1	21-121-60	B

DIAL BEFORE YOU DIG www.1100.com.au

DANGER LIVE WIRES AND COMMUNICATION SERVICES

DANGER UNDERGROUND CABLES



WATER RETICULATION LAYOUT PLAN

SCALE 1:100

LEGEND

	CONSTRUCTION BOUNDARY
	PROPOSED DN250 PE100 PN16 WATER MAIN
FH	FIRE HYDRANT
SV	SECTION VALVE
C	PROPOSED CONDUIT
W	EXISTING WATER MAIN
SW	EXISTING STORMWATER MAIN
S	EXISTING SEWER MAIN
UGE	EXISTING ELECTRICAL
*	LIVE CONNECTION TO BE COMPLETED BY CONTRACTOR UNDER UU SUPERVISION

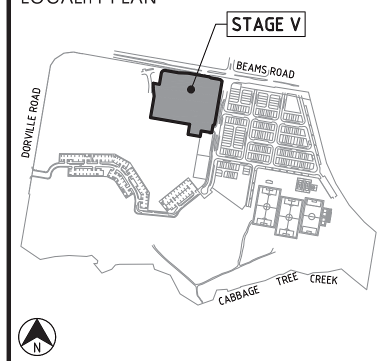
SCALE 1 0.5 0 1 2 3 4 5 6 7 8 9 10m

1 : 100 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW

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: 2023.11.21 10:54:21+10'00'

Drawing Title

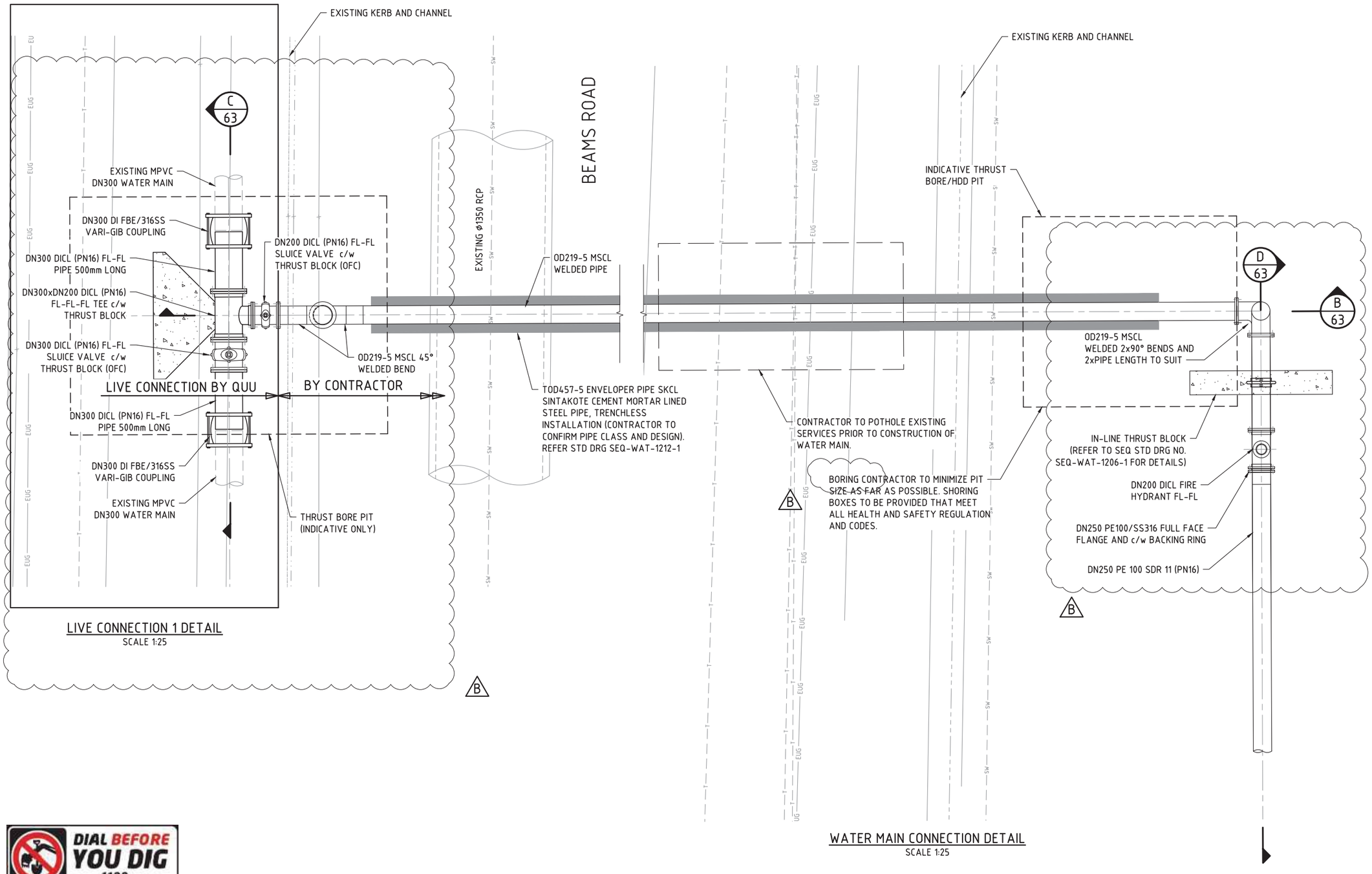
WATER RETICULATION LAYOUT PLAN CH 00 TO CH 60

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	61 of

	Drawing No	Revision
A1	21-121-61	A

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:35 AM



LIVE CONNECTION 1 DETAIL
SCALE 1:25

WATER MAIN CONNECTION DETAIL
SCALE 1:25

SCALE
0.5 0 0.5 1.0 1.5 2.0 2.5m
1 : 25 (A1 UNREDUCED)

DIAL BEFORE YOU DIG
www.1100.com.au

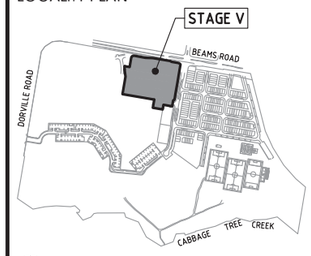
DANGER
UNDERGROUND CABLES

DANGER
LIVE WIRES AND COMMUNICATION SERVICES

M:\2021\21121 Carseldine Village Stage V\Engineering\ACAD\21-121-57-64-WATER.dwg Plotted by: RW on 21/11/2023 8:35:42 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW
B	QUU RFI REVISION	24.11.2023	RW

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

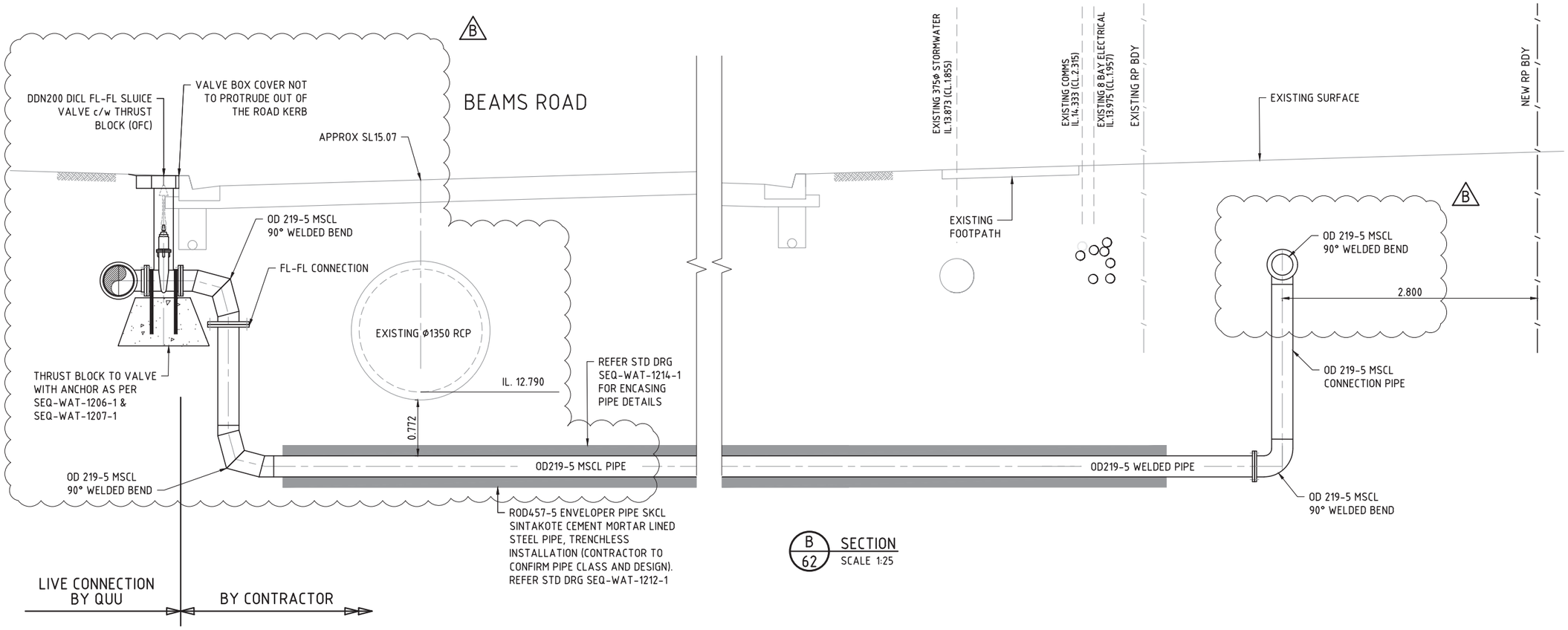
Approved
M. Shaw
Digitally signed by Mark Shaw RPEQ 17544
Date: 2023.11.21 10:54:22+10'00'

Drawing Title
WATER RETICULATION
WATER MAIN CONNECTION
DETAILS SHEET 1

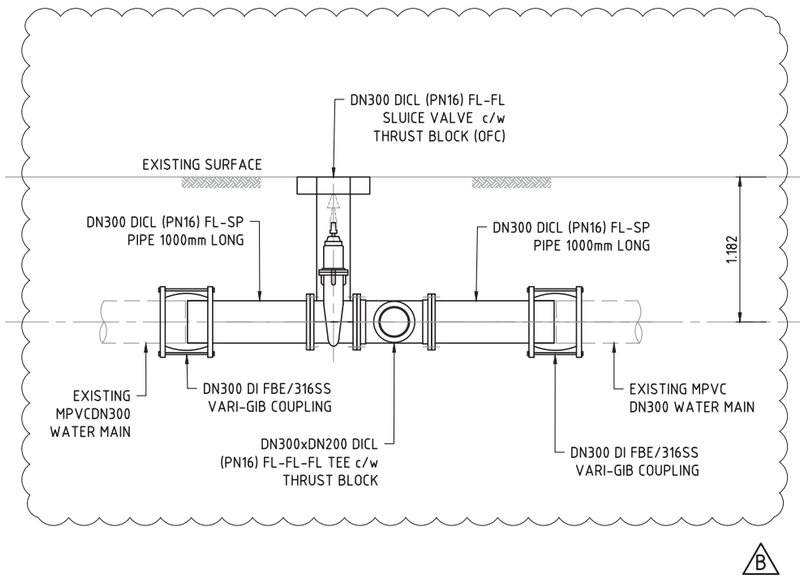
Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	62 of 20

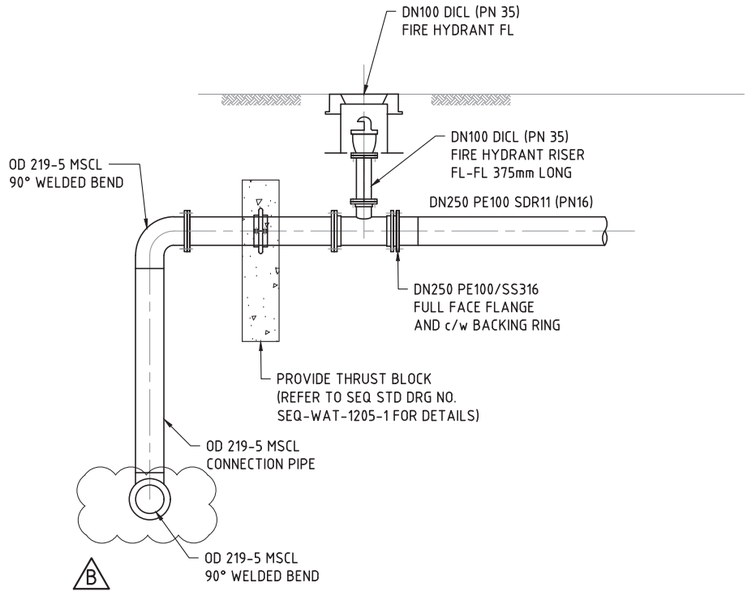
	Drawing No	Revision
A1	21-121-62	B



B/62 SECTION
SCALE 1:25



C/62 SECTION - LIVE CONNECTION 1
SCALE 1:25

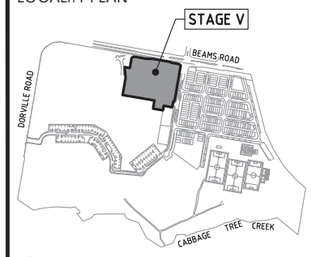


D/62 SECTION
SCALE 1:25

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!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	RW

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: 2023.11.21 10:54:22+10'00'

Drawing Title
WATER RETICULATION
WATER MAIN CONNECTION DETAILS SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	OCT '23

Scale	Sheet
AS SHOWN	63 of 20

A1	Drawing No	Revision
	21-121-63	A

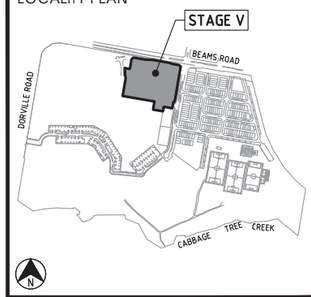
NON-CONFORMANCE TABLE

No.	SEQ CODE CLAUSE	DETAILS FOR PROPOSED VARIATION	REASON FOR PROPOSED VARIATION	RELEVANT SERVICE
NC01	SEQ WATER SUPPLY CODE Cl 5.12.5.2 CLEARANCE REQUIREMENTS	WATER MAIN TO BE CONSTRUCTED WITH A CRANK OVER EXISTING ELECTRICAL RESULTING IN A CLEARANCE OF 0.15m INSTEAD OF MIN 0.5m	CONSTRUCTION OF WATER MAIN UNDER EXISTING ELECTRICAL WOULD RESULT IN A DEEP TRENCH WITH ELECTRICAL CONDUIT HANGING ACROSS IT AND AS SUCH BE A SAFETY RISK.	DRINKING WATER
NC02	SEQ WATER SUPPLY CODE Cl 7.4.2 PIPE COVERS	WATER MAIN TO BE CONSTRUCTED WITH A CRANK OVER EXISTING ELECTRICAL RESULTING IN REDUCED COVER OF 0.45m INSTEAD OF MIN 0.6m	CONSTRUCTION OF WATER MAIN UNDER EXISTING ELECTRICAL WOULD RESULT IN A DEEP TRENCH WITH ELECTRICAL CONDUIT HANGING ACROSS IT AND AS SUCH BE A SAFETY RISK.	DRINKING WATER

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	12.10.2023	VS

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: 2023.11.21 10:54:23+10'00'

Drawing Title

WATER MAIN CONNECTION
NON-CONFORMANCE TABLE

Drawn	Designed	Checked	Date
VS	VS	MS	OCT '23

Scale	Sheet
	64 of

	Drawing No	Revision
A1	21-121-64	A

Queensland Government

TECHNICAL MEMORANDUM

To:	Richard Bender - EDQ
From:	Ralph Williams - DesignFlow
Reviewed:	Shaun Leinster (RPEQ15637) - DesignFlow
Date:	10 October 2019
Subject:	Carseldine Urban Village – Local flood assessment to support Stage 1 development
Attachments	1. Peak flood depths – Existing case - 50%, 5%, 1% AEP event 2. Peak flood depths – Proposed case 50%, 5%, 1% AEP 3. Peak flood level impacts – 50%, 5%, 1% AEP

1 INTRODUCTION

This technical memorandum provides a summary of local flood assessments for the Carseldine Urban Village to support Stage 1 development. This modelling captures in detail the potential local flood impacts and potential drainage upgrades at the following locations:

- Beams Road;
- Railway at the eastern boundary of the site; and
- Local drainage to Cabbage Tree Creek

The outcomes of this assessment provide minimum drainage requirements associated with Stage 1 development to manage local flood impacts. Outcomes from this assessment are to inform the detail design of the Stage 1.

When reading this technical memorandum reference should be made to *Carseldine Urban Village – Updated Stormwater Management Plan* (DesignFlow report Version 3 2019). Figure 1 shows the current masterplan for the development from which this assessment has been based, including the Stage 1 development boundary.

2 BACKGROUND

The regional flood assessment of the Carseldine Urban Village development has been completed, as outlined in *Carseldine Urban Village – Updated Stormwater Management Plan* (DesignFlow report Version 3 2019), based on Brisbane City Council (BCC) supplied URBS and TUFLOW regional flood models for Cabbage Tree Creek. These models were updated as necessary to make suitable for regional flood impact assessment of the Carseldine Urban Village development.

The Cabbage Tree Creek modelling is at a regional scale and not suitable for a detailed assessment of the various local catchments that influence the site. Therefore, a separate local scale flood modelling exercise has been completed to capture potential flood impacts associated with the development, including local impacts at Beams Road and the railway at the eastern boundary of the site. Additional drainage survey was completed at the northern boundary of the site along Beams Rd and within the site to inform this local flood modelling.

This technical memorandum provides a summary of the local flood modelling.

Figure 1 – Carseldine Urban Village masterplan (source: RPS)

3 EXISTING CASE MODELLING

Local modelling has been carried out using a WBNM rainfall runoff model that feeds local catchment hydrographs into a 1D/2D TUFLOW hydraulic model. The existing case WBNM model sub-catchments are shown on Figure 2 which also indicates the general direction of overland flow (yellow arrows). Figure 2 also shows the existing pipe drainage network as modelled in TUFLOW for this investigation (aqua/black lines). It is noted that in some areas these drainage lines have been laid against the natural fall of the land and therefore their alignment does not necessarily match that of the overland flow as represented by the yellow arrows. Sub-catchment details are provided on Table 1.

A summary of the existing site drainage characteristics is as follows:

- The existing Beams Rd catchments flow to the east and north away from the site.
- Catchment B1 drains to the West Outfall Pipe to Cabbage Tree Creek (refer Figure 2). When this pipe is at capacity, runoff flows eastwards through the site.
- The majority of the proposed development area currently drains to the East Outfall Pipe to Cabbage Tree Creek (refer Figure 2). When this pipe is at capacity, site runoff will generally collect over the low-lying areas around the playing fields. Runoff will then drain southwards via the open drain adjacent to the railway. Modelling also predicts that during large events, overland flow from the site heads north and east toward the railway and Beams Rd.
- The Cabbage Tree Creek outfall pipes are predicted to flow in reverse direction when Cabbage Tree Creek flood levels are high.

Figure 2 - Existing case WBNM sub-catchments

Table 1 - Existing case WBNM sub-catchment details

WBNM ID	Area (ha)	Fraction Impervious (%)	Downstream ID
A1	10.546	59.64	A3
A2	4.582	65.43	A3
A3	3.424	28.42	A4
A4	0.902	45.53	A5
A5	0.799	49.91	A6
A6	2.738	83.29	A7
A7	13.295	52.13	SINK
B1	10.021	9.47	B2
B2	3.177	18.72	B3
B3	5.454	5.56	B6
B4A	1.291	84.66	B4B
B4B	1.054	20.26	B4C
B4C	2.282	12.26	B5
B5	2.514	0.00	B7
B6	1.746	0.00	B7
B7	3.345	4.20	B8
B8	5.174	3.63	SINK

The WBNM model has been run using ARR2016 ensemble patterns with burst durations ranging from 5 minutes to 6 hours. The results of the WBNM model have then been used to select ensemble patterns with a central tendency for the following durations that have then been run in the TUFLOW model; 15min, 30min, 45min, 60min, 120min and 180min. These durations were selected based on a review of critical durations across the local catchment study area. Modelling has been carried out for the 1%, 5% and 50% AEP events.

A WBNM lag parameter of 1.4 has been selected based on a Rational Method validation of peak flows at WBNM ID B8 (refer Validation Section for details).

Rainfall intensities and loss rates are based on values from the ARR 2016 data hub. Rainfall intensities relevant to the Carseldine site for varying AEP and storm durations are provided in Table 2.

Table 2 – Rainfall intensities (mm/hr) - Carseldine

Duration	AEP						
	63.20%	50%	20%	10%	5%	2%	1%
5 min	115.20	129.60	176.40	207.60	237.60	278.40	309.60
10 min	94.20	106.20	144.00	169.20	193.20	225.00	248.40
15 min	80.00	90.40	122.00	143.20	163.60	190.40	210.40
20 min	69.60	78.60	106.50	124.80	142.80	166.20	183.90
25 min	61.92	69.84	94.56	111.12	127.20	148.32	164.16
30 min	55.80	63.00	85.40	100.40	115.00	134.40	149.00
45 min	43.60	49.20	66.80	78.80	90.67	106.27	118.40
1 hour	36.10	40.80	55.60	65.70	75.70	89.10	99.60
1.5 hour	27.40	31.00	42.40	50.33	58.27	68.67	77.33
2 hour	22.45	25.40	34.90	41.55	48.20	57.50	64.50
3 hour	16.90	19.17	26.50	31.70	37.00	44.33	50.00
4.5 hour	12.78	14.51	20.24	24.22	28.44	34.22	38.89
6 hour	10.50	11.97	16.83	20.33	23.83	28.67	32.67
9 hour	8.02	9.18	13.00	15.78	18.67	22.56	25.67
12 hour	6.65	7.64	10.92	13.25	15.75	19.08	21.83
18 hour	5.12	5.94	8.56	10.50	12.44	15.22	17.44
24 hour	4.25	4.96	7.21	8.88	10.58	12.96	14.92
30 hour	3.70	4.30	6.33	7.80	9.30	11.43	13.20
36 hour	3.28	3.83	5.67	6.97	8.36	10.31	11.92
48 hour	2.71	3.17	4.73	5.85	7.02	8.69	10.08
72 hour	2.03	2.39	3.58	4.47	5.38	6.69	7.81

An initial loss/continuing loss approach is adopted. Initial and continuing losses for impervious areas are taken at 0mm/hr, whilst continuing losses for pervious areas are taken at 2.2mm/hr. Initial losses for pervious areas vary depending on the AEP and the storm duration. These are listed in Table 3.

Table 3 Pervious area initial loss (mm) modelled

Duration	50% AEP	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP
10 min	10.4	7.6	5.8	4.1	2.9	2.1
15 min	10.4	7.6	5.8	4.1	2.9	2.1
20 min	10.4	7.6	5.8	4.1	2.9	2.1
25 min	10.4	7.6	5.8	4.1	2.9	2.1
30 min	10.4	7.6	5.8	4.1	2.9	2.1
45 min	10.4	7.6	5.8	4.1	2.9	2.1
1 hour	10.4	7.6	5.8	4.1	2.9	2.1
1.50 hour	11.1	3.2	0	0	0	3.2
2 hours	11.9	3.7	0	0	0	0
3 hours	8.9	0	0	0	0	0
6 hours	5.9	0	0	0	0	0
12 hours	8.3	0	0	0	0	0
18 hours	7.7	0	0	0	0	0
24 hours	6.3	2.9	0.6	0	0	0
36 hours	13	8	4.7	1.6	0	0
48 hours	13	9.5	7.2	5	0	0
72 hours	13	12.3	11.8	11.4	3.3	0

Local catchment inflow hydrographs from the existing case WBNM model have been input to the existing case TUFLOW model. The existing case TUFLOW model layout is shown on Figure 3 and details are summarised below:

- TUFLOW HPC Build 2018-03-AB_64_iSP.
- Model grid size of 1m to provide detail resolution of potential flood impacts
- Run for 1%, 5% and 50% AEP events for ensemble temporal patterns with a central tendency for the events durations ranging from 15 minutes to 3 hours.
- WBNM local catchment inflow hydrographs are input to TUFLOW using TUFLOW's 2d_sa polygon approach.
- Topography based on aerial LiDAR survey and defined using a TUFLOW 1m grid.
- Manning's 'n' values of; Road – 0.02, Urban Lots – 0.18, Vegetated Area – 0.075, Cleared Open space – 0.03
- Existing on-site pipe drainage associated with the two existing outfalls to Cabbage Tree Creek have been incorporated using 1D pipe elements. Details are based on a recent survey completed by Land Partners (June, 2019). In addition to survey of the main site drainage lines, additional pipe network data has been sourced from BCC records. The existing drainage pipes included in the existing case TUFLOW modelling are shown on Figure 4. Pipe diameters shown in metres.
- Cabbage Tree Creek upstream boundary is a Q5 flow rate extracted from the Cabbage Tree Creek regional model. The Cabbage Tree Creek downstream boundary is a Q5 water level. The remaining two external boundary conditions are normal depth rating curves calculated by TUFLOW based on a slope of 1%. Note: a Q5 boundary condition is in accordance with standard modelling procedures for coincident regional flood events for local modelling. The ratio of local to regional catchment associated with the Carseldine Urban Village is 0.018.

Peak depth maps for the Existing Case modelling are provided in Attachment 1.

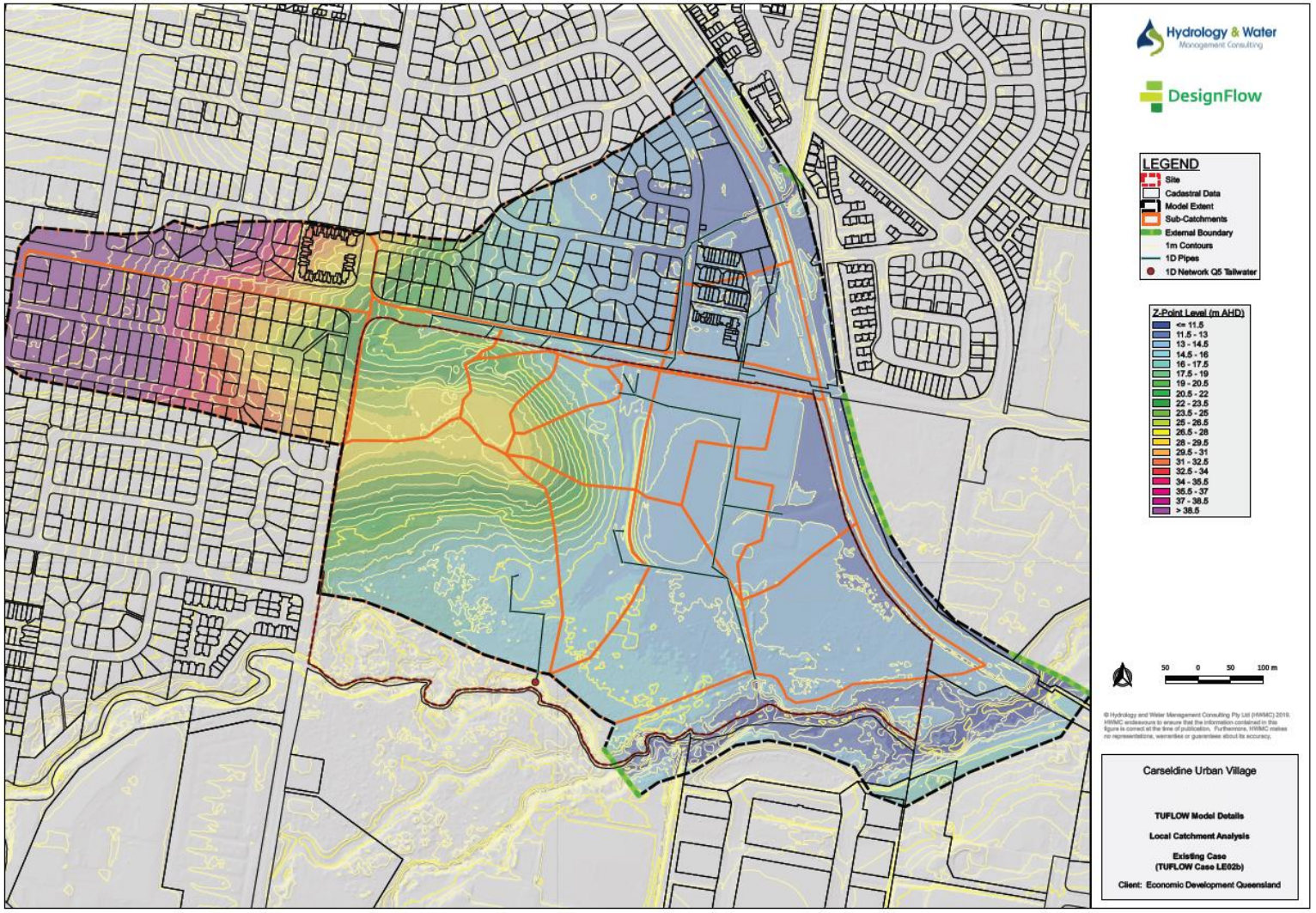


Figure 3 Existing case TUFLOW model layout

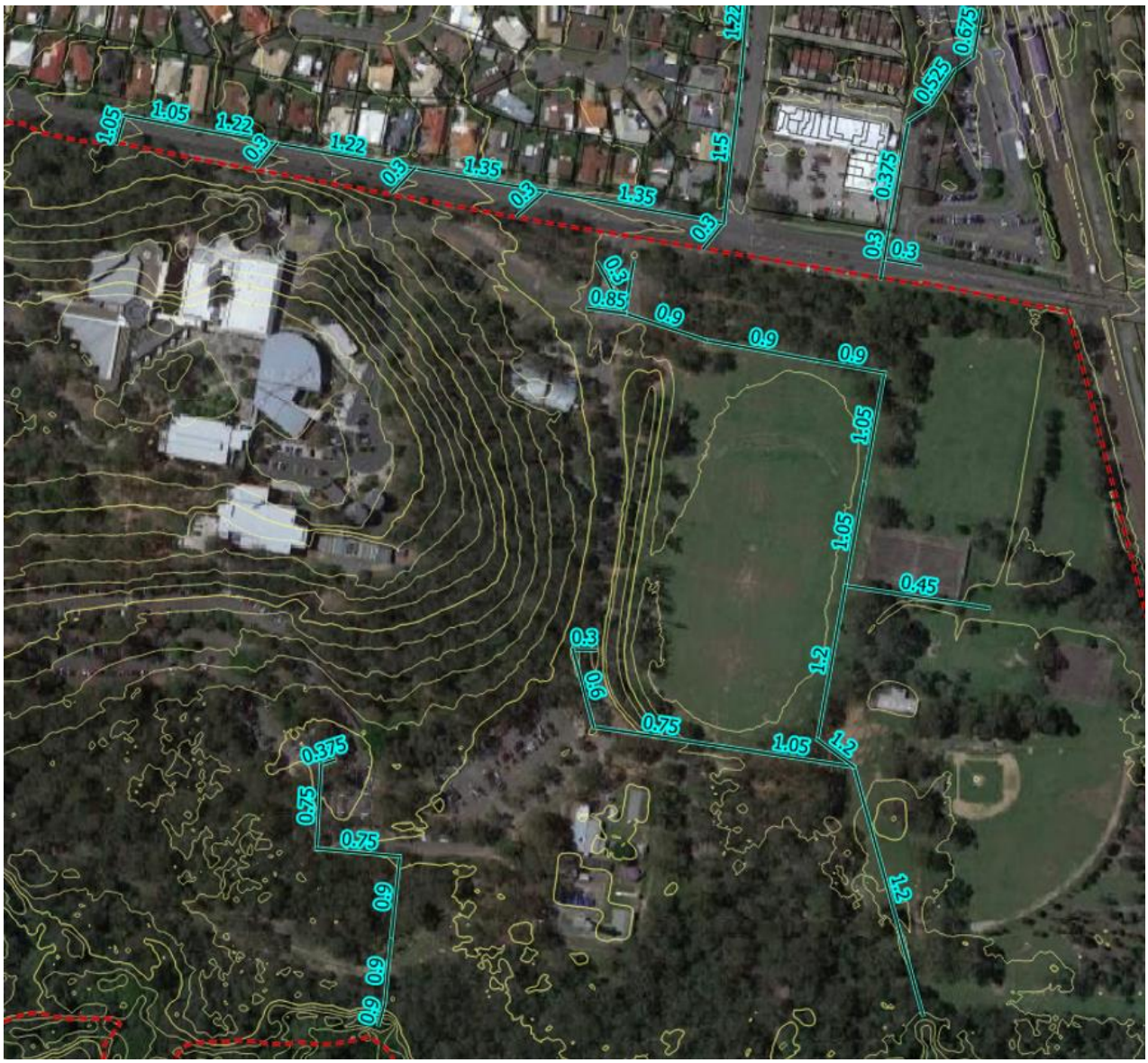


Figure 4 - Existing case pipe drainage and diameters (m)

4 VALIDATION

It is not possible to validate peak flows or levels in the hydraulic model because of storage effects and breakout flows from the defined hydrologic flow paths. Instead, a Rational Method peak flow validation has been carried out based on the existing case WBNM peak flows at the local catchment outlet near Cabbage Tree Creek (WBNM ID B8).

The 1% AEP Rational Method peak flow calculated at the outlet of B8 is 10.4 m^3/s. This is based on a Tc of 43 minutes, a catchment area of 36.1 Ha and a C10 value of 0.71. The peak flow predicted by the WBNM model at this location is 10.5 m^3/s which compares well.

5 DEVELOPED CASE MODELLING

The WBNM sub-catchments were updated to reflect the proposed development. For the purpose of this assessment to inform Stage 1 development, the ultimate site development has been applied to the hydrology model (refer to Figure 1 – Carseldine Urban Village Masterplan). All development areas have been assigned a Fraction Impervious of 90%. The proposed case WBNM sub-catchments are shown on Figure 5 and details are provided in Table 4.

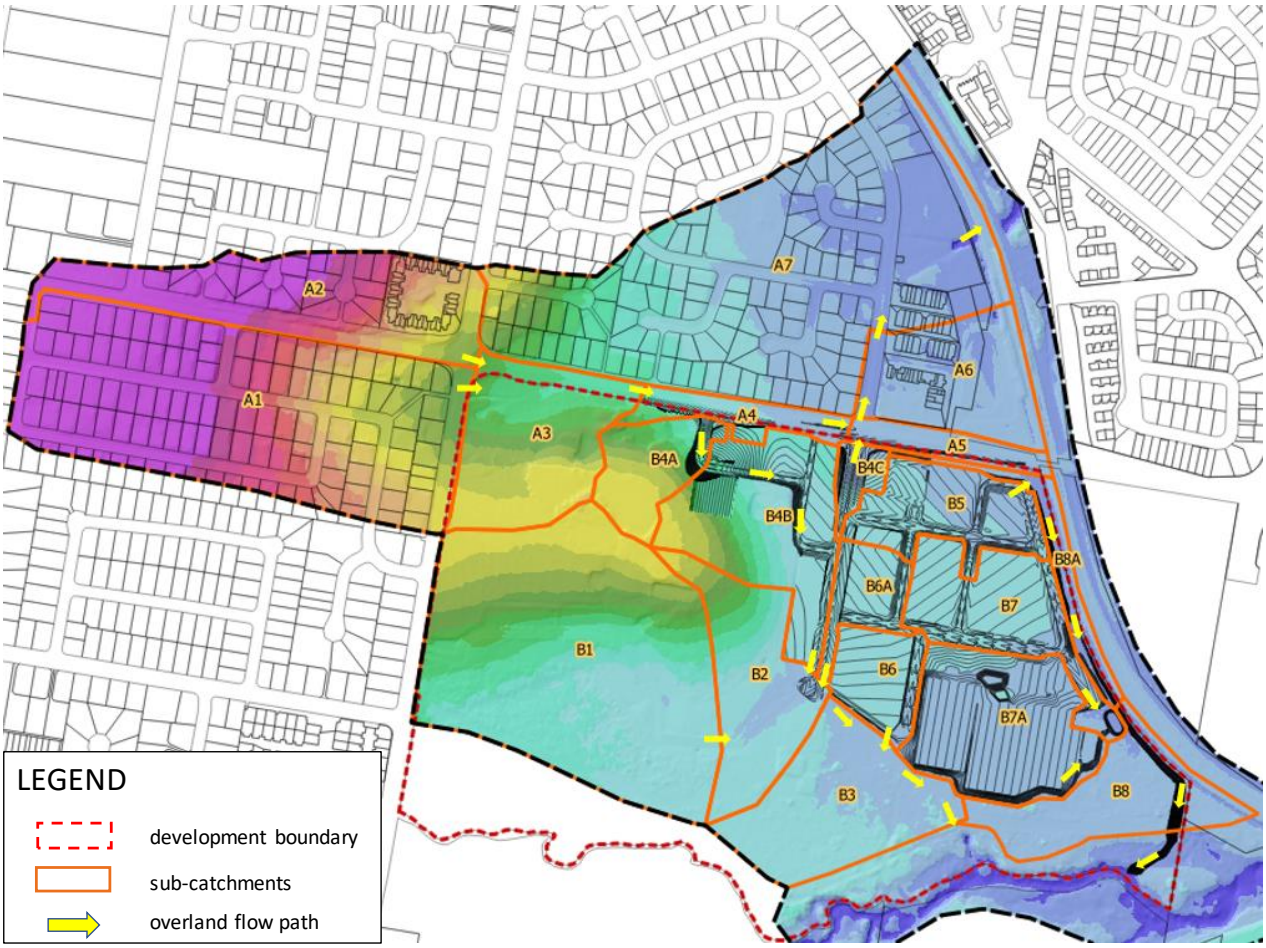


Figure 5 - Proposed case WBNM sub-catchments

Table 4 - Developed case WBNM sub-catchment details

WBNM ID	Area (ha)	Fraction Impervious (%)
A1	10.546	59.64
A2	4.582	65.43
A3	3.424	28.40
A4	0.958	57.19
A5	0.799	49.89
A6	2.738	83.29
A7	13.295	52.13
B1	10.021	9.48
B2	2.952	22.21
B3	3.504	8.63
B4A	1.481	89.20
B4B	3.679	75.04
B4C	0.452	88.32
B5	2.099	89.93
B6	1.235	84.88
B6	1.014	90.00
B7	2.545	83.70
B7A	3.528	22.59
B8	2.567	5.20
B8A	0.927	31.15

The developed case TUFLOW model is shown on Figure 6. It is equivalent to that of the existing case except for the following changes that have been made to represent the development site:

- Run with developed case WBNM hydrology
- Latest earthworks design tin by Calibre has been incorporated into the model topography (June 2019) – note bioretention extended detention depth is excluded from the flood storage
- Overland flow paths through the site have a Manning's 'n' value of 0.075 (medium vegetation).
- A bund with a crest a RL 13.7 has been applied across the south eastern outlet drain. This crest level ties in approximately with the natural ground level at this location. A one-way flapped 1200mm dia RCP has been placed through this bund.

  Note: this outlet arrangement has been designed to allow development flows to discharge to Cabbage Tree Creek, but prevent Cabbage Tree Creek flows from backing up northwards through this drain and into the development zone. Inclusion of the one-way flap valve was deemed necessary based on scenario testing of frequent local storm events, coupled with a relatively high

creek water level in Cabbage Tree Creek, which may cause local flooding (e.g. a 2 year local event with a 5 year tailwater level in Cabbage Tree Creek).

- Diversion of runoff from the north west of the site (CatB4A) via the new drainage network that discharges flows to Cabbage Tree Creek – this diversion manages development flows as well as existing drainage that reports to the Stage 1 western entry road from beams road (CatB4A). This diversion is designed to avoid flood impacts at Beams Road.
- Drainage of flows from the new eastern access road along Beams Rd (Cat B4C) to the existing Beams Rd drainage network via 450mm RCP
- Drainage sump at the low point just south of Stage 1 Lot 3
- Duplication of the existing 1200mm dia outfall to Cabbage Tree Creek

Peak depth maps for the Developed Case modelling are provided in Attachment 2.

Figure 6 TUFLOW developed case model setup

6 IMPACT ASSESSMENT

Peak flood level impact maps are provided in Attachment 3. In summary the flowing is noted:

- Flood level reductions are predicted at Beams Rd and areas to the north for all events modelled.
- Flood level reductions are predicted along the rail corridor for all events modelled.

Note: Impacts shown within Cabbage Tree Creek are not realistic and should be dismissed because Cabbage Tree Creek has been run in steady state for the purpose of assigning a tailwater level of the local catchment analysis. Therefore, catchment timing effects are not properly considered in the local hydraulic model. The separate Cabbage Tree Creek regional flood analysis (refer to Carseldine Urban Village Updated Stormwater Management plan (DesignFlow Version 3 2019) has demonstrated that the increased runoff from the proposed development site is not expected to coincide with peak flows in the creek and that no adverse impacts are predicted.

7 RECOMMENDATIONS

Based on the local flood modelling results for the Carseldine Urban Village the following is recommended to be implemented as part of Stage 1 works:

- All flows associated with the Stage 1 north western entry road are diverted south to discharge to Cabbage Tree Creek. This includes the existing catchment to the west of this entry road (CatB4A – refer to Figure 5), where 1% AEP flows of up to 1.4m^3/s are to be captured and directed southward.
- Existing drainage pipes impacted by the development are connected to the new drainage and adequately allowed for in the drainage design based on the general drainage assumptions outlined in this document.
- The minor catchment draining to the new eastern Stage 1 entry road off Beams Rd (CatB4C – refer to Figure 5) can be connected to the existing Beams Road drainage network to the north (450mm dia pipe connection). This should only occur after the drainage at the western entrance road is constructed to avoid an impact on the Beams Rd drainage.
- Ensure Stage 1 flows (except for the eastern entry road as mentioned above) are discharged to Cabbage Tree Creek. The drainage system must have capacity to discharge development flows as well as existing discharges that are connected to the Stage 1 drainage.
- Include a drainage pit that connects to the new drainage for Stage 1 in the low lying area south of Stage 1 lot 3 to manage flooding in this low lying zone.
- Final development fill levels and finished floor levels should be based on whatever is the highest flood level from the following:
    - Cabbage Tree Creek regional flooding (refer to the *Carseldine Urban Village – Updated Stormwater Management Plan*, DesignFlow 2019)
    - Local catchment flooding (this assessment)
    - Internal road drainage (future detail design)

ATTACHMENT 1 – PEAK FLOOD DEPTHS – EXISTING CASE

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- 1D Pipes - Existing
- 1m Contour (LiDAR)

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Existing Case
(TUFLOW Case LE02c)

50%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- 1D Pipes - Existing
- 1m Contour (LiDAR)

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Existing Case
(TUFLOW Case LE02b)

5%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- 1D Pipes - Existing
- 1m Contour (LiDAR)

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Existing Case
(TUFLOW Case LE02b)

1%AEP Event

Client: Economic Development Queensland

ATTACHMENT 2 – PEAK FLOOD DEPTHS – PROPOSED CASE

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Proposed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Proposed Case
(TUFLOW Case LP02d)

50%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Proposed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Proposed Case
(TUFLOW Case LP02c)

5%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Proposed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

Depth (m)

- <= 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- > 2

40 0 40 80 m

Carseldine Urban Village

Peak Flood Depths
Local Catchment Analysis

Proposed Case
(TUFLOW Case LP02c)

1%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Developed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

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

40 0 40 80 m

Carseldine Urban Village

Peak Flood Level Impacts
Local Catchment Analysis

(TUFLOW Case LP02d Vs LE02c)

50%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Developed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

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

40 0 40 80 m

Carseldine Urban Village

Peak Flood Level Impacts
Local Catchment Analysis

(TUFLOW Case LP02c Vs LE02b)

5%AEP Event

Client: Economic Development Queensland

Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Model Extent
- External Boundary
- Design Conts (0.1m)
- Developed Case Z-Point Modifiers
- 1D Pipes - Existing
- 1D Pipes - Proposed

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

40 0 40 80 m

Carseldine Urban Village

Peak Flood Level Impacts
Local Catchment Analysis

(TUFLOW Case LP02c Vs LE02b)

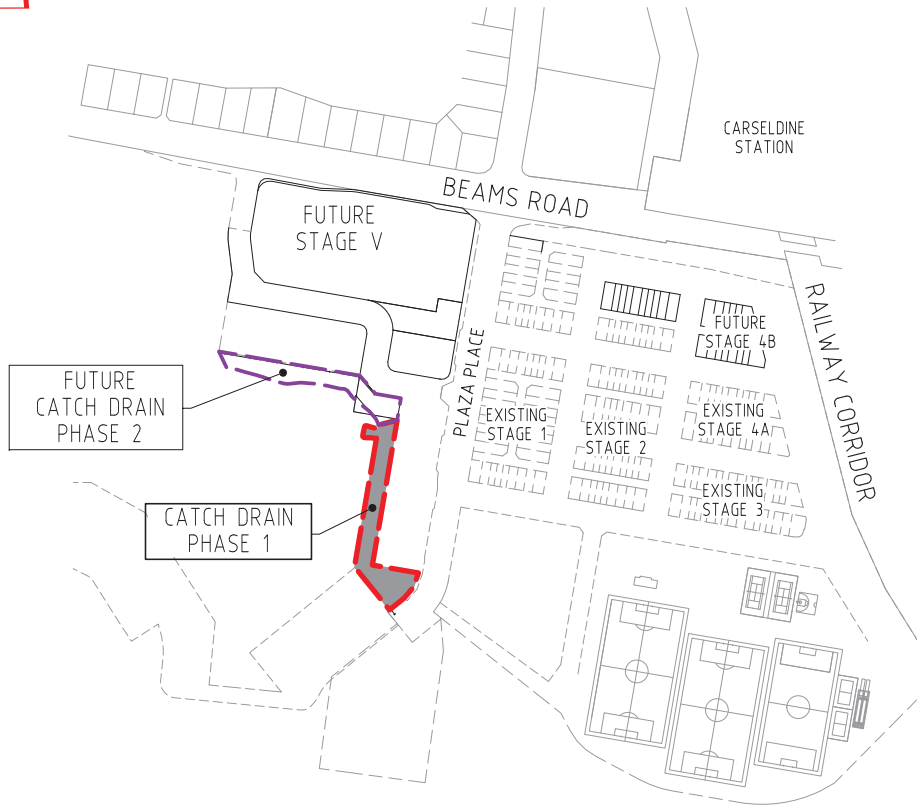
1%AEP Event

Client: Economic Development Queensland

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no. DEV2022/1289
Date: 16 November 2022

CARSELDINE VILLAGE

CATCH DRAIN



PLAN
SCALE 1:2000

DRAWING INDEX

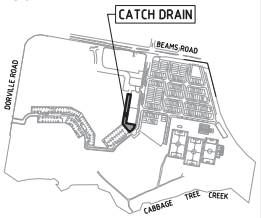
DRAWING NO.	DRAWING TITLE
22-106-01	GENERAL - LOCALITY PLAN, DRAWING INDEX AND NOTES
22-106-02	GENERAL - SETOUT PLAN
22-106-03	GENERAL - LAYOUT PLAN
22-106-04	EARTHWORKS - CONTOUR PLAN SHEET 1
22-106-05	EARTHWORKS - CONTOUR PLAN SHEET 2
22-106-06	TEMPORARY - TURNAROUND DETAILS
22-106-07	CATCH DRAIN - CROSS SECTIONS PHASE 1 WORKS
22-106-08	CATCH DRAIN - CROSS SECTIONS FUTURE PHASE 2 WORKS
22-106-09	EROSION AND SEDIMENT - CONTOUR PLAN LAYOUT PLAN
22-106-10	EROSION AND SEDIMENT - CONTOUR PLAN NOTES
22-106-11	EROSION AND SEDIMENT - CONTOUR PLAN DETAILS
22-106-12	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	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:32:44 +10'00'

Drawing Title
GENERAL
LOCALITY PLAN,
DRAWING INDEX AND NOTES

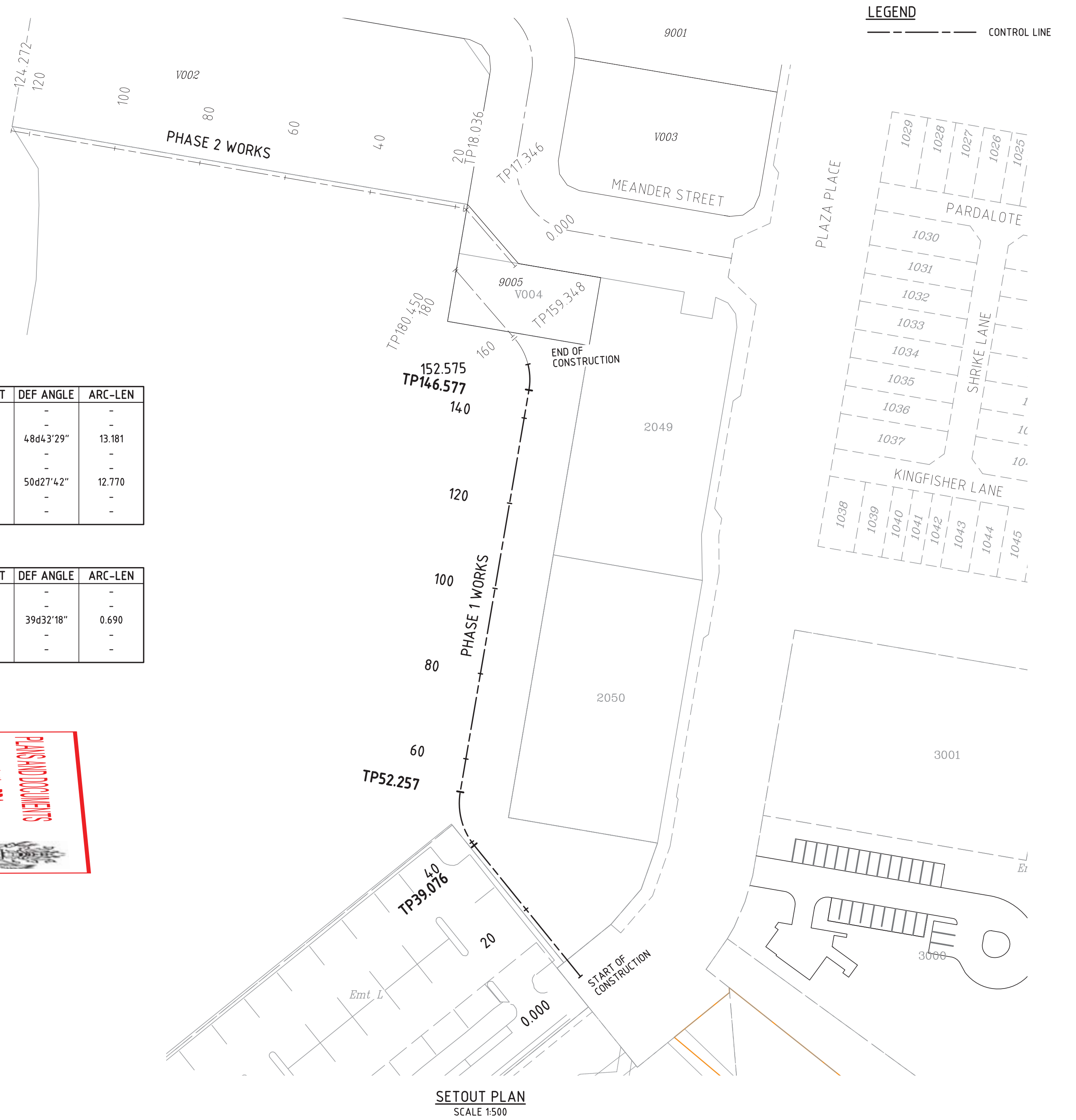
Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	01 of 12

	Drawing No	Revision
A1	22-106-01	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-01-COVER.dwg Plotted by: AA on 27/07/2022 11:55:20 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!



CATCH DRAIN CONTROL LINE DETAILS

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

FUTURE PHASE 2 WORKS CONTROL LINE DETAILS

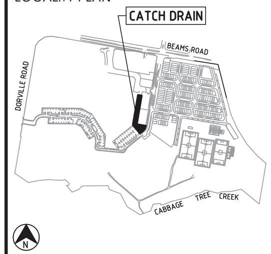
PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	502572.482	6974835.677	319d14'38"	-	-	-	-
TC	17.346	502561.157	6974848.817	319d14'38"	-	-	-	-
IP2	17.691	502560.923	6974849.089	-	1.000	0.359	39d32'18"	0.690
CT	18.036	502560.569	6974849.150	279d42'19"	-	-	-	-
IP3	124.272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

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022

SETOUT PLAN
SCALE 1:500

SCALE 1 : 500 (A1 UNREDUCED)

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:00 +10'00'

Drawing Title
GENERAL SETOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	02 of 12

	Drawing No	Revision
A1	22-106-02	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-02-GE-SETOUT.dwg Plotted by: AA on 27/07/2022 11:55:22 AM

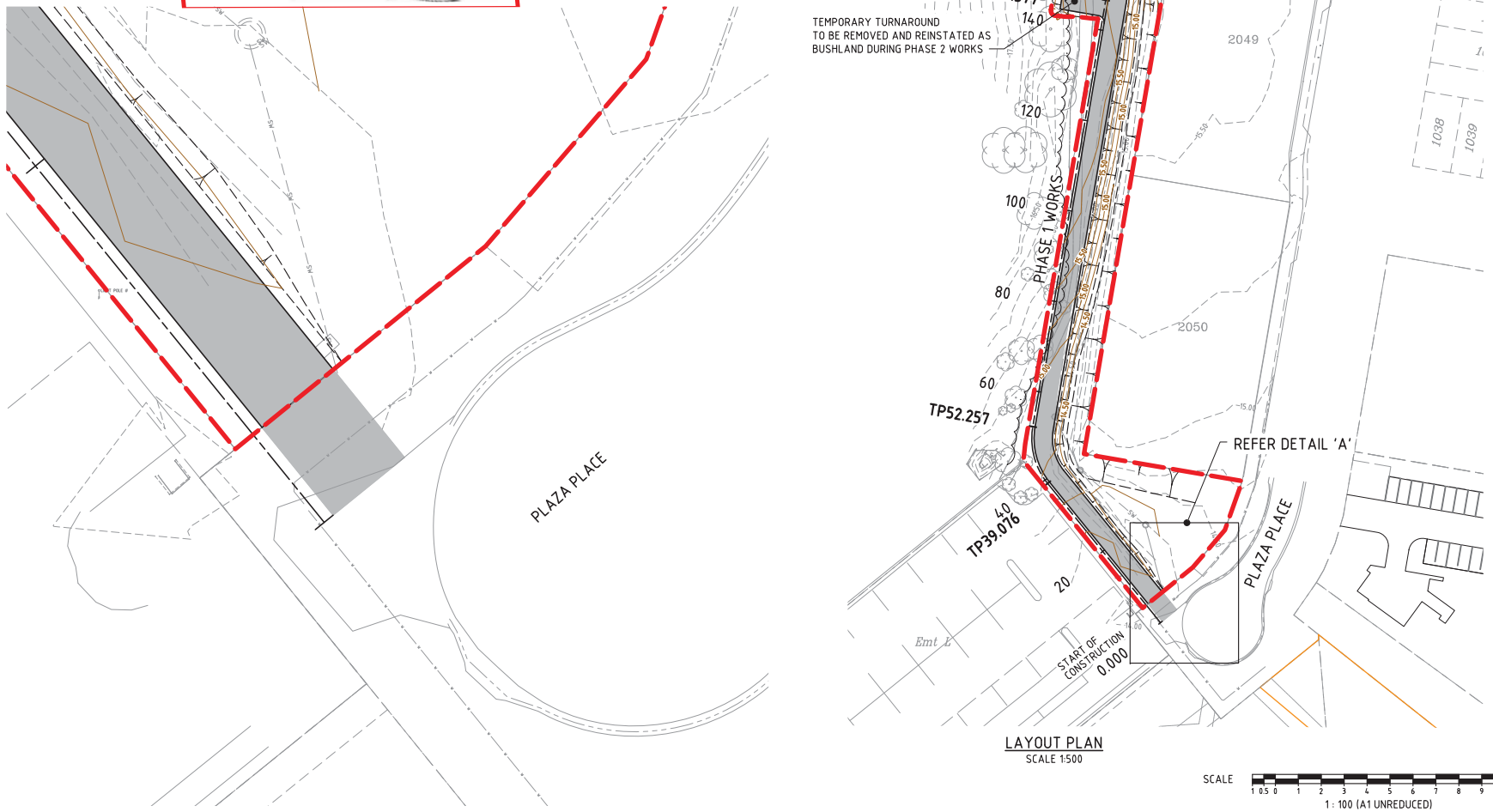
LEGEND

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

PLANS AND DOCUMENTS REFERRED TO IN THE PDA DEVELOPMENT APPROVAL

Approval no. DEV2022/1329

Date: 16 December 2022



DETAIL 'A'
SCALE 1:100

LAYOUT PLAN
SCALE 1:500

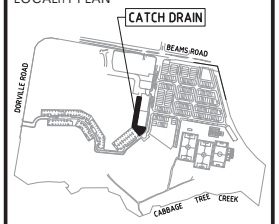
SCALE 1 0.5 0 1 2 3 4 5 6 7 8 9 10m
1 : 100 (A1 UNREDUCED)

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	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:10 +10'00'

Drawing Title
GENERAL LAYOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

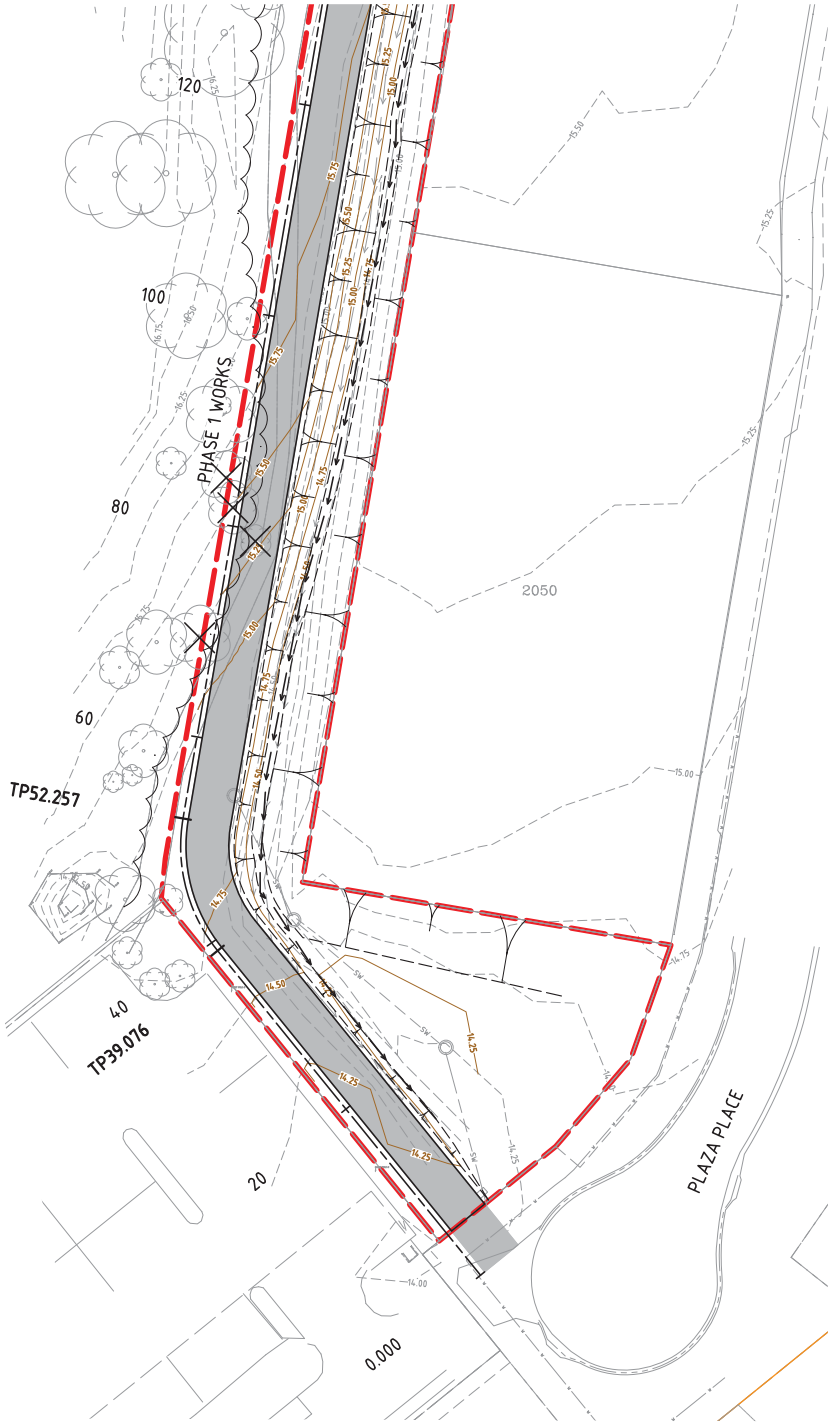
Scale	Sheet
AS SHOWN	03 of 12

Drawing No	Revision
22-106-03	A

A1

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-03-GE-LAYOUT.dwg Plotted by: AA on 27/07/2022 11:55:23 AM

JOINS KNG DWG No 22-106-05



EARTHWORKS CONTOUR PLAN
SCALE 1:250

LEGEND

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

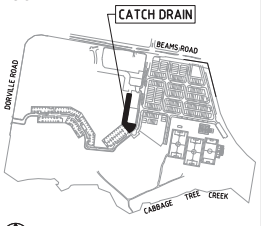
PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no. DEV2022/1489
Date: 19 December 2022

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	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:19 +10'00'

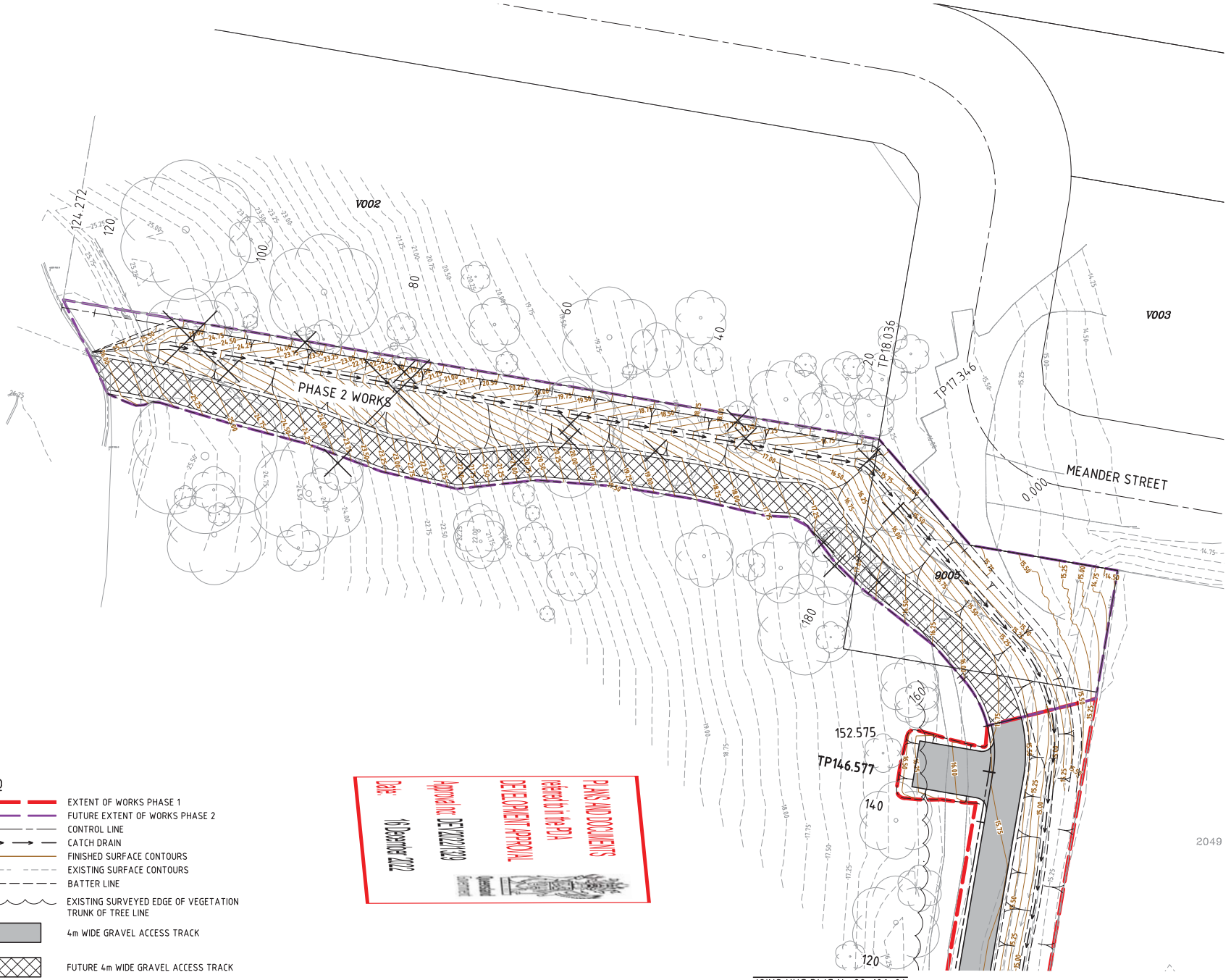
Drawing Title
EARTHWORKS CONTOUR PLAN SHEET 1

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	04 of 12

	Drawing No	Revision
A1	22-106-04	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-04-05-EARTHWORKS.dwg Plotted by: AA on 27/07/2022 11:55:25 AM



LEGEND

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

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no. DEV2022/1303
Date: 14th December 2022

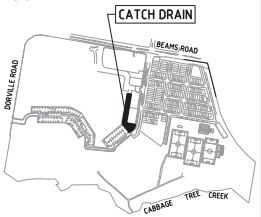
EARTHWORKS CONTOUR PLAN
SCALE 1:250

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:30 +10'00'

Drawing Title
EARTHWORKS CONTOUR PLAN SHEET 2

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	05 of 12

Drawing No	Revision
22-106-05	A

A1

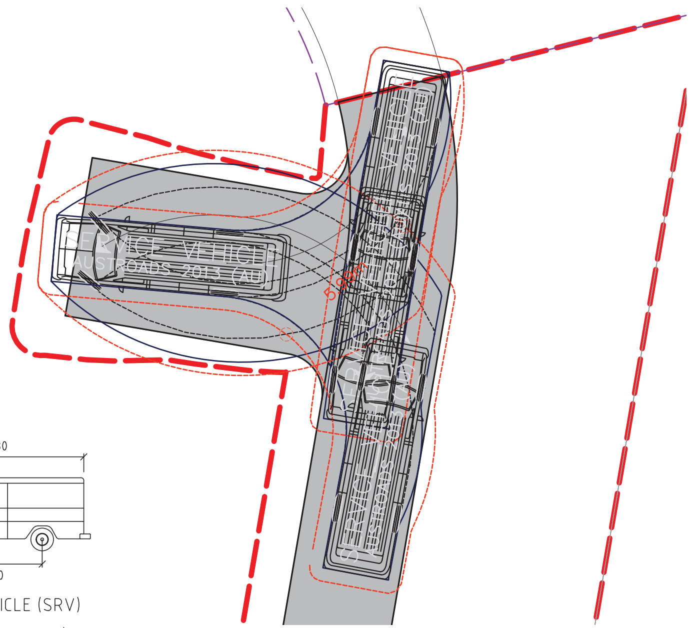
M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-04-05-EARTHWORKS.dwg Plotted by: AA on 27/07/2022 11:55:27 AM

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022

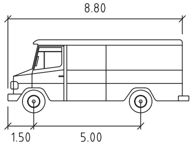
LEGEND

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

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

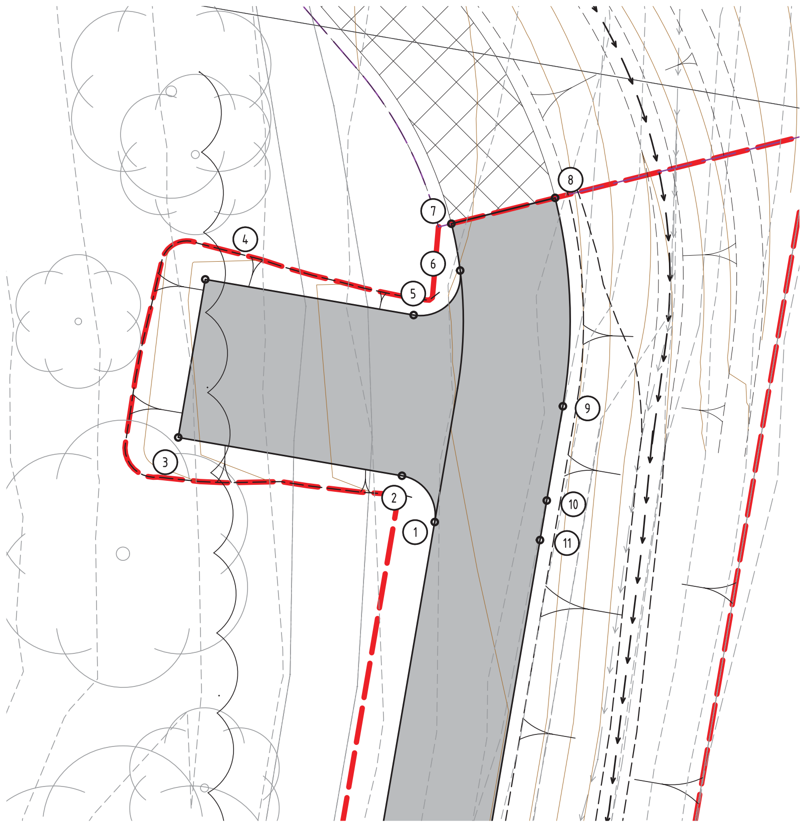


TEMPORARY TURNAROUND TURN PATHS
SCALE 1:100



SERVICE VEHICLE (SRV)

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



TEMPORARY TURNAROUND DETAIL
SCALE 1:100

SETOUT TABLE

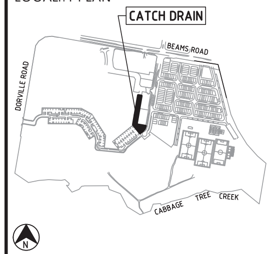
PT No.	EASTING	NORTHING	LEVEL
1	502575.296	6974801.980	15.816
2	502574.071	6974803.711	15.863
3	502565.695	6974805.144	16.291
4	502566.706	6974811.058	16.214
5	502574.508	6974809.724	15.818
6	502576.249	6974811.390	15.745
7	502575.922	6974813.141	15.789
8	502579.803	6974814.108	15.590
9	502580.095	6974806.311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

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
M. Shaw
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:39 +10'00'

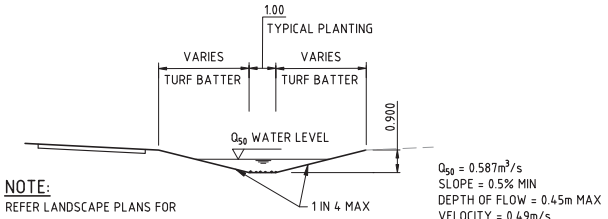
Drawing Title
TEMPORARY TURNAROUND DETAILS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale: AS SHOWN
Sheet: 06 of 12
A1
Drawing No: 22-106-06
Revision: A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-06-DETAILS.dwg Plotted by: AA on 27/07/2022 11:55:29 AM

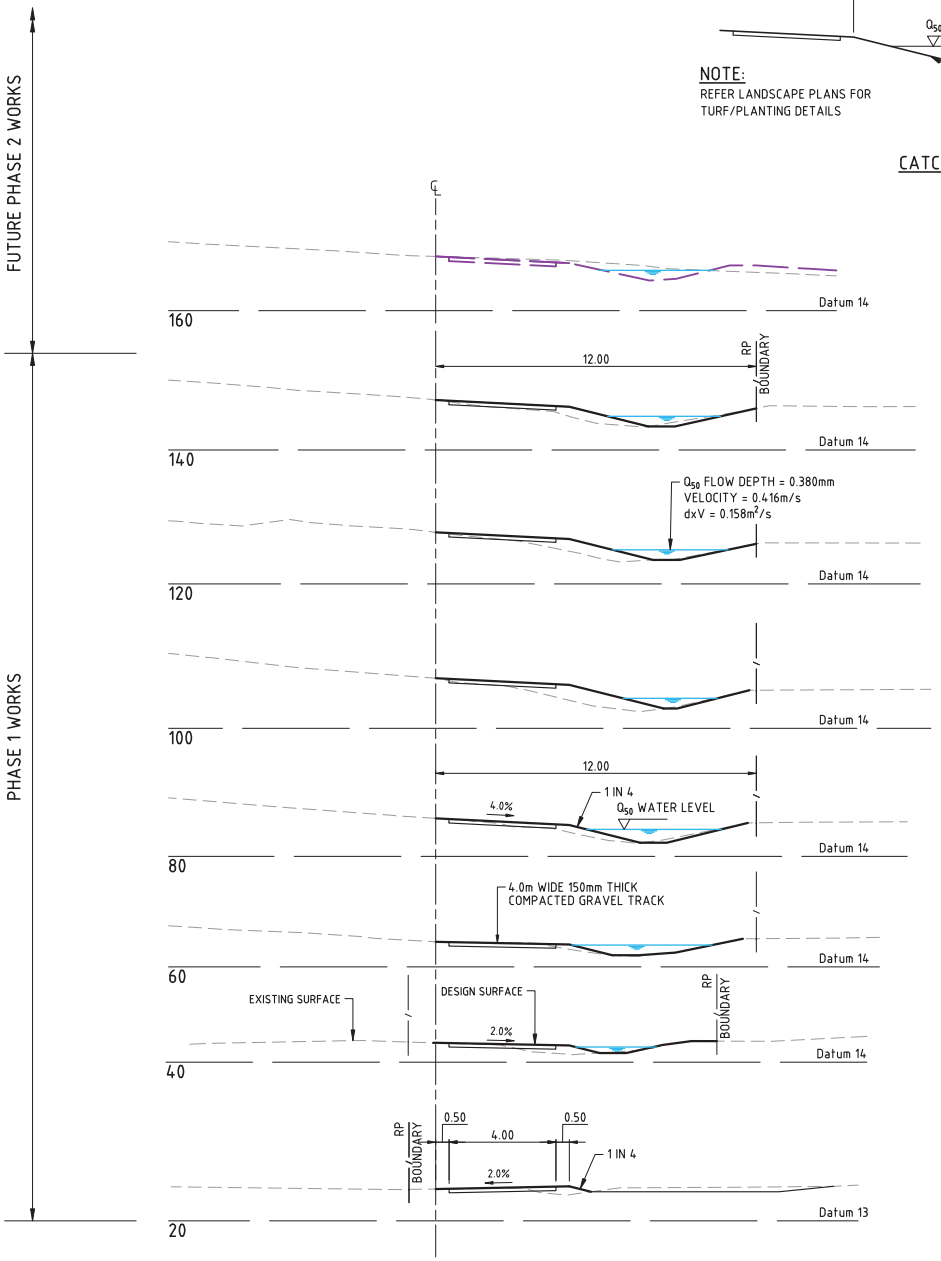
PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no: DEV2022/1283
Date: 10 December 2022



NOTE:
REFER LANDSCAPE PLANS FOR TURF/PLANTING DETAILS

Q_{50} = 0.587m³/s
SLOPE = 0.5% MIN
DEPTH OF FLOW = 0.45m MAX
VELOCITY = 0.49m/s
dxV = 0.22m²/s

CATCH DRAIN TYPICAL SECTION
NTS.



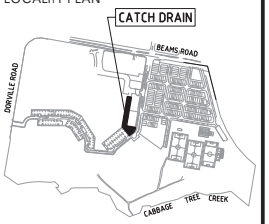
CROSS SECTIONS - CATCH DRAIN PHASE 1 WORKS
SCALE 1 : 100

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:33:49 +10'00'

Drawing Title
CATCH DRAIN
CROSS SECTIONS
PHASE 1 WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

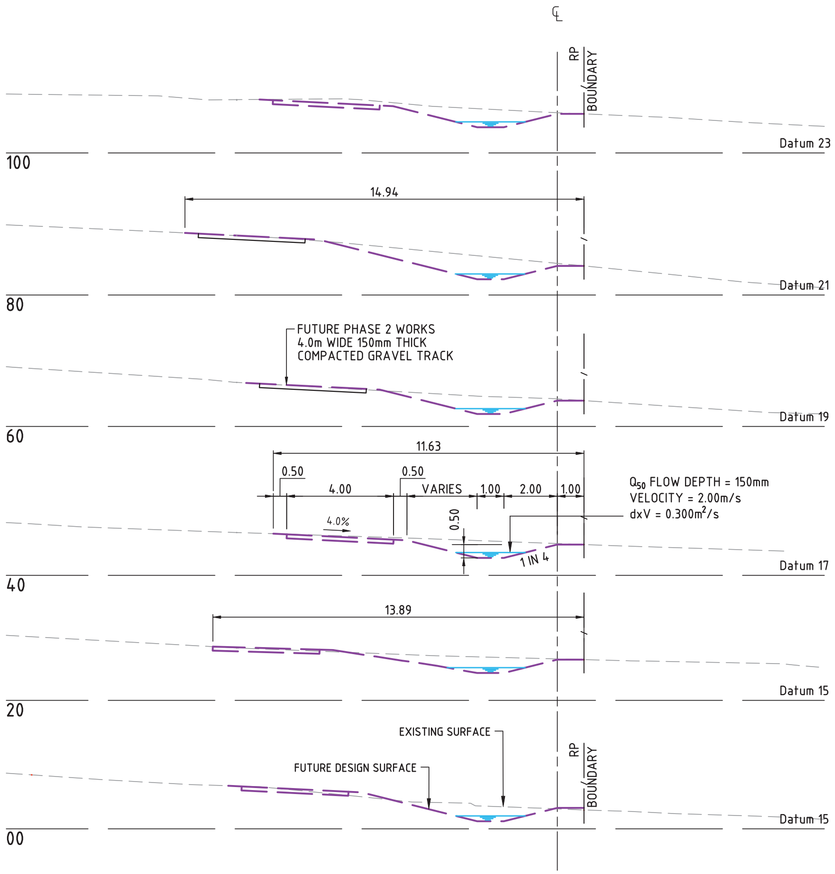
Scale	Sheet
AS SHOWN	07 of 12

Drawing No	Revision
22-106-07	A

A1

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-07-08-XS.dwg Plotted by: AA on 27/07/2022 11:55:29 AM

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022



CROSS SECTIONS - CATCH DRAIN FUTURE PHASE 2 WORKS

SCALE 1 : 100

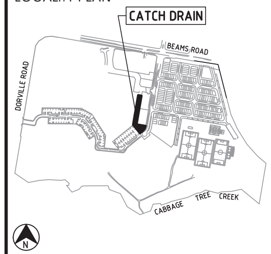
SCALE 1 0.5 0 1 2 3 4 5 6 7 8 9 10m

1 : 100 (A1 UNREDUCED)

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

CARSELDINE VILLAGE
CATCH DRAIN

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

Approved

Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:34:01 +10'00'

Drawing Title

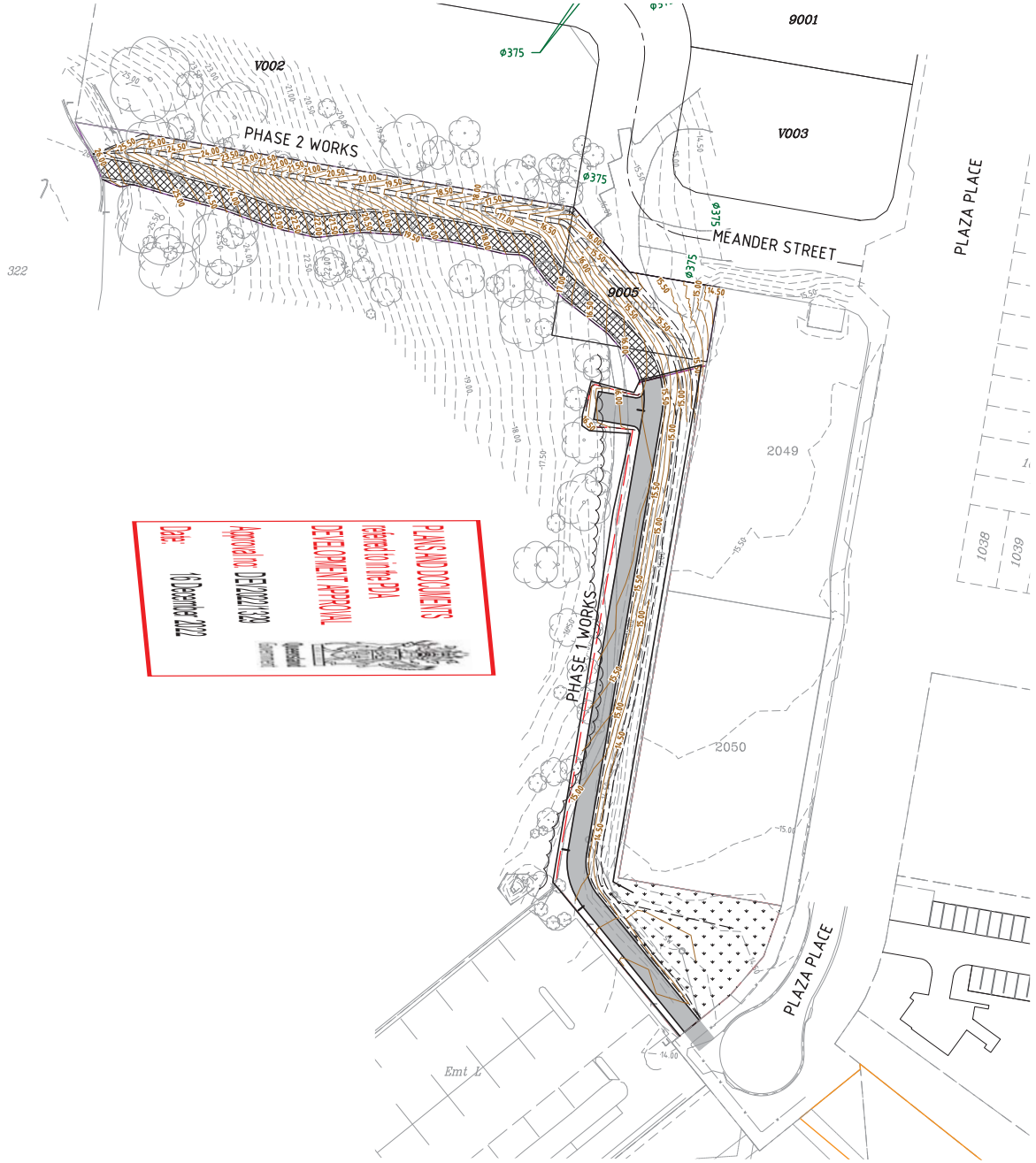
CATCH DRAIN
CROSS SECTIONS
FUTURE PHASE 2 WORKS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	08 of 12

	Drawing No	Revision
A1	22-106-08	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-07-08-XS.dwg Plotted by: AA on 27/07/2022 11:55:30 AM



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

LEGEND

SEDIMENT AND DIVERSION FENCE (TEMP)

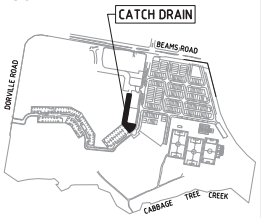
AREA TO BE GRASS SEEDED AND MULCHED

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

CARSELDINE VILLAGE CATCH DRAIN

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

Approved

Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:34:12 +10'00'

Drawing Title

EROSION AND SEDIMENT CONTOUR PLAN LAYOUT PLAN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	09 of 12

	Drawing No	Revision
A1	22-106-09	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-09-11-SEDIMENT.dwg Plotted by: AA on 27/07/2022 11:55:31 AM

EROSION AND SEDIMENT CONTROL PROGRAM

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

TREES

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

EROSION AND SEDIMENT CONTROL NOTES

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

PHASE 1 - CLEARING AND BULK EARTHWORKS

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

PHASE 2 - TRENCH EXCAVATION

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

PHASE 3 - PAVEMENT CONSTRUCTION

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

PHASE 4 - MAINTENANCE PERIOD

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

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

NOTE

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

PLANS AND DOCUMENTS
received by the RPA
DEVELOPMENT APPROVAL
Approved by: DEV2022/1023
Date: 16 December 2022

TOPSOIL

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

SEDIMENT FENCES

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

TURFING

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

DURING CONSTRUCTION SEQUENCE:

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

FOLLOWING CONSTRUCTION:

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

STABILISATION:

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

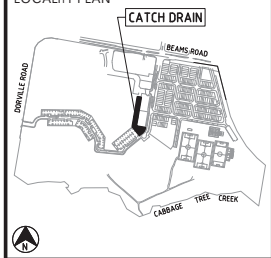
SEED MIXES

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

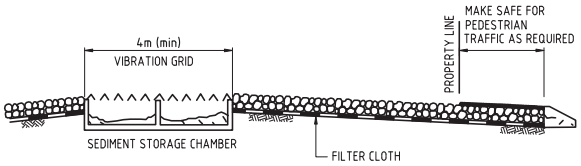
Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:34:32 +10'00'

Drawing Title
EROSION AND SEDIMENT CONTOUR PLAN NOTES

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

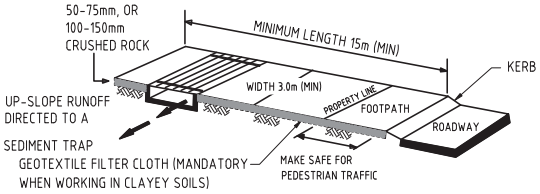
Scale: AS SHOWN
Sheet: 10 of 12
Drawing No: 22-106-10
Revision: A
A1

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-09-11-SEDIMENT.dwg Plotted by: AA on 27/07/2022 11:55:32 AM

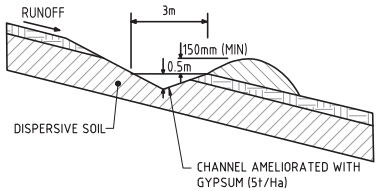


TYPICAL PROFILE OF A VIBRATION GRID

SITE ACCESS POINT SHAKEDOWN FACILITY
N.T.S.



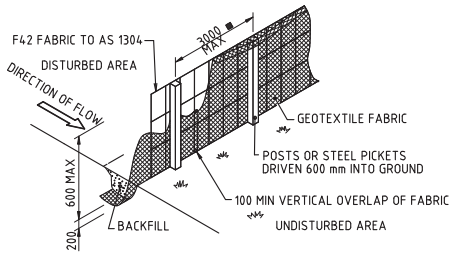
SITE ACCESS POINT ENTRY/EXIT PAD
N.T.S.



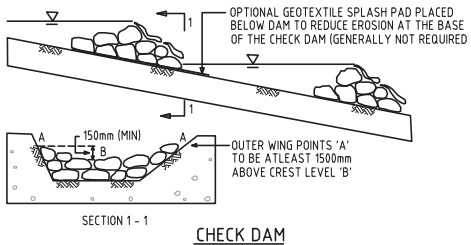
CATCH DRAIN

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

TYPICAL CATCH DRAINS DIMENSIONS & SPACINGS

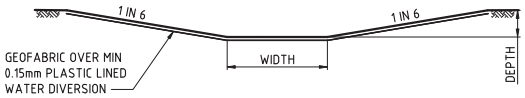


SEDIMENT FENCE
N.T.S.



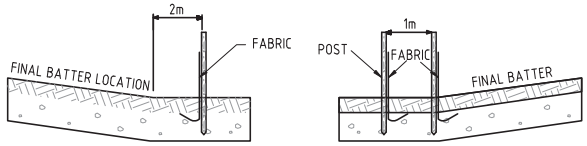
SECTION 1 - 1

CHECK DAM
N.T.S.



TYPICAL LINED CATCH DRAIN
SCALE 1 : 40

SIZING TO BE DETERMINED DURING CONSTRUCTION

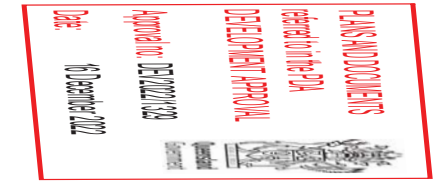


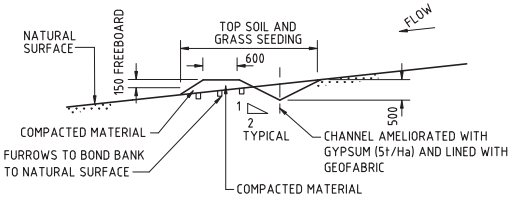
a) PLACEMENT OF SEDIMENT FENCE AT BASE OF FILL SLOPE

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

SEDIMENT FENCE DETAILS
N.T.S.

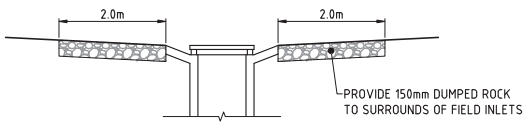
LOCATION OF SEDIMENT FENCE AT BASE OF FILL SLOPE



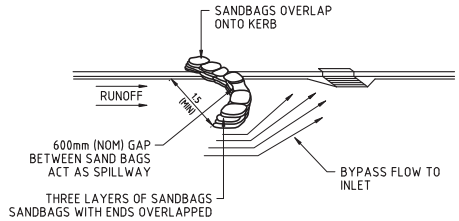


CROSS SECTION

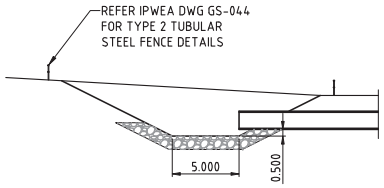
DIVERSION CHANNEL
N.T.S.



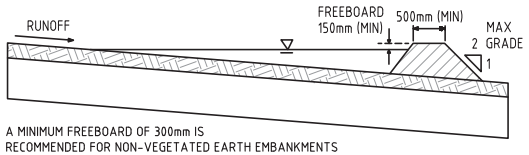
FIELD INLET PROTECTION
N.T.S.



ON GRADE GULLY INLET
N.T.S.



TEMPORARY HEADWALL DETAIL
SCALE N.T.S



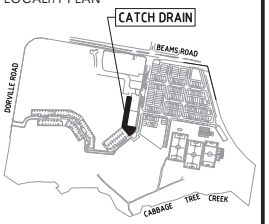
A MINIMUM FREEBOARD OF 300mm IS
RECOMMENDED FOR NON-VEGETATED EARTH EMBANKMENTS

DIVERSION DRAINAGE BANK
N.T.S.

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

CARSELDINE VILLAGE CATCH DRAIN

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

Approved

Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:34:48 +10'00'

Drawing Title

EROSION AND SEDIMENT CONTOUR PLAN DETAILS

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	11 of 12

A1	Drawing No	Revision
	22-106-11	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-09-11-SEDIMENT.dwg Plotted by: AA on 27/07/2022 11:55:32 AM

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

Safety in Design Analysis

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

☐ Positioning of new services adjacent to existing live services	☒ Slope Stability
☒ Construction adjacent to existing road carriageways	☐ Retaining Walls
☐ Pedestrians	☒ Dust Control
☒ Civil Construction Workers	☒ Erosion and Sediment Control/Management
☒ Maintenance Workers	☒ Sediment Basin Construction
☒ Work Place Health and Safety Constraints	☐ Wetland/Dam Construction
☐ Unusual material handling	☐ Working under trafic
☐ 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
	Mantenance Workers	A	4	H	TMP and SWMS required for all activities	C	3	S	Contractor
	Underground Services (Exsting)	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 eqipment / personnel anc live infrastructure in particular Power lins	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 likey 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

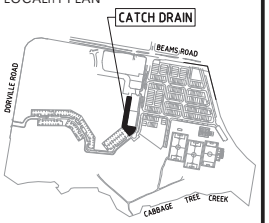
PLANS AND DOCUMENTS referenced in the PDA DEVELOPMENT APPROVAL
Approval no. PDA/12022/1389
Date: 16 December 2022

Issued 10th June 2022 Rev - A

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	27.07.2022	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN

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

Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:34:57 +10'00'

Drawing Title
SAFETY IN DESIGN

Drawn	Designed	Checked	Date
RW	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	12 of 12

Drawing No	Revision
22-106-12	A

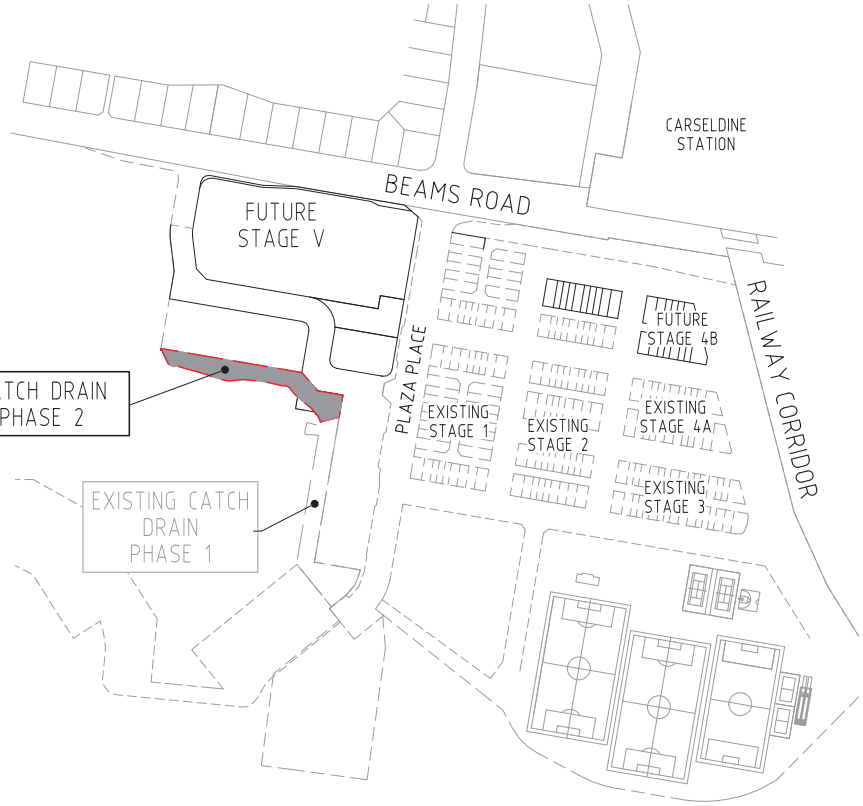
A1

M:\2022\22106 Carseldine Village Catch Drain\ACAD\22-106-12-SAFETY.dwg Plotted by: AA on 27/07/2022 11:55:32 AM

CARSELDINE VILLAGE

CATCH DRAIN

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no. DEV2022/1439
Date: 16 December 2022



PLAN
SCALE 1:2000

DRAWING INDEX

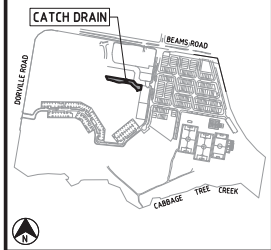
DRAWING NO.	DRAWING TITLE
22-106-101	GENERAL - LOCALITY PLAN, DRAWING INDEX AND NOTES
22-106-102	GENERAL - SETOUT PLAN
22-106-103	GENERAL - LAYOUT PLAN
22-106-104	EARTHWORKS - CONTOUR PLAN
22-106-105	CATCH DRAIN - CROSS SECTIONS EXISTING PHASE 1 WORKS
22-106-106	CATCH DRAIN - CROSS SECTIONS PROPOSED PHASE 2 WORKS
22-106-107	EROSION AND SEDIMENT - CONTOUR PLAN LAYOUT PLAN
22-106-108	EROSION AND SEDIMENT - CONTOUR PLAN NOTES
22-106-109	EROSION AND SEDIMENT - CONTOUR PLAN DETAILS
22-106-110	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	27.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE
CATCH DRAIN
PHASE 2

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
2022.07.27 13:35:09 +10'00'

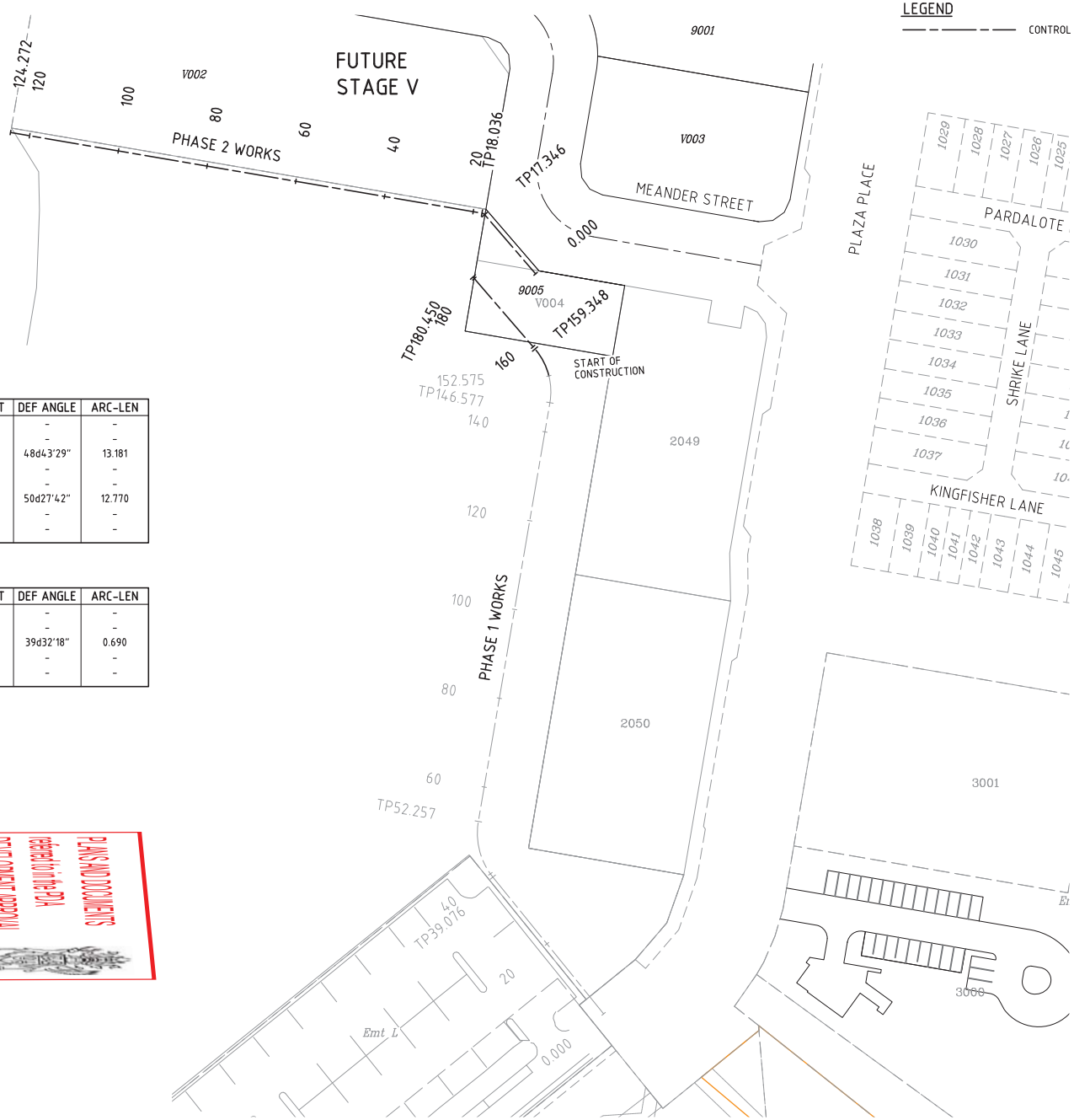
Drawing Title
GENERAL
LOCALITY PLAN,
DRAWING INDEX AND NOTES

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	01 of 10

	Drawing No	Revision
A1	22-106-101	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-101-COVER.dwg Plotted by: AA on 27/07/2022 11:59:41 AM



CATCH DRAIN CONTROL LINE DETAILS

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

PHASE 2 WORKS CONTROL LINE DETAILS

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

PLANS AND DOCUMENTS endorsed in the PDA DEVELOPMENT APPROVAL
Approval no. DEV2022/1439
Date: 16th November 2022

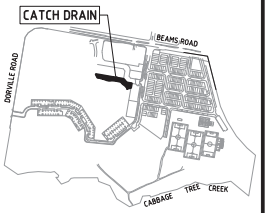
SETOUT PLAN
SCALE 1:500

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	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE
CATCH DRAIN
PHASE 2

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
2022.07.27 13:35:19 +10'00'

Drawing Title
GENERAL
SETOUT PLAN

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

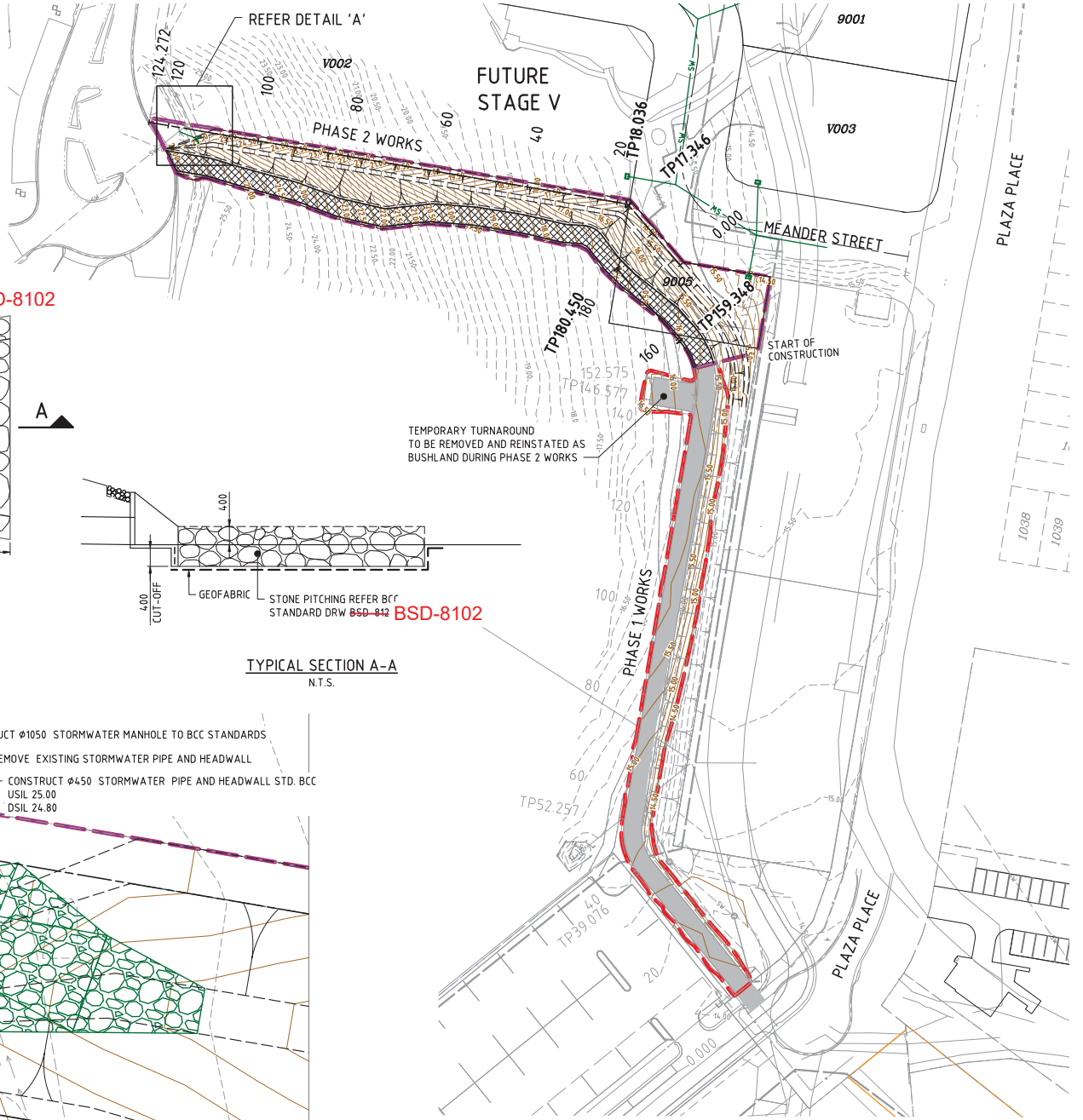
Scale	Sheet
AS SHOWN	02 of 10

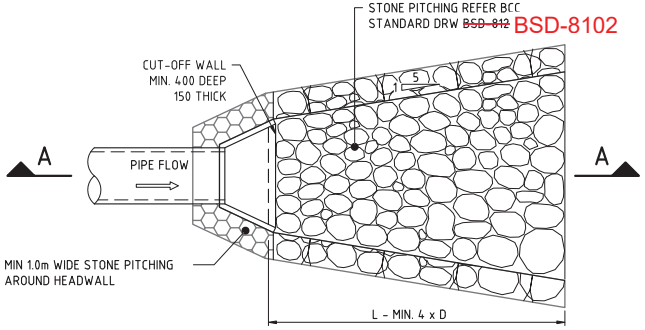
A1	Drawing No	Revision
	22-106-102	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-102-GE-SETOUT.dwg Plotted by: AA on 27/07/2022 11:59:43 AM

LEGEND

- EXISTING EXTENT OF WORKS PHASE 1
- EXTENT OF WORKS PHASE 2
- CONTROL LINE
- FINISHED SURFACE CONTOURS (36.0)
- EXISTING SURFACE CONTOURS (36.0)
- BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- EXISTING PHASE 1 4m WIDE GRAVEL ACCESS TRACK
- 4m WIDE GRAVEL ACCESS TRACK

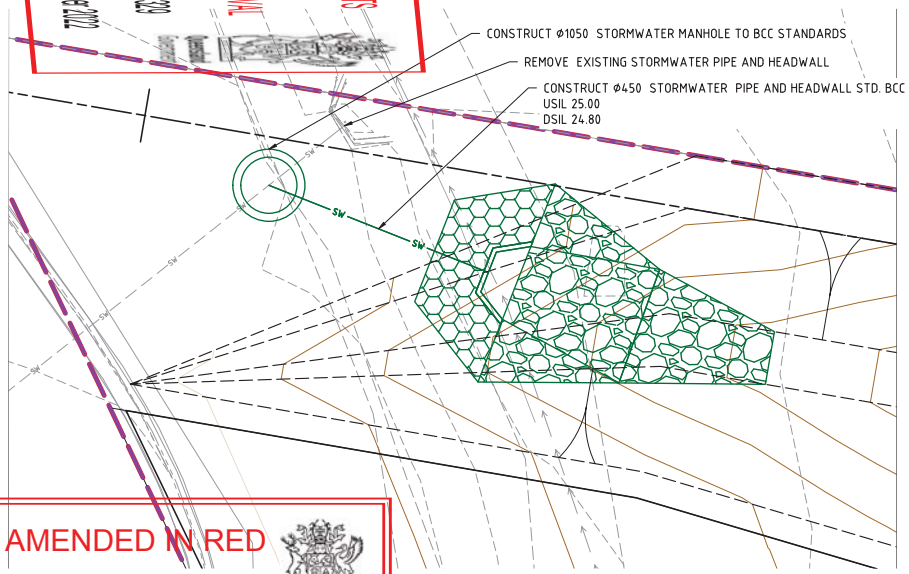




STORMWATER OUTLET STONE PITCHING
N.T.S.

TYPICAL SECTION A-A
N.T.S.

PLANS AND DOCUMENTS
Referred to in the PDA
DEVELOPMENT APPROVAL
Approved on: DEV2021/1283
Date: 16 December 2022



DETAIL 'A'
SCALE 1:50

AMENDED IN RED
By: M. Fallon
Date: 7 December 2022
Queensland Government

LAYOUT PLAN
SCALE 1:500

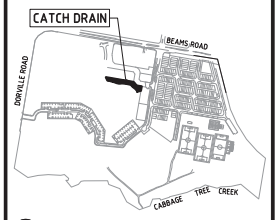
SCALE 1.0 0.5 0 1.0 2.0 3.0 4.0 5.0m
1 : 50 (A1 UNREDUCED)

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN PHASE 2

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
2022.07.27 13:35:28 +10'00'

Drawing Title
GENERAL LAYOUT PLAN

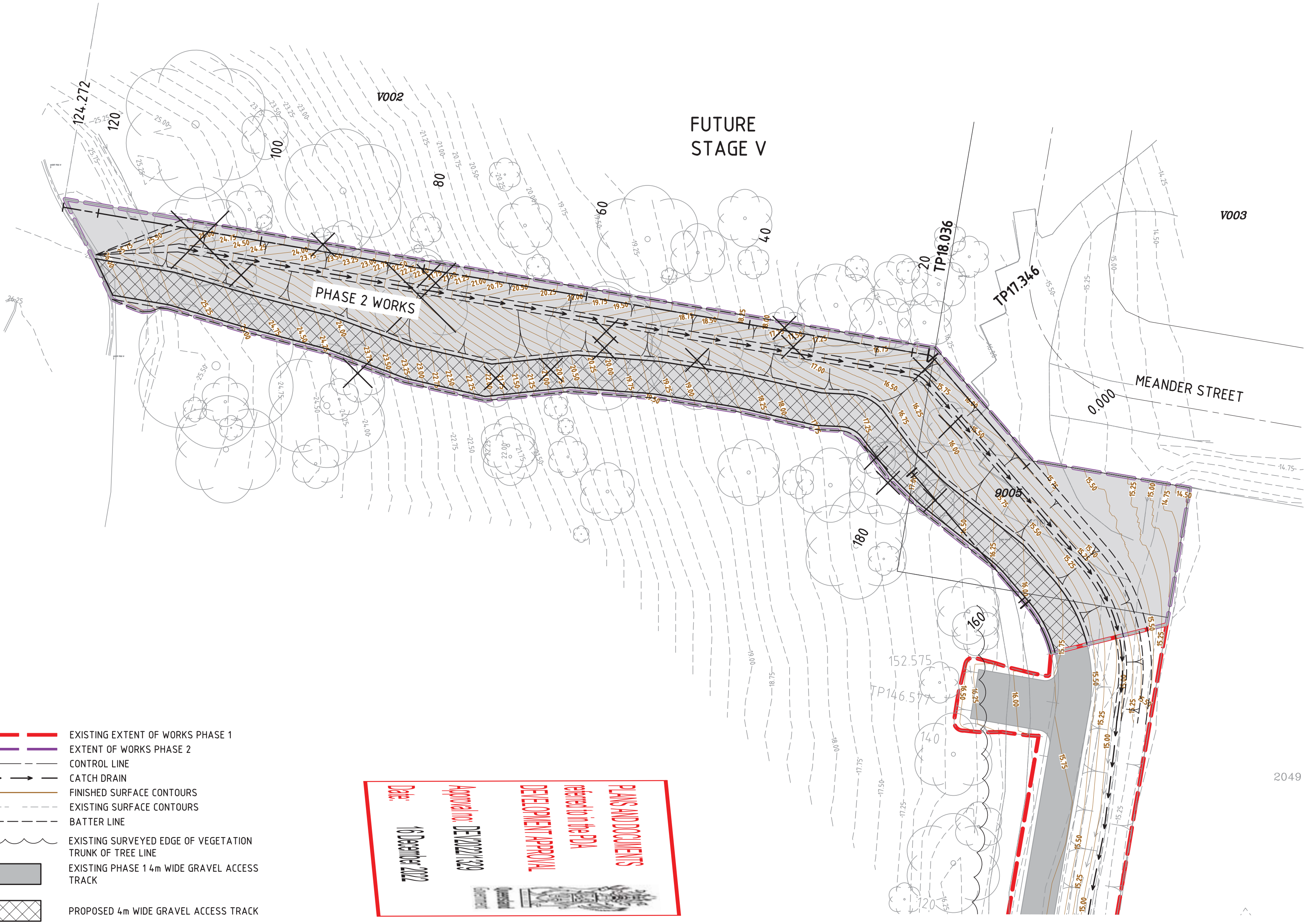
Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	03 of 10

Drawing No	Revision
22-106-103	A

A1

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-103-GE-LAYOUT.dwg Plotted by: AA on 27/07/2022 11:59:49 AM



EARTHWORKS CONTOUR PLAN

SCALE 1:250

SCALE 1 : 250 (A1 UNREDUCED)

LEGEND

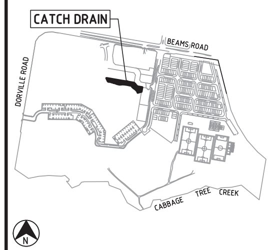
- EXISTING EXTENT OF WORKS PHASE 1
- EXTENT OF WORKS PHASE 2
- CONTROL LINE
- CATCH DRAIN
- FINISHED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- BATTER LINE
- EXISTING SURVEYED EDGE OF VEGETATION TRUNK OF TREE LINE
- EXISTING PHASE 1 4m WIDE GRAVEL ACCESS TRACK
- PROPOSED 4m WIDE GRAVEL ACCESS TRACK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

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project: CARSELDINE VILLAGE CATCH DRAIN PHASE 2

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 2022.07.27 13:35:40 +10'00'

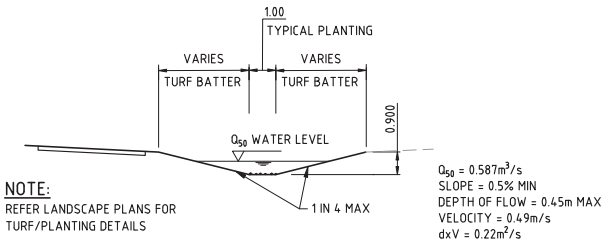
Drawing Title: EARTHWORKS CONTOUR PLAN

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	04 of 10

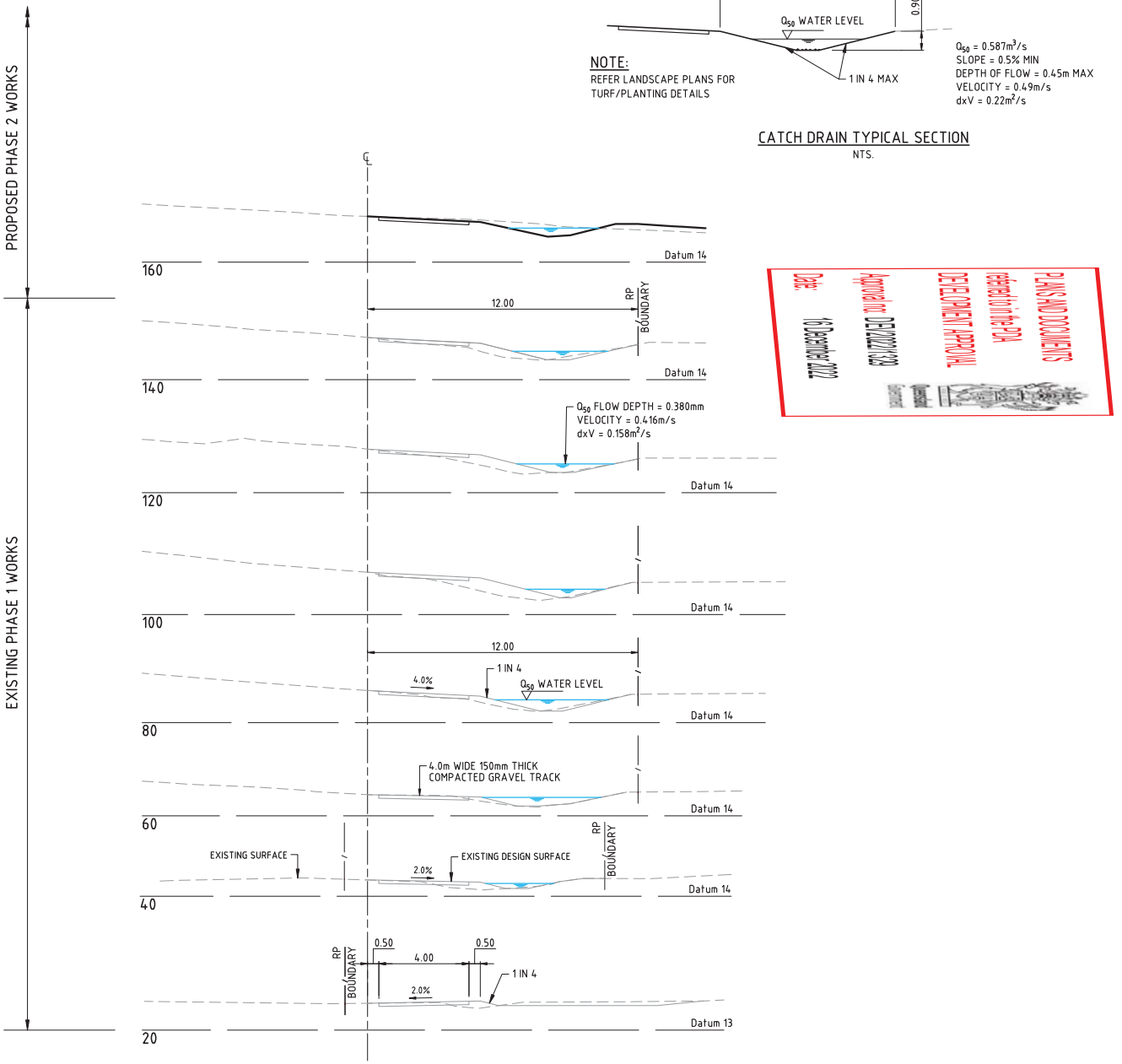
	Drawing No	Revision
A1	22-106-104	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-104-EARTHWORKS.dwg Plotted by: AA on 27/07/2022 11:59:51 AM



NOTE:
REFER LANDSCAPE PLANS FOR TURF/PLANTING DETAILS

CATCH DRAIN TYPICAL SECTION
NTS.



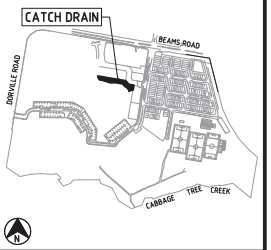
CROSS SECTIONS - CATCH DRAIN PHASE 1 WORKS
SCALE 1 : 100

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

PLANS AND DOCUMENTS
REFERRED TO IN THE PDA
DEVELOPMENT APPROVAL
Approved Ref: DEV2022/1283
Date: 16 December 2022

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE
CATCH DRAIN
PHASE 2

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
2022.07.27 13:35:54 +10'00'

Drawing Title
CATCH DRAIN
CROSS SECTIONS
EXISTING PHASE 1 WORKS

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

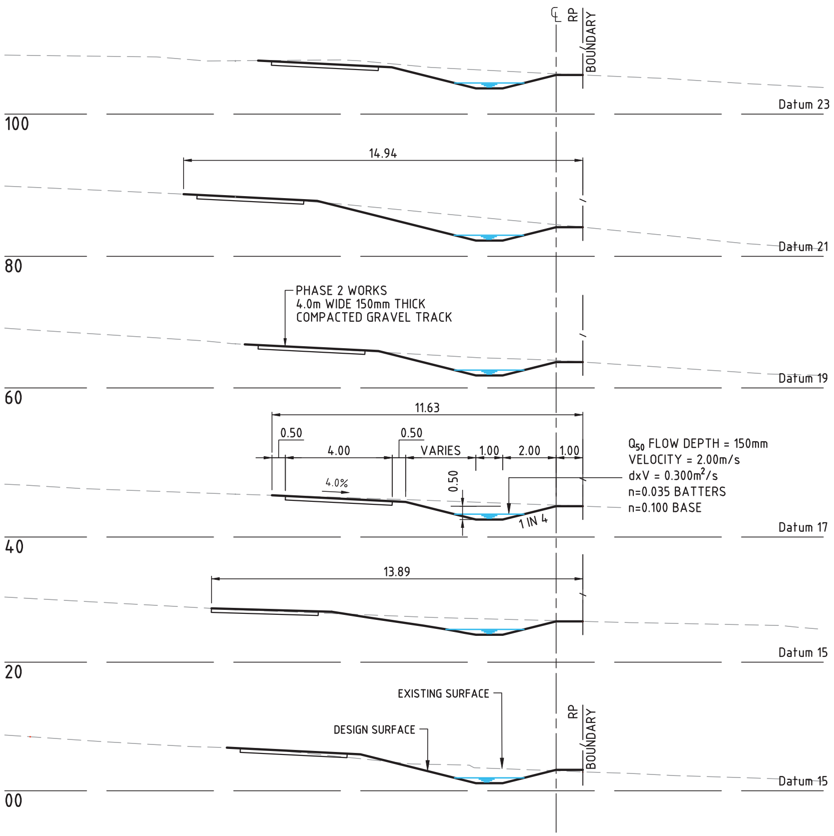
Scale	Sheet
AS SHOWN	05 of 10

	Drawing No	Revision
A1	22-106-105	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-105-106-XS.dwg Plotted by: AA on 27/07/2022 11:59:52 AM

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022

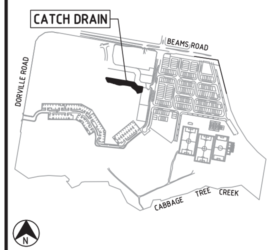


CROSS SECTIONS - CATCH DRAIN FUTURE PHASE 2 WORKS

SCALE 1 : 100

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

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE
CATCH DRAIN
PHASE 2

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
2022.07.27 13:36:04 +10'00'

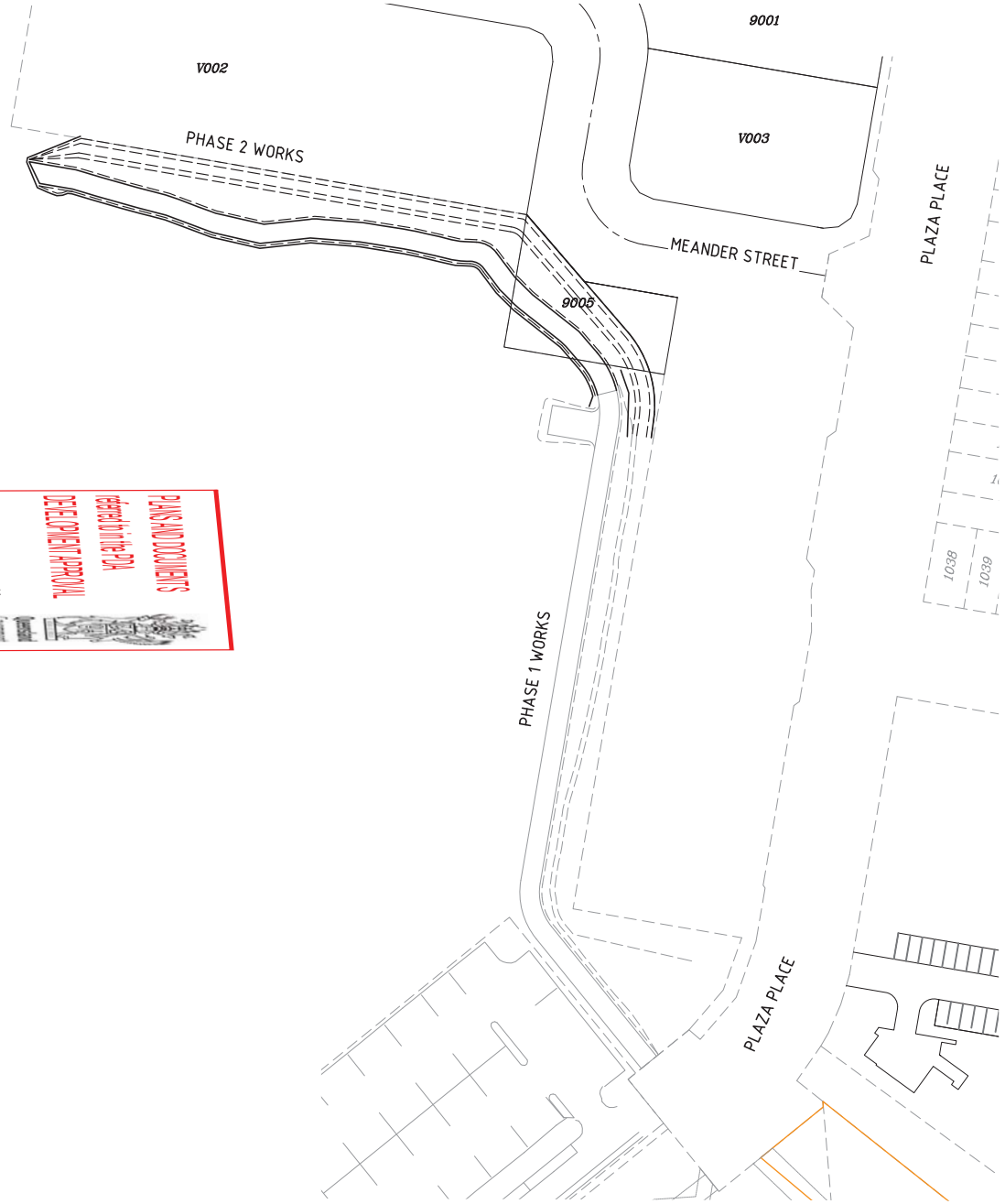
Drawing Title
CATCH DRAIN
CROSS SECTIONS
PROPOSED PHASE 2 WORKS

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	06 of 10

	Drawing No	Revision
A1	22-106-106	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-105-106-XS.dwg Plotted by: AA on 27/07/2022 11:59:52 AM



PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no. DEV2022/2838
Date 16 September 2022

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

LEGEND

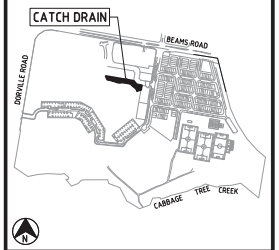
SEDIMENT AND DIVERSION FENCE (TEMP)

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	25.07.22	AA

Client

ECONOMIC
DEVELOPMENT
QUEENSLAND (EDQ)

Project

CARSELDINE VILLAGE
CATCH DRAIN
PHASE 2

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
2022.07.27 13:36:16 +10'00'

Drawing Title

EROSION AND SEDIMENT
CONTOUR PLAN
LAYOUT PLAN

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	07 of 10

	Drawing No	Revision
A1	22-106-107	A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-107-109-SEDIMENT.dwg Plotted by: AA on 27/07/2022 15:59:53 AM

EROSION AND SEDIMENT CONTROL PROGRAM

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

TREES

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

EROSION AND SEDIMENT CONTROL NOTES

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

PHASE 1 – CLEARING AND BULK EARTHWORKS

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

PHASE 2 – TRENCH EXCAVATION

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

PHASE 3 – PAVEMENT CONSTRUCTION

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

PHASE 4 – MAINTENANCE PERIOD

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

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

NOTE

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

PLANS AND DOCUMENTS
received by the RPA
DEVELOPMENT APPROVAL
Approved no: DEV2022/1023
Date: 10 October 2022

TOPSOIL

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

SEDIMENT FENCES

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

TURFING

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

DURING CONSTRUCTION SEQUENCE:

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

FOLLOWING CONSTRUCTION:

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

STABILISATION:

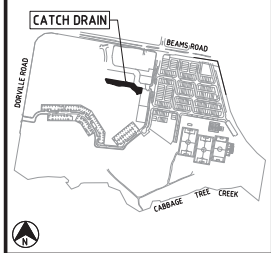
1. THE AMOUNT OF AREA EXPOSED AT ANY ONE TIME TO BE MINIMISED BY STAGING THE WORKS WHEREVER POSSIBLE AND AIMING TO ACHIEVE FINISHED LEVEL IN EACH AREA AS QUICKLY AS POSSIBLE BEFORE OPENING NEW AREAS.
2. TOPSOIL TO BE STRIPPED AND STOCKPILED SEPARATELY TO SUB-SOILS.
3. STOCKPILES TO BE PROVIDED WITH SURFACE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

SEED MIXES

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

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project
CARSELDINE VILLAGE CATCH DRAIN PHASE 2

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

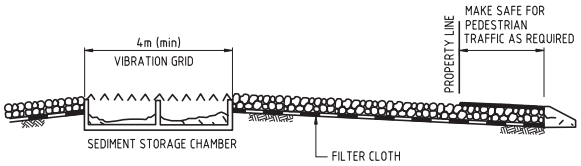
Approved
Mark Andrew Shaw BEng (Civil), MIEAust, RPEQ 17544
2022.07.27 13:36:26 +10'00'

Drawing Title
EROSION AND SEDIMENT CONTOUR PLAN NOTES

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

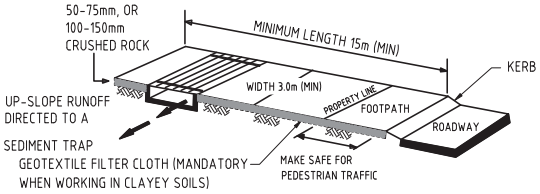
Scale: AS SHOWN
Sheet: 08 of 10
A1 | Drawing No: 22-106-108 | Revision: A

M:\2022\22106 Carseldine Village Catch Drain\ACAD\100 Series\22-106-107-109-SEDIMENT.dwg Plotted by: AA on 27/07/2022 11:59:54 AM

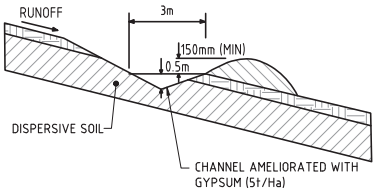


TYPICAL PROFILE OF A VIBRATION GRID

SITE ACCESS POINT SHAKEDOWN FACILITY
N.T.S.



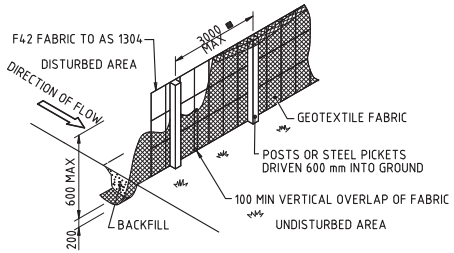
SITE ACCESS POINT ENTRY/EXIT PAD
N.T.S.



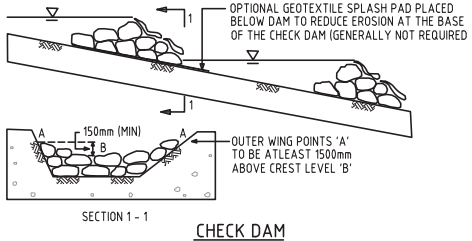
CATCH DRAIN

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

TYPICAL CATCH DRAINS DIMENSIONS & SPACINGS

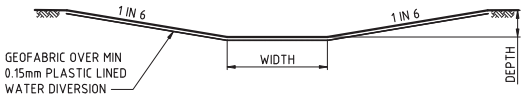


SEDIMENT FENCE
N.T.S.



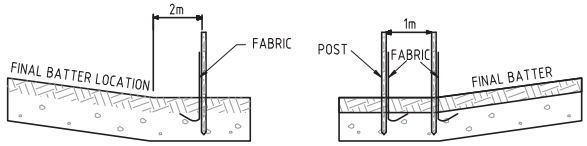
SECTION 1 - 1

CHECK DAM
N.T.S.



TYPICAL LINED CATCH DRAIN
SCALE 1 : 40

SIZING TO BE DETERMINED DURING CONSTRUCTION

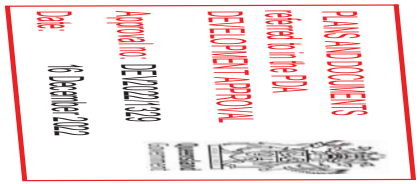


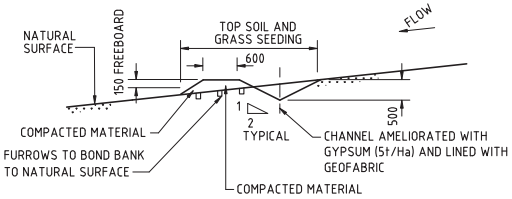
a) PLACEMENT OF SEDIMENT FENCE AT BASE OF FILL SLOPE

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

SEDIMENT FENCE DETAILS
N.T.S.

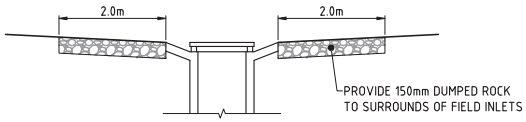
LOCATION OF SEDIMENT FENCE AT BASE OF FILL SLOPE



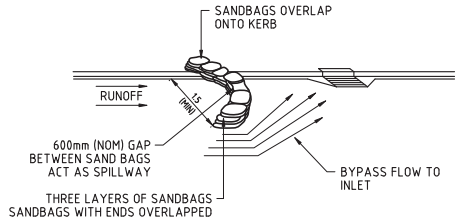


CROSS SECTION

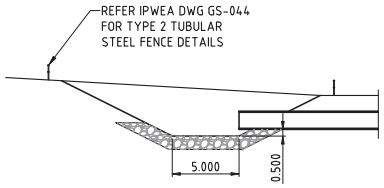
DIVERSION CHANNEL
N.T.S.



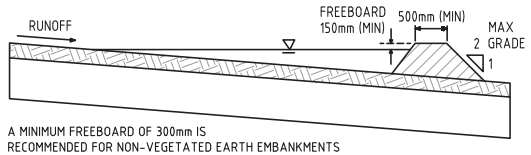
FIELD INLET PROTECTION
N.T.S.



ON GRADE GULLY INLET
N.T.S.



TEMPORARY HEADWALL DETAIL
SCALE N.T.S

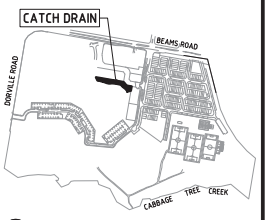


A MINIMUM FREEBOARD OF 300mm IS
RECOMMENDED FOR NON-VEGETATED EARTH EMBANKMENTS

DIVERSION DRAINAGE BANK
N.T.S.

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client

ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

Project

CARSELDINE VILLAGE CATCH DRAIN PHASE 2

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
2022.07.27 13:36:36 +10'00'

Drawing Title

EROSION AND SEDIMENT CONTOUR PLAN DETAILS

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22

Scale	Sheet
AS SHOWN	09 of 10

	Drawing No	Revision
A1	22-106-109	A

Client: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
Project: CARSELDINE VILLAGE – CATCH DRAIN (PHASE 2)
Prepared By: Jason Burton Date: 27th July 2022
Reviewed By: Mark Shaw Date: 27th July 2022

Safety in Design Analysis

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

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

☒ List all relevant safety studies

The following table summarises the safety in design issues considered.

Section of Works	Identify any Potential Incident or Hazard	Consequence	Likelihood	Risk Rating	Risk Control Measures	Consequence	Likelihood	Residual Risk Rating (after design applied)	Risk Manager
Earthworks Material Investigation	Geotechnical Investigation	C	3	S	SWMS required by Contractor	D	3	M	Contractor
Road/Earthworks Works	Pedestrians Injury	D	3	M	TMP to be provided by Contractor to exclude pedestrians from work site	E	3	L	Contractor
	Civil Construction Workers – Injury	A	4	H	TMP and SWMS required forall activities	C	2	S	Contractor
	Maintenance Workers	A	4	H	TMP and SWMS required forall 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 DBYB 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 geater 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

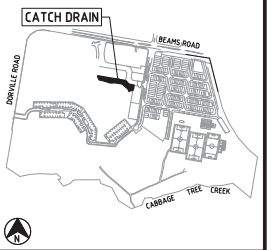
Certain - means an event or situation that is happening more or less all the time, including contiruous situations
Permanent Disability – means a disability, such as loss of a limb or eyesight, loss of hearing, chronic skin disorder, chronic back disorder, emphysema, and the like

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

PLANS AND DOCUMENTS REFERRED TO IN THE PDA DEVELOPMENT APPROVAL
Approved by: DEVELOPMENT SERVICES
Date: 16 DECEMBER 2022

DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	25.07.22	AA

Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

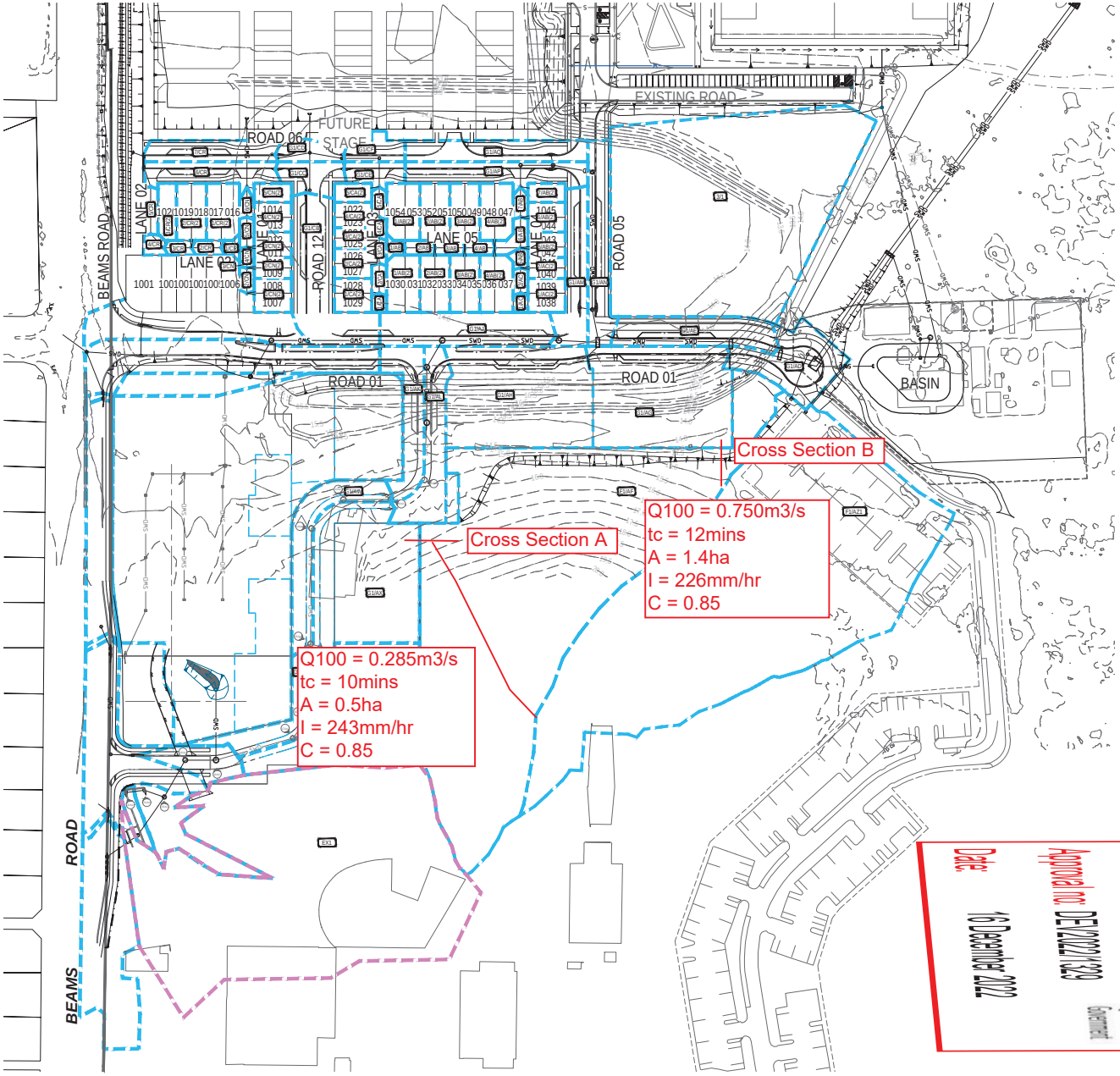
Project
CARSELDINE VILLAGE CATCH DRAIN PHASE 2

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
2022.07.27 13:36:46 +10'00'

Drawing Title
SAFETY IN DESIGN

Drawn	Designed	Checked	Date
DES	JB	MS	JUL '22
Scale: AS SHOWN			Sheet: 10 of 10
A1	Drawing No: 22-106-110		Revision: A



NOTE:
REFER DRG.15-003002.01-1410 FOR LEGEND AND NOTES.

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2021/1329
Date: 16 December 2021

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA
APPROVED: AA

STATUS: FOR CONSTRUCTION

FOR & ON BEHAL[illegible] SERVICES PTY LTD

SCALE: 1:1000 10 0 10 20 30 40 50m A1; 1:2000 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE EXTERNAL CATCHMENT PLAN

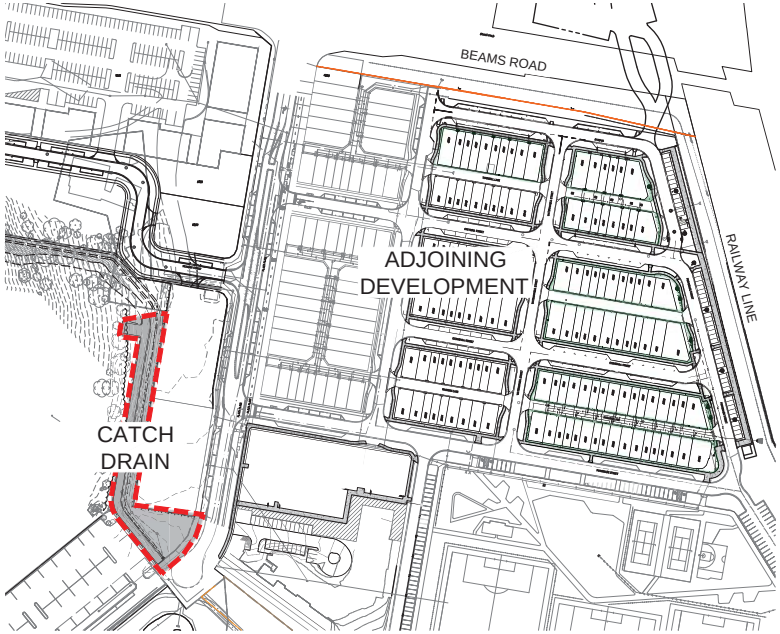
PROJECT No.	DRAWING No.	REVISION
15-003002.01	1412	A

CARSELDINE VILLAGE BEAMS ROAD, CARSELDINE - CATCH DRAIN - PHASE 1
LANDSCAPE DOCUMENTATION

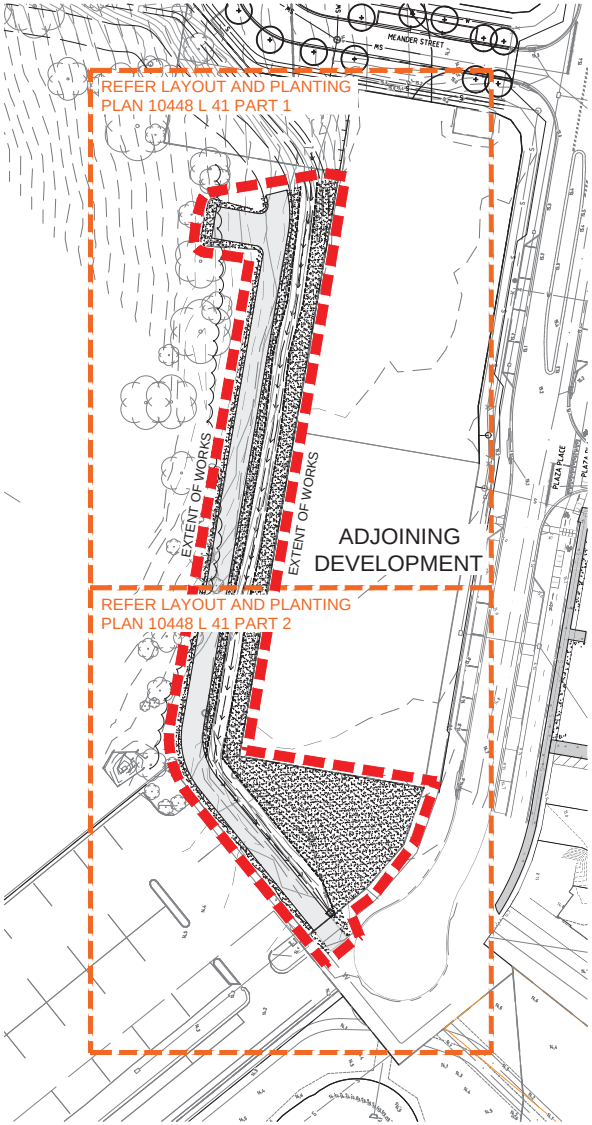
ISSUE C 01.07.2022
REVISED COUNCIL SUBMISSION

DRAWING SCHEDULE

DWG NO.	DRAWING TITLE	ISSUE	DATE
10448 L 40	LANDSCAPE COVER SHEET	C	01.07.2022
10448 L 41	LANDSCAPE LAYOUT AND PLANTING PLAN	C	01.07.2022
10448 L 42	LANDSCAPE CONSTRUCTION DETAILS	C	01.07.2022



SITE LAYOUT PLAN
SCALE: 1:1500 @ A1



STAGE LAYOUT PLAN
SCALE: 1:500 @ A1

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Queensland Government
Approval no: DEV2022/1329
Date: 16 December 2022

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\10448 L 40 - Cover Sheet.dwg

ISO 9001 QUALITY Management System SOUTHPAC
ISO 14001 ENVIRONMENT Management System SOUTHPAC
AS 4801 OHS Management System SOUTHPAC
Australian Institute of Landscape Architects

SCALE: AS NOTED

AMENDMENTS:

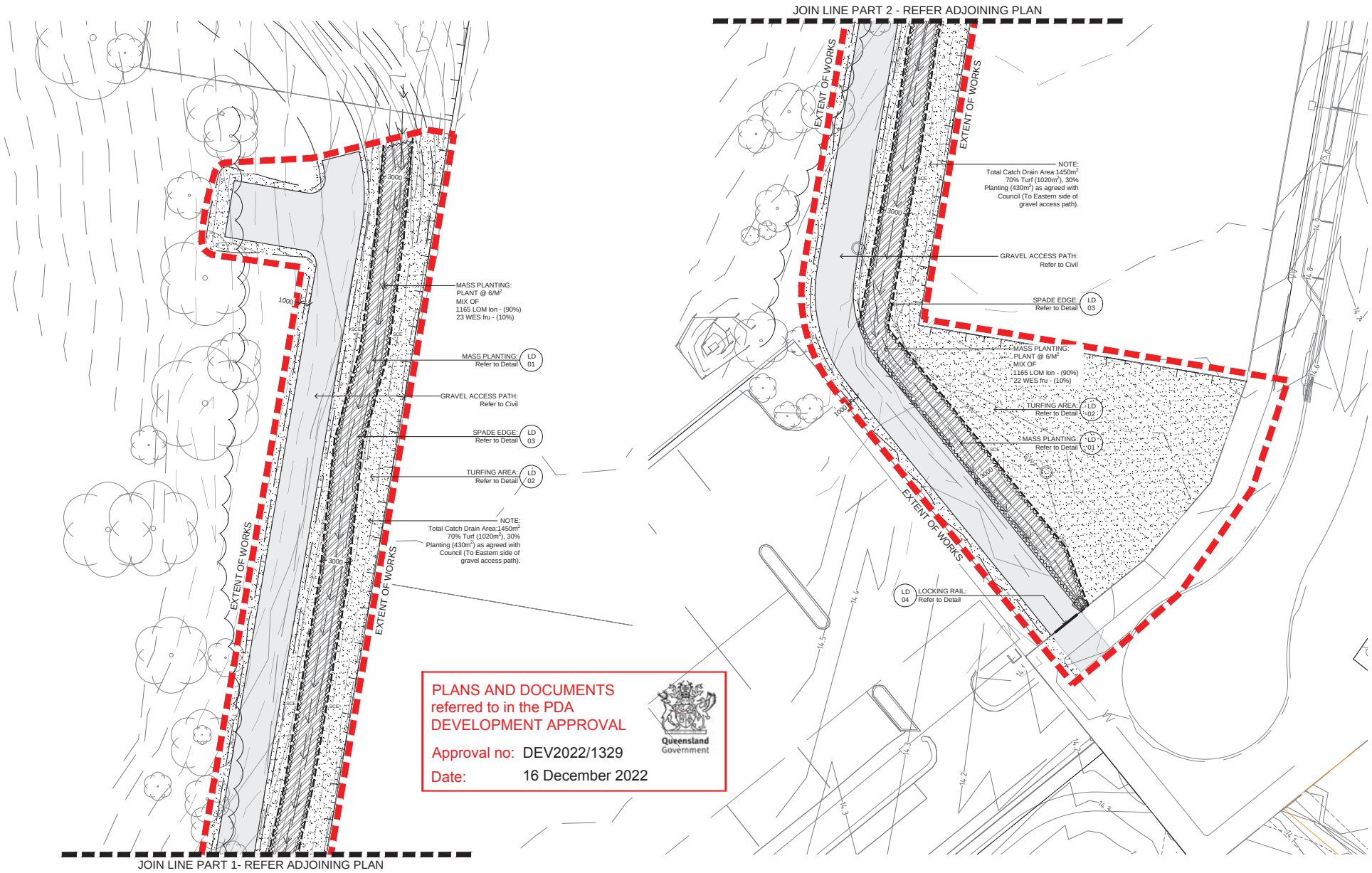
ISSUE	DATE	DESCRIPTION	CHECKED
A	22.06.2022	CLIENT ISSUE	CT
B	01.07.2022	COUNCIL SUBMISSION ISSUE	RM
C	01.07.2022	REVISED COUNCIL SUBMISSION	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE
BEAMS RD, CARSELDINE
CATCH DRAIN - PHASE 1
CARSELDINE VILLAGE

DRAWING: LANDSCAPE COVER SHEET
DRAWN: FW/CT
CHECKED: RM
DRAWING #: 10448 L 40 C

saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM



PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL

Approval no: DEV2022/1329

Date: 16 December 2022

Queensland Government

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\10448 L 41 - Layout Plan Sheet 1.dwg

ISO 9001 QUALITY · ISO 14001 ENVIRONMENT · AS 4801 OHS — SOUTHPAC Certification

Australian Institute of Landscape Architects

SCALE: 1:200@A1 1:400@A3 (0 2 4 10m)

AMENDMENTS: ISSUE	DATE	DESCRIPTION	CHECKED
A	22.06.2022	CLIENT ISSUE	RM
B	01.07.2022	COUNCIL SUBMISSION ISSUE	RM
C	01.07.2022	REVISED COUNCIL SUBMISSION	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE
BEAMS RD, CARSELDINE
CATCH DRAIN - PHASE 1

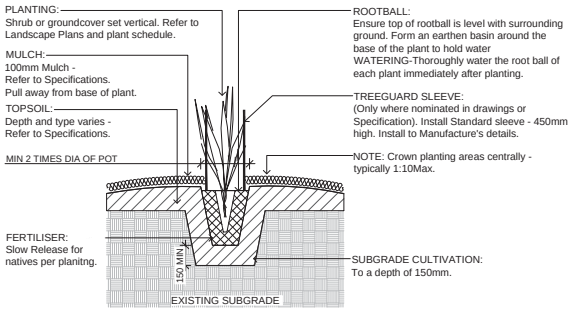
CARSELDINE VILLAGE

DRAWING: **LANDSCAPE LAYOUT PLAN AND PLANTING PLAN**

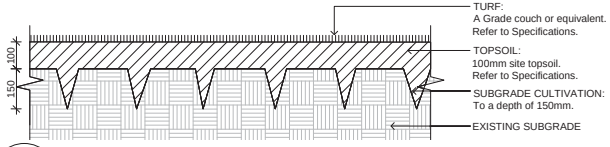
DRAWN: FW/CT CHECKED: RM

DRAWING #: **10448 L 41 C**

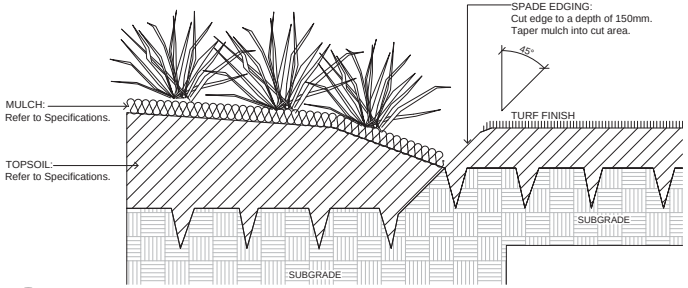
saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM



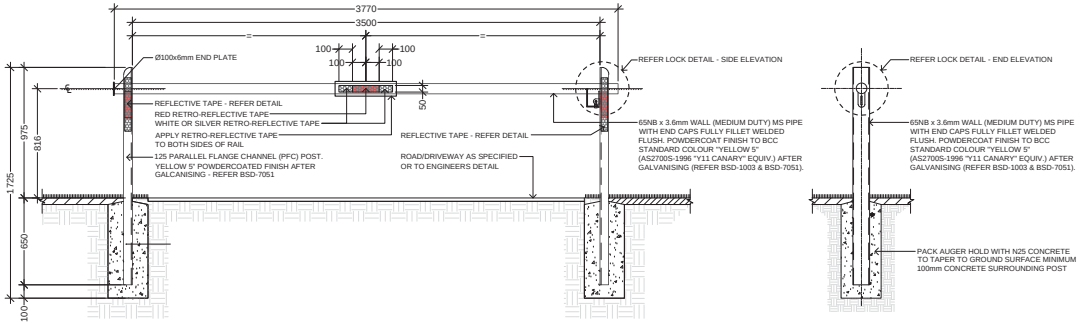
LD 01 MASS PLANTING DETAIL
SCALE: 1:20 @ A1



LD 02 TURFING DETAIL
SCALE: 1:10 @ A1

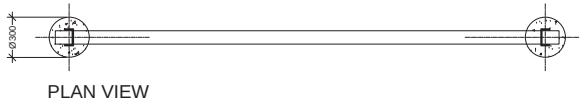


LD 03 SPADE CUT EDGE DETAIL
SCALE: 1:10 @ A1

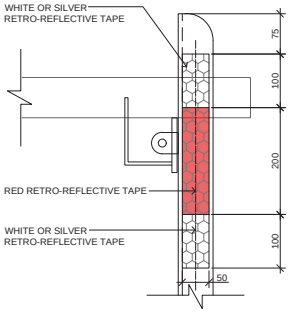


ELEVATION
SCALE: 1:20 @ A1

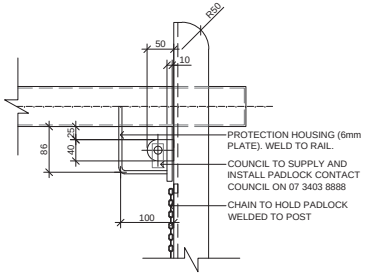
SECTION ELEVATION A-A
SCALE: 1:20 @ A1



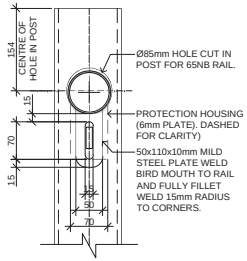
PLAN VIEW
SCALE: 1:20 @ A1



REFLECTIVE TAPE DETAIL
SCALE: 1:5 @ A1
APPLY TO BOTH SIDE OF POST



LOCK DETAIL - END ELEVATION
SCALE: 1:5 @ A1



LOCK DETAIL - SIDE ELEVATION
SCALE: 1:5 @ A1

LD 04 ENTRANCE BARRIER - LOCKRAIL WITH STEEL POSTS - (BSD-7054)

10448 - CARSELDINE VILLAGE, CARSELDINE
CATCH DRAINAGE - PHASE 1 PLANT SCHEDULE

CODE	SPECIES	COMMON NAME	SIZE	QTY	HEIGHT (Min.)	SPREAD (Min.)	STAKING	TRUNK CALIPER
GROUND COVERS								
LOM lon	LOMANDRA longifolia	Long-leaved Matrush	TUBESTOCK	**2330**	300mm	150mm	No	N/A
WES fru	WESTRINGIA fruticosa	Coast Rosemary	TUBESTOCK	**45**	300mm	150mm	No	N/A

PLANT SCHEDULE

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2022/1329
Date: 16 December 2022
Queensland Government

ISO 9001 QUALITY · ISO 14001 ENVIRONMENT · AS 4801 OHS — SOUTHPAC certifications
Australian Institute of Landscape Architects

SCALE: AS NOTED

AMENDMENTS:

ISSUE	DATE	DESCRIPTION	CHECKED
A	22.06.2022	CLIENT ISSUE	RM
B	01.07.2022	COUNCIL SUBMISSION ISSUE	RM
C	01.07.2022	REVISED COUNCIL SUBMISSION	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE
BEAMS RD, CARSELDINE
CATCH DRAIN - PHASE 1
CARSELDINE VILLAGE

DRAWING: **LANDSCAPE CONSTRUCTION DETAILS**
DRAWN: FW/CT | CHECKED: RM
DRAWING #: **10448 L 42 C**

saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\10448 L 42 - Construction Details Sheet 1.dwg

CARSELDINE VILLAGE BEAMS ROAD, CARSELDINE - CATCH DRAIN - PHASE 2

LANDSCAPE DOCUMENTATION

ISSUE A 27.07.2022
CLIENT ISSUE

DRAWING SCHEDULE

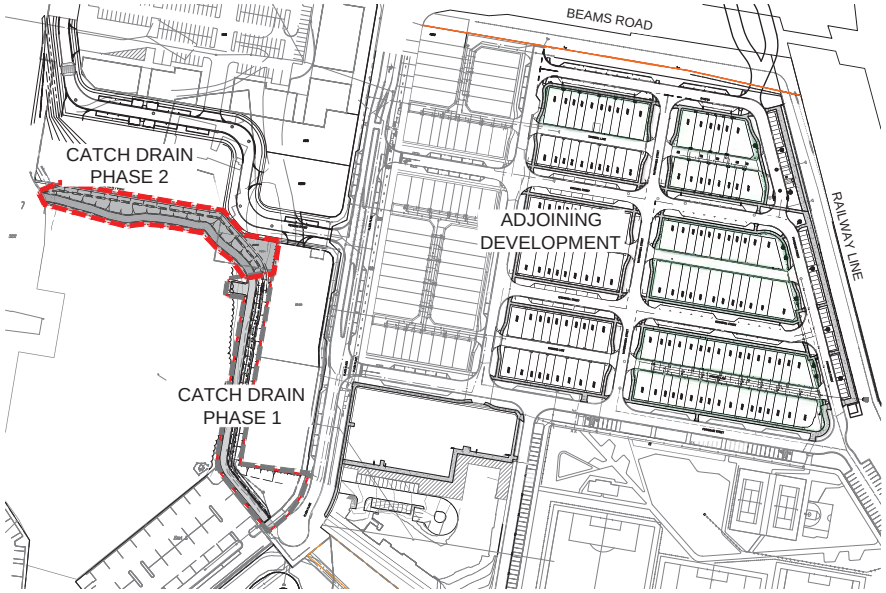
DWG NO.	DRAWING TITLE	ISSUE	DATE
10448 L 50	LANDSCAPE COVER SHEET	A	27.07.2022
10448 L 51	LANDSCAPE LAYOUT AND PLANTING PLAN	A	27.07.2022
10448 L 52	LANDSCAPE CONSTRUCTION DETAILS	A	27.07.2022

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

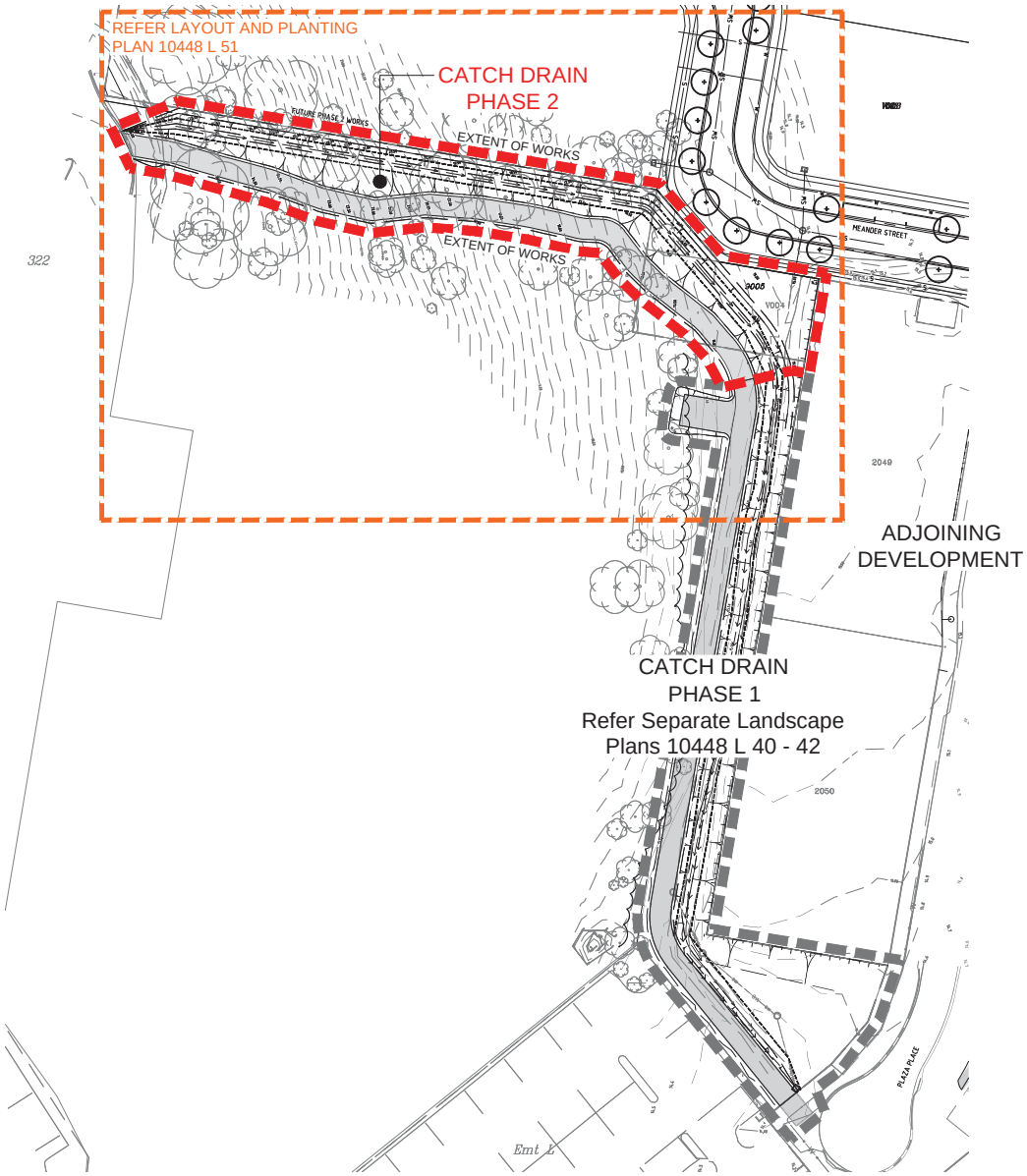
Approval no: DEV2022/1329

Date: 16 December 2022

Queensland Government



SITE LAYOUT PLAN
SCALE: 1:1500 @ A1



STAGE LAYOUT PLAN
SCALE: 1:500 @ A1

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\Phase 2\10448 L 50 - Cover Sheet.dwg

ISO 9001 QUALITY · ISO 14001 ENVIRONMENT · AS 4801 OHS — SOUTHPAC

Australian Institute of Landscape Architects

SCALE: AS NOTED

AMENDMENTS:

ISSUE	DATE	DESCRIPTION	CHECKED
A	27.07.2022	CLIENT ISSUE	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE
BEAMS RD, CARSELDINE
CATCH DRAIN - PHASE 2

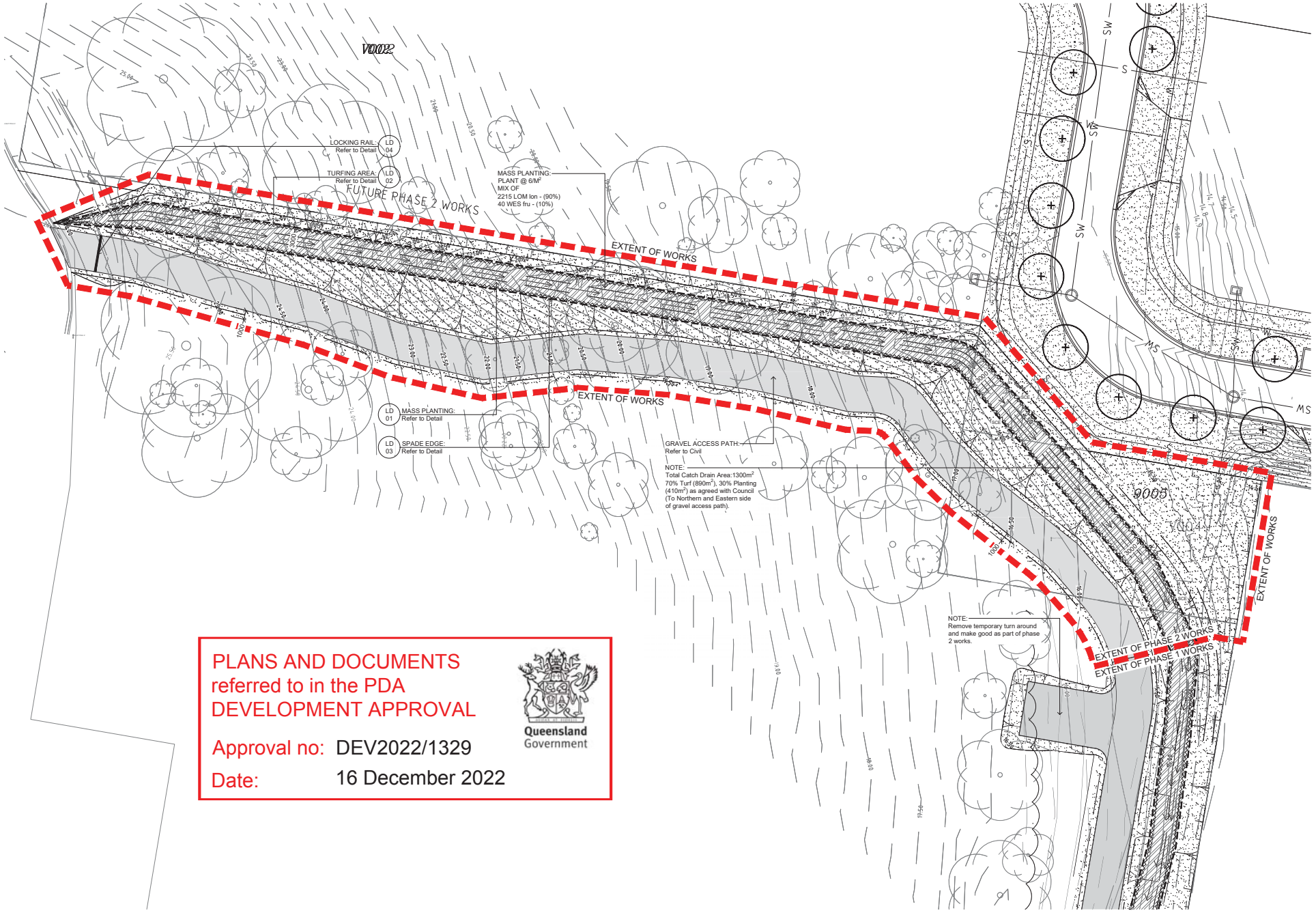
CARSELDINE VILLAGE

DRAWING: LANDSCAPE COVER SHEET

DRAWN: FW/CT | CHECKED: RM

DRAWING #: 10448 L 50 A

saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM



PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL

Approval no: DEV2022/1329

Date: 16 December 2022

Queensland Government

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\Phase 2\10448 L 51 - Layout Plan Sheet 1.dwg

ISO 9001 QUALITY Management System SOUTHPAC certification

ISO 14001 ENVIRONMENT Management System SOUTHPAC certification

AS 4801 OHS Management System SOUTHPAC certification

Australian Institute of Landscape Architects

SCALE: 1:200@A1 1:400@A3 0 2 4 10m

AMENDMENTS: ISSUE	DATE	DESCRIPTION	CHECKED
A	27.07.2022	CLIENT ISSUE	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE BEAMS RD, CARSELDINE CATCH DRAIN - PHASE 2

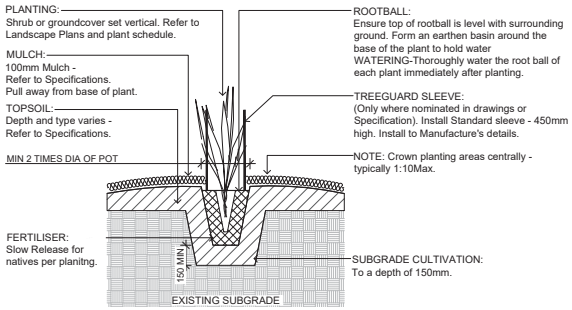
CARSELDINE VILLAGE

DRAWING: LANDSCAPE LAYOUT PLAN AND PLANTING PLAN

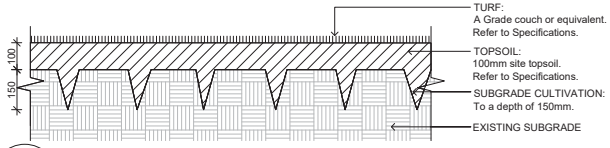
DRAWN: FW/CT CHECKED: RM

DRAWING #: 10448 L 51 A

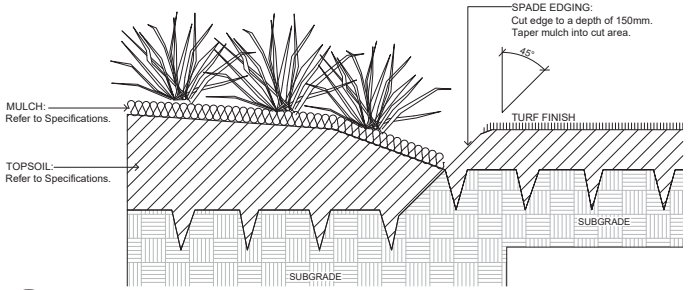
saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM



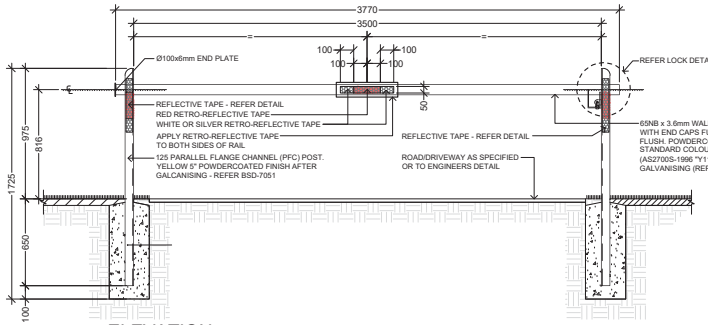
LD 01 MASS PLANTING DETAIL
SCALE: 1:20 @ A1



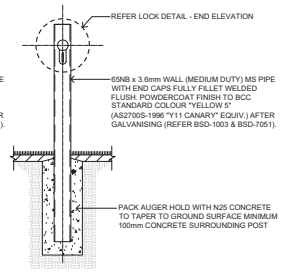
LD 02 TURFING DETAIL
SCALE: 1:10 @ A1



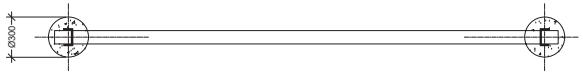
LD 03 SPADE CUT EDGE DETAIL
SCALE: 1:10 @ A1



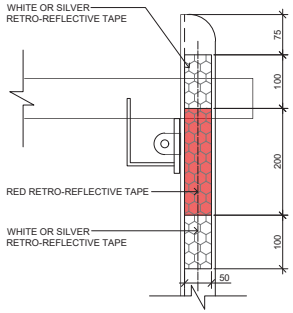
ELEVATION
SCALE: 1:20 @ A1



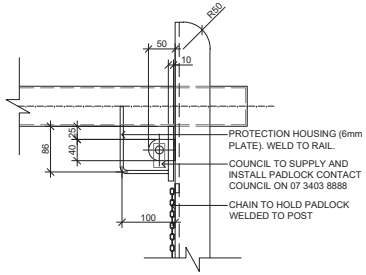
SECTION ELEVATION A-A
SCALE: 1:20 @ A1



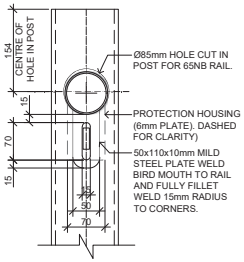
PLAN VIEW
SCALE: 1:20 @ A1



REFLECTIVE TAPE DETAIL
SCALE: 1:5 @ A1
APPLY TO BOTH SIDE OF POST



LOCK DETAIL - END ELEVATION
SCALE: 1:5 @ A1



LOCK DETAIL - SIDE ELEVATION
SCALE: 1:5 @ A1

LD 04 ENTRANCE BARRIER - LOCKRAIL WITH STEEL POSTS - (BSD-7054)

10448 - CARSELDINE VILLAGE, CARSELDINE
CATCH DRAINAGE - PHASE 2 PLANT SCHEDULE

CODE	SPECIES	COMMON NAME	SIZE	QTY	HEIGHT (Min.)	SPREAD (Min.)	STAKING	TRUNK CALIPER
GROUND COVERS								
LOM lon	LOMANDRA longifolia	Long-leaved Matrush	TUBESTOCK	**2215**	300mm	150mm	No	N/A
WES fru	WESTRINGIA fruticosa	Coast Rosemary	TUBESTOCK	**40**	300mm	150mm	No	N/A

PLANT SCHEDULE

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL

Approval no: DEV2022/1329

Date: 16 December 2022

Queensland Government

ISO 9001 QUALITY · ISO 14001 ENVIRONMENT · AS 4801 OHS — SOUTHPAC certification

Australian Institute of Landscape Architects

SCALE: AS NOTED

AMENDMENTS:

ISSUE	DATE	DESCRIPTION	CHECKED
A	27.07.2022	CLIENT ISSUE	RM

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE VILLAGE
BEAMS RD, CARSELDINE
CATCH DRAIN - PHASE 2
CARSELDINE VILLAGE

DRAWING: **LANDSCAPE CONSTRUCTION DETAILS**

DRAWN: FW/CT | CHECKED: RM

DRAWING #: **10448 L 52 A**

saunders havill group
LANDSCAPE ARCHITECTURE
9 THOMPSON STREET, BOWEN HILLS QLD 4006
PHONE 1300 123 SHG WWW.SAUNDERSHAVILL.COM

J:\10448 Beams Road, Carseldine (EDQ)\Working Files\AutoCAD\L - Landscape\Drainage Catch\Phase 2\10448 L 52 - Construction Details Sheet 1.dwg

CARSELDINE URBAN VILLAGE

STAGE 1

FOR ECONOMIC DEVELOPMENT QUEENSLAND

LOCALITY PLAN
N.T.S

DESIGN FLOW DRAWING INDEX

PROJECT No	DRAWING No	DESCRIPTION
4306	D-S-0001	BIORETENTION BASIN 2 - STAGE 1 - GENERAL LAYOUT AND DRAWING LIST
4306	D-S-0002	BIORETENTION BASIN 2 - STAGE 1 - CONSTRUCTION NOTES
4306	D-S-0101	BIORETENTION BASIN 2 - STAGE 1 - PLAN
4306	D-S-0102	BIORETENTION BASIN 2 - STAGE 1 - EARTHWORKS SECTIONS
4306	D-S-0201	BIORETENTION BASIN 2 - STAGE 1 - HYDRAULIC SECTIONS
4306	D-S-0202	BIORETENTION BASIN 2 - STAGE 1 - HYDRAULIC STRUCTURES DETAILS - SHEET 1 OF 2
4306	D-S-0203	BIORETENTION BASIN 2 - STAGE 1 - HYDRAULIC STRUCTURES DETAILS - SHEET 2 OF 2
4306	D-S-0301	BIORETENTION BASIN 2 - STAGE 1 - BIORETENTION TYPICAL DETAILS - SHEET 1 0F 2
4306	D-S-0302	BIORETENTION BASIN 2 - STAGE 1 - BIORETENTION TYPICAL DETAILS - SHEET 2 0F 2
4306	D-S-0401	BIORETENTION BASIN 2 - STAGE 1 - BIORETENTION SURFACES AND PLANTING SCHEDULES

NOTE:
DESIGN FLOW DRAWINGS MUST BE READ IN CONJUNCTION WITH CALIBRE PROFESSIONAL SERVICES 15-003002.01 PROJECT DRAWINGS

DRAWING INDEX

GENERAL	
1000	COVER SHEET AND DRAWING INDEX
BULK EARTHWORKS	
1200	BULK EARTHWORKS LAYOUT PLAN SHEET 1 OF 5
1201	BULK EARTHWORKS LAYOUT PLAN SHEET 2 OF 5
1202	BULK EARTHWORKS LAYOUT PLAN SHEET 3 OF 5
1203	BULK EARTHWORKS LAYOUT PLAN SHEET 4 OF 5
1204	BULK EARTHWORKS LAYOUT PLAN SHEET 5 OF 5
1210	BULK EARTHWORKS SECTIONS
1225	LOT EARTHWORKS LAYOUT PLAN SHEET 1 OF 2
1226	LOT EARTHWORKS LAYOUT PLAN SHEET 2 OF 2
1250	ACOUSTIC FENCE LAYOUT PLAN SHEET 1 OF 2
1251	ACOUSTIC FENCE LAYOUT PLAN SHEET 2 OF 2
1252	ACOUSTIC FENCE DETAILS
1253	BLOCKWORK RETAINING WALL DETAILS
1254	CONCRETE SLEEPER RETAINING WALL DETAIL
ROADWORKS	
1300	CONTROL LINE LAYOUT PLAN SHEET 1 OF 2
1301	CONTROL LINE LAYOUT PLAN SHEET 2 OF 2
1302	CONTROL LINE SETOUT TABLES
1310	ROADWORKS LAYOUT PLAN SHEET 1 OF 2
1311	ROADWORKS LAYOUT PLAN SHEET 2 OF 2
1320	ROADWORKS INTERSECTION DETAILS SHEET 1 OF 4
1321	ROADWORKS INTERSECTION DETAILS SHEET 2 OF 4
1322	ROADWORKS INTERSECTION DETAILS SHEET 3 OF 4
1323	ROADWORKS INTERSECTION DETAILS SHEET 4 OF 4
1330	ROAD 01-ROAD11 LONGITUDINAL SECTION
1331	ROAD 01 CROSS SECTIONS SHEET 1 OF 2
1332	ROAD 01 CROSS SECTIONS SHEET 2 OF 2
1333	ROAD 05 LONGITUDINAL SECTION AND CROSS SECTIONS
1334	ROAD 06 LONGITUDINAL SECTION
1335	ROAD 06 CROSS SECTIONS
1336	ROAD 12 LONGITUDINAL SECTION AND CROSS SECTIONS
1337	LANE 01 LONGITUDINAL SECTION AND CROSS SECTIONS
1338	LANE 02 LONGITUDINAL SECTION AND CROSS SECTIONS
1339	LANE 03 LONGITUDINAL SECTION AND CROSS SECTIONS
1340	LANE 04 LONGITUDINAL SECTION AND CROSS SECTIONS
1341	LANE 05 LONGITUDINAL SECTION AND CROSS SECTIONS
1342	ROAD 07 LONGITUDINAL SECTION AND CROSS SECTIONS
1350	SIGNAGE AND LINEMARKING LAYOUT PLAN SHEET 1 OF 3
1351	SIGNAGE AND LINEMARKING LAYOUT PLAN SHEET 2 OF 3
1352	SIGNAGE AND LINEMARKING LAYOUT PLAN SHEET 3 OF 3
1360	PAVEMENT DETAILS LAYOUT PLAN SHEET 1 OF 2
1361	PAVEMENT DETAILS LAYOUT PLAN SHEET 2 OF 2
1370	JOINTING DETAIL LAYOUT PLAN SHEET 1 OF 2
1371	JOINTING DETAIL LAYOUT PLAN SHEET 2 OF 2
1372	JOINTING DETAILS
STORMWATER DRAINAGE	
1400	STORMWATER DRAINAGE LAYOUT PLAN SHEET 1 OF 6
1401	STORMWATER DRAINAGE LAYOUT PLAN SHEET 2 OF 6
1402	STORMWATER DRAINAGE LAYOUT PLAN SHEET 3 OF 6
1403	STORMWATER DRAINAGE LAYOUT PLAN SHEET 4 OF 6
1404	STORMWATER DRAINAGE LAYOUT PLAN SHEET 5 OF 6
1405	STORMWATER DRAINAGE LAYOUT PLAN SHEET 6 OF 6
1406	STORMWATER DRAINAGE NOTES AND DETAILS SHEET
1410	STORMWATER DRAINAGE CATCHMENT PLAN SHEET 1 OF 2
1411	STORMWATER DRAINAGE CATCHMENT PLAN SHEET 2 OF 2
1412	STORMWATER DRAINAGE EXTERNAL CATCHMENT PLAN

1

DRAWING INDEX

1420	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 1 OF 6
1421	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 2 OF 6
1422	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 3 OF 6
1423	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 4 OF 6
1424	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 5 OF 6
1425	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 6 OF 6
1426	STORMWATER DRAINAGE OPEN CHANNEL SECTIONS
1430	STORMWATER DRAINAGE MINOR CALCULATION TABLES SHEET 1 OF 6
1431	STORMWATER DRAINAGE MINOR CALCULATION TABLES SHEET 2 OF 6
1432	STORMWATER DRAINAGE MINOR CALCULATION TABLES SHEET 3 OF 6
1433	STORMWATER DRAINAGE MAJOR CALCULATION TABLES SHEET 4 OF 6
1434	STORMWATER DRAINAGE MAJOR CALCULATION TABLES SHEET 5 OF 6
1435	STORMWATER DRAINAGE MAJOR CALCULATION TABLES SHEET 6 OF 6
1440	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 1 OF 12
1441	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 2 OF 12
1442	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 3 OF 12
1443	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 4 OF 12
1444	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 5 OF 12
1445	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 6 OF 12
1446	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 7 OF 12
1447	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 8 OF 12
1448	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 9 OF 12
1449	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 10 OF 12
1450	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 11 OF 12
1451	STORMWATER DRAINAGE STRUCTURE DETAILS SHEET 12 OF 12
1452	STORMWATER DRAINAGE STRUCTURE DETAILS TYPICAL DETAILS AND NOTES
1453	STORMWATER DRAINAGE STRUCTURE DETAILS TYPICAL DETAILS
SEWER RETICULATION	
1500	SEWER RETICULATION NOTES AND DETAILS
1510	SEWER RETICULATION LAYOUT PLAN SHEET 1 OF 3
1511	SEWER RETICULATION LAYOUT PLAN SHEET 2 OF 3
1512	SEWER RETICULATION LAYOUT PLAN SHEET 3 OF 3
1520	SEWER RETICULATION LONGITUDINAL SECTIONS SHEET 1 OF 4
1521	SEWER RETICULATION LONGITUDINAL SECTIONS SHEET 2 OF 4
1522	SEWER RETICULATION LONGITUDINAL SECTIONS SHEET 3 OF 4
1523	SEWER RETICULATION LONGITUDINAL SECTIONS SHEET 4 OF 4
1524	SEWER RETICULATION TUNNEL BORE AND CONNECTION DETAILS
1525	SEWER RETICULATION STRUCTURAL MANHOLE DETAILS
WATER RETICULATION	
1600	WATER RETICULATION NOTES EARLY WORKS
1601	WATER RETICULATION LAYOUT PLAN EARLY WORKS
1610	WATER RETICULATION DETAILS SHEET 1 OF 2
1611	WATER RETICULATION DETAILS SHEET 2 OF 2
1612	WATER RETICULATION DETAILS AND SECTIONS
1650	WATER RETICULATION NOTES
1651	WATER RETICULATION LAYOUT PLAN SHEET 1 OF 2
1652	WATER RETICULATION LAYOUT PLAN SHEET 2 OF 2
EXISTING SERVICES	
1900	EXISITING SERVICES WATER RETICULATION
1901	EXISTING SERVICES STORMWATER RETICULATION
1902	EXISTING SERVICES SEWERAGE RETICULATION
1903	EXISTING SERVICES ELECTRICAL UNDERGROUND
1904	EXISTING SERVICES COMMUNICATION
ROAD FUNCTIONAL	
RF1	ROAD FUNCTIONAL LAYOUT PLAN SHEET 1 OF 2
RF2	ROAD FUNCTIONAL LAYOUT PLAN SHEET 2 OF 2

BRISBANE CITY COUNCIL
AREA OF SITE: 3.51 ha

SURVEYOR
LAND PARTNERS

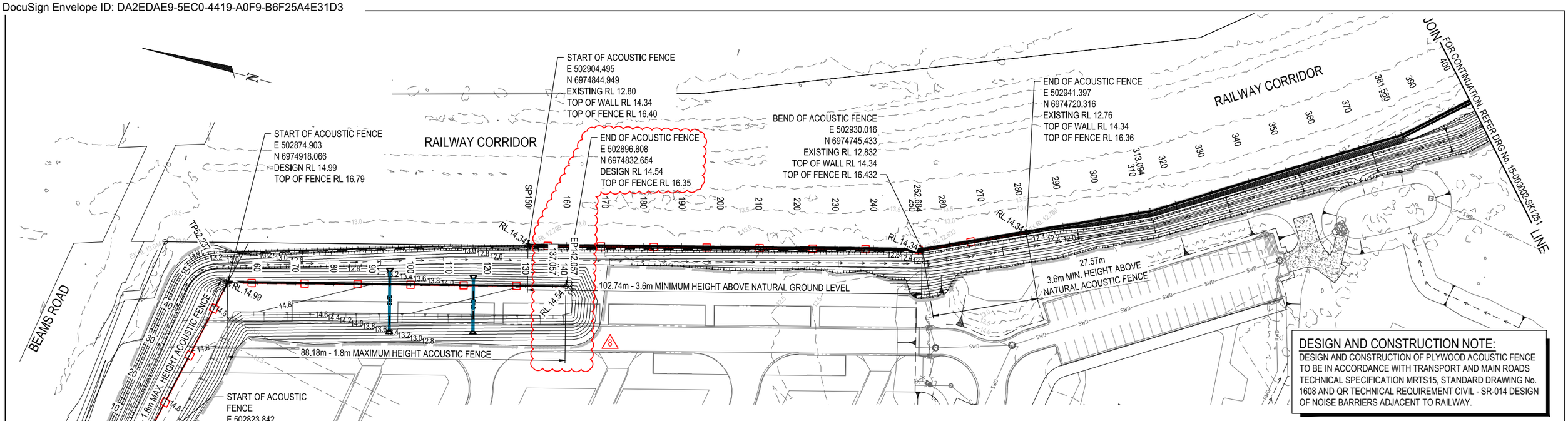
CONSTRUCTION NOTE
THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH:
- ACID SULPHATES SOILS REPORT (PREPARED BY GALLAGHER ENVIROMENTAL - GE20.025.L1)
- GEOTECHNICAL REPORT (PREPARED BY SGS - SGS/17/E184B 29 MAY 2018)
- FLORA FAUNA MANAGEMENT PLAN (FFMP) (PREPARED BY 28 SOUTH)
- DISPERSIVE SOILS MANAGEMENT PLAN (DSMP) (PREPARED BY GALLAGHER ENVIROMENTAL - GE20.025.R1)

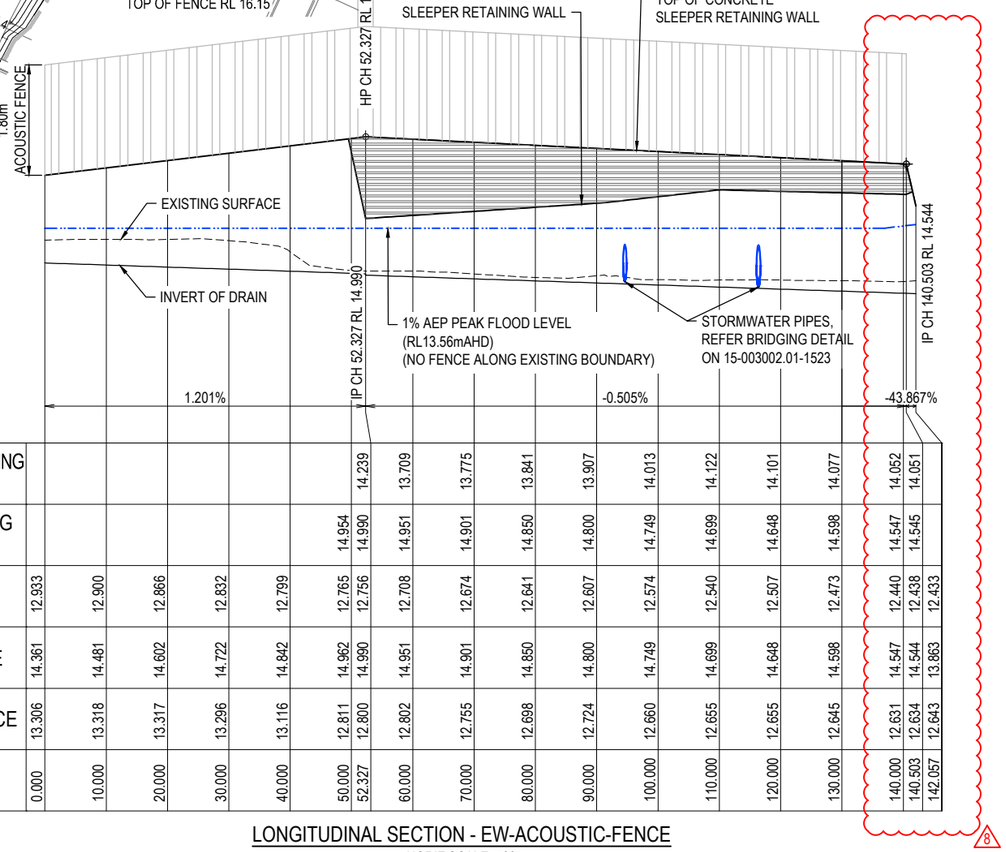
CONSTRUCTION HOLD POINT
ONCE THE BASE OF MANHOLES, INSPECTION PITS, GULLIES AND FIELD INLETS FOR STORMWATER DRAINAGE AND SEWER RETICULATION HAVE BEEN POURED, FURTHER CONSTRUCTION SHALL NOT PROCEED UNTIL THE SUPERINTENDENT AND OR ENGINEER HAVE INSPECTED THE WORKS FOR FINISHED LEVELS AND APPROVED CONSTRUCTION TO CONTINUE.

CONSTRUCTION HOLD POINT
PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL VERIFY LOCATION AND LEVELS OF ALL EXISTING CROSSINGS AND CONNECTION POINTS.

CARSELDINE URBAN VILLAGE
STAGE 1
PDA. REF NO. DEV2019/1074

Project No.:	Stage:	Milestone:	Revision Date.:	Drawing No.:	Revision:
15-003002.01	1	FOR APPROVAL	23/03/21	1000	7





DESIGN AND CONSTRUCTION NOTE:
DESIGN AND CONSTRUCTION OF PLYWOOD ACOUSTIC FENCE TO BE IN ACCORDANCE WITH TRANSPORT AND MAIN ROADS TECHNICAL SPECIFICATION MRTS15, STANDARD DRAWING No. 1608 AND QR TECHNICAL REQUIREMENT CIVIL - SR-014 DESIGN OF NOISE BARRIERS ADJACENT TO RAILWAY.

DATUM RL 10.0

CHAINAGES	BOTTOM OF RETAINING WALL LEVEL	TOP OF RETAINING WALL LEVEL	DRAIN INVERT LEVEL	DESIGN SURFACE	EXISTING SURFACE
0.000			12.933	14.361	13.306
10.000			12.900	14.481	13.318
20.000			12.866	14.602	13.317
30.000			12.832	14.722	13.296
40.000			12.799	14.842	13.116
50.000		14.954	12.765	14.962	12.811
52.327	14.239	14.990	12.756	14.990	12.800
60.000	13.709	14.951	12.708	14.951	12.802
70.000	13.775	14.901	12.674	14.901	12.755
80.000	13.841	14.850	12.641	14.850	12.698
90.000	13.907	14.800	12.607	14.800	12.724
100.000	14.013	14.749	12.574	14.749	12.660
110.000	14.122	14.699	12.540	14.699	12.655
120.000	14.101	14.648	12.507	14.648	12.655
130.000	14.077	14.598	12.473	14.598	12.645
140.000	14.052	14.547	12.440	14.547	12.631
140.503	14.051	14.545	12.438	14.544	12.634
142.057			12.433	13.863	12.643

LONGITUDINAL SECTION - EW-ACOUSTIC-FENCE

HORIZ SCALE: 500
VERTICAL SCALE: 50

DATUM RL 10.0

CHAINAGES	DRAIN INVERT LEVEL	FENCE TOP LEVEL	RETAINING WALL LEVEL	DESIGN SURFACE	EXISTING SURFACE
150.000	12.471	* 16.345 16.540	14.340	14.595	12.801
160.000	12.438	* 16.310 16.540	14.340	14.560	12.889
170.000	12.404	16.540	14.340		12.958
180.000	12.371	16.540	14.340		12.832
190.000	12.337	16.540	14.340		12.939
200.000	12.304	16.540	14.340		12.984
210.000	12.270	16.540	14.340		12.829
220.000	12.237	16.540	14.340		12.672
230.000	12.203	16.540	14.340		12.767
240.000	12.169	16.540	14.340		12.753
250.000	12.136	16.540	14.340		12.857
252.684	12.127	16.540	14.340		12.832
260.000	12.100	16.540	14.340		12.827
270.000	12.067	16.540	14.340		12.836
280.000	12.033	16.540	14.340		12.764
290.000	12.000		14.340		12.797
300.000	11.966		14.340		12.759
310.000	11.933		14.340		12.815
313.094	11.921		14.340		12.870
320.000	11.897		14.340		12.896

LONGITUDINAL SECTION - EXISTING RAIL BOUNDARY

HORIZ SCALE: 500
VERTICAL SCALE: 50

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	ACOUSTIC FENCE ALIGNMENT REVISED	AA	AA
3	14.05.20	ACOUSTIC FENCE AND BLOCK WALL LEVELS REVISED	AA	AA
4	28.05.20	RETAINING WALL LEVELS AMENDED	CHC	DC
5	25.06.20	NOTES AMENDED	CHC	DC
6	16.07.20	ACOUSTIC FENCE CHAINAGES AND LONGITUDINAL SECTION AMENDED	CHC	AA
7	21.01.21	ACOUSTIC FENCE SHIFTED, CONCRETE SLEEPER RETAINING WALL ADDED	AA	AA
8	23.03.21	END OF ACOUSTIC FENCE ADJUSTED	AR	AA

DRAWN CHECK
AA

DESIGN CHECK
AA

STATUS
FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE
1:500 10 5 0 10 20m A1
1:1000 A3
1:500 10 5 0 10 20m A1
1:1000 A3
HORIZONTAL
1:50 1 0.5 0 1 2m A1
1:100 A3
VERTICAL

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

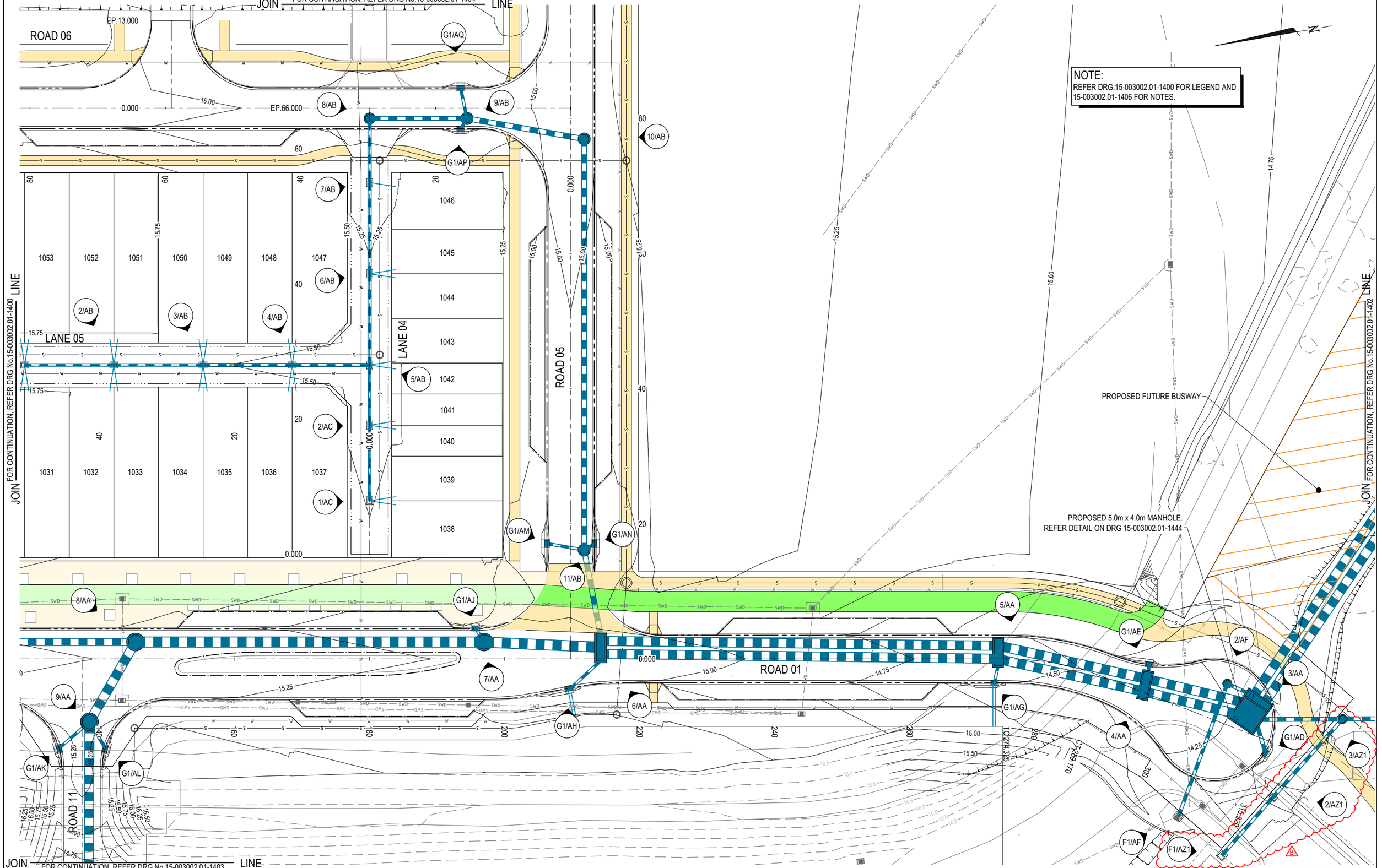
© calibregroup.com

PROJECT
CARSELDINE URBAN VILLAGE
STAGE 1

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

DRAWING TITLE
ACOUSTIC FENCE
LAYOUT PLAN
SHEET 1 OF 2

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1250	8



PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER DRAINAGE NETWORK AMENDED	CHC	AA
A	28.10.20	CARPARKING ON ROAD 1 AND 5 REVISED	CHC	AA
B	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: aa

DESIGN CHECK: aa

STATUS: FOR CONSTRUCTION

APPROVED: LESLIE ROCHE RPEQ 14843

FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE: 1:250 / 1:500 — 5 0 5 10m — A1 / A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

calibre

 calibregroup.com

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 2 OF 6

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1401	B

JOIN LINE — FOR CONTINUATION, REFER DRG No.15-003002.01-1401

EXISTING SPORTS FIELD

OUT/AA

PROVIDE 45.0m² OF ROCK ARMOURING 450mm THICK D_{50}=300mm.

1/AA

PROPOSED 4.0m x 1.05m x 2.49m DOME TOP GRATED FIELD INLET (MANHOLE CONVERTER). REFER DETAIL ON DRG 15-003002.01-1448

CABBAGE TREE CREEK

NOTE:
REFER DRG.15-003002.01-1400 FOR LEGEND AND 15-003002.01-1406 FOR NOTES.

PROPOSED FUTURE BUSWAY

PROVIDE Ø300 ROOFWATER CONNECTION FOR FUTURE LOT IL13.100 @ MIN. 1% GRADE

PROPOSED 4.0m x 1.3m DOME TOP GRATED FIELD INLET (MANHOLE CONVERTER). REFER DETAIL ON DRG 15-003002.01-1449

2/AA

PUMPING PIT. REFER DESIGN FLOW DRGs 4306 D-S1 SERIES FOR DETAILS

5/AA
G1/AE
2/AF
3/AA
G1/AD
1/AR
OUT/1
OUT/AZ
IN/AR
G1/AG
4/AA
3/AZ1
2/AZ1
F1/AF
F1/AZ1

BASIN BY OTHERS

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER DRAINAGE NETWORK AMENDED	CHC	AA
3	15.05.20	SEWER ALIGNMENT REVISED	AA	AA
4	29.05.20	OUT/1 LOCATION REVISED	AA	AA
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: aa
DESIGN CHECK: aa

STATUS: FOR CONSTRUCTION

APPROVED: LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE: 1:500 / 1:1000 — 10 5 0 10 20m — A1 / A3

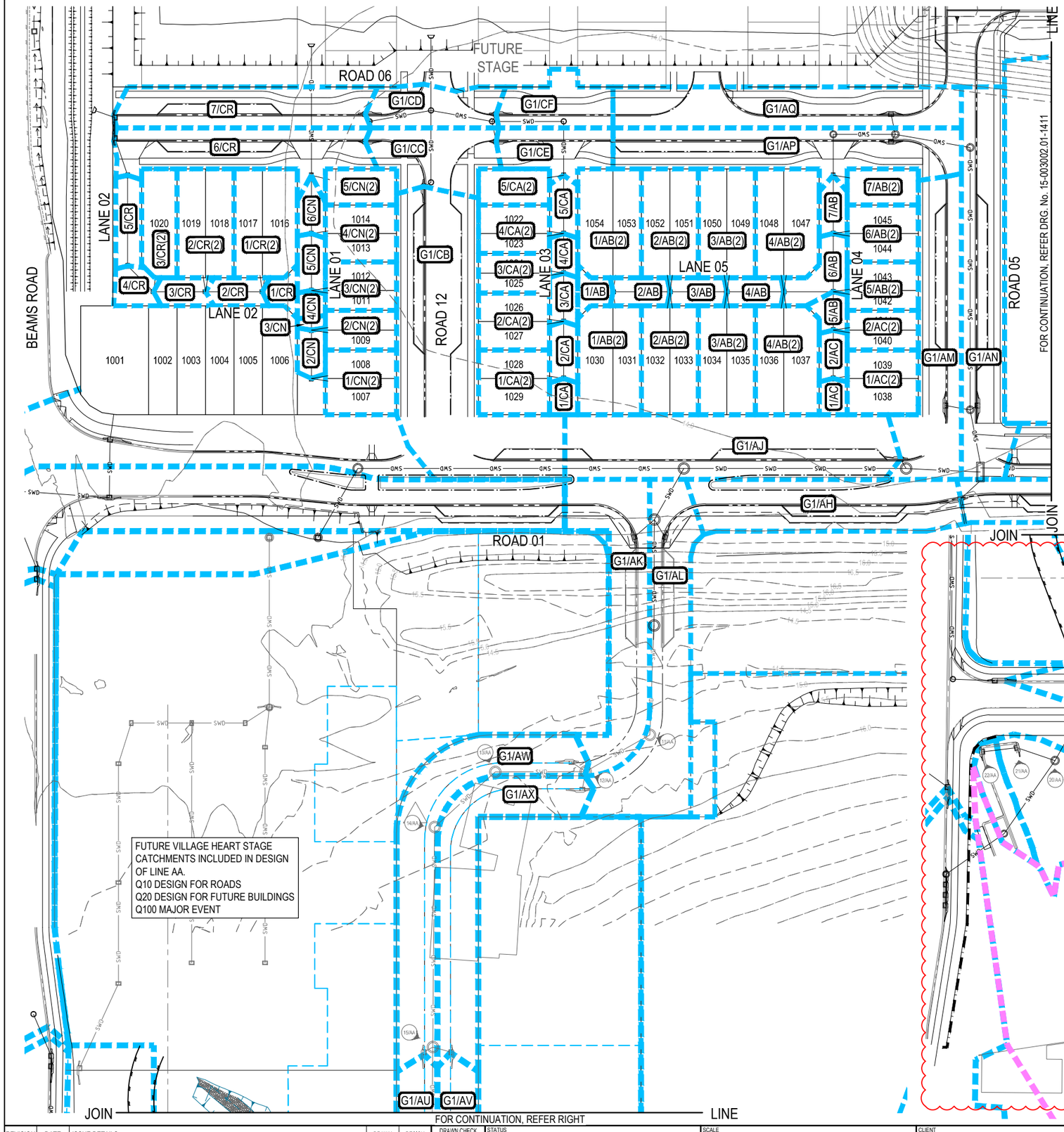
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 3 OF 6

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1402	A



CATCHMENT TABLE

CATCHMENT No.	CATCHMENT AREA (Ha.)	CATCHMENT No.	CATCHMENT AREA (Ha.)
1/CR	0.0056	1/CA(2)	0.0247
2/CR	0.0085	2/CA(2)	0.0218
3/CR	0.0079	3/CA(2)	0.0152
4/CR	0.0084	4/CA(2)	0.0185
5/CR	0.0125	5/CA(2)	0.0139
6/CR	0.0602	1/CA	0.0051
7/CR	0.0554	2/CA	0.0086
1/CR(2)	0.0367	3/CA	0.0073
2/CR(2)	0.0333	4/CA	0.0060
3/CR(2)	0.0203	5/CA	0.0084
		1/AB(2)	0.0739
2/CN	0.0072	2/AB(2)	0.0667
3/CN	0.0060	3/AB(2)	0.0667
4/CN	0.0085	4/AB(2)	0.0738
5/CN	0.0071	1/AB	0.0060
1/CN(2)	0.0247	2/AB	0.0086
2/CN(2)	0.0152	3/AB	0.0086
3/CN(2)	0.0185	4/AB	0.0086
4/CN(2)	0.0218	1/AC	0.0052
5/CN(2)	0.0139	2/AC	0.0073
G1/AK	0.0614	5/AC	0.0063
G1/AL	0.0604	6/AC	0.0147
G1/AJ	0.1147	7/AC	0.0078
G1/AH	0.0740	1/AC(2)	0.0248
G1/AG	0.0616	2/AC(2)	0.0152
G1/AD	0.1031	5/AB(2)	0.0185
G1/AE	0.0934	6/AB(2)	0.0218
G1/AN	0.0932	7/AB(2)	0.0139
G1/AM	0.0786	G1/AU	0.0506
G1/AP	0.0809	G1/AV	0.0730
G1/AQ	0.0768	G1/AW	0.0973
G1/CB	0.1513	G1/AX	0.0846
G1/CC	0.0382	F1/AZ1	1.4241
G1/CD	0.0283	F1/AF	1.3923
G1/CE	0.0270	EX1	1.1700
G1/CF	0.0276		

LEGEND

- G3/72 — STORMWATER CATCHMENT NAME
- G5a/72 — FUTURE CATCHMENT NAME
- STORMWATER CATCHMENT BOUNDARY
- 64.0 — EXISTING SURFACE CONTOUR (0.5m INTERVALS)
- 66.0 — DESIGN SURFACE CONTOUR (0.5m INTERVALS)
- SWD — PROPOSED STORMWATER DRAINAGE
- SWD — STORMWATER DRAINAGE BY OTHERS
- SWD — FUTURE STORMWATER DRAINAGE
- SWD — EXISTING STORMWATER DRAINAGE

CAUTION !! UNDERGROUND TELECOMMS CABLES
UNDERGROUND TELECOMMUNICATION CABLES EXIST IN THIS VICINITY. CONTACT SUPPLIER FOR CABLE LOCATIONS. EXTREME CARE MUST BE TAKEN WHILST EXCAVATING.

CAUTION !! UNDERGROUND GAS MAIN
UNDERGROUND GAS MAIN EXIST IN THIS VICINITY. CONTACT SUPPLIER FOR MAIN LOCATIONS. EXTREME CARE MUST BE TAKEN WHILST EXCAVATING

CAUTION !! UNDERGROUND ELECTRICAL CABLES
UNDERGROUND ELECTRICITY CABLES EXIST IN THIS VICINITY. CONTACT ENERGEX FOR CABLE LOCATIONS. EXTREME CARE MUST BE TAKEN WHILST EXCAVATING

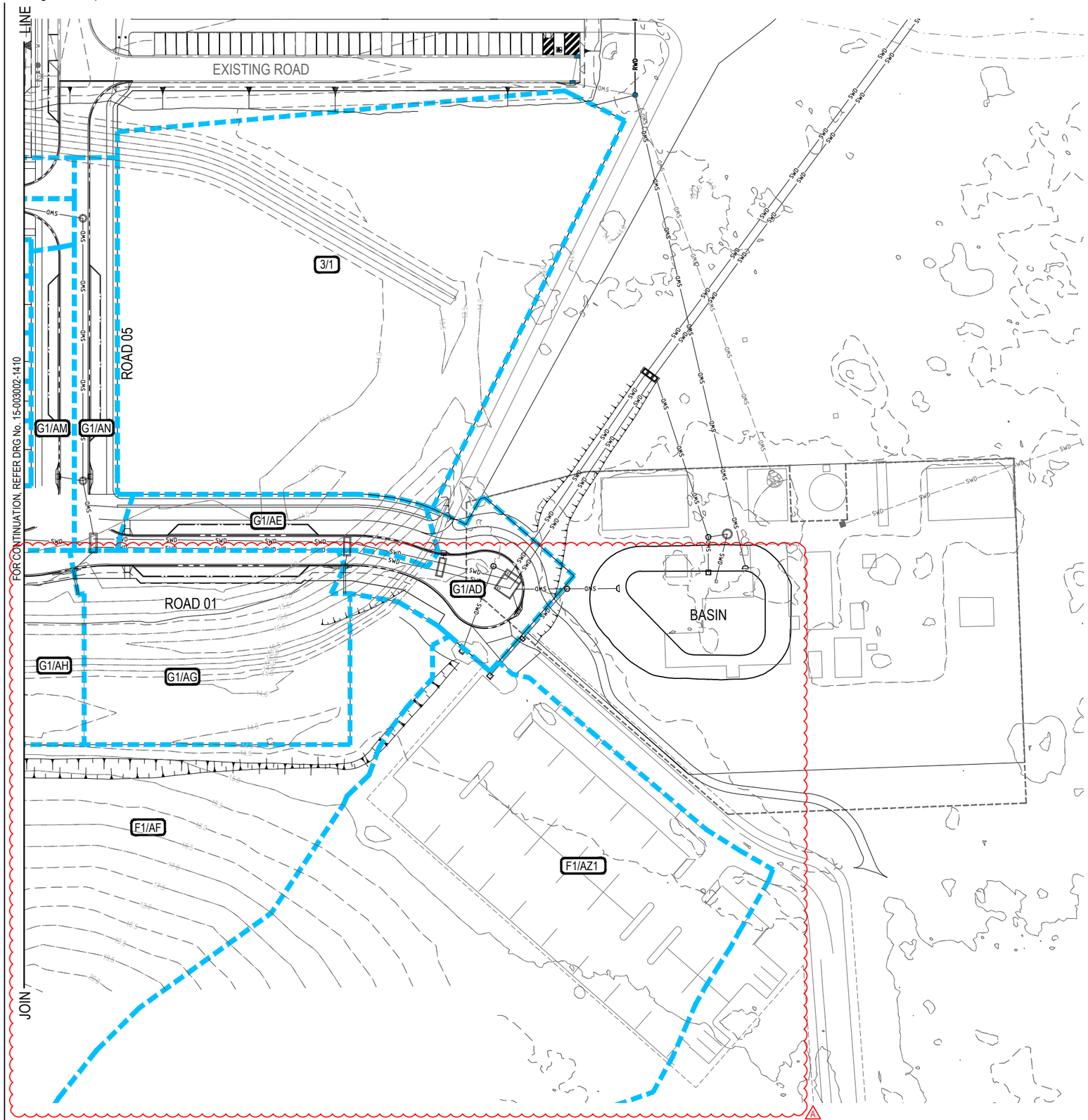
CAUTION !! OVERHEAD ELECTRICAL CABLES
OVERHEAD ELECTRICITY CABLES EXIST IN THIS VICINITY. CONTACT ENERGEX WHERE CABLE CLEARANCE IS COMPROMISED BY MACHINERY.

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	CATCHMENT AREAS AMENDED	CHC	AA
3	15.05.20	MINOR DRAINAGE AMENDMENTS	AA	AA
4	07.07.20	1/CN CATCHMENT REMOVED	CHC	AA
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA
DESIGN CHECK: AA
STATUS: FOR CONSTRUCTION
APPROVED: LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD
SCALE: 1:500 / 1:1000 — 10 5 0 10 20m — A1 / A3
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND
calibre — calibregroup.com

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1
DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.
DRAWING TITLE: STORMWATER DRAINAGE CATCHMENT PLAN SHEET 1 OF 2
PROJECT No. 15-003002.01
DRAWING No. 1410
REVISION A



NOTE:
REFER DRG.15-003002.01-1410 FOR LEGEND AND NOTES.

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	CATCHMENT AREAS AMENDED	CHC	AA
3	15.05.20	MINOR DRAINAGE AMENDMENTS	AA	AA
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA
DESIGN CHECK: AA

STATUS: FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE
1:500 10 5 0 10 20m A1
1:1000 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

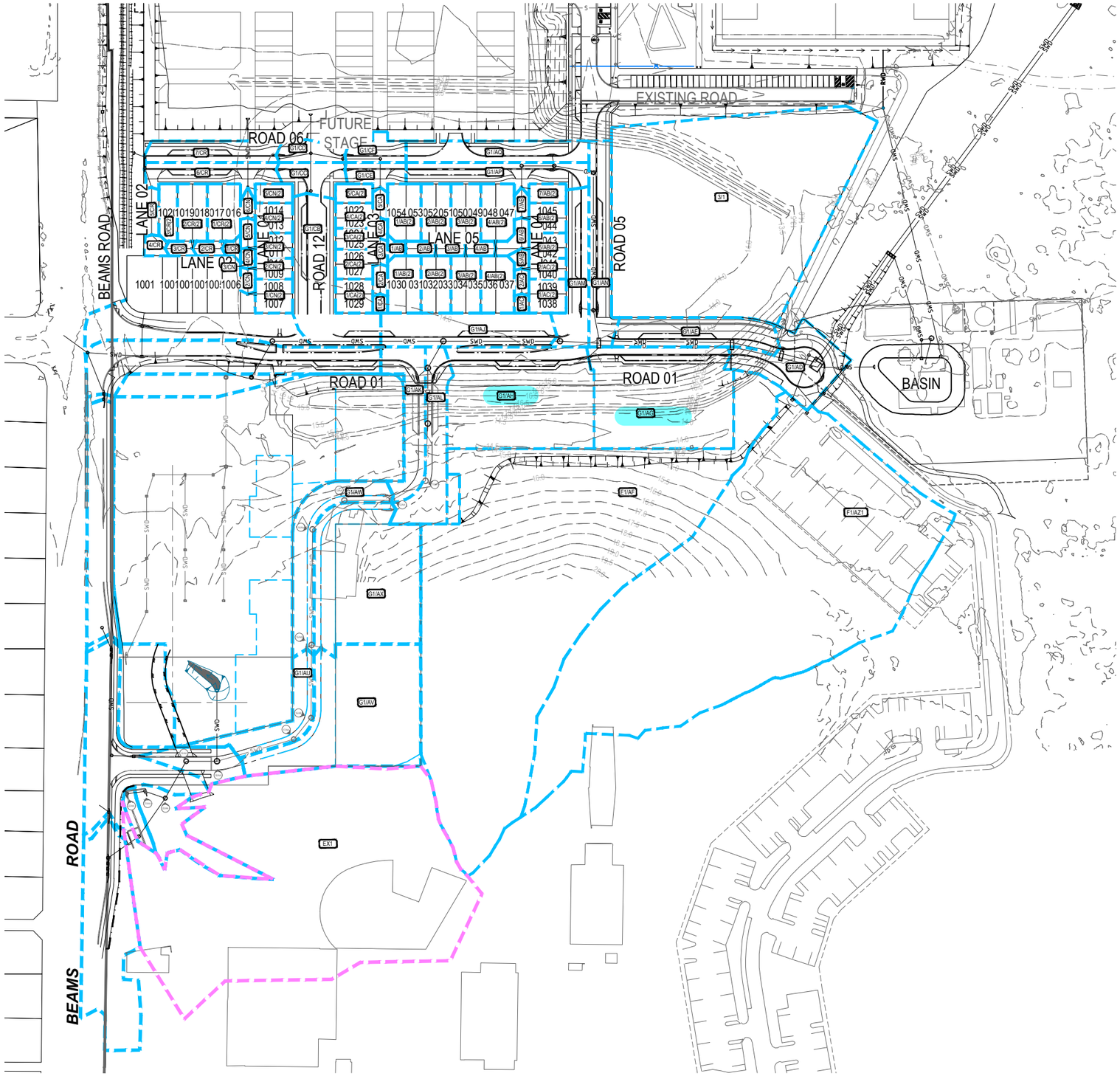
calibre
calibregroup.com

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE CATCHMENT PLAN SHEET 2 OF 2

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1411	A



NOTE:
REFER DRG.15-003002.01-1410 FOR LEGEND AND NOTES.

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA
DESIGN CHECK: AA

STATUS: FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE
1:1000 10 0 10 20 30 40 50m A1
1:2000 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

calibre

calibregroup.com

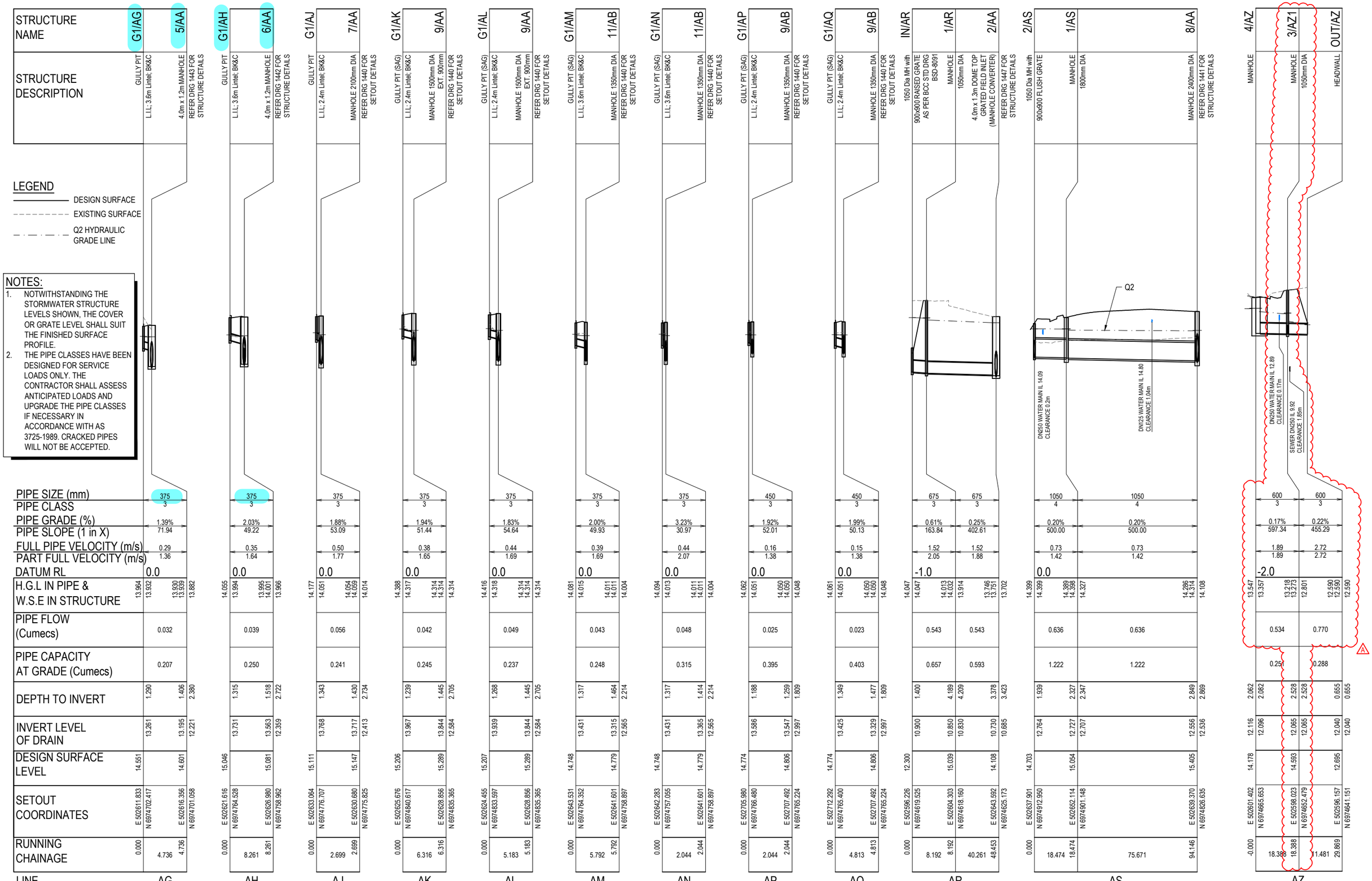
PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE EXTERNAL CATCHMENT PLAN

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1412	A

STRUCTURE NAME	G1/AG	5/AA	G1/AH	6/AA	G1/AJ	7/AA	G1/AK	9/AA	G1/AL	9/AA	G1/AM	11/AB	G1/AN	11/AB	G1/AP	9/AB	G1/AQ	9/AB	IN/AR	1/AR	2/AS	1/AS	8/AA	4/AZ	3/AZ1	OUT/AZ
STRUCTURE DESCRIPTION	GULLY PIT L.I.L: 3.6m Lintel; BK&C	4.0m x 1.2m MANHOLE REFER DRG 1443 FOR STRUCTURE DETAILS	GULLY PIT L.I.L: 3.6m Lintel; BK&C	4.0m x 1.2m MANHOLE REFER DRG 1442 FOR STRUCTURE DETAILS	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 2100mm DIA REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 2.4m Lintel; BK&C	MANHOLE 1500mm DIA EXT. 900mm REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 2.4m Lintel; BK&C	MANHOLE 1500mm DIA EXT. 900mm REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 3.6m Lintel; BK&C	MANHOLE 1350mm DIA REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 3.6m Lintel; BK&C	MANHOLE 1350mm DIA REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 2.4m Lintel; BK&C	MANHOLE 1350mm DIA REFER DRG 1440 FOR SETOUT DETAILS	GULLY PIT (SAG) L.I.L: 2.4m Lintel; BK&C	MANHOLE 1350mm DIA REFER DRG 1440 FOR SETOUT DETAILS	1050 Dia MH with 900x900 RAISED GRATE AS PER BCC STD DRG BSD-8091	MANHOLE 1050mm DIA 4.0m x 1.3m DOME TOP GRATED FIELD INLET (MANHOLE CONVERTER) REFER DRG 1447 FOR STRUCTURE DETAILS	1050 Dia MH with 900x900 FLUSH GRATE	MANHOLE 1800mm DIA	MANHOLE 2400mm DIA REFER DRG 1441 FOR STRUCTURE DETAILS	MANHOLE	MANHOLE 1050mm DIA	HEADWALL
PIPE SIZE (mm)	375		375		375		375		375		375		375		450		450		675	675	1050	1050				
PIPE CLASS	3		3		3		3		3		3		3		3		3		3	3	4	4				
PIPE GRADE (%)	1.39%		2.03%		1.88%		1.94%		1.83%		2.00%		3.23%		1.92%		1.99%		0.61%	0.25%	0.20%	0.20%			0.17%	0.22%
PIPE SLOPE (1 in X)	71.94		49.22		53.09		51.44		54.64		49.93		30.97		52.01		50.13		163.84	402.61	500.00	500.00			597.34	455.29
FULL PIPE VELOCITY (m/s)	0.29		0.35		0.50		0.38		0.44		0.39		0.44		0.16		0.15		1.52	1.52	0.73	0.73			1.89	2.72
PART FULL VELOCITY (m/s)	1.36		1.64		1.77		1.65		1.69		1.69		2.07		1.38		1.38		2.05	1.88	1.42	1.42			1.89	2.72
DATUM RL	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		-1.0		0.0				-2.0	
H.G.L IN PIPE & W.S.E IN STRUCTURE	13.964	13.932 13.930 13.939 13.882	14.055	13.994 13.995 14.001 13.966	14.177	14.051 14.054 14.059 14.014	14.388	14.317 14.314 14.314 14.314	14.416	14.318 14.314 14.314 14.314	14.081	14.015 14.011 14.011 14.004	14.094	14.013 14.011 14.011 14.004	14.062	14.051 14.050 14.050 14.048	14.061	14.051 14.050 14.050 14.048	14.047	14.047 14.013 14.032 13.914 13.746 13.751 13.702	14.399	14.399 14.388 14.380 14.327 14.286 14.314 14.108	13.547	13.357 13.218 13.273 12.801 12.590 12.590 12.590
PIPE FLOW (Cumecs)	0.032		0.039		0.056		0.042		0.049		0.043		0.048		0.025		0.023		0.543	0.543	0.636	0.636			0.534	0.770
PIPE CAPACITY AT GRADE (Cumecs)	0.207		0.250		0.241		0.245		0.237		0.248		0.315		0.395		0.403		0.657	0.593	1.222	1.222			0.251	0.288
DEPTH TO INVERT	1.290	1.406 2.380	1.315	1.518 2.722	1.343	1.430 2.734	1.239	1.445 2.705	1.268	1.445 2.705	1.317	1.464 2.214	1.317	1.414 2.214	1.188	1.259 1.809	1.349	1.477 1.809	1.400	4.189 4.209 3.378 3.423	1.939	2.327 2.347 2.849 2.869			2.062	2.082 2.528 2.528 0.655 0.655
INVERT LEVEL OF DRAIN	13.261	13.195 12.221	13.731	13.563 12.359	13.768	13.717 12.413	13.967	13.844 12.584	13.939	13.844 12.584	13.431	13.315 12.565	13.431	13.365 12.565	13.586	13.547 12.997	13.425	13.329 12.997	10.900	10.850 10.830 10.730 10.685	12.764	12.727 12.707 12.556 12.536			12.116	12.096 12.065 12.065 12.040 12.040
DESIGN SURFACE LEVEL	14.551	14.601	15.046	15.081	15.111	15.147	15.206	15.289	15.207	15.289	14.748	14.779	14.748	14.779	14.774	14.806	14.774	14.806	12.300	15.039 14.108	14.703	15.054 15.405			14.178	14.593 12.695
SETOUT COORDINATES	E 502611.833 N 6974702.417	E 502616.356 N 6974701.058	E 502621.616 N 6974764.528	E 502626.980 N 6974758.962	E 502633.064 N 6974776.707	E 502630.680 N 6974775.825	E 502625.676 N 6974840.617	E 502628.856 N 6974835.365	E 502624.455 N 6974833.597	E 502628.856 N 6974835.365	E 502643.531 N 6974764.352	E 502641.601 N 6974758.897	E 502642.283 N 6974757.055	E 502641.601 N 6974758.897	E 502705.980 N 6974766.480	E 502707.492 N 6974765.224	E 502712.292 N 6974765.400	E 502707.492 N 6974765.224	E 502596.226 N 6974619.525	E 502604.303 N 6974618.160 E 502643.592 N 6974625.173	E 502637.901 N 6974912.950	E 502652.114 N 6974901.148 E 502639.370 N 6974826.635			E 502601.402 N 6974665.653	E 502598.023 N 6974662.479 E 502596.157 N 6974641.151
RUNNING CHAINAGE	0.000	4.736 4.736	0.000	8.261 8.261	0.000	2.699 2.699	0.000	6.316 6.316	0.000	5.183 5.183	0.000	5.792 5.792	0.000	2.044 2.044	0.000	2.044 2.044	0.000	4.813 4.813	0.000	8.192 8.192 40.261 48.453	0.000	18.474 18.474 75.671 94.146			-0.000	18.388 18.388 11.481 29.869
LINE	AG		AH		AJ		AK		AL		AM		AN		AP		AQ		AR		AS				AZ	



LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- Q2 HYDRAULIC GRADE LINE

NOTES:

1. NOTWITHSTANDING THE STORMWATER STRUCTURE LEVELS SHOWN, THE COVER OR GRATE LEVEL SHALL SUIT THE FINISHED SURFACE PROFILE.
2. THE PIPE CLASSES HAVE BEEN DESIGNED FOR SERVICE LOADS ONLY. THE CONTRACTOR SHALL ASSESS ANTICIPATED LOADS AND UPGRADE THE PIPE CLASSES IF NECESSARY IN ACCORDANCE WITH AS 3725-1989. CRACKED PIPES WILL NOT BE ACCEPTED.

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER LONGITUDINAL SECTIONS AMENDED	CHC	AA
3	20.05.20	LINE AR AND MANHOLE 2/AS REVISED	CHC	AA
4	07.07.20	LINE AR AMENDED	CHC	AA
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA

DESIGN CHECK: AA

STATUS: FOR CONSTRUCTION

APPROVED: LESLIE ROCHE RPEQ 14843

FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE: 1:1000 / 1:2000 HORIZONTAL 10 0 10 20 30 40 50m A1 A3; 1:100 / 1:200 VERTICAL 2 1 0 2 4m A1 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

calibre

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

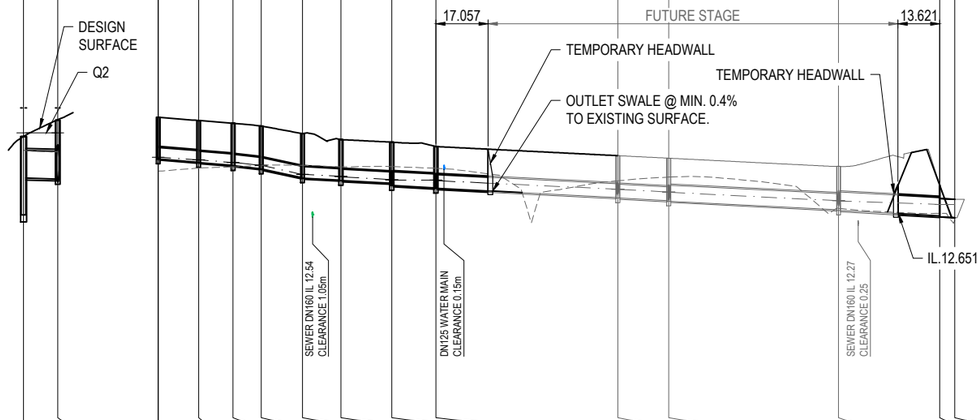
DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.

DRAWING TITLE: STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 3 OF 6

PROJECT No. 15-003002.01 | DRAWING No. 1422 | REVISION A

PDA. REF NO. DEV2019/1074

STRUCTURE NAME	F1/AZ1	2/AZ1	3/AZ1	1/AY	2/AS	1/CA	2/CA	3/CA	4/CA	5/CA	6/CA	7/CA	8/CA	9/CA	10/CA	11/CA	OUT/CA	CH8/DA	G1/CB	2/CB	8/CA	G1/CC	2/CC	8/CA	G1/CD	2/CC	G1/CE	7/CA	G1/CF	7/CA
STRUCTURE DESCRIPTION	FIELD INLET 900x900 RAISED GRATE	FIELD INLET 600x900 FLUSH GRATE	MANHOLE 1050mm DIA	MANHOLE 1500mm DIA	1050 Dia MH with 900x900 FLUSH GRATE	900x600 BCC FIELD INLET 'V' GRATE TO MATCH ROAD CROSS FALL (TRAFFICABLE)	900x600 BCC FIELD INLET 'V' GRATE TO MATCH ROAD CROSS FALL (TRAFFICABLE)	900x600 BCC FIELD INLET 'V' GRATE TO MATCH ROAD CROSS FALL (TRAFFICABLE)	900x600 BCC FIELD INLET 'V' GRATE TO MATCH ROAD CROSS FALL (TRAFFICABLE)	900x600 BCC FIELD INLET 'V' GRATE TO MATCH ROAD CROSS FALL (TRAFFICABLE)	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	HEADWALL	OPEN CHANNEL	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 1050mm DIA	MANHOLE 1050mm DIA	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 1050mm DIA	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 1050mm DIA	GULLY PIT L.I.L: 2.4m Lintel; BK&C	MANHOLE 1050mm DIA
PIPE SIZE (mm)		450	450		900		375	375	375	375	375	375	450	450	450	525	600	T5800B1000x600 CHNL		375	375		375	375		375		375		375
PIPE CLASS		3	3		3		3	3	3	3	3	3	3	3	3	3	3			3	3		3	3		3		3		3
PIPE GRADE (%)		0.54%	0.55%		0.25%		0.75%	0.75%	1.00%	2.00%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.56%	0.54%		0.50%	0.50%		0.50%	0.50%		0.61%		0.50%		0.50%
PIPE SLOPE (1 in X)		184.61	182.33		400.00		133.33	133.33	100.00	50.00	200.00	200.00	200.00	200.00	200.00	200.00	180.00	184.59		200.00	200.00		200.00	200.00		165.21		200.00		200.00
FULL PIPE VELOCITY (m/s)		1.49	1.49		0.00		0.06	0.14	0.21	0.28	0.28	0.27	0.35	0.75	0.91	0.85	0.78	0.11		0.42	0.42		0.11	0.18		0.08		0.16		0.08
PART FULL VELOCITY (m/s)		1.49	1.49		0.00		0.70	0.89	1.10	1.53	0.93	0.93	1.08	1.32	1.38	1.47	1.60	1.15		1.04	1.04		0.70	0.83		0.69		0.80		0.64
DATUM RL	-1.0			-1.0		0.0													0.0			0.0			0.0		0.0		0.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	13.757 13.428	13.349 13.349	13.324	14.286 14.286	14.286 14.286	12.982 14.493	14.492 14.406	14.406 14.403	14.322 14.322	14.318 14.229	14.229 14.224	14.224 13.935	13.935 13.934	13.934 13.870	13.870 13.851	13.851 13.767	13.767 13.753	13.750 13.748	13.748 13.725	13.450 13.450	13.440	13.359 13.359	13.349	13.075 13.075	13.061	12.954 12.954	12.954 12.954	12.954 12.954	12.954 12.954	12.954 12.954
PIPE FLOW (Cumecs)		0.237	0.236		0.000		0.007	0.016	0.023	0.031	0.031	0.030	0.056	0.120	0.145	0.183	0.219	0.216		0.046	0.046		0.012	0.020		0.009		0.018		0.008
PIPE CAPACITY AT GRADE (Cumecs)		0.210	0.211		0.906		0.152	0.152	0.175	0.248	0.124	0.124	0.202	0.202	0.202	0.304	0.458	5.658		0.124	0.124		0.124	0.124		0.136		0.124		0.124
DEPTH TO INVERT	1.792	1.977	1.997 2.508	1.358	1.919	1.361	1.355	1.375	1.370	1.390	1.387	1.407	1.431	1.451	1.321	1.341	1.341	1.416	1.344	1.364	1.364	1.384	1.384	1.404	1.415	1.435	1.007	1.036	0.600	0.602
INVERT LEVEL OF DRAIN	12.252	12.190	12.170 12.085	12.812	12.784	14.432	14.333	14.313	14.229	14.209	14.118	14.098	13.828	13.808	13.745	13.725	13.642	13.567	13.495	13.475	13.178	13.158	13.075	13.055	12.778	12.758	12.575	12.546	12.520	12.518
DESIGN SURFACE LEVEL	14.044	14.167	14.593	14.170	14.703	15.793	15.688	15.599	15.505	15.259	15.066	14.983	14.839	14.542	14.459	14.193	13.582	13.120	14.897	14.922	14.839	14.633	14.668	14.839	14.633	14.668	14.957	14.983	14.957	14.983
SETOUT COORDINATES	E 502581.142 N 6974673.479	E 502588.348 N 6974664.587	E 502598.023 N 6974652.479	E 502638.414 N 6974924.097	E 502637.901 N 6974912.950	E 502664.667 N 6974850.571	E 502677.678 N 6974848.346	E 502688.747 N 6974846.453	E 502697.786 N 6974844.907	E 502711.093 N 6974842.631	E 502723.414 N 6974840.523	E 502726.215 N 6974856.903	E 502731.078 N 6974870.409	E 502789.580 N 6974860.404	E 502805.991 N 6974857.597	E 502860.573 N 6974848.262	E 502892.542 N 6974856.465	E 502897.273 N 6974857.689	E 502713.986 N 6974875.059	E 502714.667 N 6974873.216	E 502731.078 N 6974870.409	E 502726.535 N 6974886.663	E 502731.004 N 6974884.902	E 502731.078 N 6974870.409	E 502732.847 N 6974885.583	E 502731.004 N 6974884.902	E 502721.415 N 6974856.727	E 502726.215 N 6974856.903	E 502727.727 N 6974855.648	E 502726.215 N 6974856.903
RUNNING CHAINAGE	0.000 11.446	11.446 15.498	15.498 26.944	0.000 11.159	11.159 11.159	0.000 13.200	13.200 11.230	24.430 9.170	33.600 13.500	47.100 12.500	59.600 16.617	76.217 14.355	90.572 59.351	149.923 16.649	166.572 55.375	221.947 33.005	254.952 4.887	259.839	0.000 2.034	2.034 16.649	18.683	0.000 4.813	4.813 14.493	19.306	0.000 2.041	2.041	0.000 4.813	4.813	0.000 2.041	2.041
LINE	AZ1			AY		CA													CB			CC			CD		CE		CF	



LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- Q2 HYDRAULIC GRADE LINE

NOTES:

1. NOTWITHSTANDING THE STORMWATER STRUCTURE LEVELS SHOWN, THE COVER OR GRATE LEVEL SHALL SUIT THE FINISHED SURFACE PROFILE.
2. THE PIPE CLASSES HAVE BEEN DESIGNED FOR SERVICE LOADS ONLY. THE CONTRACTOR SHALL ASSESS ANTICIPATED LOADS AND UPGRADE THE PIPE CLASSES IF NECESSARY IN ACCORDANCE WITH AS 3725-1989. CRACKED PIPES WILL NOT BE ACCEPTED.

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER LONGITUDINAL SECTIONS AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
4	20.05.20	LINE CA AND AY REVISED	CHC	AA
A	23.03.21	LINE AZ1 ADDED	AR	AA

DRAWN CHECK: AA

DESIGN CHECK: AA

STATUS: FOR CONSTRUCTION

APPROVED: LESLIE ROCHE RPEQ 14843

FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE

1:1000 1:2000 10 0 10 20 30 40 50m HORIZONTAL A1 A3

1:100 1:200 2 1 0 2 4m VERTICAL A1 A3

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 4 OF 6

PDA. REF NO. DEV2019/1074

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1423	A

LOCATION		CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES											PART FULL		DESIGN LEVELS							
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		Vf2/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m		%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m			m	%	m	m	m/s	m	m	m	m	m	m	m	
2	F1/1	90	0.77	0.6	10	116	0.134	0.101	33	5	151	0.127	0.097	41	41		0.064				FSIP-6x9	41	0		5	151	0.097	41	6.288	0.41	375	0.37	1.51	1		G1	0.007	6.96	0.048		0.048	0.05	0.003	0.156	0.94	13.156	13.13	13.673	13.67	13.72	14.212	0.49	F1/1
2	G2/1	90	0.77	0.6	10	116	0.117	0.088	28	5	151	0.111	0.085	36	36	2.443	0.078	0.04	0.5	2.5	GULLY BK-S	36	0		5.05	150	0.182	76	14.765	0.4	375	0.69	1.52	0.47	1	T9/T10	0.024	2.29	0.055	2.66	0.064	0.19	0.028	0.228	1.08	13.11	13.051	13.615	13.587	13.68	14.424	0.745	G2/1
2	3/1	0																			MH1050				5.18	149	0.182	437	112.797	0.83	600	1.55					0.122	1	0.122		0.122	0.86	0.925	0.4	2.18	13.031	12.1	13.465	12.5	13.59	13.95	0.363	3/1
2	OUT/1																				HW outlet																													12.5	12.757		OUT/1
2	1/2	0																			MH1050				5.43	147	0.295	120	13	0.4	525	0.56	1.07	0	1	T3/T6	0.016	1.84	0.029	2.19	0.035	0.05	0.009	0.244	1.22	13.033	12.981	13.492	13.485	13.53	14.527	1	1/2
2	2/2	0																			MH1050				5.54	146	0.295	119	79.943	0.4	600	0.42	1.04	0	0.88	T10	0.009	2.09	0.019	2.68	0.024	0.03	0.029	0.228	1.21	12.961	12.642	13.466	13.44	13.49	14.817	1.326	2/2
2	3/2	0																			MH1200				6.23	139	0.342	132	29.037	0.4	600	0.47	1.37	0	1	T1/T3	0.011	0.86	0.01	1.02	0.011	0.05	0.013	0.242	1.24	12.622	12.506	13.43	13.417	13.44	14.451	1.009	3/2
2	4/2	0																			MH1050				6.36	138	0.467	178	22.526	0.4	600	0.63	1.56	0	1	T1/T3	0.02	1.59	0.032	1.91	0.039	0.08	0.019	0.285	1.34	12.486	12.396	13.385	13.366	13.42	14.305	0.882	4/2
2	5/2	0																			MH1350				6.55	137	1.548	563	73.216	0.4	675	1.57	1.53	0	1	T3/T6	0.126	1.79	0.226	2.14	0.27	0.45	0.328	0.599	1.68	12.376	12.083	13.14	12.811	13.41	13.994	0.584	5/2
2	6/2	0																			MH1350				7.04	134	1.674	598	15.685	0.4	675	1.67	1.32	0	1	T1/T3	0.142	1.27	0.18	1.52	0.217	0.88	0.082	0.675	1.67	12.063	12	12.631	12.492	12.85	13.577	0.729	6/2
2	OUT/2																				HW outlet																													12.49	12.995		OUT/2
2	1/3	0																			MH1050				6.29	139	0.945	338	11.233	0.4	600	1.2	1.93	0	1	T1/T3	0.073	1.53	0.112	1.76	0.129	0.3	0.034	0.433	1.55	12.54	12.495	13.57	13.536	13.7	14.187	0.488	1/3
2	2/3	0																			MH1200				6.39	138	1.081	390	19.914	0.4	600	1.38	1.79	0	1	T1/T3	0.097	0.93	0.09	1.07	0.104	0.4	0.08	0.497	1.56	12.475	12.396	13.446	13.366	13.55	14.124	0.574	2/3
2	G1/4	90	0.77	0.6	10	116	0.064	0.049	16	5	151	0.061	0.047	20	20	1.908	0.066	0.03	0.5	2.5	GULLY BK-S	20	0	G1/6	5	151	0.047	20	2.369	9.03	375	0.18	1.04	1		G1	0.002	7	0.011		0.011	0.01	0	0.049	2.28	13.061	12.847	13.44	13.44	13.45	14.551	1.1	G1/4
2	G1/5	90	0.77	0.6	10	116	0.173	0.131	42	5	151	0.164	0.126	53	53	2.856	0.088	0.04	0.5	2.5	GULLY BK-S	52	1	G1/8	5	151	0.126	52	5.465	0.71	375	0.47	1.59	1		G1	0.011	6.62	0.074		0.074	0.09	0.005	0.153	1.22	12.9	12.861	13.421	13.417	13.5	14.41	0.915	G1/5
2	G1/6	90	0.77	0.6	10	116	0.112	0.085	27	5	151	0.106	0.081	34	36		0			3	SAG BK-S	36	0	G1/7	5	151	0.081	36	2.663	0.41	375	0.33	2.19	1		G1	0.005	4.39	0.024		0.024	0.04	0.001	0.146	0.91	12.739	12.728	13.537	13.536	13.56	14.248	0.687	G1/6
2	G1/7	90	0.77	0.6	10	116	0.072	0.055	18	5	151	0.069	0.053	22	22		0			2.5	SAG BK-S	22	0		5	151	0.053	22	5.414	0.41	375	0.2	2.11	1		G1	0.002	4.57	0.009		0.009	0.02	0.001	0.113	0.79	12.755	12.733	13.537	13.536	13.55	14.264	0.718	G1/7
2	G1/8	90	0.77	0.6	10	116	0.108	0.081	26	5	151	0.102	0.078	33	34	2.398	0.077	0.04	0.5	2.5	GULLY BK-S	34	0		5	151	0.078	34	10.493	0.4	375	0.31	1.91	1		G1	0.005	5.21	0.025		0.025	0.04	0.004	0.142	0.88	12.125	12.083	12.815	12.811	12.84	13.599	0.759	G1/8
2	G1/9	90	0.77	0.6	10	116	0.078	0.059	19	5	151	0.074	0.057	24	24	2.08	0.069	0.03	0.5	2.5	GULLY BK-S	24	0		5	151	0.057	24	7.578	0.4	375	0.22	1.9	1		G1	0.002	5.24	0.012		0.012	0.02	0.001	0.118	0.8	12.113	12.083	12.813	12.811	12.83	13.586	0.761	G1/9
2	22/AA	90	0.77	0.6	10	116	0.016	0.012	4	5	151	0.015	0.012	5	20		0				SAG BK-S	20	0	LOST	5	151	0.012	20	8.131	0.52	375	0.18	1.03	1		G1	0.002	7	0.012		0.012	0.01	0.003	0.101	0.83	15.543	15.501	15.724	15.723	15.74	16.91	1.175	22/AA
2	21/AA	90	0.77	0.6	10	116	0.081	0.061	20	5	151	0.077	0.059	25	43		0				SAG BK-S	43	0	22/AA	5	151	0.071	63	9.343	0.6	375	0.57	1.18	0.68	1	G1/T3/T6	0.016	3.69	0.061	4.07	0.067	0.63	0.056	0.179	1.2	15.481	15.425	15.663	15.604	15.73	16.914	1.184	21/AA
2	20/AA	0																			MH1800				5.37	147	0.186	969	18.748	0.53	1200	0.86	1.08	0	0.76	T6/T9	0.037	2.57	0.096	2.71	0.101	0.39	0.097	0.483	2.28	14.6	14.5	15.133	15.061	15.23	17.653	2.419	20/AA
2	19/AA	0																			MH2100				5.53	146	0.186	968	13.636	0.59	1200	0.86	1.04	0	1	T5/T8	0.037	1.28	0.048	1.34	0.05	0.67	0.08	0.47	2.36	14.48	14.4	15.013	14.922	15.06	17.673	2.61	19/AA
2	18/AA	0																			MH2100				5.64	145	0.186	968	35.368	0.59	1200	0.86	1.01	0	1	T1/T2	0.037	0.25	0.009		0.009	-0.13	0.081	0.468	2.37	14.38	14.17	14.913	14.958	14.92	18.533	3.611	18/AA
2	17/AA	0																			MH1800				5.93	142	0.186	966	12.161	0.66	1200	0.85	1.02	0	1	T2/T5	0.037	0.54	0.02		0.02	-0.04	0.011	0.455	2.46	14.15	14.07	14.938	14.942	14.96	18.503	3.545	17/AA
2	16/AA	0																			MH1800				6.04	141	0.186	966	32.182	1.15	1200	0.85	1.02	0	1	T2/T5	0.037	0.61	0.023		0.023	-0.02	0.018	0.392	3.01	14.05	13.68	14.919	14.926	14.94	17.974	3.032	16/AA
2	15/AA	0																			MH1800				6.3	139	0.276	1244	51	0.86	1200	1.1	1.1	0	1	T1/T3	0.062	1.6	0.099	1.94	0.12	0.1	0.05	0.485	2.9	13.66	13.22	14.827	14.777	14.95	16.702	1.756	15/AA
2	14/AA	0																			MH1800				6.73	136	0.276	1242	19.016	0.68	1350	0.87	1.17	0	0.89	T5/T8	0.038	0.53	0.021	0.57	0.022	0.05	0.01	0.49	2.65	13.2	13.07	14.757	14.746	14.78	15.798	1.019	14/AA
2	13/AA	0																			MH1800				6.89	135	0.276	1241	20.943	0.57	1350	0.87	1.26	0	1	T2/T5	0.038	0.69	0.026		0.026	0.05	0.011	0.514	2.48	13.05	12.93	14.72	14.709	14.75	15.701	0.955	13/AA
2	12/AA	0																			MH2100				7.02	134	0.41	1591	17.172	0.52	1350	1.11	1.35	0	1	T3/T6	0.063	1.93	0.122	2.28	0.143	0.09	0.015	0.604	2.57	12.91	12.82	14.587	14.572	14.73	15.595	0.865	12/AA
2	11/AA	0																			MH2100				7.16	133	0.41	1590	25.371	0.45	1350	1.11	1.31	0	1	T5/T8	0.063	1.19	0.075	1.24	0.078	0.09	0.022	0.629	2.43	12.8	12.685	14.497	14.474	14.58	15.503	0.928	11/AA
2	10/AA	0																			MH2100				7.36	131	0.409	1588	24.539	0.25	1350	1.11	1.34	0	1	T1/T2	0.063	0.21	0.013		0.013	0.09	0.022	0.75	1.94	12.665	12.604	14.461	14.44	14.47	15.351	0.877	10/AA
2	9/AA	0																			MH2100				7.33	131	0.535	1671	13.666	0.2	1350	1.17	1.39	0	1	T3/T6	0.07	1.86	0.13	2.22	0.154	0.1	0.013	0.832	1.8	12.584	12.556	14.31	14.297	14.46	15.289	0.825	9/AA
2	8/AA	0																			MH				7.71	129	0.542	2306	51.548	0.2	1500	1.3	1.17	0	1	T2/T5	0.087	0.72	0.062		0.062	0.11	0.055	0.951	1.95	12.536	12.433	14.234	14.179	14.3	15.405	1.108	8/AA
2	7/AA	0																			MH2100				7.94	127	0.622	2353	17.264	0.2	1500	1.33	1.18	0	1	T1/T3	0.09	0.44	0.04	0.5	0.045	0.11	0.019	0.964	1.96	12.413	12.379	14.14	14.121	14.19	15.147	0.962	7/AA
2	6/AA	0																			MH				7.03	134	1.22	2782	58.87	0.2	(2x)1350	0.97	1.31	0	0.9	T1/T3	0.048	0.83	0.04	0.97	0.047	0.07	0.04	0.74	1.73	12.359	12.241	14.081	14.041	14.13	15.081	0.954	6/AA
2	5/AA	0																			MH				7.01	134	1.234	2940	22.305	0.2	(2x)1350	1.03	1.36	0	1	T1/T3	0.054	1.33	0.072	1.61	0.086	0.08	0.017	0.766	1.75	12.221	12.176	13.969	13.952	14.06	14.601	0.546	5/AA
2	4/AA	0																			MH				7.19	132	1.303	2980	16.122	0.25	(2x)1350	1.04	1.33	0	1	T1/T3	0.055	0.39	0.021	0.43	0.024	0.08	0.013	0.721	1.92	12.156	12.116	13.93	13.918	13.95	14.382	0.428	4/AA
2	3/AA	0																			MH				9.12	121	1.939	2629	58.472	0.2	(2x)1350	0.92	2.3	0	1	T9/T10	0.043	1.94	0.083	2.22	0.095	0.06	0.035	0.715	1.71	10.822	10.705	13.834	13.799	13.93	14.328	0.398	3/AA
2	2/AA	0					0	0	0			0	0	0	0				0.5	1	MH	0	0	1/AA	9.55	119	1.934	3161	137.788	0.2	(2x)1350	1.1	2.31	0	1	T1/T3	0.062	0.81	0.051	0.91	0.057	0.09	0.121	0.802	1.78	10.685	10.409	13.748	13.628	13.81	14.108	0.303	2/AA
2	1/AA	0					0	0	0			0	0	0	0				0.5	1	MH	0	0	LOST	10.53	113	1.92	3128	57.645	0.24	(2x)1350	1.09	2.41	0	1	T1/T3	0.061	1.29	0.078	1.46	0.089	0.09	0.049	0.751	1.91	10.389	10.25	13.549	13.5	13.64	14.339	0.701	1/AA
2	OUT/AA																				HW outlet																													13.5	13.814		OUT/AA
2	1/AB	99	0.77	0.6	10	116	0.08	0.062	20	5	151	0.08	0.062	26	26	3.38	0.042	0.02	0.5	2.5	F1-6x9 on-grade	20	6	2/AB	5	151	0.062	20	13.2	0.5	375	0.18	1.03	1		G1	0.002	7	0.011		0.011	0.01	0.002	0.101	0.82	14.145	14.079	14.435	14.434	14.45	15.652	1.206	1/AB
2	2/AB	99	0.77	0.6	10	116	0.075	0.058	19	5	151	0.075	0.058	24	30	3.596	0.045	0.02	0.5	2.5	F1-6x9 on-grade	23	7	3/AB	5.11	150	0.119	42	13.2	0.5	375	0.38	1.05	0.54	1	G1/T1	0.008	2.45	0.018		0.018	0.05	0.007	0.151	1.02	14.059	13.993	14.416	14.409	14.43	15.586	1.152	2/AB
2	3/AB	99	0.77	0.6	10	116	0.075	0.058	19	5	151	0.075	0.058	24	32	3.645	0.046	0.02	0.5	2.5	F1-6x9 on-grade	24	8	4/AB	5.22	149	0.177	66	13.2	0.5	450	0.41	1.09	0.36	0.83	T1	0.009	1.33	0.012		0.012	0.05	0.007	0.177	1.13	13.918	13.852	14.397	14.39	14.41	15.519	1.11	3/AB
2	4/AB	99	0.77	0.6	10	116	0.082	0.064	21	5	151	0.082	0.063	27	34	3.754	0.047	0.02	0.5	2.5	F1-6x9 on-grade	26	8	5/AB	5.22	149	0.239	91	11.45	0.5	450	0.57	1.24	0.28	1	T1	0.017	1.39	0.023		0.023	0.1	0.012	0.212	1.23	13.832	13.775	14.367	14.356	14.39	15.452	1.062	4/AB
2	5/AB	97	0.77	0.6	10	116	0.025	0.019	6	5	151	0.024	0.019	8	18	2.881	0.036	0.01	2.5	2.5	F1-6x9 on-grade	14	5	6/AB	5.32	148	0.298	118	13.5	0.5	450	0.74	1.36	0.11	1	T9/T10	0.028	2.37	0.066	2.73	0.076	0.17	0.023	0.247	1.32	13.755	13.687	14.289	14.266	14.37	15.344	0.978	5/AB
2	6/AB	96	0.77	0.6	10	116	0.036	0.028	9	5	151	0.036	0.028	12	16	2.755	0.034	0.01	0.6	2.5	F1-6x9 on-grade	12	4	7/AB	5.43	147	0.326	129	13.5	0.75	450	0.81	1.33	0.1	1	T1	0.033	0.65	0.022		0.022	0.2	0.028	0.231	1.57	13.667	13.566	14.245	14.217	14.27	15.263	0.997	6/AB
2	7/AB	96	0.77	0.6	10	116	0.022	0.017	5	5	151	0.021	0.016	7	11		0.026		2.67	2.5	FSIP-6x9	11	0	G1/AP	5.54	146	0.342	138	9.5	1	525	0.64	1.38	0.08	0.86	T1	0.021	-0.01	0		0	0.1	0.01	0.205	1.77	13.491	13.396	14.218	14.208	14.22	15.059	0.842	7/AB
2	8/AB	0																			MH1200				5.62	145	0.342	138	14.405	1.21	600	0.49	1.49	0	0.88	T10	0.012	2.09	0.025	2.68	0.032	0.05	0.007	0.184	1.87	13.321	13.147	14.182	14.175	14.22	14.867	0.652	8/AB
2	9/AB	0																			MH1350				5.63	145	0.455	183	17.612	0.5	750	0.41	1.57	0	1	T2	0.009	0.28	0.002		0.002	0.03	0.005	0.246	1.45	12.997	12.909	14.173	14.168	14.18	14.806	0.631	9/AB
2	10/AB	0																			MH1350				5.78	143	0.455	181	60.823	0.5	750	0.41	1.71	0	1	T8/T10	0.009	1.79	0.015	2.11	0.018	0.03	0.016	0.245	1.45	12.889	12.585	14.153	14.137	14.17	15.079	0.908	10/AB
2	11/AB	0																			MH1350				6.28	139	0.581	263	14.648	0.44	750	0.6	2.1	0	1	T2/T4	0.018	0.44	0.008		0.008	0.06	0.008	0.309	1.54	12.565	12.5	14.129	14.121	14.14	14.779	0.642	11/AB
2	1/AC	98	0.77	0.6	10	116	0.03	0.023	7	5	151	0.03	0.023	10	10	2.175	0.027	0.01	0.74	2.5	F1-6x9 on-grade	7	2	2/AC	5	151	0.023	7	11.2	0.55	375	0.07	1	1		G1	0	7	0.002		0.002	0	0	0.06	0.64	14.152	14.09	14.357	14.357	14.36	15.481	1.122	1/AC
2	2/AC	97	0.77	0.6	10	116	0.022	0.017	6	5	151	0.022	0.017	7	9	2.161	0.027	0.01	0.74	2.5	F1-6x9 on-grade	7	2	5/AB	5.09	150	0.04	14	8.9	2.7	375	0.13	1	0.5	1	T1	0.001	2.03	0.002		0.002	0	0	0.057	1.36	14.07	13.83	14.355	14.356	14.36	15.399	1.042	2/AC
2	G1/AD	90	0.77	0.6	10	116	0.103	0.078	25	5	151	0.098	0.075	31	53		0.005		0.8	2.62	SAG BK-S	53	0	2/AA	5	151	0.075	53	6.668	4.17	525	0.25	2.17	1		G2	0.003	6.29	0.02		0.02	0.02	0.001	0.088	2.24	12.8	12.522	13.919	13.918	13.94	14.187	0.249	G1/AD
2	G1/AE	90	0.77	0.6	10	116	0.093	0.071	23	5	151	0.089	0.068	28	48	2.991	0.072	0.04	1.02	2.5	GULLY BK-M	48	0	4/AZ	5	151	0.068	48	3.325	0.92	375	0.44	2.62	1		G2	0.01	4.63	0.045		0.045	0.08	0.003	0.138	1.32	13.016	12.985	13.954	13.952	14	14.328	0.328	G1/AE
2	F1/AF	5	0.77	0.6	16	94	1.392	0.85	222	16	94	1.392	0.85	222	222		0.177				1050 MH with 9x9 Grate	222	0	G1/AD	16	94	0.85	222	20.91	1.85	450	1.4	6.68	1		G1	0.099	1.83	0.182		0.182	0.61	0.127	0.244	2.52	11.41	11.024	14.232	14.105	14.41	14.437	0.023	F1/AF
2	2/AF	0																			MH1050				16.17	94	0.85	221	6.177	2.63	450	1.39	6.98	0	1	T10	0.099	1.52	0.15	1.92	0.19	0.6	0.037	0.219	2.87	11.004	10.842	13.955	13.918	14.15	14.232	0.087	2/AF
2	G1/AG	90	0.77	0.6	10	116	0.062	0.047	15	5	151	0.058	0.045	19	32	2.04	0.068	0.04	1	2.5	GULLY BK-M	32	0	G1/AD	5	151	0.045	172	4.736	1.39	375	1.56	3.33	1		G2	0.123	3.44	0.425		0.425	0.96	0.045	0.261	2.09	13.261	13.195	14.086	14.041	14.51	14.551	0.04	G1/AG
2	G1/AH	90	0.77	0.6	10	116	0.074	0.056	18	5	151	0.07	0.054	23	39				0.02	2.48	GULLY BK-M	39	0	G1/AG	5	151	0.054	179	8.261	2.03	375	1.62	2.79	1		G2	0.133	4.27	0.569		0.569	1.04	0.086	0.234	2.46	13.731	13.563	14.206	14.121	14.78	15.046	0.27	G1/AH
2	G1/AJ	90	0.77	0.6	10	116	0.115	0.087	28	5	151	0.109	0.083	35	59	2.977	0.091	0.05	0.5	2.5	GULLY BK-S	56	3	G1/AM	5	151	0.083	56	2.699	1.88	375	0.5	1.44	1		G2	0.013	9.7	0.125		0.125	0.1	0.003	0.123	1.77	13.768	13.717	14.182	14.179	14.31	15.111	0.804	G1/AJ
2	G1/AK	90	0.77	0.6	10	116	0.082	0.062	20	5	151	0.078	0.059	25	42		0		12.98	-24.89	SAG BK-S	42	0	G1/AL	5	151	0.059	42	6.316	1.94	375	0.38	1.46	1		G2	0.007	9.7	0.071		0.071	0.06	0.004	0.105	1.65	13.967	13.844	14.443	14.44	14.51	15.206	0.692	G1/AK
2	G1/AL	90	0.77	0.6	10	116	0.096	0.072	23	5	151	0.091	0.069	29	49		0.002		15.54	2.5	SAG BK-S	49	0	G1/AH	5	151	0.069	49	5.183	1.83	375	0.44	1.59	1		G2	0.01	9.2	0.093		0.093	0.08	0.004	0.116	1.69	13.939	13.844	14.444	14.44	14.54	15.207	0.67	G1/AL
2	G1/AM	90	0.77	0.6	10	116	0.079	0.06	19	5	151	0.075	0.057	24	43		0		0.45	2.5	SAG BK-M	43	0	G1/AN	5	151	0.057	43	5.792	2	375	0.39	2.04	1		G2	0.008	6.85	0.054		0.054	0.06	0.004	0.106	1.69	13.431	13.315	14.14	14.137	14.19	14.748	0.554	G1/AM
2	G1/AN	90	0.77	0.6	10	116	0.093	0.071	23	5	151	0.089	0.068	28	48		0		0.45	2.5	SAG BK-M	48	0		5	151	0.068	48	2.044	3.23	375	0.44	2.06	1		G2	0.01	6.74	0.066		0.066	0.08	0.002	0.099	2.07	13.431	13.365	14.138	14.137	14.2	14.748	0.544	G1/AN
2	G1/AP	90	0.77	0.6	10	116	0.081	0.061	20	5	151	0.077	0.059	25	25		0		0.45	2.5	SAG BK-S	25	0	G1/AQ	5	151	0.059	25	2.044	1.92	450	0.16	1.34	1		G2	0.001	9.7	0.012		0.012	0.01	0	0.076	1.38	13.586	13.547	14.175	14.175	14.19	14.774	0.587	G1/AP
2	G1/AQ	90	0.77	0.6	10	116	0.077	0.058	19	5	151	0.073	0.056	23	23		0		0.45	2.5	SAG BK-S	23	0		5	151	0.056	23	4.813	1.99	450	0.15	1.69	1		G2	0.001	8.68	0.01		0.01	0.01	0	0.074	1.38	13.425	13.329	14.176	14.175	14.19	14.774	0.589	G1/AQ
2	IN/AR	0					0	0	0			0	0	0	0		0				1050 MH with 9x9 Grate	0	0		5	151	0	543	8.192	0.61	675	1.52					0.117	0	0		0	0.42	0.034	0.468	2.05	11	10.95	14.1	14.066	14.1	14.5	0.4	IN/AR
2	1/AR	0																			MH1050				5.07	150	0	543	40.261	0.5	675	1.52	4.67	0	1	T1/T3	0.117	0.84	0.099	1.01	0.119	0.42	0.168	0.508	1.88	10.93	10.73	13.967	13.799	14.09	15.039	0.953	1/AR
2	2/AS	0					0	0	0			0	0	0	0		0				1050 MH with 9x9 Grate	0	0		5.09	150	0	636	18.474	0.2	1050	0.73					0.028	0	0		0	0.05	0.01	0.538	1.42	12.764	12.727	14.41	14.4	14.41	15.1	0.69	2/AS
2	1/AS	0																			MH1800				5.25	149	0	636	75.675	0.2	1050	0.73	1.62	0	1	T6/T9	0.028	2.26	0.062	2.57	0.071	0.05	0.041	0.538	1.42	12.707	12.556	14.338	14.297	14.41	15.054	0.646	1/AS
2	G1/AU	90	0.77	0.6	10	116	0.051	0.038	12	5	151	0.048	0.037	15	26	1.43	0.053	0.05	3.92	2.5	GULLY BK-S	26	0	G1/AW	5	151	0.037	115	2.589	5.14	450	0.73	1.56	1		G2	0.027	9.38	0.252		0.252	9.32	0	0.129	3.07	15.354	15.22	15.59	15.349	15.84	16.681	0.839	G1/AU
2	G1/AV	90	0.77	0.6	10	116	0.073	0.055	18	5	151	0.069	0.053	22	37	1.65	0.058	0.06	3.92	2.5	GULLY BK-S	37	0	G1/AX	5	151	0.053	167	4.482	2.97	450	1.05	1.93	1		G2	0.056	7.39	0.417		0.417	5.35	0	0.181	2.79	15.362	15.229	15.65	15.41	16.07	16.681	0.614	G1/AV
2	G1/AW	90	0.77	0.6	10	116	0.097	0.074	24	5	151	0.092	0.071	30	50	2.779	0.086	0.04	0.51	2.5	GULLY BK-S	50	0	G1/AK	5	151	0.071	184	4.145	2.41	450	1.15	2.12	1		G2	0.068	6.52	0.443		0.443	0.41	0.017	0.202	2.65	14.218	14.118	14.726	14.709	15.17	15.544	0.375	G1/AW
2	G1/AX	90	0.77	0.6	10	116	0.085	0.064	21	5	151	0.08	0.062	26	43	2.622	0.083	0.04	0.51	2.5	GULLY BK-S	43	0	G1/AL	5	151	0.062	173	4.274	2.04	450	1.09	2.04	1		G2	0.06	6.85	0.412		0.412	0.37	0.016	0.205	2.46	14.22	14.133	14.724	14.709	15.14	15.532	0.395	G1/AX
2	1/AY	0																			MH1500				5	151	0	0	11.159	0.25	900	0					0	0	0		0	0	0	0	0	12.812	12.784	14.41	14.41	14.41	15.1	0.69	1/AY
2	IN/AZ	0					0	0	0			0	0	0	0						HW inlet	0	0		5	151	0	534	4.821	0.44	(2x)1350	0.19	0.99			Outlet Control	0.002	1.5	0.003		0.003	-0.03	0	0.251	1.45	12.137	12.116	13.477	13.478	13.48	14.292	0.813	IN/AZ
2	4/AZ	0					0	0	0			0	0	0	0						MH	0	0	G1/AD	5.04	151	0	534	17.717	0.22	600	1.89	2.34	0	1	T1/T3	0.182	0.97	0.176	1.09	0.199	0.76	0.134	0.6	1.89	12.096	12.057	13.302	13.168	13.5	14.178	0.678	4/AZ
2	OUT/AZ																				HW outlet																													12.59	12.695		OUT/AZ
2	F1/AZ1	20	0.77	0.6	16	94	1.424	0.907	237	16	94	1.424	0.907	237	237		0.185				RSIP-9x9	237	0	LOST	16	94	0.907	237	20.415	0.51	450	1.49	3.47	1		G1	0.113	2.82	0.319		0.319	0.69	0.141	0.45	1.49	12.252	12.148	13.496	13.356	13.82	13.979	0.164	F1/AZ1
2	2/AZ1	0																			MH1050				16.17	94	0.907	236	10.098	0.51	450	1.48	2.77	0	1	T1/T3	0.112	1.06	0.119	1.24	0.14	0.68	0.069	0.45	1.48	12.128	12.077	13.237	13.168	13.38	14.398	1.021	2/AZ1

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK
aa

DESIGN CHECK
aa

STATUS
FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

©
calibregroup.com

PROJECT
CARSELDINE URBAN VILLAGE
STAGE 1

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

DRAWING TITLE
STORMWATER DRAINAGE MINOR
CALCULATION TABLES
SHEET 1 OF 6

PROJECT No. 15-003002.01

DRAWING No. 1430

REVISION A

	LOCATION	CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES											PART FULL		DESIGN LEVELS							
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		$V^2/2g$	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m		%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m			m	%	m	m	m/s	m	m	m	m	m	m	m	
2	3/AZ1	0																			MH1050												1.95	0	1	T1/T3		1.13	0.425	1.28	0.485									13.23	14.635	1.408	3/AZ1
2	1/BA	100	0.77	0.6	10	116	0.058	0.045	14	5	151	0.057	0.044	19	19	2.928	0.037	0.01	0.4	2.5	F1-6x9 on-grade	14	4	2/BA	5	151	0.044	14	11.2	0.5	375	0.13	1.02	1		G1	0.001	7	0.006		0.006	0	0.001	0.086	0.75	13.969	13.913	14.182	14.181	14.19	15.287	1.099	1/BA
2	2/BA	98	0.77	0.6	10	116	0.042	0.032	10	5	151	0.041	0.032	13	18	2.788	0.035	0.01	0.67	2.5	F1-6x9 on-grade	14	4	3/BA	5.09	150	0.076	28	9.2	0.5	375	0.25	1.02	0.49	1	T1	0.003	2.01	0.006		0.006	0.01	0.002	0.12	0.9	13.888	13.842	14.175	14.174	14.18	15.212	1.031	2/BA
2	3/BA	99	0.77	0.6	10	116	0.047	0.036	12	5	151	0.047	0.036	15	19	2.882	0.036	0.01	0.67	2.5	F1-6x9 on-grade	15	5	4/BA	5.17	149	0.113	42	10.9	0.5	375	0.38	1.03	0.35	1	T1	0.007	1.62	0.012		0.012	0.04	0.005	0.15	1.01	13.817	13.763	14.162	14.157	14.17	15.151	0.977	3/BA
2	4/BA	98	0.77	0.6	10	116	0.036	0.028	9	5	151	0.035	0.027	11	16	2.688	0.034	0.01	0.67	2.5	F1-6x9 on-grade	12	4	5/BA	5.17	149	0.139	54	6.79	0.5	375	0.49	1.12	0.23	1	T1	0.012	1.19	0.014		0.014	0.09	0.006	0.173	1.08	13.738	13.704	14.143	14.136	14.16	15.078	0.921	4/BA
2	5/BA	98	0.77	0.6	10	116	0.026	0.02	6	5	151	0.025	0.02	8	12		0.029		0.67	2.5	FSIP-6x9	12	0	6/BA	5.22	149	0.159	66	8.887	0.5	375	0.59	1.22	0.18	1	T1	0.018	1.02	0.018		0.018	0.14	0.012	0.194	1.14	13.679	13.634	14.118	14.106	14.14	15.032	0.896	5/BA
2	6/BA	98	0.77	0.6	10	116	0.036	0.028	9	5	151	0.036	0.028	12	12	1.937	0.024	0.01	0.67	2.5	F1-6x9 on-grade	9	3	G1/CH	5.3	148	0.187	74	29.597	0.5	375	0.67	1.32	0.12	1	T1	0.023	0.75	0.017		0.017	0.18	0.053	0.208	1.17	13.609	13.461	14.088	14.036	14.11	14.972	0.866	6/BA
2	7/BA	100	0.77	0.6	10	116	0.054	0.042	14	5	151	0.054	0.042	18	18	3.504	0.044	0.01	-0.02	2.5	F1-6x9 on-grade	0	18	8/BA	5.47	146	0.227	72	10.626	0.5	375	0.65	1.6	0	1	T1	0.022	0.2	0.004		0.004	0.17	0.018	0.205	1.16	13.436	13.383	14.032	14.014	14.04	15.031	0.995	7/BA
2	8/BA	98	0.77	0.6	10	116	0.04	0.031	10	5	151	0.04	0.031	13	31	3.261	0.041	0.02	0.85	2.5	F1-6x9 on-grade	23	8	9/BA	5.56	145	0.258	94	11.2	0.5	375	0.85	1.75	0.24	1	T1	0.037	1.13	0.042		0.042	0.28	0.032	0.243	1.23	13.358	13.302	13.972	13.94	14.01	14.956	0.942	8/BA
2	9/BA	99	0.77	0.6	10	116	0.06	0.046	15	5	151	0.06	0.046	19	27	3.126	0.039	0.02	0.85	2.5	F1-6x9 on-grade	20	7	10/BA	5.65	144	0.304	112	10.348	0.4	450	0.71	1.47	0.18	0.83	T1	0.025	0.43	0.011		0.011	0.15	0.016	0.257	1.2	13.277	13.236	13.929	13.913	13.94	14.86	0.92	9/BA
2	10/BA	97	0.77	0.6	10	116	0.022	0.017	5	5	151	0.021	0.017	7	14	2.435	0.03	0.01	0.85	2.5	F1-6x9 on-grade	10	4	11/BA	5.74	144	0.321	122	6.452	0.4	450	0.76	1.56	0.08	1	T1	0.03	0.59	0.018		0.018	0.18	0.012	0.271	1.22	13.211	13.185	13.896	13.884	13.91	14.772	0.859	10/BA
2	11/BA	99	0.77	0.6	10	116	0.035	0.027	9	5	151	0.035	0.027	11	15	2.492	0.031	0.01	0.85	2.5	F1-6x9 on-grade	11	4	12/BA	5.7	144	0.346	132	4.748	0.4	450	0.83	1.61	0.08	1	T1	0.035	0.57	0.02		0.02	0.21	0.01	0.285	1.24	13.16	13.141	13.864	13.854	13.88	14.717	0.833	11/BA
2	12/BA	99	0.77	0.6	10	116	0.033	0.025	8	5	151	0.032	0.025	11	14	2.461	0.031	0.01	0.85	2.5	F1-6x9 on-grade	11	4	13/BA	5.74	144	0.371	141	6.452	0.4	450	0.89	1.64	0.07	1	T1	0.04	0.54	0.022		0.022	0.25	0.016	0.3	1.25	13.116	13.09	13.832	13.816	13.85	14.676	0.822	12/BA
2	13/BA	98	0.77	0.6	10	116	0.023	0.018	6	5	151	0.023	0.018	7	11	2.236	0.028	0.01	0.85	2.5	F1-6x9 on-grade	0	11	14/BA	5.79	143	0.388	140	9.929	0.4	525	0.65	1.43	0	0.86	T1	0.021	-0.49	-0.01		-0.01	0.11	0.011	0.268	1.27	13.065	13.025	13.827	13.816	13.82	14.621	0.805	13/BA
2	14/BA	98	0.77	0.6	10	116	0.03	0.023	7	5	151	0.03	0.023	10	21		0		0.85	2.5	FSIP-6x9	0	21	G1/CY	5.82	143	0.41	139	12.698	0.4	525	0.64	1.55	0	1	T1	0.021	0.2	0.004		0.004	0.1	0.013	0.266	1.26	13	12.949	13.812	13.799	13.82	14.537	0.721	14/BA
2	15/BA	0																			MH1050				5.92	142	0.41	138	33.206	0.4	600	0.49	1.46	0	0.88	T6/T9	0.012	2.49	0.03	2.82	0.034	0.05	0.017	0.247	1.26	12.924	12.792	13.769	13.752	13.8	14.331	0.528	15/BA
2	16/BA	0																			MH1050				6.13	140	0.663	234	35.261	0.5	675	0.65	1.51	0	1	T3/T6	0.022	1.94	0.042	2.28	0.05	0.08	0.027	0.294	1.56	12.74	12.564	13.709	13.682	13.76	14.352	0.593	16/BA
2	1/BB	99	0.77	0.6	10	116	0.054	0.042	13	5	151	0.054	0.042	17	17	4.063	0.051	0.01	-0.15	2.5	F1-6x9 on-grade	0	17	2/BB	5	151	0.042	0	10.9	0.5	375	0					0	0	0		0	0	0	0	0	13.813	13.759	13.84	13.84	13.84	15.123	1.283	1/BB
2	2/BB	97	0.77	0.6	10	116	0.022	0.017	6	5	151	0.022	0.017	7	25	3.072	0.038	0.02	0.76	2.5	F1-6x9 on-grade	18	6	3/BB	5.09	150	0.059	18	2.3	0.5	375	0.16	1.03	1		G1	0.001	7	0.01		0.01	0.36	0.011	0.097	0.8	13.734	13.722	13.83	13.822	13.84	15.065	1.225	2/BB
2	3/BB	99	0.77	0.6	10	116	0.02	0.015	5	5	151	0.02	0.015	6	13	2.406	0.03	0.01	0.76	2.5	F1-6x9 on-grade	9	3	4/BB	5.11	150	0.074	27	6.9	0.5	375	0.25	1.01	0.34	1	T1	0.003	1.6	0.005		0.005	0.52	0.035	0.12	0.9	13.697	13.663	13.817	13.781	13.82	15.047	1.225	3/BB
2	4/BB	98	0.77	0.6	10	116	0.023	0.018	6	5	151	0.023	0.018	7	11	2.246	0.028	0.01	0.76	2.5	F1-6x9 on-grade	8	3	5/BB	5.17	149	0.092	35	2.3	0.5	375	0.32	1.02	0.22	1	T1	0.005	1.17	0.006		0.006	0.59	0.012	0.137	0.97	13.638	13.626	13.774	13.761	13.78	14.994	1.214	4/BB
2	5/BB	99	0.77	0.6	10	116	0.017	0.013	4	5	151	0.017	0.013	5	8	2.03	0.025	0.01	0.76	2.5	F1-6x9 on-grade	6	2	6/BB	5.19	149	0.104	41	8.9	0.5	375	0.37	1.02	0.15	1	T1	0.007	0.87	0.006		0.006	0.53	0.045	0.149	1.01	13.601	13.557	13.75	13.703	13.76	14.977	1.221	5/BB
2	6/BB	97	0.77	0.6	10	116	0.021	0.016	5	5	151	0.021	0.016	7	9		0		0.76	2.5	FSIP-6x9	0	9	7/BB	5.26	148	0.12	41	2.3	0.5	375	0.37	1	0	1	T1	0.007	0.2	0.001		0.001	0.14	0.01	0.148	1.01	13.532	13.52	13.683	13.68	13.68	14.909	1.225	6/BB
2	7/BB	99	0.77	0.6	10	116	0.023	0.018	6	5	151	0.023	0.018	8	16	2.635	0.033	0.01	0.76	2.5	F1-6x9 on-grade	12	4	8/BB	5.19	149	0.138	53	6.9	0.5	375	0.48	1.04	0.23	1	T1	0.012	1.19	0.014		0.014	0.26	0.03	0.171	1.08	13.495	13.461	13.666	13.648	13.68	14.891	1.211	7/BB
2	8/BB	99	0.77	0.6	10	116	0.039	0.03	10	5	151	0.039	0.03	13	17		0.03		0.76	2.5	FSIP-6x9	13	4	8A/BB	5.25	149	0.168	65	6.46	0.5	375	0.59	1.05	0.2	1	T1	0.018	1.07	0.019		0.019	0.62	0.033	0.193	1.14	13.436	13.403	13.629	13.589	13.65	14.839	1.191	8/BB
2	8A/BB	90	0.77	0.6	10	116	0.006	0.004	1	5	151	0.005	0.004	2	6		0		0.76	2.5	FSIP-6x9	0	6	G1/BD	5.3	148	0.172	65	12.14	0.5	375	0.59	1.01	0	1	T1	0.018	0.2	0.004		0.004	0.32	0.054	0.193	1.14	13.378	13.318	13.571	13.532	13.58	14.789	1.214	8A/BB
2	9/BB	0																			MH1050				5.4	147	0.172	65	15.25	0.5	525	0.3	1.02	0	0.71	T10	0.005	2.09	0.009	2.8	0.013	0.01	0.004	0.164	1.12	13.168	13.091	13.522	13.521	13.54	14.59	1.055	9/BB
2	G1/BD	90	0.77	0.6	10	116	0.11	0.083	27	5	151	0.105	0.08	34	39		0		0.55	2.5	SAG BK-S	39	0	G1/BE	5	151	0.08	39	4.542	0.67	450	0.25	1.07	1		G2	0.003	9.7	0.03		0.03	0	0	0.125	1.09	13.099	13.069	13.521	13.521	13.55	14.479	0.928	G1/BD
2	G1/BE	90	0.77	0.6	10	116	0.061	0.046	15	5	151	0.058	0.044	19	19		0		0.55	2.5	SAG BK-S	19	0	G1/4	5	151	0.044	19	2.844	0.67	450	0.12	1.01	1		G2	0.001	9.7	0.007		0.007	0	0	0.086	0.87	13.095	13.076	13.521	13.521	13.53	14.479	0.951	G1/BE
2	1/BF	100					0.049	0.038	16			0.049	0.038	16	16	4.284	0.054	0.01	-0.15	2.5	F1-6x9 on-grade	0	16	2/BF	5	151	0.038	0	12.1	0.5	375	0					0	0	0		0	0	0	0	0	13.538	13.477	13.824	13.824	13.82	14.849	1.025	1/BF
2	2/BF	98	0.77	0.6	10	116	0.046	0.036	11	5	151	0.046	0.035	15	31	3.548	0.044	0.02	0.55	2.5	F1-6x9 on-grade	23	7	3/BF	5.1	150	0.073	23	8.9	0.5	375	0.21	1.04	1		G1	0.002	7	0.016		0.016	0.01	0.001	0.11	0.86	13.452	13.408	13.808	13.807	13.82	14.797	0.973	2/BF
2	3/BF	98	0.77	0.6	10	116	0.025	0.019	6	5	151	0.025	0.019	8	15	2.736	0.034	0.01	0.55	2.5	F1-6x9 on-grade	12	4	4/BF	5.18	149	0.092	34	3.4	0.5	375	0.31	1.13	0.34	1	T1	0.005	1.57	0.008		0.008	0.04	0.001	0.135	0.96	13.383	13.366	13.799	13.798	13.81	14.749	0.942	3/BF
2	4/BF	99	0.77	0.6	10	116	0.017	0.013	4	5	151	0.017	0.013	6	9	2.27	0.028	0.01	0.55	2.5	F1-6x9 on-grade	7	2	5/BF	5.2	149	0.105	41	9.8	0.5	375	0.37	1.22	0.17	1	T1	0.007	0.96	0.007		0.007	0.06	0.005	0.149	1.01	13.341	13.292	13.791	13.786	13.8	14.73	0.932	4/BF
2	5/BF	99	0.77	0.6	10	116	0.052	0.04	13	5	151	0.051	0.04	17	19	2.958	0.037	0.01	0.55	2.5	F1-6x9 on-grade	14	5	6/BF	5.18	149	0.144	55	15.9	0.5	450	0.35	1.26	0.26	0.83	T1	0.006	0.85	0.005		0.005	0.04	0.006	0.161	1.08	13.217	13.137	13.781	13.775	13.79	14.677	0.891	5/BF
2	6/BF	98	0.77	0.6	10	116	0.059	0.045	15	5	151	0.058	0.045	19	23	3.211	0.04	0.01	0.55	2.5	F1-6x9 on-grade	18	6	7/BF	5.32	148	0.189	72	12.2	0.5	450	0.45	1.47	0.24	1	T1	0.01	1.25	0.013		0.013	0.06	0.008	0.186	1.16	13.112	13.051	13.762	13.754	13.78	14.59	0.815	6/BF
2	7/BF	98	0.77	0.6	10	116	0.042	0.032	10	5	151	0.042	0.032	13	19	2.974	0.037	0.01	0.55	2.5	F1-6x9 on-grade	15	5	8/BF	5.34	148	0.22	86	10.7	0.5	450	0.54	1.62	0.17	1	T1	0.015	0.92	0.014		0.014	0.09	0.01	0.205	1.22	13.026	12.973	13.74	13.73	13.75	14.523	0.769	7/BF
2	8/BF	99	0.77	0.6	10	116	0.054	0.042	13	5	151	0.054	0.042	17	22	3.137	0.039	0.01	0.55	2.5	F1-6x9 on-grade	17	5	9/BF	5.43	147	0.262	101	15.283	0.5	450	0.64	1.74	0.16	1	T1	0.021	0.87	0.018		0.018	0.13	0.019	0.226	1.27	12.948	12.872	13.712	13.693	13.73	14.465	0.735	8/BF
2	9/BF	97	0.77	0.6	10	116	0.031	0.024	8	5	151	0.03	0.023	10	15		0.03		0.83	0.02	FSIP-6x9	13	2	G1/6	5.53	146	0.285	113	12.698	0.5	525	0.52	1.71	0.11	0.86	T1	0.014	0.15	0.002		0.002	0.07	0.009	0.222	1.3	12.797	12.733	13.691	13.682	13.69	14.381	0.688	9/BF
2	1/BG	90	0.77	0.6	10	116	0.151	0.114	37	5	151	0.143	0.11	46	46		0.004		0.61	2.5	SAG MK-S	46	0	G1/BD	5	151	0.11	46	2.034	0.5	375	0.42	1.75	1		G2	0.009	8.35	0.074		0.074	0.07	0.001	0.158	1.04	13.32	13.31	13.903	13.902	13.98	14.632	0.655	1/BG
2	2/BG	0																			MH1050				5.02	151	0.11	46	66	0.4	375	0.42	1.65	0	1	T6/T9	0.009	2.13	0.019	2.42	0.021	0.07	0.045	0.168	0.96	13.285	13.021	13.883	13.837	13.9	14.663	0.759	2/BG
2	3/BG	0																			MH1050				5.57	145	0.179	72	39.216	0.4	450	0.46	1.87	0	1	T1/T3	0.011	1.4	0.015	1.62	0.017	0.06	0.025	0.198	1.07	12.996	12.839	13.823	13.797	13.84	14.427	0.587	3/BG
2	4/BG	0																			MH1050				5.89	142	0.255	101	12.582	0.4	450	0.63	2.19	0	1	T3	0.02	1.45	0.03	1.65	0.034	0.12	0.016	0.24	1.17	12.814	12.764	13.768	13.752	13.8	14.216	0.415	4/BG
2	1/BL	90	0.77	0.6	10	116	0.095	0.072	23	5	151	0.091	0.069	29	29		0		0.59	2.5	SAG MK-S	29	0	1/BM	5	151	0.069	29	2.041	0.5	375	0.26	2.1	1		G2	0.004	6.58	0.023		0.023	0.03	0.001	0.123	0.92	13.074	13.064	13.838	13.837	13.86	14.403	0.542	1/BL
2	1/BM	90	0.77	0.6	10	116	0.104	0.078	25	5	151	0.098	0.075	32	32		0		0.22	2.5	SAG MK-S	32	0	G1/6	5	151	0.075	32	2.256	0.51	375	0.29	2.54	1		G2	0.004	4.81	0.02		0.02	0.03	0.001	0.128	0.94	12.866	12.854	13.798	13.797	13.82	14.187	0.369	1/BM
2	1/CA	98	0.77	0.6	10	116	0.03	0.023	7	5	151	0.03	0.023	10	10	2.141	0.027	0.01	0.8	2.5	F1-6x9 on-grade	7	2	2/CA	5	151	0.023	7	13.2	0.75	375	0.06	1	1		G1	0	7	0.001		0.001	0.65	0.095	0.055	0.7	14.432	14.333	14.492	14.406	14.49	15.793	1.3	1/CA
2	2/CA	97	0.77	0.6	10	116	0.03	0.023	8	5	151	0.03	0.023	10	12	2.341	0.029	0.01	0.8	2.5	F1-6x9 on-grade	9	3	3/CA	5.11	150	0.046	16	11.23	0.75	375	0.14	1.01	0.56	1	G1/T1	0.001	2.63	0.003		0.003	0.72	0.084	0.082	0.89	14.313	14.229	14.403	14.322	14.41	15.688	1.282	2/CA
2	3/CA	97	0.77	0.6	10	116	0.022	0.017	6	5	151	0.022	0.017	7	10	2.2	0.028	0.01	0.8	2.5	F1-6x9 on-grade	8	3	4/CA	5.2	149	0.063	23	9.17	1	375	0.21	1.01	0.32	1	T1	0.002	1.53	0.004		0.004	0.98	0.092	0.093	1.1	14.209	14.118	14.318	14.229	14.32	15.599	1.277	3/CA
2	4/CA	98	0.77	0.6	10	116	0.024	0.019	6	5	151	0.024	0.019	8	11	1.972	0.025	0.01	1.31	2.5	F1-6x9 on-grade	8	3	5/CA	5.17	149	0.081	31	13.5	2	375	0.28	1.01	0.25	1	T1	0.004	1.27	0.005		0.005	2.14	0.263	0.089	1.53	14.098	13.828	14.224	13.935	14.23	15.505	1.276	4/CA
2	5/CA	96	0.77	0.6	10	116	0.022	0.017	6	5	151	0.022	0.017	7	10		0		1.88	2.5	FSIP-6x9	0	10	G1/CE	5.28	148	0.098	31	12.5	0.5	375	0.28	1	0	1	T1	0.004	0.2	0.001		0.001	0.51	0.063	0.127	0.93	13.808	13.745	13.934	13.87	13.94	15.259	1.324	5/CA
2	6/CA	0																			MH1050				5.39	147	0.098	30	16.617	0.5	375	0.27	1.03	0	1	T10	0.004	2.09	0.008	2.66	0.01	0.51	0.083	0.126	0.93	13.725	13.642	13.851	13.767	13.86	15.066	1.205	6/CA
2	7/CA	0																			MH1050				5.53	146	0.138	56	14.355	0.5	450	0.35	1.01	0	1	T2/T4	0.006	0.45	0.003		0.003	0.01	0.026	0.162	1.08	13.567	13.495	13.75	13.748	13.75	14.983	1.23	7/CA
2	8/CA	0																			MH1050				5.36	147	0.293	120	59.351	0.5	450	0.75	1.05	0	1	T4/T8	0.029	0.79	0.023	0.8	0.023	0.46	0.291	0.25	1.32	13.475	13.178	13.725	13.45	13.75	14.839	1.091	8/CA
2	9/CA	0																			MH1050				5.66	144	0.36	145	16.649	0.5	450	0.91	1.02	0	1	T1/T2	0.042	0.23	0.01		0.01	0.59	0.085	0.282	1.38	13.158	13.075	13.44	13.342	13.45	14.542	1.092	9/CA
2	10/CA	0																			MH1050				5.79	143	0.415	168	55.375	0.5	525	0.78	1.01	0	1	T1/T2	0.031	0.24	0.007		0.007	0.44	0.269	0.278	1.44	13.055	12.778	13.334	13.091	13.34	14.459	1.118	10/CA
2	11/CA	0																			MH1050				6.25	139	0.51	200	16.233	0.46	600	0.71	1.02	0	1	T2/T4	0.025	0.42	0.011		0.011	0.07	0.041	0.293	1.46	12.758	12.684	13.081	13.069	13.09	14.202	1.111	11/CA
2	12/CA	0																			MH1050				6.39	138	0.619	261	16.772	0.5	600	0.92	1.15	0	1	T3	0.043	1.74	0.075	2.11	0.091	0.17	0.069	0.335	1.61	12.659	12.575	12.994	12.965	13.09	14.387	1.302	12/CA
2	OUT/CA	0					0	0	0			0	0	0	0						HW outlet	0	0		6.53	137	0.619	259	4.887	0.54	T5800B1000x600	0.13					0.001	1	0.001		0.001	-0.01	0	0.137	1.22	12.546	12.52	12.964	12.965	12.97	13.582	0.617	OUT/CA
2	G1/CB	90	0.77	0.6	10	116	0.151	0.115	37	5	151	0.144	0.11	46	46	2.707	0.085	0.04	0.5	2.5	GULLY BK-S	46	0	G1/CC	5	151	0.11	46	2.034	0.5	375	0.42	1.23	1		G2	0.009	9.7	0.086		0.086	0.52	0.01	0.158	1.04	13.659	13.649	13.817	13.807	13.9	14.897	0.993	G1/CB
2	2/CB	0																			MH1050				5.02	151	0.11	46	16.649	0.5	375	0.42	1.06	0	1	T6/T9	0.009	2.22	0.02	2.53	0.022	0.24	0.065	0.158	1.04	13.629	13.546	13.787	13.748	13.81	14.922	1.112	2/CB
2	G1/CC	90	0.77	0.6	10	116	0.038	0.029	9	5	151	0.036	0.028	12	12	1.563	0.056	0.02	0.5	2.5	GULLY BK-S	12	0	6/CR	5	151	0.028	12	4.813	0.5	375	0.11	1.01	1		G2	0.001	9.7	0.006		0.006	0.01	0.008	0.078	0.7	13.662	13.638	13.754	13.753	13.76	14.633	0.874	G1/CC
2	2/CC	0																			MH1050				5.04	151	0.048	20	14.493	0.5	375	0.18	1.01	0	1	T6/T9	0.002	2.43	0.004	2.72	0.005	0.01	0.013	0.102	0.83	13.618	13.545	13.749	13.748	13.75	14.668	0.914	2/CC
2	G1/CD	90	0.77	0.6	10	116	0.028	0.021	7	5	151	0.027	0.021	9	9	1.377	0.052	0.02	0.5	2.5	GULLY BK-S	9	0	7/CR	5	151	0.021	9	2.041	0.61	375	0.08	1.01	1		G2	0	9.7	0.003		0.003	-0.01	0.001	0.064	0.69	13.65	13.638	13.753	13.753	13.76	14.633	0.877	G1/CD
2	G1/CE	90	0.77	0.6	10	116	0.027	0.02	7	5	151	0.026	0.02	8	18	1.867	0.064	0.02	0.5	2.5	GULLY BK-S	18	0	G1/CD	5	151	0.02	18	4.813	0.5	375	0.16	1.04	1		G2	0.001	9.7	0.013		0.013	0.11	0.018	0.097	0.8	13.661	13.637	13.758	13.753	13.77	14.957	1.186	G1/CE
2	G1/CF	90	0.77	0.6	10	116	0.028	0.021	7	5	151	0.026	0.02	8	8	1.362	0.051	0.02	0.5	2.5	GULLY BK-S	8	0	G1/CD	5	151	0.02	8	2.041	0.5	375	0.08	1.01	1		G2	0	9.7	0.003		0.003	0	0.001	0.066	0.64	13.65	13.64	13.753	13.753	13.76	14.957	1.201	G1/CF
2	G1/CG	90	0.77	0.6	10	116	0.099	0.075	24	5	151	0.094	0.072	30	30	2.289	0.074	0.03	0.5	2.5	GULLY BK-S	30	0	5/CS	5	151	0.072	30	2.041	1	375	0.27	1.1	1		G2	0.004	9.7	0.037		0.037	-0.54	0.01	0.105	1.19	13.315	13.295	13.439	13.45	13.48	14.517	1.041	G1/CG
2	G1/CH	90	0.77	0.6	10	116	0.035	0.027	9	5	151	0.034	0.026	11	14	1.551	0.056	0.02	0.71	2.5	GULLY BK-S	14	0	LOST	5	151	0.026	14	4.813	0.67	375	0.12	1.02	1		G2	0.001	9.7	0.008		0.008	0.28	0.026	0.078	0.82	13.337	13.305	13.42	13.406	13.43	14.643	1.216	G1/CH
2	2/CH	0																			MH1050				5.04	151	0.055	26	14.355	0.67	375	0.23	1.02	0	1	T6/T9	0.003	2.42	0.007	2.71	0.007	0.41	0.081	0.107	0.98	13.285	13.189	13.399	13.341	13.41	14.666	1.259	2/CH
2	G1/CJ	90	0.77	0.6	10	116	0.04	0.03	10	5	151	0.038	0.029	12	12	1.477	0.054	0.02	0.71	2.5	GULLY BK-S	12	0	6/CS	5	151	0.029	12	2.041	1.02	375	0.11	1.02	1		G2	0.001	9.7	0.006		0.006	-0.12	0.012	0.066	0.92	13.326	13.305	13.404	13.406	13.41	14.643	1.233	G1/CJ
2	G1/CM	90	0.77	0.6	10	116	0.129	0.098	31	5	151	0.122	0.094	39	39		0		0.1	2.5	SAG BK-S	39	0	G1/CY	5	151	0.094	39	2.041	1	450	0.25	1.07	1		G2	0.003	9.7	0.03		0.03	-0.31	0.013	0.113	1.26	12.95	12.93	13.085	13.091	13.12	14.17	1.055	G1/CM
2	1/CN	90	0.77	0.6	10	116	0.006	0.005	1	5	151	0.006	0.004	2	5		0.016		1.3	7.87	FSIP-6x9	5	0		5	151	0.004	5	7.846	0.5	375	0.04	1	1		G2	0	9.7	0.001		0.001	0.31	0.032	0.05	0.54	13.93	13.891	13.981	13.957	13.98	14.862	0.88	1/CN
2	2/CN	98	0.77	0.6	10	116	0.032	0.024	8	5	151	0.031	0.024	10	11	2.089	0.026	0.01	1.3	2.5	F1-6x9 on-grade	9	3	1/CN	5	151	0.029	13	11.2	0.5	375	0.12	1.01	0.64	1	G1/T1/T3	0.001	3.25	0.002	3.63	0.003	0.51	0.056	0.083	0.73	13.871	13.815	13.954	13.897	13.96	15.042	1.085	2/CN
2	3/CN	99	0.77	0.6	10	116	0.017	0.013	4	5	151	0.017	0.013	6	6	1.932	0.024	0.01	0.33	2.5	F1-6x9 on-grade	4	1	2/CN	5.09	150	0.042	17	9.2	0.5	375	0.16	1	0.24	1	T1	0.001	1.24	0.002		0.002	0.51	0.046	0.095	0.79	13.795	13.749	13.89	13.843	13.89	15.162	1.27	3/CN
2	4/CN	98	0.77	0.6	10	116	0.022	0.017	5	5	151	0.022	0.017	7	7	2.083	0.026	0.01	0.41	2.5	F1-6x9 on-grade	5	2	5/CN	5.17	149	0.059	23	13.2	0.5	375	0.2	1.01	0.24	1	T1	0.002	1.22	0.003		0.003	0.47	0.065	0.108	0.85	13.729	13.663	13.838	13.776	13.84	15.158	1.318	4/CN
2	5/CN	97	0.77	0.6	10	116	0.03	0.023	8	5	151	0.03	0.023	10	11	2.489	0.031	0.01	0.5	2.5	F1-6x9 on-grade	9	3	6/CN	5.28	148	0.082	31	13.5	0.5	375	0.28	1.01	0.28	1	T1	0.004	1.37	0.005		0.005	0.46	0.067	0.128	0.93	13.643	13.576	13.771	13.708	13.78	15.092	1.316	5/CN
2	6/CN	97	0.77	0.6	10	116	0.021	0.016	5	5	151	0.021	0.016	7	9		0.024		4.33	2.5	FSIP-6x9	9	0	6/CR	5.3	148	0.097	40	28.6	0.52	375	0.36	1.02	0.23	1	T1	0.007	1.21	0.008		0.008	0.52	0.149	0.145	1.02	13.556	13.407	13.7	13.551	13.71	14.79	1.082	6/CN
2	7/CN	100					0.021	0.016	7			0.021	0.016	7	7				-0.19	2.5	F1-6x9 on-grade	0	7	8/CN	5.54	146	0.113	39	9.2	0.58	375	0.35	1	0	1	T1	0.006	0.2	0.001		0.001	0.27	0.045	0.139	1.05	13.387	13.334	13.529	13.504	13.53	14.854	1.324	7/CN
2	8/CN	99	0.77	0.6	10	116	0.041	0.031	10	5	151	0.04	0.031	13	20	2.698	0.034	0.01	0.99	2.5	F1-6x9 on-grade	15	5	9/CN	5.54	146	0.144	53	11.2	0.47	375	0.48	1.04	0.27	1	T1	0.012	1.36	0.016		0.016	0.45	0.053	0.174	1.06	13.314	13.261	13.488	13.437	13.5	14.793	1.289	8/CN
2	9/CN	97	0.77	0.6	10	116	0.026	0.02	6	5	151	0.025	0.02	8	13	2.326	0.029	0.01	0.99	2.5	F1-6x9 on-grade	10	3	10/CN	5.63	145	0.163	62	9.2	0.72	375	0.56	1.04	0.16	1	T1	0.016	0.91	0.015		0.015	0.61	0.065	0.169	1.29	13.241	13.175	13.422	13.366	13.44	14.681	1.244	9/CN
2	10/CN	97	0.77	0.6	10	116	0.021	0.016	5	5	151	0.021	0.016	7	10	2.101	0.026	0.01	0.99	2.5	F1-6x9 on-grade	8	3	11/CN	5.6	145	0.178	69	11.2	0.53	375	0.63	1.04	0.11	1	T1	0.02	0.7	0.014		0.014	0.51	0.059	0.197	1.18	13.155	13.096	13.352	13.295	13.37	14.59	1.224	10/CN
2	11/CN	99	0.77	0.6	10	116	0.051	0.04	13	5	151	0.051	0.04	17	19	2.664	0.033	0.01	0.99	2.5	F1-6x9 on-grade	0	19	11A/CN	5.69	144	0.218	68	6.6	0.38	375	0.61	1.01	0	1	T1	0.019	0.2	0.004		0.004	0.37	0.025	0.215	1.04	13.076	13.05	13.291	13.267	13.3	14.479	1.184	11/CN
2	11A/CN	90	0.77	0.6	10	116	0.004	0.003	1	5	151	0.004	0.003	1	21		0		0.99	2.5	FSIP-6x9	0	21	5/CS	5.75	144	0.221	68	22	0.39	375	0.61	1.01	0	1	T1	0.019	0.2	0.004		0.004	0.47	0.09	0.213	1.04	13.05	12.964	13.263	13.16	13.27	14.413	1.146	11A/CN
2	12/CN	96	0.77	0.6	10	116	0.024	0.018	6	5	151	0.024	0.018	8	11		0.027		0.82	2.5	FSIP-6x9	11	0	6/CS	5.82	143	0.237	77	14.002	0.4	450	0.49	1.01	0.14	0.83	T1	0.012	0.23	0.003		0.003	0.16	0.04	0.206	1.09	12.944	12.888	13.157	13.135	13.16	14.413	1.253	12/CN

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK
aa

DESIGN CHECK
aa

STATUS
FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

calibre
© calibregroup.com

PROJECT
CARSELDINE URBAN VILLAGE
STAGE 1

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

DRAWING TITLE
STORMWATER DRAINAGE MINOR
CALCULATION TABLES
SHEET 2 OF 6

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1431	A

	LOCATION	CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES							PART FULL		DESIGN LEVELS								
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		Vf2/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m	%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m	m		m	%	m	m	m/s	m	m	m	m	m	m	m	
2	13/CN	98	0.77	0.6	10	116	0.029	0.022	7	5	151	0.028	0.022	9	14	2.44	0.031	0.01	0.82	2.5	F1-6x9 on-grade	10	4	12/CN	5.93	142	0.259	86	11.2	0.38	450	0.54	1.02	0.12	1	T1	0.015	0.74	0.011		0.011	0.17	0.03	0.223	1.1	12.888	12.846	13.124	13.104	13.14	14.528	1.393	13/CN
2	14/CN	97	0.77	0.6	10	116	0.027	0.021	7	5	151	0.026	0.02	9	18	2.692	0.034	0.01	0.82	2.5	F1-6x9 on-grade	13	5	13/CN	6.14	140	0.281	98	13.2	0.4	450	0.62	1.04	0.13	1	T1	0.019	0.81	0.016		0.016	0.23	0.043	0.237	1.16	12.846	12.793	13.088	13.058	13.1	14.621	1.517	14/CN
2	15/CN	100					0.029	0.023	9			0.029	0.023	9	9	3.562	0.045	0.01	-0.18	2.5	F1-6x9 on-grade	0	9	14/CN	6.14	140	0.302	97	18.647	0.4	450	0.61	1.01	0	1	T1	0.019	0.2	0.004		0.004	0.12	0.041	0.234	1.16	12.793	12.718	13.054	13.032	13.06	14.702	1.644	15/CN
2	16/CN	0																			MH1050				6.05	141	0.39	132	15.366	0.4	525	0.61	1.09	0	1	T3/T6	0.019	2.05	0.039	2.37	0.045	0.13	0.04	0.258	1.25	12.718	12.656	12.993	12.972	13.04	14.497	1.459	16/CN
2	OUT/CN	0					0	0	0						0	0					HW outlet	0	0		6.18	140	0.39	131	2.678	0.52	T5800B1000x600	0.06					0	1	0		0	0	0	0.096	0.98	12.606	12.592	12.972	12.972	12.97	13.3	0.328	OUT/CN
2	G1/CP	90	0.77	0.6	10	116	0.064	0.048	16	5	151	0.061	0.047	20	20	1.925	0.065	0.03	0.5	2.5	GULLY MK-S	20	0	G1/CM	5	151	0.047	20	5.367	0.67	375	0.18	1.04	1		G2	0.002	9.7	0.015		0.015	-0.02	0.019	0.094	0.91	13.119	13.083	13.218	13.219	13.23	14.408	1.174	G1/CP
2	2/CP	0																			MH1050				5.04	151	0.092	39	7.854	2.59	375	0.35	1.05	0	1	T6/T9	0.006	2.44	0.015	2.72	0.017	2.2	0.194	0.094	1.79	13.063	12.86	13.204	13.032	13.22	14.457	1.236	2/CP
2	G1/CQ	90	0.77	0.6	10	116	0.063	0.047	15	5	151	0.06	0.046	19	19	1.908	0.065	0.03	0.5	2.5	GULLY MK-S	19	0	G1/CX	5	151	0.046	19	2.611	1.38	375	0.17	1.04	1		G2	0.002	9.7	0.015		0.015	-0.08	0.019	0.077	1.17	13.119	13.083	13.217	13.219	13.23	14.408	1.176	G1/CQ
2	1/CR	99	0.77	0.6	10	116	0.042	0.033	11	5	151	0.042	0.032	14	14	2.177	0.027	0.01	1.25	2.5	F1-6x9 on-grade	10	4	2/CR	5	151	0.032	10	13.2	1	375	0.09	1.01	1		G1	0	7	0.003		0.003	0.83	0.123	0.061	0.86	13.812	13.68	13.883	13.773	13.89	15.151	1.265	1/CR
2	2/CR	98	0.77	0.6	10	116	0.042	0.032	10	5	151	0.041	0.032	13	17	2.344	0.029	0.01	1.53	2.5	F1-6x9 on-grade	13	4	3/CR	5.11	150	0.064	22	12.05	0.5	375	0.2	1.01	0.55	1	G1/T1	0.002	2.58	0.005		0.005	0.41	0.058	0.108	0.85	13.66	13.6	13.768	13.718	13.77	14.949	1.176	2/CR
2	3/CR	97	0.77	0.6	10	116	0.028	0.022	7	5	151	0.028	0.021	9	13	2.187	0.027	0.01	1.48	2.5	F1-6x9 on-grade	10	3	4/CR	5.21	149	0.086	32	8.749	0.5	375	0.29	1.03	0.31	1	T6	0.004	1.91	0.008	2.48	0.011	0.5	0.044	0.13	0.94	13.58	13.536	13.71	13.666	13.72	14.767	1.047	3/CR
2	4/CR	90	0.77	0.6	10	116	0.008	0.006	2	5	151	0.008	0.006	3	6	1.963	0.025	0.01	0.53	2.61	F1-6x9 on-grade	5	1	5/CR	5.28	148	0.092	36	21	0.5	375	0.33	1.04	0.13	1	T6	0.006	2	0.011	2.43	0.014	0.49	0.105	0.139	0.98	13.516	13.411	13.655	13.552	13.67	14.686	1.017	4/CR
2	5/CR	90	0.77	0.6	10	116	0.013	0.009	3	5	151	0.012	0.009	4	5		0.017		0.5	2.5	FSIP-6x9	5	0	6/CR	5.35	148	0.1	41	9.161	0.5	375	0.37	1.04	0.13	1	T1/T3	0.007	1.7	0.012	2.1	0.015	0.13	0.034	0.149	1.01	13.391	13.345	13.54	13.528	13.56	14.581	1.026	5/CR
2	6/CR	90	0.77	0.6	10	116	0.06	0.046	15	5	151	0.057	0.044	18	18	1.5	0.037	0.03	0.5	2.5	GULLY BK-S	18	0	7/CR	5.42	147	0.144	59	4.77	0.5	375	0.53					0.014	1	0.014		0.014	0.17	0.019	0.182	1.11	13.325	13.301	13.513	13.505	13.53	14.344	0.816	6/CR
2	7/CR	90	0.77	0.6	10	116	0.055	0.042	14	5	151	0.053	0.04	17	17	3.789	0.019	0.01	0.5	2.5	GULLY BK-S	17	0	CH2/DA	5.46	146	0.185	75	4.863	0.65	375	0.68					0.024	1	0.024		0.024	0.75	0.031	0.195	1.3	13.281	13.25	13.481	13.445	13.51	14.344	0.839	7/CR
2	OUT/CR	0					0	0	0			0	0	0	0					2.75	HW outlet	0	0		5.5	146	0.185	75	3.087	0.97	T3400B500x375	0.1					0.001	1	0.001		0.001	-0.64	0.029	0.081	1.13	13.23	13.2	13.311	13.331	13.31	13.794	0.482	OUT/CR
2	1/CS	99	0.77	0.6	10	116	0.077	0.059	19	5	151	0.076	0.059	25	25	3.202	0.04	0.02	0.62	2.5	F1-6x9 on-grade	19	6	2/CS	5	151	0.059	19	13.2	0.5	375	0.17	1.03	1		G1	0.001	7	0.01		0.01	0.01	0.004	0.099	0.81	13.456	13.39	13.64	13.639	13.65	14.656	1.006	1/CS
2	2/CS	99	0.77	0.6	10	116	0.082	0.064	21	5	151	0.082	0.063	27	33	3.548	0.044	0.02	0.62	2.5	F1-6x9 on-grade	25	8	3/CS	5.11	150	0.122	43	12.233	0.5	375	0.39	1.07	0.57	1	G2/T1/T3	0.008	2.88	0.022	3.35	0.026	0.03	0.01	0.153	1.02	13.37	13.309	13.617	13.613	13.64	14.575	0.932	2/CS
2	3/CS	90	0.77	0.6	10	116	0.025	0.019	6	5	151	0.024	0.019	8	16	3.352	0.022	0.01	0.93	2.5	F1-6x9 on-grade	12	4	4/CS	5.21	149	0.141	54	22.833	0.5	375	0.49	1.09	0.21	1	T9/T10	0.012	2.56	0.032	2.79	0.034	0.07	0.02	0.174	1.09	13.289	13.175	13.581	13.566	13.62	14.413	0.797	3/CS
2	4/CS	90	0.77	0.6	10	116	0.014	0.011	3	5	151	0.013	0.01	4	8		0.022		0.93	2.5	FSIP-6x9	8	0	5/CS	5.4	147	0.151	62	10.383	0.5	375	0.56	1.12	0.13	1	T3/T6	0.016	1.92	0.031	2.36	0.038	0.12	0.013	0.187	1.12	13.155	13.103	13.536	13.523	13.57	14.2	0.627	4/CS
2	5/CS	90	0.77	0.6	10	116	0.099	0.075	24	5	151	0.094	0.072	30	51		0.075		0.5	2.5	FSIP-6x9	51	0	6/CS	5.38	147	0.222	111	6.074	0.5	375	1.01	1.34	0.45	1	T3/T6	0.052	1.83	0.095	2.45	0.127	0.31	0.021	0.278	1.27	13.083	13.053	13.428	13.409	13.56	13.947	0.392	5/CS
2	6/CS	90	0.77	0.6	10	116	0.091	0.069	22	5	151	0.086	0.066	28	28		0.05		0.5	2.5	FSIP-6x9	28	0	CH4/DA	5.43	147	0.288	138	2.154	0.56	375	1.25					0.08	1	0.08		0.08	1.59	0.015	0.331	1.34	13.033	13.021	13.329	13.295	13.41	13.947	0.538	6/CS
2	OUT/CS	0					0	0	0			0	0	0	0					9.37	HW outlet	0	0		5.45	147	0.288	138	2.13	1.82	T4200B1000x400	0.13					0.001	1	0.001		0.001	-0.24	0.001	0.07	1.54	12.992	12.953	13.159	13.164	13.16	13.45	0.29	OUT/CS
2	G1/CX	90	0.77	0.6	10	116	0.083	0.063	20	5	151	0.079	0.06	25	25		0		0.53	2.5	SAG MK-S	25	0		5	151	0.06	25	5.555	0.51	375	0.23	1.07	1		G2	0.003	9.7	0.026		0.026	0.01	0.002	0.115	0.89	12.895	12.867	13.132	13.131	13.16	14.211	1.053	G1/CX
2	1/CX	0																			MH1050				5.05	151	0.108	66	24.456	0.5	375	0.6	1.12	0	1	T6/T9	0.018	2.22	0.04	2.52	0.046	0.09	0.039	0.195	1.14	12.842	12.72	13.091	13.069	13.14	14.264	1.127	1/CX
2	G1/CY	90	0.77	0.6	10	116	0.066	0.05	16	5	151	0.062	0.048	20	41		0.001		0.53	2.5	SAG MK-S	41	0	G1/CX	5	151	0.048	41	3.007	0.54	375	0.37	1.18	1		G2	0.007	9.7	0.067		0.067	0.02	0.003	0.145	1.03	12.895	12.879	13.132	13.131	13.2	14.211	1.012	G1/CY
2	G12/D	80	0.77	0.6	10	116	0.155	0.114	37	5	151	0.139	0.105	44	44	1.739	0.065	0.06	2.54	3	GULLY BK-S	44	0	G13/D	5	151	0.105	44	2.4	1	450	0.28	1.06	1		G1	0.004	7	0.027		0.027	1.99	0.014	0.12	1.3	15.443	15.419	15.586	15.538	15.61	16.731	1.117	G12/D
2	G13/D	80	0.77	0.6	10	116	0.005	0.004	1	5	151	0.005	0.004	1	1	0.264	0.022	0.01	2.97	3	GULLY BK-S	1	0	G7/D	5.02	151	0.109	45	2.4	1	525	0.21	1	0.03	0.86	T1	0.002	0	0		0	2.01	0.013	0.115	1.29	15.344	15.32	15.483	15.435	15.48	16.663	1.18	G13/D
2	G7/D	80	0.77	0.6	10	116	0.005	0.003	1	5	151	0.004	0.003	1	1	0.252	0.021	0.01	2.82	3	GULLY BK-S	1	0	G8/D	5.04	151	0.112	47	2.4	1	600	0.17	1	0.03	0.88	T1	0.001	0	0		0	2.01	0.012	0.112	1.28	15.245	15.221	15.381	15.333	15.38	16.595	1.214	G7/D
2	G8/D	80	0.77	0.6	10	116	0.004	0.003	1	5	151	0.004	0.003	1	1	0.241	0.02	0.01	2.82	3	GULLY BK-S	1	0	G15/E	5.06	150	0.114	48	16.517	1	825	0.09	1	0.02	0.73	T6/T9	0	2.56	0.001	2.84	0.001	-0.02	0.002	0.103	1.24	14.996	14.832	15.225	15.229	15.23	16.527	1.301	G8/D
2	14/D	0																			MH1500				5.2	149	0.114	47	20.627	0.93	825	0.09	1	0	1	T1/T2	0	0.26	0		0	0	0	0.105	1.2	14.812	14.62	15.229	15.229	15.23	18.124	2.895	14/D
2	CH1/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH2/DA	5	151	0	0	22	0.34	T3400B1000x300	0					0	0	0		0	0	0	0	0	13.279	13.205	13.331	13.331	13.33	13.578	0.247	CH1/DA
2	CH2/DA	0					0	0	0			0	0	0	0					16.5	CHNL auto	0	0	CH3/DA	5.53	146	0.185	75	75.682	0.34	T4200B1000x400	0.08					0	0	0		0	0.22	0.173	0.126	0.4	13.205	12.952	13.331	13.164	13.33	13.605	0.274	CH2/DA
2	CH3/DA	0					0	0	0			0	0	0	0					15.8	CHNL	0	0	CH4/DA	5.7	144	0.466	207	51.924	0.33	T4200B1000x400	0.2					0.002	0	0		0	0.29	0.155	0.212	0.53	12.952	12.778	13.164	13.012	13.16	13.353	0.189	CH3/DA
2	CH4/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH5/DA	6.17	140	0.467	202	11.111	0.34	T4600B1000x450	0.16					0.001	0	0		0	0.16	0.02	0.21	0.52	12.778	12.741	13.012	12.994	13.01	13.227	0.215	CH4/DA
2	CH5/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH6/DA	6.26	139	0.467	201	44.659	0.34	T5800B1200x600	0.13					0.001	0	0		0	0.05	0.027	0.197	0.52	12.741	12.591	12.994	12.972	12.99	13.34	0.346	CH5/DA
2	CH6/DA	0					0	0	0			0	0	0	0						CHNL auto	0	0	CH7/DA	6.63	136	0.865	327	15.495	0.34	T5800B1200x600	0.16					0.001	0	0		0	0.04	0.008	0.253	0.6	12.591	12.539	12.972	12.966	12.97	13.192	0.22	CH6/DA
2	CH7/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH8/DA	6.76	135	0.865	325	6.409	0.34	T6300B1500x600	0.14					0.001	0	0		0	0.02	0.002	0.231	0.58	12.539	12.518	12.966	12.965	12.97	13.139	0.173	CH7/DA
2	CH8/DA	0					0	0	0			0	0	0	0						CHNL auto	0	0	CH9/DA	6.78	135	1.488	583	118.289	0.34	T6300B1500x600	0.25					0.003	0	0		0	0.04	0.057	0.311	0.68	12.518	12.121	12.965	12.912	12.97	13.12	0.155	CH8/DA
2	CH9/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH10/DA	7.76	128	1.488	554	60.012	0.34	T7000B1000x1000	0.14					0.001	0	0		0	0.01	0.004	0.365	0.73	12.121	11.92	12.912	12.909	12.91	13.121	0.209	CH9/DA
2	CH10/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH11/DA	8.26	125	1.488	542	83.219	0.34	T6600B600x1000	0.15					0.001	0	0		0	0.01	0.009	0.407	0.73	11.92	11.641	12.909	12.901	12.91	12.92	0.011	CH10/DA
2	CH11/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH12/DA	8.95	121	1.487	525	54.926	0.34	T9600B600x1500	0.09					0	0	0		0	0	0.001	0.401	0.73	11.641	11.457	12.901	12.9	12.9	13.141	0.24	CH11/DA
2	CH12/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH13/DA	9.48	119	1.492	517	21.506	0.34	T11400B600x1800	0.07					0	0	0		0	0	0	0.398	0.72	11.457	11.385	12.9	12.9	12.9	13.257	0.357	CH12/DA
2	CH13/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH14/DA	9.59	118	1.487	513	9.816	0.35	T11400B600x1800	0.06					0	0	0		0	0	0	0.393	0.73	11.385	11.351	12.9	12.9	12.9	13.185	0.285	CH13/DA
2	CH14/DA	0					0	0	0			0	0	0	0						CHNL	0	0	LOST	9.64	118	1.485	511	38.52	0.34	T11400B600x1800	0.06					0	0	0		0	0	0	0.396	0.72	11.351	11.222	12.9	12.9	12.9	13.151	0.251	CH14/DA
2	OUT/DA																				CHNL																						12.9	13.022			OUT/DA
2	G15/E	80	0.77	0.6	10	116	0.041	0.03	10	5	151	0.036	0.028	12	12	1.061	0.045	0.03	2.35	3	GULLY BK-S	12	0	G3/EA	5	151	0.028	12	5.337	1.01	450	0.07	1.01	1		G2	0	9.7	0.003		0.003	1.21	0.05	0.062	0.88	14.633	14.579	14.705	14.641	14.71	16.023	1.315	G15/E
2	OUT/E																				HW outlet																						14.64	16.053			OUT/E
2	G1/EA	80	0.77	0.6	10	116	0.051	0.038	12	5	151	0.046	0.035	15	15	1	0.042	0.04	6.12	2.5	GULLY BK-M	15	0	G3/EA	5	151	0.035	15	10.015	5.74	375	0.13	1.02	1		G1	0.001	7	0.006		0.006	6.12	0.481	0.048	1.78	14.65	14.075	14.736	14.123	14.74	15.959	1.217	G1/EA
2	2/EA	0																			MH1050				5.08	150	0.035	15	51.141	1.78	375	0.13	1.01	0	1	T9/T10	0.001	2.13	0.002	2.67	0.002	1.23	0.66	0.063	1.18	14.022	13.111	14.107	13.477	14.11	15.497	1.387	2/EA
2	G3/EA	80	0.77	0.6	10	116	0.276	0.204	66	5	151	0.248	0.187	79	79	2.364	0.098	0.08	1.29	3	GULLY BK-S	76	3	G4/EA	5	151	0.219	89	2.4	1	375	0.8	1.48	0.84	1	G1/T1/T3	0.033	5.37	0.177	5.44	0.18	2.23	0.014	0.189	1.59	13.081	13.057	13.299	13.246	13.48	14.537	1.058	G3/EA
2	G4/EA	80	0.77	0.6	10	116	0.004	0.003	1	5	151	0.003	0.002	1	4	0.658	0.037	0.01	0.98	3	GULLY BK-S	4	0	LOST	5.02	151	0.221	93	4.809	0.98	450	0.58	1.1	0.04	0.83	T6/T9	0.017	2.43	0.042	2.53	0.044	0.94	0.047	0.178	1.59	12.982	12.935	13.193	13.148	13.24	14.511	1.274	G4/EA
2	5/EA																				MH1050																						13.15	14.592			5/EA

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK: aa
DESIGN CHECK: aa

STATUS: FOR CONSTRUCTION

APPROVED: LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE:

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

calibre

calibregroup.com

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1

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

DRAWING TITLE: STORMWATER DRAINAGE MINOR CALCULATION TABLES SHEET 3 OF 6

PROJECT No.	DRAWING No.	REVISION
15-003002.01	1432	A

DocuSign Envelope ID: DA2EDAE9-5EC0-4419-A0F9-B6F25A4E31D3

	LOCATION	CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES											PART FULL		DESIGN LEVELS							
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		$V_f^2/2g$	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m		%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m			m	%	m	m	m/s	m	m	m	m	m	m	m	
50	F1/1	90	1	0.8	10	228	0.134	0.131	83	5	290	0.127	0.126	101	101		0.118				FSIP-6x9	101	0		5	290	0.126	101	6.288	0.41	375	0.92	2.82	1		G1	0.025	3.37	0.083		0.083	0.19	0.012	0.277	1.15	13.156	13.13	14.129	14.116	14.2	14.212	0	F1/1
50	G2/1	90	1	0.8	10	228	0.117	0.114	72	5	290	0.111	0.11	88	88	3.02	0.102	0.06	0.5	2.5	GULLY BK-S	88	0		5.05	289	0.235	189	14.765	0.4	375	1.71	2.84	0.47	1	T9/T10	0.149	1.59	0.237	1.97	0.294	1.16	0.171	0.375	1.71	13.11	13.051	13.879	13.708	14.2	14.424	0.251	G2/1
50	3/1	0																			MH1050				5.18	287	0.235	550	112.797	0.83	600	1.94					0.193	1	0.193		0.193	0.83	0.931	0.484	2.25	13.031	12.1	13.515	12.584	13.7	13.95	0.242	3/1
50	OUT/1																				HW outlet																													12.6	12.757		OUT/1
50	1/2	0																			MH1050				5.45	283	0.382	182	13	0.4	525	0.84	2.73	0	1	T1/T3	0.036	0.81	0.029	0.94	0.034	0.18	0.023	0.314	1.35	13.033	12.981	14.432	14.409	14.5	14.527	0.061	1/2
50	2/2	0																			MH1050				5.56	281	0.382	180	79.943	0.4	600	0.64	2.42	0	0.88	T10	0.021	1.78	0.037	2.08	0.043	0.09	0.069	0.287	1.35	12.961	12.642	14.372	14.303	14.4	14.817	0.402	2/2
50	3/2	0																			MH1200				6.21	271	0.442	302	29.037	0.4	600	1.07	2.82	0	1	T3/T6	0.058	1.33	0.077	1.5	0.087	0.24	0.07	0.398	1.52	12.622	12.506	14.226	14.156	14.3	14.451	0.138	3/2
50	4/2	0																			MH1050				6.36	268	0.604	386	22.526	0.4	600	1.36	2.81	0	1	T1/T3	0.095	0.99	0.094	1.17	0.111	0.39	0.089	0.488	1.56	12.486	12.396	14.062	13.973	14.2	14.305	0.132	4/2
50	5/2	0																			MH1350				6.55	265	2.001	1313	73.216	0.4	675	3.67	2.4	0	1	T3/T6	0.117	1.42	0.166	1.6	0.187	0.42	0.304	0.675	3.67	12.376	12.083	13.807	13.503	14	13.994	0	5/2
50	6/2	0																			MH1350				7.16	258	2.178	1433	15.685	0.4	675	4	2.24	0	1	T1/T3	0.497	1.13	0.562	1.28	0.636	1.81	0.276	0.675	4	12.063	12	12.941	12.658	13.6	13.577	0	6/2
50	OUT/2																				HW outlet																													12.7	12.995		OUT/2
50	1/3	0																			MH1050				6.29	269	1.221	599	11.233	0.4	600	2.12	2.74	0	1	T3/T6	0.037	1.38	0.051	1.54	0.058	0.15	0.017	0.6	2.12	12.54	12.495	14.129	14.112	14.2	14.187	0	1/3
50	2/3	0																			MH1200				6.27	270	1.387	941	19.914	0.4	600	3.33	2.75	0	1	T3/T6	0.065	1.32	0.086	1.5	0.098	0.27	0.054	0.6	3.33	12.475	12.396	14.026	13.973	14.1	14.124	0	2/3
50	G1/4	90	1	0.8	10	228	0.064	0.063	40	5	290	0.061	0.06	49	214	3.55	0.135	0.11	0.5	2.5	GULLY BK-S	136	78	G1/6	5	290	0.06	136	2.369	9.03	375	1.23	3.87	1		G1	0.077	2.54	0.196		0.196	0.6	0.014	0.13	4	13.061	12.847	14.317	14.303	14.5	14.551	0.038	G1/4
50	G1/5	90	1	0.8	10	228	0.173	0.169	107	5	290	0.164	0.162	131	131	3.524	0.116	0.08	0.5	2.5	GULLY BK-S	97	34	G1/8	5	290	0.162	97	5.465	0.71	375	0.88	3.68	1		G1	0.04	2.68	0.106		0.106	0.31	0.017	0.222	1.43	12.9	12.861	14.172	14.156	14.3	14.41	0.132	G1/5
50	G1/6	90	1	0.8	10	228	0.112	0.11	70	5	290	0.106	0.105	85	302		0.125			3	SAG BK-S	111	191	G1/7	5	290	0.105	111	2.663	0.41	375	1	4.02	1		G1	0.051	2.44	0.125		0.125	0.4	0.011	0.302	1.16	12.739	12.728	14.123	14.112	14.2	14.248	0	G1/6
50	G1/7	90	1	0.8	10	228	0.072	0.071	45	5	290	0.069	0.068	55	246		0.102			2.5	SAG BK-S	246	0		5	290	0.068	246	5.414	0.41	375	2.23	4.02	1		G1	0.053	2.44	0.13		0.13	0.41	0.022	0.375	2.23	12.755	12.733	14.134	14.112	14.3	14.264	0	G1/7
50	G1/8	90	1	0.8	10	228	0.108	0.105	67	5	290	0.102	0.101	81	115	3.847	0.113	0.07	0.5	2.5	GULLY BK-S	115	0		5	290	0.101	115	10.493	0.4	375	1.04	3.93	1		G1	0.029	2.5	0.072		0.072	0.23	0.024	0.322	1.14	12.125	12.083	13.527	13.503	13.6	13.599	0	G1/8
50	G1/9	90	1	0.8	10	228	0.078	0.077	48	5	290	0.074	0.073	59	59	2.968	0.092	0.05	0.5	2.5	GULLY BK-S	59	0		5	290	0.073	59	7.578	0.4	375	0.54	3.83	1		G1	0.015	2.57	0.038		0.038	0.11	0.009	0.195	1.02	12.113	12.083	13.512	13.503	13.5	13.586	0.037	G1/9
50	22/AA	90	1	0.8	10	228	0.016	0.016	10	5	290	0.015	0.015	12	73		0				SAG BK-S	47	26	LOST	5	290	0.015	47	8.131	0.52	375	0.43	2.44	1		G1	0.009	3.88	0.036		0.036	0.07	0.006	0.159	1.06	15.543	15.501	16.42	16.415	16.5	16.91	0.454	22/AA
50	21/AA	90	1	0.8	10	228	0.081	0.08	50	5	290	0.077	0.076	61	84		0				SAG BK-S	47	37	22/AA	5	290	0.091	94	9.343	0.6	375	0.85	2.52	0.5	1	T3/T6	0.037	1.53	0.057	1.85	0.068	0.29	0.027	0.23	1.32	15.481	15.425	16.358	16.331	16.4	16.914	0.488	21/AA
50	20/AA	0																			MH1800				5.37	284	0.24	1376	18.748	0.53	1200	1.22	1.46	0	0.76	T1/T3	0.075	1.06	0.08	1.27	0.096	0.12	0.023	0.588	2.5	14.6	14.5	16.251	16.228	16.3	17.653	1.306	20/AA
50	19/AA	0																			MH2100				5.53	282	0.24	1374	13.636	0.59	1200	1.21	1.46	0	1	T5/T8	0.075	1.28	0.096	1.34	0.101	0.12	0.017	0.572	2.59	14.48	14.4	16.132	16.115	16.2	17.673	1.44	19/AA
50	18/AA	0																			MH2100				5.64	280	0.24	1373	35.368	0.59	1200	1.21	1.45	0	1	T1/T2	0.075	0.25	0.019		0.019	0.12	0.044	0.569	2.6	14.38	14.17	16.096	16.052	16.1	18.533	2.418	18/AA
50	17/AA	0																			MH1800				5.93	275	0.24	1370	12.161	0.66	1200	1.21	1.59	0	1	T2/T5	0.075	0.54	0.041		0.041	0.12	0.015	0.552	2.7	14.15	14.07	16.011	15.996	16.1	18.503	2.451	17/AA
50	16/AA	0																			MH1800				6.04	273	0.24	1369	32.182	1.15	1200	1.21	1.62	0	1	T2/T5	0.075	0.61	0.045		0.045	0.12	0.04	0.473	3.31	14.05	13.68	15.951	15.912	16	17.974	1.978	16/AA
50	15/AA	0																			MH1800				6.3	269	0.357	1720	51	0.86	1200	1.52	1.9	0	1	T1/T3	0.118	1.37	0.162	1.58	0.187	0.19	0.099	0.582	3.16	13.66	13.22	15.75	15.65	15.9	16.702	0.766	15/AA
50	14/AA	0																			MH1800				6.73	263	0.357	1714	19.016	0.68	1350	1.2	1.82	0	0.89	T5/T8	0.073	0.53	0.039	0.56	0.041	0.1	0.02	0.584	2.89	13.2	13.07	15.612	15.592	15.7	15.798	0.146	14/AA
50	13/AA	0																			MH1800				6.89	261	0.357	1712	20.943	0.57	1350	1.2	1.88	0	1	T2/T5	0.073	0.69	0.05		0.05	0.1	0.022	0.613	2.71	13.05	12.93	15.542	15.52	15.6	15.701	0.109	13/AA
50	12/AA	0																			MH2100				7.06	259	0.531	2053	17.172	0.52	1350	1.43	1.94	0	1	T3/T6	0.063	1.75	0.11	1.94	0.122	0.09	0.015	0.7	2.74	12.91	12.82	15.41	15.395	15.5	15.595	0.063	12/AA
50	11/AA	0																			MH2100				7.2	258	0.531	2051	25.371	0.45	1350	1.43	1.93	0	1	T5/T8	0.105	1.11	0.116	1.14	0.12	0.15	0.037	0.731	2.59	12.8	12.685	15.279	15.242	15.4	15.503	0.104	11/AA
50	10/AA	0																			MH2100				7.42	255	0.531	2047	24.539	0.25	1350	1.43	1.91	0	1	T1/T2	0.104	0.21	0.022		0.022	0.15	0.036	0.886	2.06	12.665	12.604	15.22	15.184	15.2	15.351	0.109	10/AA
50	9/AA	0																			MH2100				7.58	253	0.7	2100	13.666	0.2	1350	1.47	1.94	0	1	T3/T6	0.109	1.7	0.185	1.9	0.207	0.15	0.021	0.983	1.88	12.584	12.556	14.999	14.978	15.2	15.289	0.083	9/AA
50	8/AA	0																			MH				7.69	252	0.7	3140	51.548	0.2	1500	1.78	1.63	0	1	T2/T5	0.161	0.65	0.104		0.104	0.2	0.102	1.22	2.04	12.536	12.433	14.874	14.772	15	15.405	0.427	8/AA
50	7/AA	0																			MH2100				7.87	250	0.802	3192	17.264	0.2	1500	1.81	1.58	0	1	T1/T3	0.166	0.43	0.072	0.49	0.081	0.2	0.035	1.243	2.04	12.413	12.379	14.7	14.665	14.8	15.147	0.366	7/AA
50	6/AA	0																			MH				7.03	260	1.578	4144	58.87	0.2	(2x)1350	1.45	1.72	0	0.9	T1/T3	0.107	1.21	0.129	1.38	0.147	0.15	0.089	0.972	1.88	12.359	12.241	14.536	14.447	14.7	15.081	0.398	6/AA
50	5/AA	0																			MH				7.52	254	1.637	4368	22.305	0.2	(2x)1350	1.53	1.67	0	1	T1/T3	0.119	1.29	0.153	1.52	0.181	0.17	0.037	1.016	1.89	12.221	12.176	14.294	14.257	14.5	14.601	0.126	5/AA
50	4/AA	0																			MH				7.3	256	1.695	4420	16.122	0.25	(2x)1350	1.54	1.56	0	1	T1/T3	0.122	0.38	0.047	0.43	0.052	0.17	0.028	0.937	2.08	12.156	12.116	14.21	14.183	14.3	14.382	0.12	4/AA
50	3/AA	0																			MH				9.12	236	2.522	4413	58.472	0.2	(2x)1350	1.54	2.49	0	1	T9/T10	0.028	1.89	0.052	2.04	0.056	0.04	0.023	1.025	1.89	10.822	10.705	14.131	14.108	14.2	14.328	0.141	3/AA
50	2/AA	0					0	0	0			0	0	0	0				0.5	1	MH	-1071	1071	1/AA	9.61	231	2.522	4345	137.788	0.2	(2x)1350	1.52	2.53	0	1	T1/T3	0.118	0.6	0.071	0.67	0.079	0.17	0.228	1.011	1.89	10.685	10.409	14.028	13.8	14.1	14.108	0.001	2/AA
50	1/AA	0					0	0	0			0	0	0	1071				0.5	1	MH	500	571	LOST	10.75	222	2.522	4780	57.645	0.24	(2x)1350	1.67	2.55	0.1	1	T1/T3	0.142	1.3	0.185	1.5	0.214	0.2	0.115	1.012	2.08	10.389	10.25	13.615	13.5	13.8	14.339	0.509	1/AA
50	OUT/AA																				HW outlet																													13.5	13.814		OUT/AA
50	1/AB	99	1	0.8	10	228	0.08	0.08	51	5	290	0.08	0.08	64	13	2.617	0.033	0.01	0.5	2.5	F1-6x9 on-grade	10	3	2/AB	5	290	0.08	61	13.2	0.5	375	0.55	3.96	1		G1	0.016	2.48	0.038		0.038	0.12	0.016	0.186	1.12	14.145	14.079	15.591	15.575	15.6	15.652	0.023	1/AB
50	2/AB	99	1	0.8	10	228	0.075	0.075	48	5	290	0.075	0.075	60	26	3.405	0.043	0.02	0.5	2.5	F1-6x9 on-grade	0	26	3/AB	5.11	288	0.154	106	13.2	0.5	375	0.96	4.04	0	1	T1	0.047	0.2	0.01		0.01	0.37	0.048	0.267	1.26	14.059	13.993	15.565	15.517	15.6	15.586	0.011	2/AB
50	3/AB	99	1	0.8	10	228	0.075	0.075	48	5	290	0.075	0.075	60	48	4.28	0.053	0.02	0.5	2.5	F1-6x9 on-grade	27	21	4/AB	5.22	286	0.229	178	13.2	0.5	450	1.12	3.55	0.2	0.83	T1	0.064	0.21	0.013		0.013	0.39	0.051	0.329	1.43	13.918	13.852	15.503	15.452	15.5	15.519	0.002	3/AB
50	4/AB	99	1	0.8	10	228	0.082	0.082	52	5	290	0.082	0.082	66	0				0.5	2.5	F1-6x9 on-grade	-27	27	5/AB	5.22	286	0.309	244	11.45	0.5	450	1.54	3.6	0	1	T1	0.12	0.2	0.024		0.024	0.73	0.084	0.45	1.54	13.832	13.775	15.428	15.344	15.5	15.452	0	4/AB
50	5/AB	97	1	0.8	10	228	0.025	0.025	16	5	290	0.024	0.024	20	0				2.5	2.5	F1-6x9 on-grade	-156	156	6/AB	5.32	285	0.385	183	13.5	0.5	450	1.15	3.52	0	1	T9/T10	0.067	1.72	0.116	2.04	0.137	0.41	0.055	0.336	1.44	13.755	13.687	15.2	15.145	15.3	15.344	0.006	5/AB
50	6/AB	96	1	0.8	10	228	0.036	0.036	23	5	290	0.036	0.036	29	172	7.686	0.085	0.05	0.6	2.5	F1-6x9 on-grade	79	93	7/AB	5.43	283	0.421	274	13.5	0.75	450	1.72	3.28	0.3	1	T1	0.151	0.96	0.145		0.145	0.92	0.124	0.45	1.72	13.667	13.566	15	14.876	15.1	15.263	0.118	6/AB
50	7/AB	96	1	0.8	10	228	0.022	0.021	14	5	290	0.021	0.021	17	103		0.03		2.67	2.5	FSIP-6x9	13	90	G1/AP	5.54	281	0.442	294	9.5	1	525	1.36	2.64	0.05	0.86	T1	0.094	-0.27	-0.026		-0.026	0.47	0.044	0.319	2.14	13.491	13.396	14.902	14.857	14.9	15.059	0.183	7/AB
50	8/AB	0																			MH1200				5.62	280	0.442	293	14.405	1.21	600	1.04	2.58	0	0.88	T10	0.035	1.75	0.062	2.02	0.072	0.15	0.021	0.276	2.3	13.321	13.147	14.795	14.774	14.9	14.867	0	8/AB
50	9/AB	0																			MH1350				5.63	280	0.588	496	17.612	0.5	750	1.12	2.37	0	1	T2/T4	0.001	0.43	0		0	0	0	0.432	1.88	12.997	12.909	14.774	14.773	14.8	14.806	0.032	9/AB
50	10/AB	0																			MH1350				5.78	278	0.588	492	60.823	0.5	750	1.11	2.51	0	1	T8/T10	0.009	1.57	0.014	1.66	0.015	0.03	0.017	0.43	1.88	12.889	12.585	14.759	14.743	14.8	15.079	0.305	10/AB
50	11/AB	0																			MH1350				6.28	269	0.751	615	14.648	0.44	750	1.39	2.9	0	1	T2/T4	0.099	0.33	0.033		0.033	0.3	0.045	0.521	1.88	12.565	12.5	14.71	14.665	14.7	14.779	0.036	11/AB
50	1/AC	98	1	0.8	10	228	0.03	0.03	19	5	290	0.03	0.03	24	24	3.058	0.038	0.02	0.74	2.5	F1-6x9 on-grade	18	6	2/AC	5	290	0.03	18	11.2	0.55	375	0.16	3.22	1		G1	0.001	3	0.004		0.004	0.01	0.001	0.094	0.83	14.152	14.09	15.356	15.355	15.4	15.481	0.121	1/AC
50	2/AC	97	1	0.8	10	228	0.022	0.022	14	5	290	0.022	0.022	18	23	3.038	0.038	0.02	0.74	2.5	F1-6x9 on-grade	18	6	5/AB	5.09	289	0.052	36	8.9	2.7	375	0.32	3.43	0.5	1	T1	0.005	1.29	0.007		0.007	0.04	0.004	0.089	1.78	14.07	13.83	15.348	15.344	15.4	15.399	0.044	2/AC
50	G1/AD	90	1	0.8	10	228	0.103	0.101	64	5	290	0.098	0.097	78	521		0.125		0.8	2.62	SAG BK-S	28	493	2/AA	5	290	0.097	28	6.668	4.17	525	0.13	2.64	1		G2	0.001	4.59	0.004		0.004	0	0	0.064	1.85	12.8	12.522	14.183	14.183	14.2	14.187	0	G1/AD
50	G1/AE	90	1	0.8	10	228	0.093	0.091	58	5	290	0.089	0.088	71	71	3.472	0.081	0.05	1.02	2.5	GULLY BK-M	70	1	4/AZ	5	290	0.088	70	3.325	0.92	375	0.63	3.5	1		G2	0.02	3.26	0.066		0.066	0.16	0.005	0.169	1.45	13.016	12.985	14.262	14.257	14.3	14.328	0	G1/AE
50	F1/AF	5	1	0.8	16	188	1.392	1.125	587	16	188	1.392	1.125	587	587		0.2				1050 MH with 9x9 Grate	185	403	G1/AD	16	188	1.125	185	20.91	1.85	450	1.16	6.73	1		G1	0.069	1.83	0.126		0.126	0.42	0.088	0.219	2.41	11.41	11.024	14.311	14.223	14.4	14.437	0	F1/AF
50	2/AF	0																			MH1050				16.17	187	1.125	183	6.177	2.63	450	1.15	7.17	0	1	T10	0.021	1.52	0.033	1.92	0.041	0.13	0.008	0.197	2.73	11.004	10.842	14.191	14.183	14.2	14.232	0	2/AF
50	G1/AG	90	1	0.8	10	228	0.062	0.06	38	5	290	0.058	0.058	47	0				1	2.5	GULLY BK-M	-39	39	G1/AD	5	290	0.058	255	4.736	1.39	375	2.31					0.272	0	0		0	2.11	0.1	0.375	2.31	13.261	13.195	14.547	14.447	14.5	14.551	0.004	G1/AG
50	G1/AH	90	1	0.8	10	228	0.074	0.072	46	5	290	0.07	0.07	56	0				0.02	2.48	GULLY BK-M	-53	53	G1/AG	5	290	0.07	373	8.261	2.03	375	3.37					0.581	0	0		0	4.51	0.373	0.375	3.37	13.731	13.563	15.038	14.665	15	15.046	0.008	G1/AH
50	G1/AJ	90	1	0.8	10	228	0.115	0.112	71	5	290	0.109	0.108	87	87	3.455	0.103	0.06	0.5	2.5	GULLY BK-S	73	14	G1/AM	5	290	0.108	73	2.699	1.88	375	0.66	2.92	1		G2	0.022	3.97	0.088		0.088	0.17	0.005	0.142	1.91	13.768	13.717	14.777	14.772	14.9	15.111	0.246	G1/AJ
50	G1/AK	90	1	0.8	10	228	0.082	0.08	51	5	290	0.078	0.077	62	89		0.1		12.98	-24.89	SAG BK-S	34	55	G1/AL	5	290	0.077	34	6.316	1.94	375	0.31	3.3	1		G2	0.005	3.48	0.017		0.017	0.04	0.002	0.095	1.56	13.967	13.844	15.186	15.184	15.2	15.206	0.002	G1/AK
50	G1/AL	90	1	0.8	10	228	0.096	0.094	59	5	290	0.091	0.09	72	213		0.11		15.54	2.5	SAG BK-S	38	175	G1/AH	5	290	0.09	38	5.183	1.83	375	0.34	3.38	1		G2	0.006	3.39	0.02		0.02	0.05	0.002	0.101	1.57	13.939	13.844	15.186	15.184	15.2	15.207	0.001	G1/AL
50	G1/AM	90	1	0.8	10	228	0.079	0.077	49	5	290	0.075	0.074	60	74		0.08		0.45	2.5	SAG BK-M	2	72	G1/AN	5	290	0.074	2	5.792	2	375	0.02	3.5	1		G2	0	3.26	0		0	0	0	0.022	0.65	13.431	13.315	14.743	14.743	14.7	14.748	0.005	G1/AM
50	G1/AN	90	1	0.8	10	228	0.093	0.091	58	5	290	0.089	0.088	71	142		0.051		0.45	2.5	SAG BK-M	142	0		5	290	0.088	142	2.044	3.23	375	1.29	3.51	1		G2	0.002	3.25	0.005		0.005	0.01	0	0.177	2.78	13.431	13.365	14.743	14.743	14.7	14.748	0	G1/AN
50	G1/AP	90	1	0.8	10	228	0.081	0.079	50	5	290	0.077	0.076	61	152		0.125		0.45	2.5	SAG BK-S	3	149	G1/AQ	5	290	0.076	3	2.044	1.92	450	0.02	2.64	1		G2	0	4.59	0		0	0	0	0.026	0.7	13.586	13.547	14.774	14.774	14.8	14.774	0	G1/AP
50	G1/AQ	90	1	0.8	10	228	0.077	0.075	48	5	290	0.073	0.072	58	207		0.092		0.45	2.5	SAG BK-S	207	0		5	290	0.072	207	4.813	1.99	450	1.3	3	1		G2	0	3.8	0		0	0	0	0.229	2.55	13.425	13.329	14.774	14.774	14.8	14.774	0	G1/AQ
50	IN/AR	0					0	0	0			0	0	0	0		0				1050 MH with 9x9 Grate	0	0		5	290	0	543	8.192	0.61	675	1.52					0.117	0	0		0	0.42	0.034	0.468	2.05	11	10.95	14.409	14.375	14.4	14.5	0.091	IN/AR
50	1/AR	0																			MH1050				5.07	289	0	543	40.261	0.5	675	1.52	5.13	0	1	T1/T3	0.117	0.84	0.099	1.01	0.119	0.42	0.168	0.508	1.88	10.93	10.73	14.276	14.108	14.4	15.039	0.644	1/AR
50	2/AS	0					0	0	0			0	0	0	0		0				1050 MH with 9x9 Grate	0	0		5.09	289	0	1042	18.474	0.2	1050	1.2					0.074	0	0		0	0.15	0.027	0.746	1.58	12.764	12.727	15.075	15.048	15.1	15.1	0.025	2/AS
50	1/AS	0																			MH1800				5.25	286	0	1042	75.675	0.2	1050	1.2	2.23	0	1	T6/T9	0.021	1.91	0.039	2.19	0.045	0.04	0.031	0.746	1.58	12.707	12.556	15.009	14.978	15.1	15.054	0	1/AS
50	G1/AU	90	1	0.8	10	228	0.051	0.05	31	5	290	0.048	0.048	38	38	1.669	0.059	0.06	3.92	2.5	GULLY BK-S	38	0	G1/AW	5	290	0.048	149	2.589	5.14	450	0.94	1.97	1		G2	0.045	7.16	0.321		0.321	0.27	0.007	0.147	3.3	15.354	15.22	15.919	15.912	16.2	16.681	0.441	G1/AU
50	G1/AV	90	1	0.8	10	228	0.073	0.071	45	5	290	0.069	0.069	55	55	1.937	0.065	0.07	3.92	2.5	GULLY BK-S	49	6	G1/AX	5	290	0.069	211	4.482	2.97	450	1.33	2.36	1		G2	0.09	5.47	0.49		0.49	0.55	0.024	0.206	2.97	15.362	15.229	15.936	15.912	16.4	16.681	0.255	G1/AV
50	G1/AW	90	1	0.8	10	228	0.097	0.095	60	5	290	0.092	0.091	74	0				0.51	2.5	GULLY BK-S	-27	27	G1/AK	5	290	0.091	208	4.145	2.41	450	1.31					0.088	0	0		0	0.53	0.022	0.217	2.74	14.218	14.118	15.542	15.52	15.5	15.544	0.002	G1/AW
50	G1/AX	90	1	0.8	10	228	0.085	0.083	53	5	290	0.08	0.08	64	0				0.51	2.5	GULLY BK-S	-86	86	G1/AL	5	290	0.08	147	4.274	2.04	450	0.92					0.044	0	0		0	0.27	0.011	0.187	2.35	14.22	14.133	15.532	15.52	15.5	15.532	0	G1/AX
50	1/AY	0																			MH1500				5	290	0	0	11.159	0.25	900	0					0	0	0		0	0	0	0	0	12.812	12.784	15.075	15.075	15.1	15.1	0.025	1/AY
50	IN/AZ	0					0	0	0			0	0	0	0						HW inlet	0	0		5	290	0	534	4.821	0.44	(2x)1350	0.19	1.03			Outlet Control	0.002	1.5	0.003		0.003	0	0	0.251	1.45	12.137	12.116	13.523	13.523	13.5	14.292	0.766	IN/AZ
50	4/AZ	0					0	0	0			0	0	0	1	0.254	0.021	0.01			MH	0	1	G1/AD	5.04	289	0	534	17.717	0.22	600	1.89	2.41	0	1	T1/T3	0.182	0.95	0.172	1.06	0.194	0.76	0.134	0.6	1.89	12.096	12.057	13.351	13.217	13.5	14.178	0.633	4/AZ
50	3/AZ1	0																			MH1050				16.25	187	1.194	792	7.78	0.22	600	2.8	2.04	0	1	T1/T3	0.4	1.16	0.466	1.32	0.527	2.02	0.128	0.6	2.8	12.057	12.04	12.752	12.595	13.3	14.635	1.356	3/AZ1
50	OUT/AZ																				HW outlet																													12.6	12.695		OUT/AZ
50	F1/AZ1	20	1	0.8	16	188	1.424	1.194	623	16	188	1.424	1.194	623	623		0.2				RSIP-9x9	262	362	LOST	16	188	1.194	262	20.415	0.51	450	1.64	3.8	1		G1	0.138	2.59	0.357		0.357	0.84	0.172	0.45	1.64	12.252	12.148	13.607	13.435	14	13.979	0.015	F1/AZ1

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK
aa

DESIGN CHECK
aa

STATUS
FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

calibre
©
calibregroup.com

PROJECT
CARSELDINE URBAN VILLAGE
STAGE 1

DRAWING TITLE
STORMWATER DRAINAGE MAJOR
CALCULATION TABLES
SHEET 4 OF 6

PROJECT No. 15-003002.01
DRAWING No. 1433
REVISION A

DocuSign Envelope ID: DA2EDAE9-5EC0-4419-A0F9-B6F25A4E31D3

	LOCATION	CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES											PART FULL		DESIGN LEVELS							
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		Vf2/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m		%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m			m	%	m	m	m/s	m	m	m	m	m	m	m	
50	2/AZ1	0																			MH1050				16.17	187	1.194	259	10.098	0.51	450	1.63	2.97	0	1	T1/T3	0.136	0.99	0.134	1.2	0.163	0.83	0.083	0.45	1.63	12.128	12.077	13.301	13.217	13.5	14.398	0.935	2/AZ1
50	1/BA	100	1	0.8	10	228	0.058	0.057	36	5	290	0.057	0.057	46	31	3.554	0.044	0.02	0.4	2.5	F1-6x9 on-grade	24	7	2/BA	5	290	0.057	39	11.2	0.5	375	0.35	3.33	1		G1	0.006	2.92	0.018		0.018	0.05	0.005	0.144	0.99	13.969	13.913	15.198	15.193	15.2	15.287	0.07	1/BA
50	2/BA	98	1	0.8	10	228	0.042	0.041	26	5	290	0.041	0.041	33	29	3.33	0.042	0.02	0.67	2.5	F1-6x9 on-grade	22	7	3/BA	5.09	289	0.099	75	9.2	0.5	375	0.68	3.48	0.36	1	T1	0.024	1.06	0.025		0.025	0.18	0.017	0.211	1.18	13.888	13.842	15.168	15.151	15.2	15.212	0.019	2/BA
50	3/BA	99	1	0.8	10	228	0.047	0.047	30	5	290	0.047	0.047	38	36	3.613	0.045	0.02	0.67	2.5	F1-6x9 on-grade	19	16	4/BA	5.17	287	0.145	105	10.9	0.5	375	0.96	3.56	0.2	1	T1	0.046	0.73	0.034		0.034	0.36	0.039	0.266	1.26	13.817	13.763	15.117	15.078	15.2	15.151	0	3/BA
50	4/BA	98	1	0.8	10	228	0.036	0.036	23	5	290	0.035	0.035	29	0				0.67	2.5	F1-6x9 on-grade	-29	29	5/BA	5.26	286	0.181	123	6.79	0.5	375	1.11	3.57	0	1	T1	0.063	0.2	0.013		0.013	0.49	0.033	0.305	1.28	13.738	13.704	15.065	15.032	15.1	15.078	0	4/BA
50	5/BA	98	1	0.8	10	228	0.026	0.026	16	5	290	0.025	0.025	20	41		0.03		0.67	2.5	FSIP-6x9	-7	48	6/BA	5.32	285	0.206	125	8.887	0.5	375	1.13	3.6	0	1	T1	0.065	0.2	0.013		0.013	0.51	0.045	0.311	1.28	13.679	13.634	15.017	14.972	15	15.032	0.002	5/BA
50	6/BA	98	1	0.8	10	228	0.036	0.036	23	5	290	0.036	0.036	29	0				0.67	2.5	F1-6x9 on-grade	-153	153	G1/CH	5.3	285	0.241	48	29.597	0.5	375	0.43	3.63	0	1	T1	0.01	0.2	0.002		0.002	0.07	0.022	0.161	1.05	13.609	13.461	14.967	14.945	15	14.972	0.003	6/BA
50	7/BA	100	1	0.8	10	228	0.054	0.054	34	5	290	0.054	0.054	44	17	3.433	0.043	0.01	-0.02	2.5	F1-6x9 on-grade	0	17	8/BA	5.54	281	0.295	77	10.626	0.5	375	0.69	4.02	0	1	T1	0.025	0.2	0.005		0.005	0.19	0.02	0.213	1.18	13.436	13.383	14.94	14.92	14.9	15.031	0.086	7/BA
50	8/BA	98	1	0.8	10	228	0.04	0.04	25	5	290	0.04	0.04	32	43	3.7	0.046	0.02	0.85	2.5	F1-6x9 on-grade	32	11	9/BA	5.63	280	0.335	118	11.2	0.5	375	1.07	4.17	0.29	1	T1	0.058	0.89	0.052		0.052	0.45	0.051	0.293	1.28	13.358	13.302	14.868	14.817	14.9	14.956	0.036	8/BA
50	9/BA	99	1	0.8	10	228	0.06	0.06	38	5	290	0.06	0.06	48	39	3.577	0.045	0.02	0.85	2.5	F1-6x9 on-grade	29	10	10/BA	5.65	280	0.393	166	10.348	0.4	450	1.04	3.42	0.2	0.83	T1	0.056	0.18	0.01		0.01	0.34	0.035	0.34	1.29	13.277	13.236	14.807	14.772	14.8	14.86	0.043	9/BA
50	10/BA	97	1	0.8	10	228	0.022	0.022	14	5	290	0.021	0.021	17	19	2.748	0.034	0.01	0.85	2.5	F1-6x9 on-grade	12	8	11/BA	5.74	278	0.415	188	6.452	0.4	450	1.18	3.47	0.07	1	T1	0.071	0.39	0.027		0.027	0.43	0.028	0.387	1.29	13.211	13.185	14.745	14.717	14.8	14.772	0	10/BA
50	11/BA	99	1	0.8	10	228	0.035	0.035	22	5	290	0.035	0.035	28	0				0.85	2.5	F1-6x9 on-grade	-11	11	12/BA	5.79	277	0.449	211	4.748	0.4	450	1.33	2.96	0	1	T1	0.09	0.2	0.018		0.018	0.55	0.026	0.45	1.33	13.16	13.141	14.473	14.447	14.5	14.717	0.226	11/BA
50	12/BA	99	1	0.8	10	228	0.033	0.033	21	5	290	0.032	0.032	26	8	1.934	0.024	0.01	0.85	2.5	F1-6x9 on-grade	6	2	13/BA	5.83	277	0.482	249	6.452	0.4	450	1.57	2.96	0.03	1	T1	0.125	0.28	0.035		0.035	0.76	0.049	0.45	1.57	13.116	13.09	14.412	14.363	14.4	14.676	0.229	12/BA
50	13/BA	98	1	0.8	10	228	0.023	0.023	15	5	290	0.023	0.023	18	26	3.086	0.039	0.02	0.85	2.5	F1-6x9 on-grade	0	26	14/BA	5.88	276	0.505	247	9.929	0.4	525	1.14	2.47	0	0.86	T1	0.066	-0.49	-0.032		-0.032	0.33	0.033	0.392	1.42	13.065	13.025	14.395	14.363	14.4	14.621	0.258	13/BA
50	14/BA	98	1	0.8	10	228	0.03	0.03	19	5	290	0.03	0.029	24	50		0		0.85	2.5	FSIP-6x9	0	50	G1/CY	5.88	276	0.531	244	12.698	0.4	525	1.13	2.6	0	1	T1	0.065	0.2	0.013		0.013	0.32	0.041	0.388	1.42	13	12.949	14.35	14.309	14.4	14.537	0.174	14/BA
50	15/BA	0																			MH1050				5.98	274	0.531	242	33.206	0.4	600	0.85	2.33	0	0.88	T6/T9	0.037	1.9	0.071	2.32	0.086	0.15	0.051	0.343	1.45	12.924	12.792	14.238	14.187	14.3	14.331	0.007	15/BA
50	16/BA	0																			MH1050				6.13	272	0.857	331	35.261	0.5	675	0.92	2.14	0	1	T3/T6	0.002	1.53	0.003	1.73	0.004	0.01	0.003	0.36	1.71	12.74	12.564	14.183	14.181	14.2	14.352	0.165	16/BA
50	1/BB	99	1	0.8	10	228	0.054	0.054	34	5	290	0.054	0.054	43	28	4.871	0.061	0.01	-0.15	2.5	F1-6x9 on-grade	0	28	2/BB	5	290	0.054	15	10.9	0.5	375	0.14					0.001	0	0		0	0.01	0.001	0.088	0.76	13.813	13.759	14.963	14.962	15	15.123	0.16	1/BB
50	2/BB	97	1	0.8	10	228	0.022	0.022	14	5	290	0.022	0.022	18	34	3.471	0.043	0.02	0.76	2.5	F1-6x9 on-grade	25	9	3/BB	5.09	289	0.076	55	2.3	0.5	375	0.5	3.28	0.63	1	G1/T1	0.013	1.73	0.022		0.022	0.1	0.002	0.175	1.09	13.734	13.722	14.941	14.938	15	15.065	0.103	2/BB
50	3/BB	99	1	0.8	10	228	0.02	0.02	13	5	290	0.02	0.02	16	25	3.081	0.039	0.02	0.76	2.5	F1-6x9 on-grade	18	6	4/BB	5.11	288	0.096	73	6.9	0.5	375	0.66	3.31	0.25	1	T1	0.022	0.85	0.019		0.019	0.17	0.012	0.207	1.17	13.697	13.663	14.919	14.907	14.9	15.047	0.109	3/BB
50	4/BB	98	1	0.8	10	228	0.023	0.023	14	5	290	0.023	0.023	18	25	3.075	0.038	0.02	0.76	2.5	F1-6x9 on-grade	18	6	5/BB	5.17	287	0.118	91	2.3	0.5	375	0.82	3.39	0.2	1	T1	0.035	0.73	0.025		0.025	0.27	0.006	0.239	1.23	13.638	13.626	14.882	14.876	14.9	14.994	0.087	4/BB
50	5/BB	99	1	0.8	10	228	0.017	0.017	11	5	290	0.017	0.017	13	20	2.829	0.035	0.01	0.76	2.5	F1-6x9 on-grade	15	5	6/BB	5.19	287	0.135	105	8.9	0.5	375	0.95	3.4	0.14	1	T1	0.046	0.58	0.027		0.027	0.36	0.032	0.266	1.26	13.601	13.557	14.849	14.817	14.9	14.977	0.101	5/BB
50	6/BB	97	1	0.8	10	228	0.021	0.021	13	5	290	0.021	0.021	17	22		0		0.76	2.5	FSIP-6x9	0	22	7/BB	5.26	286	0.155	105	2.3	0.5	375	0.95	3.43	0	1	T1	0.046	0.2	0.009		0.009	0.36	0.008	0.264	1.26	13.532	13.52	14.808	14.799	14.8	14.909	0.092	6/BB
50	7/BB	99	1	0.8	10	228	0.023	0.023	15	5	290	0.023	0.023	19	40	3.701	0.046	0.02	0.76	2.5	F1-6x9 on-grade	30	11	8/BB	5.28	286	0.179	134	6.9	0.5	375	1.22	3.48	0.22	1	T1	0.075	0.78	0.058		0.058	0.59	0.04	0.375	1.22	13.495	13.461	14.741	14.701	14.8	14.891	0.092	7/BB
50	8/BB	99	1	0.8	10	228	0.039	0.039	25	5	290	0.039	0.039	31	42		0.03		0.76	2.5	FSIP-6x9	13	29	8A/BB	5.25	286	0.217	146	6.46	0.5	375	1.32	3.37	0.09	1	T1	0.09	0.45	0.04		0.04	0.7	0.045	0.375	1.32	13.436	13.403	14.66	14.616	14.7	14.839	0.138	8/BB
50	8A/BB	90	1	0.8	10	228	0.006	0.005	3	5	290	0.005	0.005	4	33		0		0.76	2.5	FSIP-6x9	0	33	G1/BD	5.3	285	0.222	146	12.14	0.5	375	1.32	3.3	0	1	T1	0.089	0.2	0.018		0.018	0.69	0.084	0.375	1.32	13.378	13.318	14.598	14.514	14.6	14.789	0.173	8A/BB
50	9/BB	0																			MH1050				5.4	284	0.222	145	15.25	0.5	525	0.67	2.6	0	0.71	T10	0.023	1.54	0.035	2.34	0.053	0.11	0.017	0.255	1.39	13.168	13.091	14.479	14.462	14.5	14.59	0.058	9/BB
50	G1/BD	90	1	0.8	10	228	0.11	0.108	68	5	290	0.105	0.103	83	161		0.067		0.55	2.5	SAG BK-S	25	136	G1/BE	5	290	0.103	25	4.542	0.67	450	0.16	3.04	1		G2	0.001	3.76	0.005		0.005	0.01	0	0.1	0.96	13.099	13.069	14.462	14.462	14.5	14.479	0.012	G1/BD
50	G1/BE	90	1	0.8	10	228	0.061	0.059	38	5	290	0.058	0.057	46	182		0.067		0.55	2.5	SAG BK-S	17	165	G1/4	5	290	0.057	17	2.844	0.67	450	0.11	3.04	1		G2	0.001	3.75	0.002		0.002	0	0	0.082	0.85	13.095	13.076	14.462	14.462	14.5	14.479	0.015	G1/BE
50	1/BF	100					0.049	0.049	39			0.049	0.049	39	-1				-0.15	2.5	F1-6x9 on-grade	-1	0	2/BF	5	290	0.049	39	12.1	0.5	375	0.35					0.006	0	0		0	0.05	0.006	0.145	0.99	13.538	13.477	14.793	14.787	14.8	14.849	0.056	1/BF
50	2/BF	98	1	0.8	10	228	0.046	0.046	29	5	290	0.046	0.046	37	14	2.632	0.033	0.01	0.55	2.5	F1-6x9 on-grade	10	3	3/BF	5.1	288	0.094	79	8.9	0.5	375	0.72	3.56	0.21	1	T1	0.026	0.75	0.02		0.02	0.2	0.018	0.218	1.19	13.452	13.408	14.767	14.749	14.8	14.797	0.01	2/BF
50	3/BF	98	1	0.8	10	228	0.025	0.025	16	5	290	0.025	0.025	20	0				0.55	2.5	F1-6x9 on-grade	-7	7	4/BF	5.18	287	0.119	100	3.4	0.5	375	0.9	3.54	0	1	T1	0.042	0.2	0.008		0.008	0.32	0.011	0.255	1.25	13.383	13.366	14.702	14.691	14.7	14.749	0.039	3/BF
50	4/BF	99	1	0.8	10	228	0.017	0.017	11	5	290	0.017	0.017	14	2	1.238	0.015	0	0.55	2.5	F1-6x9 on-grade	1	0	5/BF	5.2	287	0.136	123	9.8	0.5	375	1.11	3.6	0.01	1	T1	0.063	0.24	0.015		0.015	0.49	0.048	0.305	1.28	13.341	13.292	14.676	14.627	14.7	14.73	0.039	4/BF
50	5/BF	99	1	0.8	10	228	0.052	0.051	33	5	290	0.051	0.051	41	28	3.416	0.043	0.02	0.55	2.5	F1-6x9 on-grade	21	7	6/BF	5.18	287	0.186	161	15.9	0.5	450	1.01	3.13	0.15	0.83	T1	0.052	0	0		0	0.32	0.051	0.304	1.41	13.217	13.137	14.628	14.577	14.6	14.677	0.05	5/BF
50	6/BF	98	1	0.8	10	228	0.059	0.059	37	5	290	0.058	0.058	47	39	3.871	0.048	0.02	0.55	2.5	F1-6x9 on-grade	1	38	7/BF	5.32	285	0.245	178	12.2	0.5	450	1.12	3.25	0.01	1	T1	0.064	0.22	0.014		0.014	0.39	0.048	0.329	1.43	13.112	13.051	14.563	14.516	14.6	14.59	0.013	6/BF
50	7/BF	98	1	0.8	10	228	0.042	0.042	27	5	290	0.042	0.042	33	59	4.539	0.057	0.03	0.55	2.5	F1-6x9 on-grade	0	59	8/BF	5.42	283	0.286	192	10.7	0.5	450	1.21	3.31	0	1	T1	0.074	0.21	0.015		0.015	0.45	0.048	0.35	1.44	13.026	12.973	14.5	14.452	14.5	14.523	0.007	7/BF
50	8/BF	99	1	0.8	10	228	0.054	0.054	34	5	290	0.054	0.054	43	74	4.935	0.062	0.03	0.55	2.5	F1-6x9 on-grade	48	26	9/BF	5.43	283	0.338	267	15.283	0.5	450	1.68	3.34	0.2	1	T1	0.144	0.73	0.105		0.105	0.88	0.134	0.45	1.68	12.948	12.872	14.347	14.213	14.5	14.465	0.013	8/BF
50	9/BF	97	1	0.8	10	228	0.031	0.031	19	5	290	0.03	0.03	24	44		0.03		0.83	0.02	FSIP-6x9	13	31	G1/6	5.56	281	0.369	289	12.698	0.5	525	1.34	2.7	0.05	0.86	T1	0.091	-0.27	-0.025		-0.025	0.45	0.057	0.409	1.6	12.797	12.733	14.238	14.181	14.2	14.381	0.168	9/BF
50	1/BG	90	1	0.8	10	228	0.151	0.148	94	5	290	0.143	0.142	114	114		0.022		0.61	2.5	SAG MK-S	70	44	G1/BD	5	290	0.142	70	2.034	0.5	375	0.64	3.1	1		G2	0.021	3.7	0.076		0.076	0.16	0.003	0.202	1.16	13.32	13.31	14.405	14.402	14.5	14.632	0.151	1/BG
50	2/BG	0																			MH1050				5.02	290	0.142	70	66	0.4	375	0.63	2.98	0	1	T6/T9	0.021	1.7	0.035	1.82	0.037	0.16	0.105	0.216	1.06	13.285	13.021	14.367	14.262	14.4	14.663	0.259	2/BG
50	3/BG	0																			MH1050				5.57	281	0.232	105	39.216	0.4	450	0.66	2.82	0	1	T1/T3	0.022	0.99	0.022	1.17	0.026	0.13	0.053	0.246	1.18	12.996	12.839	14.24	14.187	14.3	14.427	0.161	3/BG
50	4/BG	0																			MH1050				5.89	276	0.33	100	12.582	0.4	450	0.63	3.05	0	1	T1/T3	0	0.95	0	1.16	0	0	0	0.239	1.16	12.814	12.764	14.187	14.187	14.2	14.216	0.029	4/BG
50	1/BL	90	1	0.8	10	228	0.095	0.093	59	5	290	0.091	0.09	72	72		0		0.59	2.5	SAG MK-S	40	32	1/BM	5	290	0.09	40	2.041	0.5	375	0.36	3.23	1		G2	0.007	3.55	0.024		0.024	0.05	0.001	0.146	1	13.074	13.064	14.263	14.262	14.3	14.403	0.116	1/BL
50	1/BM	90	1	0.8	10	228	0.104	0.102	64	5	290	0.098	0.097	78	111		0.002		0.22	2.5	SAG MK-S	2	109	G1/6	5	290	0.097	2	2.256	0.51	375	0.02	3.52	1		G2	0	3.24	0		0	0	0	0.03	0.4	12.866	12.854	14.187	14.187	14.2	14.187	0	1/BM
50	1/CA	98	1	0.8	10	228	0.03	0.03	19	5	290	0.03	0.03	24	7	1.883	0.024	0.01	0.8	2.5	F1-6x9 on-grade	5	2	2/CA	5	290	0.03	22	13.2	0.75	375	0.2	1.44	1		G1	0.002	7	0.014		0.014	0.02	0.002	0.097	0.98	14.432	14.333	14.957	14.955	15	15.793	0.822	1/CA
50	2/CA	97	1	0.8	10	228	0.03	0.03	19	5	290	0.03	0.03	24	14	2.454	0.031	0.01	0.8	2.5	F1-6x9 on-grade	10	4	3/CA	5.11	288	0.059	47	11.23	0.75	375	0.43	1.71	0.32	1	T1	0.009	1.4	0.013		0.013	0.07	0.008	0.143	1.21	14.313	14.229	14.942	14.934	15	15.688	0.733	2/CA
50	3/CA	97	1	0.8	10	228	0.022	0.022	14	5	290	0.022	0.022	18	13	2.423	0.03	0.01	0.8	2.5	F1-6x9 on-grade	10	3	4/CA	5.2	287	0.081	66	9.17	1	375	0.6	1.93	0.17	1	T1	0.018	0.85	0.016		0.016	0.14	0.013	0.16	1.48	14.209	14.118	14.918	14.905	14.9	15.599	0.665	3/CA
50	4/CA	98	1	0.8	10	228	0.024	0.024	15	5	290	0.024	0.024	19	12	2.065	0.026	0.01	1.31	2.5	F1-6x9 on-grade	9	3	5/CA	5.28	286	0.106	88	13.5	2	375	0.79	2.15	0.12	1	T1	0.032	0.62	0.02		0.02	0.25	0.034	0.154	2.05	14.098	13.828	14.885	14.852	14.9	15.505	0.6	4/CA
50	5/CA	96	1	0.8	10	228	0.022	0.022	14	5	290	0.022	0.022	18	14		0		1.88	2.5	FSIP-6x9	0	14	G1/CE	5.28	285	0.127	97	12.5	0.5	375	0.88	2.78	0	1	T1	0.039	0.2	0.008		0.008	0.3	0.038	0.249	1.24	13.808	13.745	14.844	14.806	14.9	15.259	0.407	5/CA
50	6/CA	0																			MH1050				5.39	284	0.127	96	16.617	0.5	375	0.87	2.91	0	1	T10	0.039	1.74	0.067	2	0.078	0.3	0.05	0.248	1.24	13.725	13.642	14.738	14.688	14.8	15.066	0.25	6/CA
50	7/CA	0																			MH1050				5.53	282	0.178	149	14.355	0.5	450	0.94	2.49	0	1	T2/T4	0.045	0.37	0.017		0.017	0.27	0.039	0.288	1.39	13.567	13.495	14.672	14.632	14.7	14.983	0.295	7/CA
50	8/CA	0																			MH1050				5.47	282	0.381	237	59.351	0.5	450	1.49	2.57	0	1	T4/T8	0.033	0.76	0.025	0.78	0.026	0.2	0.12	0.45	1.49	13.475	13.178	14.607	14.487	14.6	14.839	0.206	8/CA
50	9/CA	0																			MH1050				5.86	276	0.472	262	16.649	0.5	450	1.65	2.95	0	1	T1/T2	0.139	0.22	0.031		0.031	0.85	0.141	0.45	1.65	13.158	13.075	14.456	14.315	14.5	14.542	0.055	9/CA
50	10/CA	0																			MH1050				5.79	277	0.537	378	55.375	0.5	525	1.74	2.4	0	1	T2/T4	0.155	0.31	0.048		0.048	0.77	0.427	0.525	1.74	13.055	12.778	14.267	13.841	14.3	14.459	0.144	10/CA
50	11/CA	0																			MH1050				6.25	270	0.659	458	16.233	0.46	600	1.62	1.8	0	1	T2/T4	0.134	0.44	0.058		0.058	0.56	0.09	0.6	1.62	12.758	12.684	13.782	13.692	13.8	14.202	0.361	11/CA
50	12/CA	0																			MH1050				6.39	268	0.8	610	16.772	0.5	600	2.16	1.83	0	1	T3/T6	0.237	1.65	0.391	1.91	0.454	1.06	0.157	0.6	2.16	12.659	12.575	13.301	13.123	13.8	14.387	0.632	12/CA
50	OUT/CA	0					0	0	0			0	0	0	0						HW outlet	0	0		6.53	266	0.801	605	4.887	0.54	T5800B1000x600	0.3					0.004	1	0.004		0.004	-0.02	0	0.212	1.54	12.546	12.52	13.119	13.12	13.1	13.582	0.459	OUT/CA
50	G1/CB	90	1	0.8	10	228	0.151	0.148	94	5	290	0.144	0.142	115	115	3.841	0.113	0.07	0.5	2.5	GULLY BK-S	89	26	G1/CC	5	290	0.142	89	2.034	0.5	375	0.8	3.19	1		G2	0.033	3.6	0.118		0.118	0.26	0.005	0.235	1.22	13.659	13.649	14.736	14.731	14.9	14.897	0.043	G1/CB
50	2/CB	0																			MH1050				5.02	290	0.142	89	16.649	0.5	375	0.8	2.95	0	1	T6/T9	0.033	1.71	0.056	1.83	0.06	0.25	0.042	0.234	1.22	13.629	13.546	14.675	14.632	14.7	14.922	0.187	2/CB
50	G1/CC	90	1	0.8	10	228	0.038	0.037	24	5	290	0.036	0.036	29	55	2.896	0.089	0.05	0.5	2.5	GULLY BK-S	2	53	6/CR	5	290	0.036	2	4.813	0.5	375	0.02	2.59	1		G2	0	4.7	0		0	0	0	0.036	0.44	13.662	13.638	14.633	14.633	14.6	14.633	0	G1/CC
50	2/CC	0																			MH1050				5.04	289	0.063	4	14.493	0.5	375	0.04	2.71	0	1	T6/T9	0	1.88	0	2.09	0	0	0	0.046	0.51	13.618	13.545	14.632	14.632	14.6	14.668	0.035	2/CC
50	G1/CD	90	1	0.8	10	228	0.028	0.028	18	5	290	0.027	0.027	21	21	2.003	0.067	0.03	0.5	2.5	GULLY BK-S	2	20	7/CR	5	290	0.027	2	2.041	0.61	375	0.01	2.62	1		G2	0	4.64	0		0	0	0	0.029	0.42	13.65	13.638	14.633	14.633	14.6	14.633	0	G1/CD
50	G1/CE	90	1	0.8	10	228	0.027	0.026	17	5	290	0.026	0.025	20	34	2.404	0.077	0.04	0.5	2.5	GULLY BK-S	34	0	G1/CD	5	290	0.025	34	4.813	0.5	375	0.31	2.8	1		G2	0.005	4.24	0.021		0.021	0.04	0.002	0.134	0.96	13.661	13.637	14.69	14.688	14.7	14.957	0.246	G1/CE
50	G1/CF	90	1	0.8	10	228	0.028	0.027	17	5	290	0.026	0.026	21	21	1.983	0.067	0.03	0.5	2.5	GULLY BK-S	21	0	G1/CD	5	290	0.026	21	2.041	0.5	375	0.19	2.79	1		G2	0.002	4.26	0.008		0.008	0.01	0	0.104	0.83	13.65	13.64	14.689	14.688	14.7	14.957	0.26	G1/CF
50	G1/CG	90	1	0.8	10	228	0.099	0.097	61	5	290	0.094	0.093	75	75	3.259	0.098	0.05	0.5	2.5	GULLY BK-S	37	37	5/CS	5	290	0.093	37	2.041	1	375	0.34	3.18	1		G2	0.006	3.6	0.021		0.021	0.04	0.001	0.117	1.26	13.315	13.295	14.488	14.487	14.5	14.517	0.009	G1/CG
50	G1/CH	90	1	0.8	10	228	0.035	0.035	22	5	290	0.034	0.033	27	180	3.032	0.12	0.11	0.71	2.5	GULLY BK-S	91	90	LOST	5	290	0.033	91	4.813	0.67	375	0.82	3.42	1		G2	0.034	3.34	0.115		0.115	0.27	0.013	0.216	1.37	13.337	13.305	14.506	14.493	14.6	14.643	0.022	G1/CH
50	2/CH	0																			MH1050				5.04	289	0.071	121	14.355	0.67	375	1.09	3.27	0	1	T6/T9	0.061	1.81	0.11	2.08	0.127	0.47	0.068	0.264	1.45	13.285	13.189	14.383	14.315	14.5	14.666	0.156	2/CH
50	G1/CJ	90	1	0.8	10	228	0.04	0.039	25	5	290	0.038	0.037	30	30	2.14	0.071	0.04	0.71	2.5	GULLY BK-S	30	0	6/CS	5	290	0.037	30	2.041	1.02	375	0.27	3.15	1		G2	0.004	3.64	0.014		0.014	0.03	0.001	0.105	1.19	13.326	13.305	14.494	14.493	14.5	14.643	0.135	G1/CJ
50	G1/CM	90	1	0.8	10	228	0.129	0.126	80	5	290	0.122	0.121	98	98		0.039		0.1	2.5	SAG BK-S	98	0	G1/CY	5	290	0.121	98	2.041	1	450	0.61	2.24	1		G2	0.019	5.99	0.115		0.115	0.12	0.002	0.181	1.62	12.95	12.93	13.843	13.841	14	14.17	0.212	G1/CM
50	1/CN	90	1	0.8	10	228	0.006	0.006	4	5	290	0.006	0.006	5	7		0.02		1.3	7.87	FSIP-6x9	7	0		5	290	0.006	7	7.846	0.5	375	0.06	2.48	1		G2	0	4.97	0		0	0	0	0.061	0.61	13.93	13.891	14.862	14.862	14.9	14.862	0	1/CN
50	2/CN	98	1	0.8	10	228	0.032	0.032	20	5	290	0.031	0.031	25	10	1.972	0.025	0.01	1.3	2.5	F1-6x9 on-grade	7	3	1/CN	5	290	0.037	31	11.2	0.5	375	0.28	2.64	0.51	1	G1/T1/T3	0	1.53	0	1.78	0	0	0	0.128	0.94	13.871	13.815	14.862	14.862	14.9	15.042	0.18	2/CN
50	3/CN	99	1	0.8	10	228	0.017	0.017	11	5	290	0.017	0.017	14	7	2.081	0.026	0.01	0.33	2.5	F1-6x9 on-grade	5	2	2/CN	5.09	289	0.054	46	9.2	0.5	375	0.42	2.84	0.14	1	T1	0	0.61	0		0	0	0	0.159	1.04	13.795	13.749	14.862	14.862	14.9	15.162	0.3	3/CN
50	4/CN	98	1	0.8	10	228	0.022	0.022	14	5	290	0.022	0.022	18	7	2.022	0.025	0.01	0.41	2.5	F1-6x9 on-grade	5	2	5/CN	5.17	287	0.076	64	13.2	0.5	375	0.58	3.02	0.1	1	T1	0.013	0.48	0.006		0.006	0.1	0.014	0.191	1.13	13.729	13.663	14.856	14.842	14.9	15.158	0.296	4/CN
50	5/CN	97	1	0.8	10	228	0.03	0.03	19	5	290	0.03	0.03	24	13	2.585	0.032	0.01	0.5	2.5	F1-6x9 on-grade	10	3	6/CN	5.28	286	0.106	88	13.5	0.5	375	0.79	3.2	0.13	1	T1	0.032	0.56	0.018		0.018	0.25	0.034	0.233	1.22	13.643	13.576	14.824	14.79	14.8	15.092	0.25	5/CN
50	6/CN	97	1	0.8	10	228	0.021	0.021	13	5	290	0.021	0.021	17	13		0.03		4.33	2.5	FSIP-6x9	-47	60	6/CR	5.39	284	0.126	49	28.6	0.52	375	0.45	3.26	0	1	T1	0.01	0.2	0.002		0.002	0.08	0.023	0.163	1.07	13.556	13.407	14.776	14.753	14.8	14.79	0.012	6/CN
50	7/CN	100					0.021	0.021	17			0.021	0.021	17	2				-0.19	2.5	F1-6x9 on-grade	0	2	8/CN	5.54	281	0.146	63	9.2	0.58	375	0.57	3.64	0	1	T1	0.016	0.2	0.003		0.003	0.13	0.012	0.181	1.19	13.387	13.334	14.75	14.738	14.8	14.854	0.101	7/CN
50	8/CN	99	1	0.8	10	228	0.041	0.04	26	5	290	0.04	0.04	32	22	2.817	0.035	0.02	0.99	2.5	F1-6x9 on-grade	17	6	9/CN	5.61	280	0.187	92	11.2	0.47	375	0.84	3.8	0.21	1	T1	0.036	0.73	0.026		0.026	0.28	0.031	0.246	1.2	13.314	13.261	14.712	14.681	14.7	14.793	0.055	8/CN
50	9/CN	97	1	0.8	10	228	0.026	0.026	16	5	290	0.025	0.025	20	-11				0.99	2.5	F1-6x9 on-grade	-11	0	10/CN	5.63	280	0.211	119	9.2	0.72	375	1.08	2.65	0	1	T1	0.059	0.2	0.012		0.012	0.46	0.042	0.254	1.49	13.241	13.175	14.223	14.181	14.2	14.681	0.446	9/CN
50	10/CN	97	1	0.8	10	228	0.021	0.021	13	5	290	0.021	0.021	17	12	2.211	0.028	0.01	0.99	2.5	F1-6x9 on-grade	9	3	11/CN	5.71	279	0.232	138	11.2	0.53	375	1.25	2.74	0.07	1	T1	0.08	0.41	0.033		0.033	0.62	0.07	0.375	1.25	13.155	13.096	14.148	14.078	14.2	14.59	0.409	10/CN
50	11/CN	99	1	0.8	10	228	0.051	0.051	33	5	290	0.051	0.051	41	36	3.376	0.042	0.02	0.99	2.5	F1-6x9 on-grade	0	36	11A/CN	5.69	279	0.281	146	6.6	0.38	375	1.32	2.67	0	1	T1	0.089	0.2	0.018		0.018	0.69	0.046	0.375	1.32	13.076	13.05	14.06	14.014	14.1	14.479	0.401	11/CN
50	11A/CN	90	1	0.8	10	228	0.004	0.004	3	5	290	0.004	0.004	3	39		0		0.99	2.5	FSIP-6x9	0	39	5/CS	5.75	278	0.285	145	22	0.39	375	1.31	2.57	0	1	T1	0.088	0.2	0.018		0.018	0.68	0.15	0.375	1.31	13.05	12.964	13.997	13.847	14	14.413	0.399	11A/CN
50	12/CN	96	1	0.8	10	228	0.024	0.024	15	5	290	0.024	0.023	19	14		0.03		0.82	2.5	FSIP-6x9	13	1	6/CS	5.93	275	0.309	165	14.002	0.4	450	1.04	2.01	0.08	0.83	T1	0.055	-0.2	-0.011		-0.011	0.33	0.047	0.338	1.29	12.944	12.888	13.857	13.811	13.8	14.413	0.566	12/CN

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK
AA

DESIGN CHECK
AA

STATUS
FOR CONSTRUCTION

APPROVED
LESLIE ROCHE RPEQ 14843

FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD

SCALE

CLIENT
ECONOMIC DEVELOPMENT QUEENSLAND

calibre
© calibregroup.com

PROJECT
CARSELDINE URBAN VILLAGE
STAGE 1

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

DRAWING TITLE
STORMWATER DRAINAGE MAJOR
CALCULATION TABLES
SHEET 5 OF 6

PROJECT No. 15-003002.01
DRAWING No. 1434
REVISION A

	LOCATION	CATCHMENT PROPERTIES			FULL AREA RUNOFF					PART AREA RUNOFF					INLET DESIGN										DRAIN DESIGN								HEADLOSSES							PART FULL		DESIGN LEVELS								
		fi	Ci	Cp	tc	I	A	CA	Q	tc	I	A	CA	Q	Qa							Qg	Qb		tc	I	CA	Qp	L	S		Vf	S/Do	Qg/Qo	Du/Do		Vf2/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN ARI	STRUCTURE No.	FRACTION IMPERVIOUS	COEFFICIENT OF RUNOFF IMPERVIOUS AREA	COEFFICIENT OF RUNOFF PERVIOUS AREA	TIME OF CONCENTRATION	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	TIME OF CONCENTRATION	RAINFALL INTENSITY	PARTIAL CATCHMENT AREA	EQUIVALENT IMPERVIOUS AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C(INC. BYPASS)	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	SUBMERGENCE RATIO	GRATE FLOW RATIO	DIAMETER RATIO	CHART(S) USED	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E COEFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VEL.	PIPE U/S I.L	PIPE D/S I.L	PIPE U/S H.G.L	PIPE D/S H.G.L	W.S.E	GRATE LEVEL	FREEBOARD	STRUCTURE No.
Yrs					min	mm/h	ha	ha	L/s	min	mm/h	ha	ha	L/s	L/s	m	m		%	%		L/s	L/s		min	mm/hr	ha	L/s	m	%	mm	m/s					m	m	m	m	m	%	m	m	m/s	m	m	m	m	m	m	m	
50	13/CN	98	1	0.8	10	228	0.029	0.029	18	5	290	0.028	0.028	23	14	2.481	0.031	0.01	0.82	2.5	F1-6x9 on-grade	11	4	12/CN	6.05	273	0.337	188	11.2	0.38	450	1.18	2.05	0.06	1	T1	0.071	0.43	0.031		0.031	0.43	0.048	0.409	1.24	12.888	12.846	13.78	13.732	13.8	14.528	0.717	13/CN
50	14/CN	97	1	0.8	10	228	0.027	0.027	17	5	290	0.026	0.026	21	30	3.247	0.041	0.02	0.82	2.5	F1-6x9 on-grade	22	8	13/CN	6.14	272	0.364	219	13.2	0.4	450	1.38	1.97	0.1	1	T1	0.097	0.6	0.058		0.058	0.59	0.078	0.45	1.38	12.846	12.793	13.674	13.596	13.7	14.621	0.889	14/CN
50	15/CN	100					0.029	0.029	24			0.029	0.029	24	6	2.909	0.036	0	-0.18	2.5	F1-6x9 on-grade	0	6	14/CN	6.14	272	0.39	234	18.647	0.4	450	1.47	1.78	0	1	T1	0.11	0.2	0.022		0.022	0.67	0.125	0.45	1.47	12.793	12.718	13.574	13.449	13.6	14.702	1.106	15/CN
50	16/CN	0																			MH1050				6.05	273	0.504	321	15.366	0.4	525	1.48	1.51	0	1	T3/T6	0.112	2.05	0.231	2.37	0.267	0.52	0.074	0.525	1.48	12.718	12.656	13.218	13.139	13.5	14.497	1.012	16/CN
50	OUT/CN	0					0	0	0			0	0	0	0						HW outlet	0	0		6.18	271	0.504	319	2.678	0.52	T5800B1000x600	0.16					0.001	1	0.001		0.001	0	0	0.155	1.27	12.606	12.592	13.137	13.137	13.1	13.3	0.161	OUT/CN
50	G1/CP	90	1	0.8	10	228	0.064	0.063	40	5	290	0.061	0.06	48	48	2.754	0.086	0.04	0.5	2.5	GULLY MK-S	48	0	G1/CM	5	290	0.06	48	5.367	0.67	375	0.44	1.46	1		G2	0.01	9.7	0.095		0.095	0.08	0.004	0.15	1.17	13.119	13.083	13.57	13.565	13.7	14.408	0.743	G1/CP
50	2/CP	0																			MH1050				5.04	289	0.119	96	7.854	2.59	375	0.87	1.37	0	1	T6/T9	0.038	2.44	0.093	2.72	0.104	0.3	0.023	0.15	2.31	13.063	12.86	13.472	13.449	13.6	14.457	0.881	2/CP
50	G1/CQ	90	1	0.8	10	228	0.063	0.061	39	5	290	0.06	0.059	47	47	2.732	0.085	0.04	0.5	2.5	GULLY MK-S	47	0	G1/CX	5	290	0.059	47	2.611	1.38	375	0.43	1.44	1		G2	0.009	9.7	0.091		0.091	0.07	0.002	0.122	1.51	13.119	13.083	13.567	13.565	13.7	14.408	0.749	G1/CQ
50	1/CR	99	1	0.8	10	228	0.042	0.042	27	5	290	0.042	0.042	34	9	1.848	0.023	0.01	1.25	2.5	F1-6x9 on-grade	7	2	2/CR	5	290	0.042	32	13.2	1	375	0.29	2.45	1		G1	0.004	3.86	0.016		0.016	0.03	0.004	0.108	1.2	13.812	13.68	14.714	14.71	14.7	15.151	0.421	1/CR
50	2/CR	98	1	0.8	10	228	0.042	0.042	26	5	290	0.041	0.041	33	18	2.375	0.03	0.01	1.53	2.5	F1-6x9 on-grade	13	5	3/CR	5.11	288	0.083	67	12.05	0.5	375	0.61	2.8	0.29	1	T1	0.019	1	0.019		0.019	0.15	0.018	0.197	1.14	13.66	13.6	14.691	14.673	14.7	14.949	0.239	2/CR
50	3/CR	97	1	0.8	10	228	0.028	0.028	18	5	290	0.028	0.028	22	17	2.384	0.03	0.01	1.48	2.5	F1-6x9 on-grade	12	4	4/CR	5.21	287	0.111	93	8.749	0.5	375	0.84	2.92	0.16	1	T6	0.036	1.61	0.058	1.7	0.061	0.28	0.025	0.242	1.23	13.58	13.536	14.615	14.59	14.7	14.767	0.091	3/CR
50	4/CR	90	1	0.8	10	228	0.008	0.008	5	5	290	0.008	0.008	6	13	2.598	0.032	0.01	0.53	2.61	F1-6x9 on-grade	10	3	5/CR	5.28	285	0.119	102	21	0.5	375	0.93	2.87	0.09	1	T6	0.044	1.62	0.071	1.7	0.074	0.34	0.071	0.259	1.25	13.516	13.411	14.52	14.448	14.6	14.686	0.092	4/CR
50	5/CR	90	1	0.8	10	228	0.013	0.012	8	5	290	0.012	0.012	9	13		0.029		0.5	2.5	FSIP-6x9	13	0	6/CR	5.46	283	0.131	114	9.161	0.5	375	1.03	2.85	0.11	1	T1/T3	0.054	1.22	0.066	1.42	0.077	0.42	0.038	0.283	1.27	13.391	13.345	14.382	14.344	14.5	14.581	0.122	5/CR
50	6/CR	90	1	0.8	10	228	0.06	0.059	37	5	290	0.057	0.057	46	158	4.247	0.072	0.09	0.5	2.5	GULLY BK-S	85	73	7/CR	5.42	283	0.186	197	4.77	0.5	375	1.78					0.162	1	0.162		0.162	1.26	0.06	0.375	1.78	13.325	13.301	14.182	14.122	14.3	14.344	0	6/CR
50	7/CR	90	1	0.8	10	228	0.055	0.054	34	5	290	0.053	0.052	42	135	5	0.04	0.04	0.5	2.5	GULLY BK-S	99	36	CH2/DA	5.46	283	0.239	295	4.863	0.65	375	2.67					0.364	1	0.364		0.364	3.03	0.138	0.375	2.67	13.281	13.25	13.758	13.61	14.1	14.344	0.222	7/CR
50	OUT/CR	0					0	0	0			0	0	0	0					2.75	HW outlet	0	0		5.5	282	0.239	295	3.087	0.97	T3400B500x375	0.4					0.008	1	0.008		0.008	-0.44	0.004	0.16	1.64	13.23	13.2	13.464	13.478	13.5	13.794	0.322	OUT/CR
50	1/CS	99	1	0.8	10	228	0.077	0.077	49	5	290	0.076	0.076	61	15	2.682	0.034	0.01	0.62	2.5	F1-6x9 on-grade	12	4	2/CS	5	290	0.076	58	13.2	0.5	375	0.52	3.11	1		G1	0.014	3.08	0.043		0.043	0.11	0.014	0.18	1.1	13.456	13.39	14.578	14.564	14.6	14.656	0.035	1/CS
50	2/CS	99	1	0.8	10	228	0.082	0.082	52	5	290	0.082	0.082	66	27	3.294	0.041	0.02	0.62	2.5	F1-6x9 on-grade	19	7	3/CS	5.11	288	0.158	127	12.233	0.5	375	1.15	3.21	0.25	1	T1/T3	0.068	1.29	0.087	1.45	0.098	0.52	0.064	0.317	1.28	13.37	13.309	14.477	14.413	14.6	14.575	0	2/CS
50	3/CS	90	1	0.8	10	228	0.025	0.025	16	5	290	0.024	0.024	19	0				0.93	2.5	F1-6x9 on-grade	-36	36	4/CS	5.21	287	0.182	126	22.833	0.5	375	1.14	2.86	0	1	T9/T10	0.067	1.89	0.126	2.16	0.144	0.52	0.118	0.314	1.28	13.289	13.175	14.218	14.099	14.4	14.413	0.051	3/CS
50	4/CS	90	1	0.8	10	228	0.014	0.014	9	5	290	0.013	0.013	11	46		0.03		0.93	2.5	FSIP-6x9	13	33	5/CS	5.4	284	0.195	138	10.383	0.5	375	1.25	2.55	0.09	1	T3/T6	0.079	1.56	0.123	1.73	0.137	0.62	0.064	0.375	1.25	13.155	13.103	13.976	13.912	14.1	14.2	0.087	4/CS
50	5/CS	90	1	0.8	10	228	0.099	0.097	61	5	290	0.094	0.093	75	185		0.08		0.5	2.5	FSIP-6x9	40	145	6/CS	5.49	282	0.289	175	6.074	0.5	375	1.59	2.29	0.23	1	T3/T6	0.129	1.66	0.214	1.89	0.243	1	0.061	0.375	1.59	13.083	13.053	13.699	13.638	13.9	13.947	0.006	5/CS
50	6/CS	90	1	0.8	10	228	0.091	0.089	56	5	290	0.086	0.085	69	214		0.08		0.5	2.5	FSIP-6x9	56	158	CH4/DA	5.43	283	0.373	229	2.154	0.56	375	2.08					0.22	1	0.22		0.22	2.66	0.035	0.375	2.08	13.033	13.021	13.418	13.361	13.6	13.947	0.309	6/CS
50	OUT/CS	0					0	0	0			0	0	0	0					9.37	HW outlet	0	0		5.45	283	0.373	229	2.13	1.82	T4200B1000x400	0.22					0.002	1	0.002		0.002	-0.04	0	0.093	1.8	12.992	12.953	13.352	13.353	13.4	13.45	0.095	OUT/CS
50	G1/CX	90	1	0.8	10	228	0.083	0.081	52	5	290	0.079	0.078	63	69		0.021		0.53	2.5	SAG MK-S	69	0		5	290	0.078	69	5.555	0.51	375	0.62	3.37	1		G2	0.02	3.4	0.068		0.068	0.15	0.009	0.199	1.16	12.895	12.867	14.092	14.084	14.2	14.211	0.051	G1/CX
50	1/CX	0																			MH1050				5.05	289	0.14	162	24.456	0.5	375	1.47	3.35	0	1	T6/T9	0.11	1.65	0.182	1.78	0.196	0.86	0.21	0.375	1.47	12.842	12.72	13.902	13.692	14.1	14.264	0.166	1/CX
50	G1/CY	90	1	0.8	10	228	0.066	0.064	41	5	290	0.062	0.062	50	100		0.08		0.53	2.5	SAG MK-S	94	6	G1/CX	5	290	0.062	94	3.007	0.54	375	0.85	3.51	1		G2	0.037	3.25	0.119		0.119	0.28	0.009	0.238	1.27	12.895	12.879	14.092	14.084	14.2	14.211	0	G1/CY
50	G12/D	80	1	0.8	10	228	0.155	0.148	94	5	290	0.139	0.136	110	420	4.213	0.133	0.23	2.54	3	GULLY BK-S	99	321	G13/D	5	290	0.136	99	2.4	1	450	0.62	2.86	1		G1	0.02	3.32	0.065		0.065	0.12	0.003	0.183	1.63	15.443	15.419	16.664	16.661	16.7	16.731	0.002	G12/D
50	G13/D	80	1	0.8	10	228	0.005	0.005	3	5	290	0.005	0.005	4	325	3.801	0.123	0.19	2.97	3	GULLY BK-S	145	180	G7/D	5.02	290	0.141	243	2.4	1	525	1.12	2.51	0.59	0.86	G1/T1	0.064	1.79	0.115		0.115	0.32	0.008	0.283	2.05	15.344	15.32	16.546	16.538	16.7	16.663	0.002	G13/D
50	G7/D	80	1	0.8	10	228	0.005	0.004	3	5	290	0.004	0.004	3	183	3.084	0.102	0.14	2.82	3	GULLY BK-S	120	63	G8/D	5.04	289	0.145	363	2.4	1	600	1.28	2.16	0.33	0.88	T1	0.084	1.01	0.085		0.085	0.35	0.008	0.332	2.26	15.245	15.221	16.453	16.445	16.5	16.595	0.057	G7/D
50	G8/D	80	1	0.8	10	228	0.004	0.004	2	5	290	0.004	0.004	3	66	2.108	0.074	0.08	2.82	3	GULLY BK-S	62	4	G15/E	5.06	289	0.148	425	16.517	1	825	0.8	1.77	0.15	0.73	T6/T9	0.032	2.25	0.073	2.5	0.081	0.09	0.014	0.308	2.33	14.996	14.832	16.372	16.358	16.5	16.527	0.074	G8/D
50	14/D	0																			MH1500				5.2	287	0.148	424	20.627	0.93	825	0.79	1.87	0	1	T1/T2	0.032	0.26	0.008		0.008	0.09	0.018	0.314	2.28	14.812	14.62	16.349	16.331	16.4	18.124	1.766	14/D
50	CH1/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH2/DA	5	290	0	0	22	0.34	T3400B1000x300	0					0	0	0		0	0	0	0	0	13.279	13.205	13.478	13.478	13.5	13.578	0.1	CH1/DA
50	CH2/DA	0					0	0	0			0	0	0	36	4.59	0.014	0.02		16.5	CHNL auto	36	0	CH3/DA	5.53	282	0.239	330	75.682	0.34	T4200B1000x400	0.36					0.006	0	0		0	0.16	0.137	0.267	0.6	13.205	12.952	13.478	13.353	13.5	13.605	0.127	CH2/DA
50	CH3/DA	0					0	0	0			0	0	0	0					15.8	CHNL	-74	74	CH4/DA	5.74	278	0.604	472	51.924	0.33	T4200B1000x400	0.45					0.01	0	0		0	0.3	0.158	0.317	0.66	12.952	12.778	13.353	13.195	13.4	13.353	0	CH3/DA
50	CH4/DA	0					0	0	0			0	0	0	233	2.269	0.159	0.14			CHNL	233	0	CH5/DA	6.17	271	0.604	693	11.111	0.34	T4600B1000x450	0.55					0.016	0	0		0	0.18	0.022	0.379	0.73	12.778	12.741	13.195	13.175	13.2	13.227	0.032	CH4/DA
50	CH5/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH6/DA	6.26	270	0.604	690	44.659	0.34	T5800B1200x600	0.46					0.011	0	0		0	0.08	0.046	0.365	0.73	12.741	12.591	13.175	13.137	13.2	13.34	0.165	CH5/DA
50	CH6/DA	0					0	0	0			0	0	0	0						CHNL auto	0	0	CH7/DA	6.63	264	1.118	998	15.495	0.34	T5800B1200x600	0.48					0.012	0	0		0	0.09	0.016	0.434	0.8	12.591	12.539	13.137	13.124	13.1	13.192	0.055	CH6/DA
50	CH7/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH8/DA	6.76	263	1.118	993	6.409	0.34	T6300B1500x600	0.42					0.009	0	0		0	0.06	0.005	0.404	0.79	12.539	12.518	13.124	13.12	13.1	13.139	0.015	CH7/DA
50	CH8/DA	0					0	0	0			0	0	0	0						CHNL auto	-616	616	CH9/DA	6.78	263	1.923	978	118.289	0.34	T6300B1500x600	0.42					0.009	0	0		0	0.15	0.178	0.402	0.78	12.518	12.121	13.12	12.942	13.1	13.12	0	CH8/DA
50	CH9/DA	0					0	0	0			0	0	0	616	3.349	0.23	0.25			CHNL	616	0	CH10/DA	7.76	251	1.923	1531	60.012	0.34	T7000B1000x1000	0.38					0.008	0	0		0	0.04	0.029	0.586	0.95	12.121	11.92	12.942	12.92	12.9	13.121	0.179	CH9/DA
50	CH10/DA	0					0	0	0			0	0	0	0						CHNL	-822	822	CH11/DA	8.26	245	1.923	676	83.219	0.34	T6600B600x1000	0.19					0.002	0	0		0	0.02	0.015	0.449	0.77	11.92	11.641	12.92	12.905	12.9	12.92	0	CH10/DA
50	CH11/DA	0					0	0	0			0	0	0	822	2.775	0.361	0.49			CHNL	822	0	CH12/DA	9	237	1.926	1459	54.926	0.34	T9600B600x1500	0.26					0.003	0	0		0	0.01	0.004	0.626	0.94	11.641	11.457	12.905	12.902	12.9	13.141	0.236	CH11/DA
50	CH12/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH13/DA	9.45	232	1.926	1435	21.506	0.34	T11400B600x1800	0.2					0.002	0	0		0	0	0.001	0.622	0.94	11.457	11.385	12.902	12.901	12.9	13.257	0.355	CH12/DA
50	CH13/DA	0					0	0	0			0	0	0	0						CHNL	0	0	CH14/DA	9.7	230	1.931	1427	9.816	0.35	T11400B600x1800	0.18					0.002	0	0		0	0	0	0.614	0.95	11.385	11.351	12.901	12.901	12.9	13.185	0.284	CH13/DA
50	CH14/DA	0					0	0	0			0	0	0	0						CHNL	0	0	LOST	9.78	230	1.931	1423	38.52	0.34	T11400B600x1800	0.17					0.001	0	0		0	0	0.001	0.619	0.93	11.351	11.222	12.901	12.9	12.9	13.151	0.25	CH14/DA
50	OUT/DA																				CHNL																						12.9	13.022		OUT/DA
50	G15/E	80	1	0.8	10	228	0.041	0.039	25	5	290	0.036	0.036	29	33	1.664	0.061	0.05	2.35	3	GULLY BK-S	33	0	G3/EA	5	290	0.036	33	5.337	1.01	450	0.2	1.05	1		G2	0.002	9.7	0.021		0.021	1.39	0.045	0.102	1.2	14.633	14.579	14.756	14.681	14.8	16.023	1.247	G15/E
50	OUT/E																				HW outlet																						14.7	16.053		OUT/E
50	G1/EA	80	1	0.8	10	228	0.051	0.049	31	5	290	0.046	0.045	36	36	1.499	0.055	0.06	6.12	2.5	GULLY BK-M	36	0	G3/EA	5	290	0.045	36	10.015	5.74	375	0.33	1.1	1		G1	0.006	7	0.039		0.039	6.16	0.528	0.075	2.33	14.65	14.075	14.787	14.17	14.8	15.959	1.133	G1/EA
50	2/EA	0																			MH1050				5.08	289	0.045	36	51.141	1.78	375	0.33	1.04	0	1	T9/T10	0.005	2.13	0.012	2.67	0.015	0.29	0.191	0.1	1.54	14.022	13.111	14.158	14.012	14.2	15.497	1.324	2/EA
50	G3/EA	80	1	0.8	10	228	0.276	0.264	168	5	290	0.248	0.242	195	195	3.352	0.133	0.13	1.29	3	GULLY BK-S	138	58	G4/EA	5	290	0.283	170	2.4	1	375	1.54	2.5	0.79	1	G1/T1/T3	0.121	2.81	0.342	2.86	0.348	0.94	0.023	0.298	1.81	13.081	13.057	13.67	13.648	14	14.537	0.519	G3/EA
50	G4/EA	80	1	0.8	10	228	0.004	0.004	2	5	290	0.003	0.003	3	60	2.087	0.089	0.07	0.98	3	GULLY BK-S	60	0	LOST	5.02	290	0.286	230	4.809	0.98	450	1.45	1.56	0.26	0.83	T6/T9	0.107	2.24	0.239	2.34	0.25	0.49	0.028	0.309	1.98	12.982	12.935	13.409	13.385	13.7	14.511	0.852	G4/EA
50	5/EA																				MH1050																						13.4	14.592		5/EA

PDA. REF NO. DEV2019/1074

REVISION	DATE	ISSUE DETAILS	DRAWN	DESIGN
1	1.11.19	ISSUED FOR APPROVAL	CHC	AA
2	16.04.20	STORMWATER NETWORK AMENDED	CHC	AA
3	15.05.20	STORMWATER NETWORK AMENDED	AA	AA
A	23.03.21	STORMWATER NETWORK AMENDED	AA	AA

DRAWN CHECK: AA
DESIGN CHECK: AA
STATUS: FOR CONSTRUCTION
APPROVED: LESLIE ROCHE RPEQ 14843
FOR & ON BEHALF OF CALIBRE PROFESSIONAL SERVICES PTY LTD
SCALE:
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

PROJECT: CARSELDINE URBAN VILLAGE STAGE 1
DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.
DRAWING TITLE: STORMWATER DRAINAGE MAJOR CALCULATION TABLES SHEET 6 OF 6
PROJECT No.: 15-003002.01
DRAWING No.: 1435
REVISION: A

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

15th October 2018

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

Via Email: BrisAdmin@calibreconsulting.co

Dear Applicant,

Queensland Urban Utilities Services Advice Notice

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

Proposed service connection/alteration/disconnection type:

Drinking water	☑
Non-drinking water	☐
Wastewater	☑

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

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

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

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

ABN 86 673 835 011

Queensland Urban Utilities Services Advice

Infrastructure and Design

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

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

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

Water

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

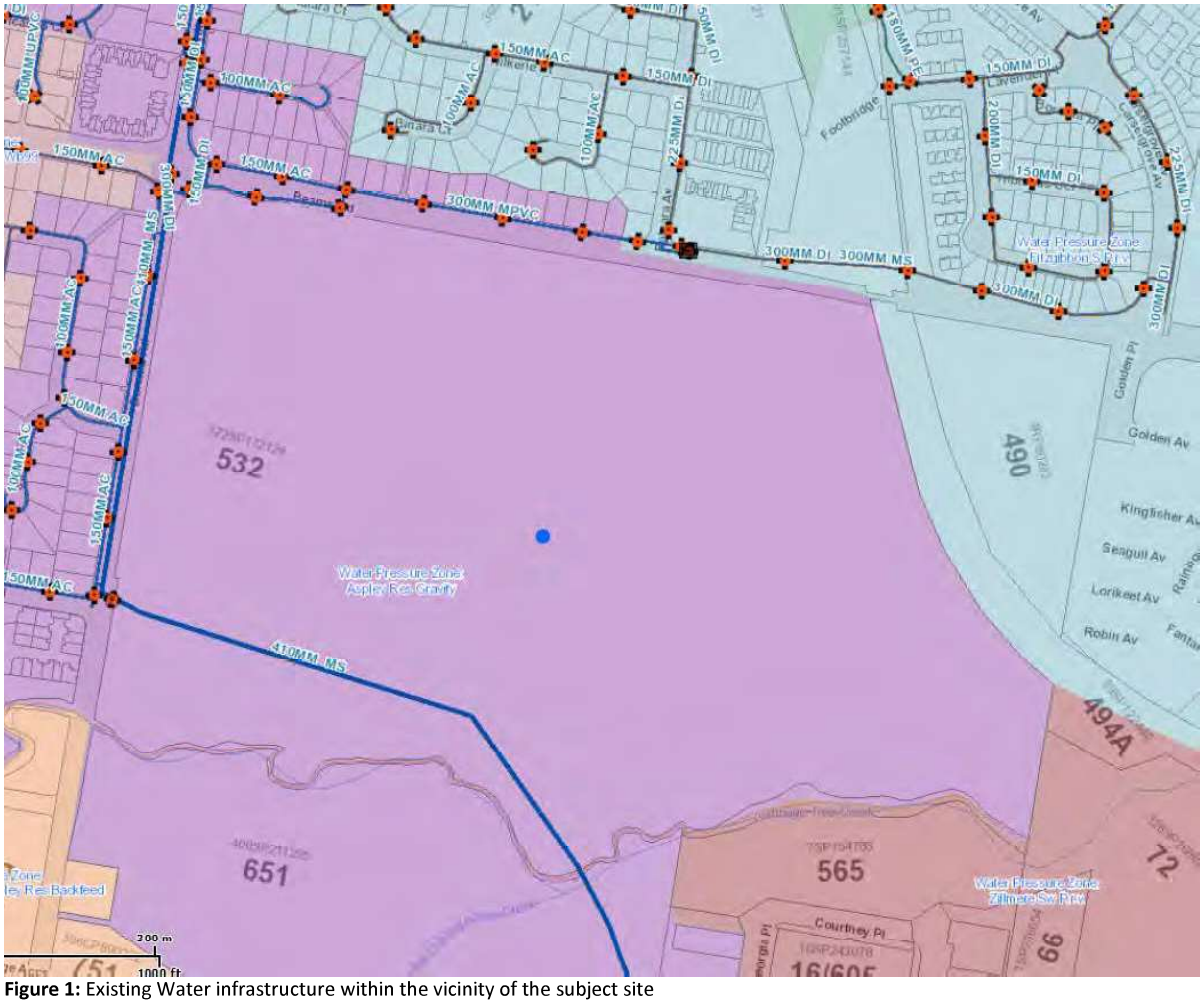


Figure 1: Existing Water infrastructure within the vicinity of the subject site

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

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

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

note that:

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

Wastewater

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

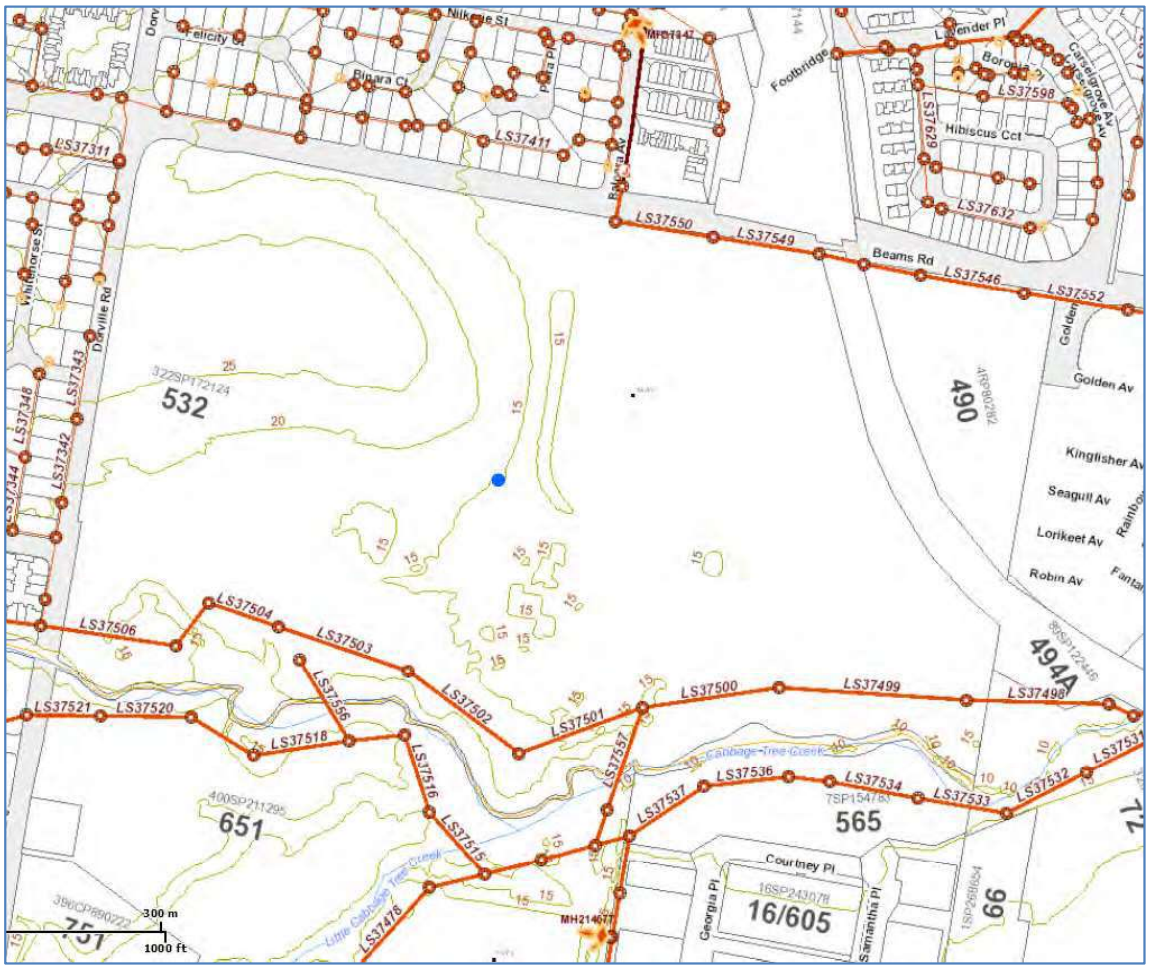


Figure 1: Existing Wastewater infrastructure within the vicinity of the subject site

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

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

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

Network Demand and Capacity

Water

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

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

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

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

Table 1: Indicative Flow and Pressure Advice

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

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

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

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

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

Disclaimer

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

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

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

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

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

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

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

Land and Easements

Sewer Main in Private Properties

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

Water Main in Private Properties

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

Infrastructure Charges (as at 1 July 2018)

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

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

Trade Waste

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

Connection Application Process

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

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

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

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

Fees and Charges

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

1. Application Phase

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

2. Design, Construction and Maintenance Phases

Design Approval Fee (reticulation)

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

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

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

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

Time Frames for Assessment

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

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

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

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

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

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

Yours sincerely

Toby Turner
Senior Engineer
Queensland Urban Utilities

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

15th June 2020

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

Via Email: BrisAdmin@calibreconsulting.co

Dear Applicant,

Urban Utilities Water Reticulation Analysis

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

Proposed service connection/alteration/disconnection type:

Drinking water	☑
Non-drinking water	☐
Wastewater	☑

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

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

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

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

Urban Utilities Services Advice

Background

Objective

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

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

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

Water Supply

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

Figure 1 – Development site and surrounding water supply network

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

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

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

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

Figure 2 – Development site and surrounding Sewer network

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

Design Criteria

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

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

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

Table 1: Summary of Staging and EP

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

Water Demands

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

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

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

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

Water Supply Network Firefighting Capacity

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

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

Sewerage Loading

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

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

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

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

Water Network Analysis

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

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

Existing network configuration

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

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

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

Water Connection Points

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

Water Main Sizing

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

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

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

Sewer Network Analysis

Capacity assessment

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

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

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

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

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

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

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

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

Yours sincerely

Sajid Imam Syed
Development Assessment Team Leader
Urban Utilities

CARSELDINE URBAN VILLAGE

UPDATED STORMWATER MANAGEMENT PLAN

DesignFlow

Prepared for Economic Development Queensland

October 2019

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2019/1074

Date: 26 March 2020

Queensland Government

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.

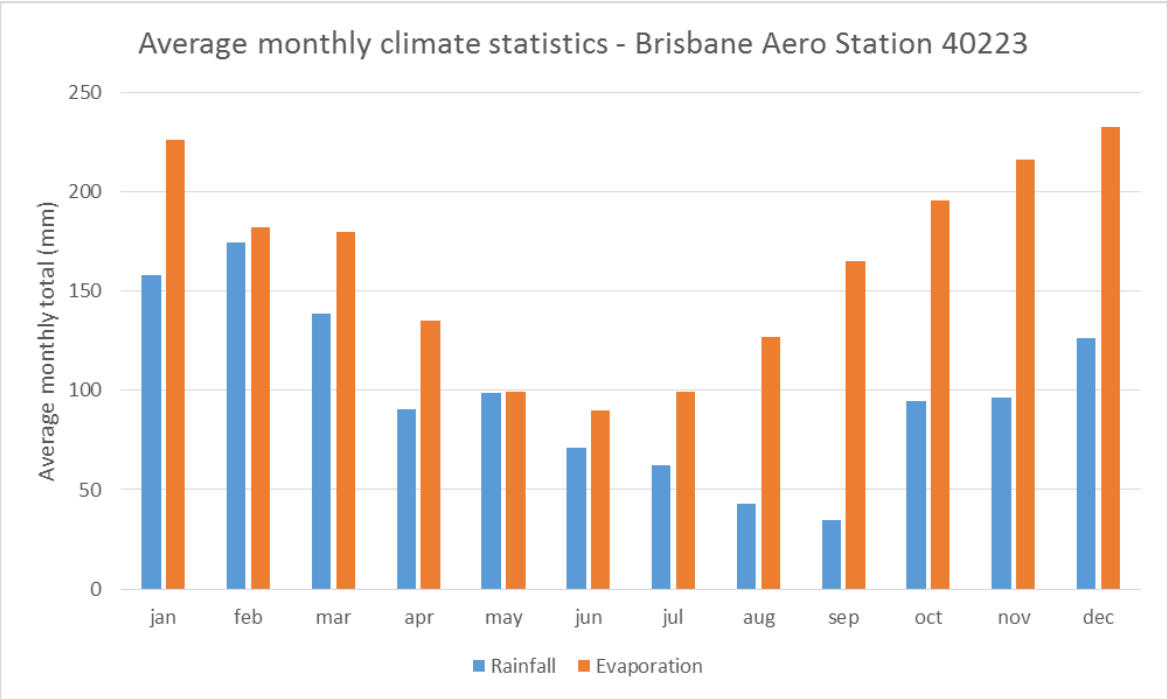


Figure 2 Average monthly climate statistics

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.

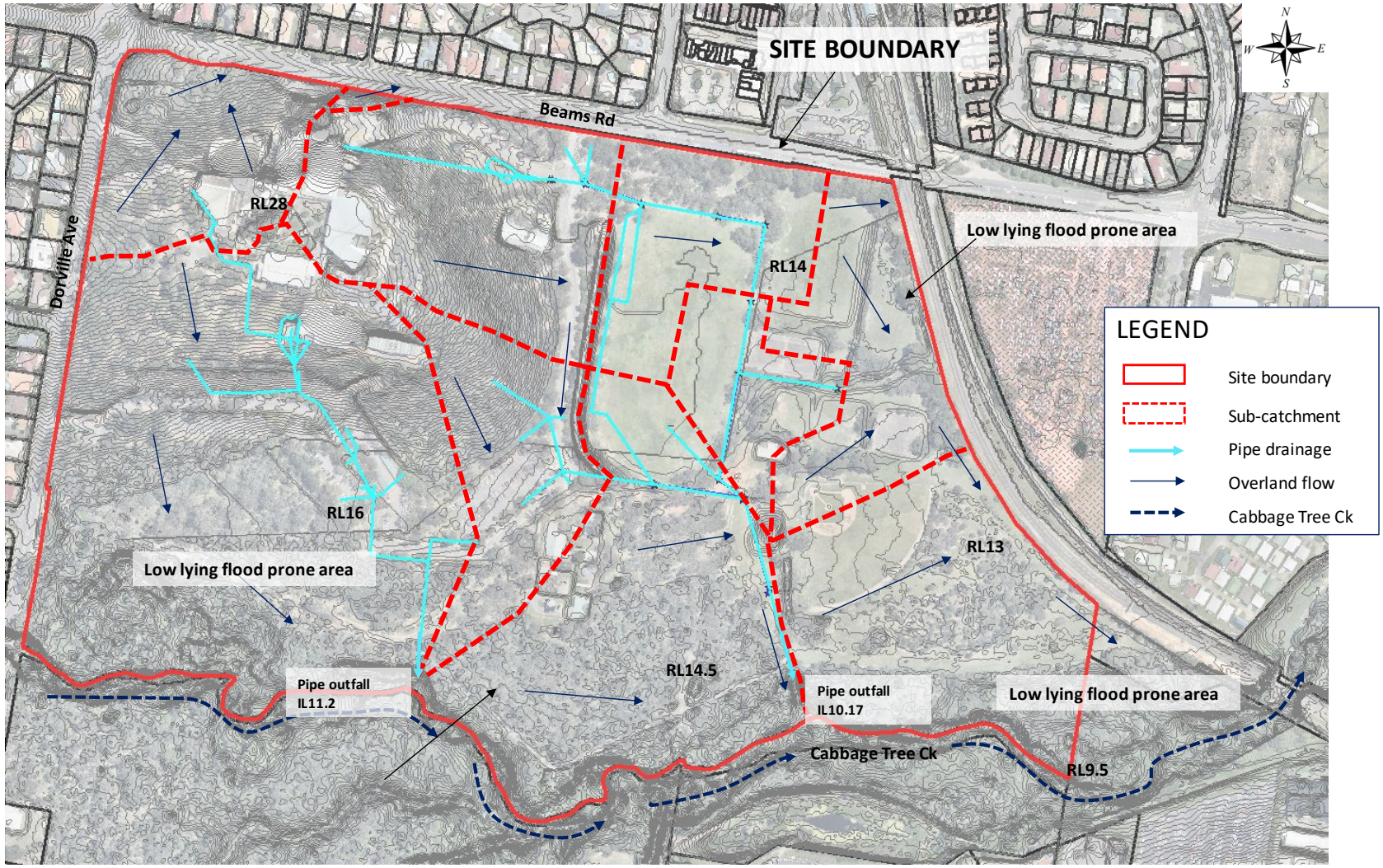


Figure 3: Topography and drainage

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).

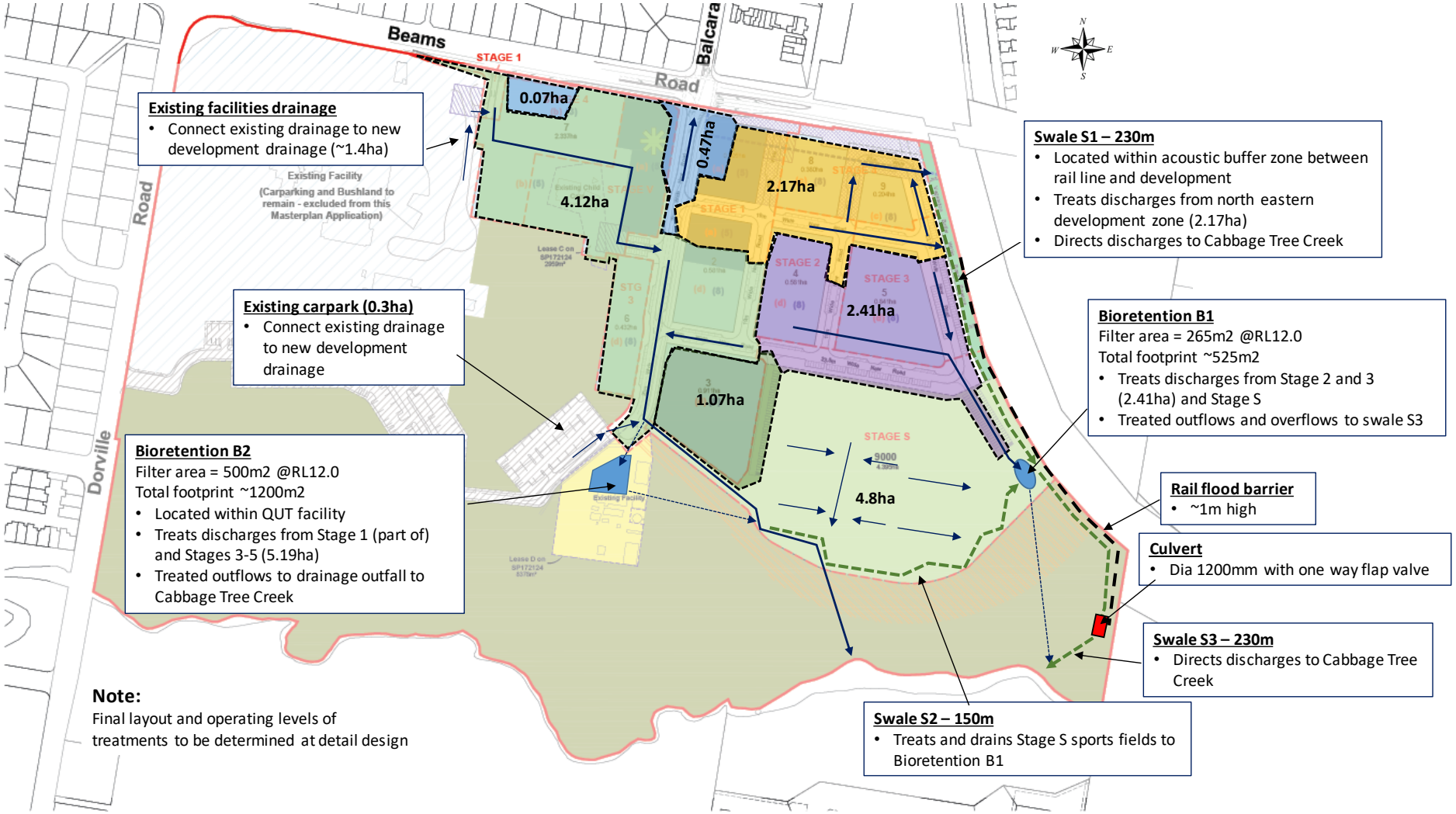


Figure 5 Stormwater Management Strategy Carseldine Urban Village

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.

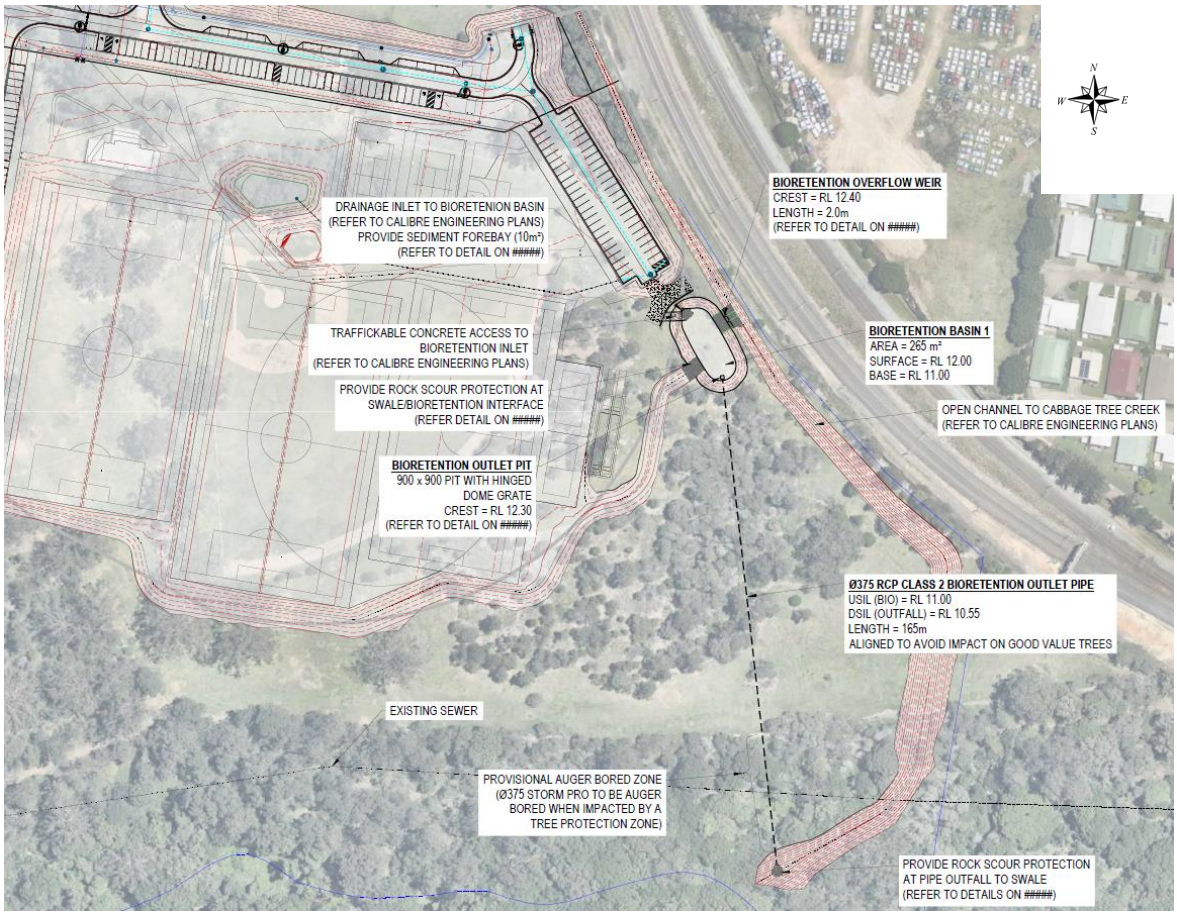


Figure 6 Bioretention basin B1 general arrangement

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.

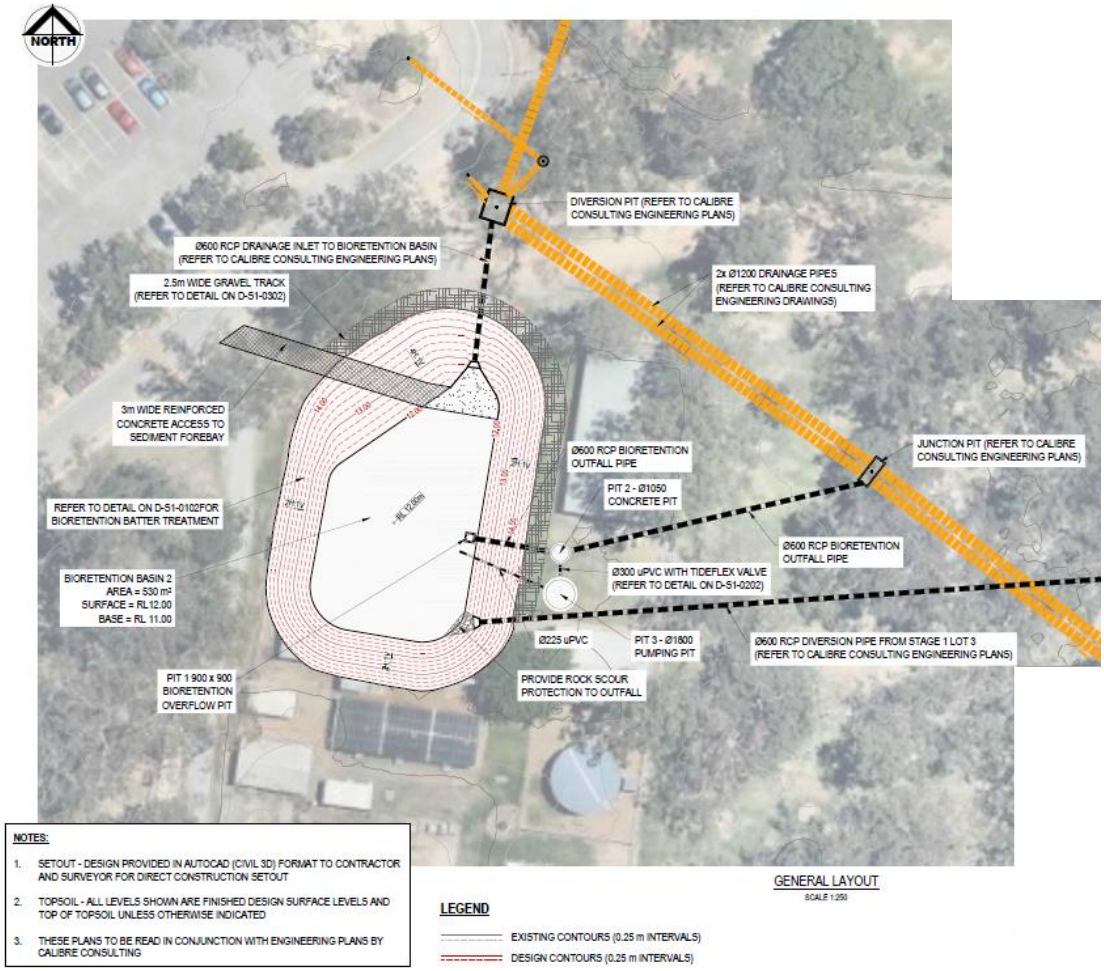


Figure 7 Bioretention basin B2 general arrangement

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.

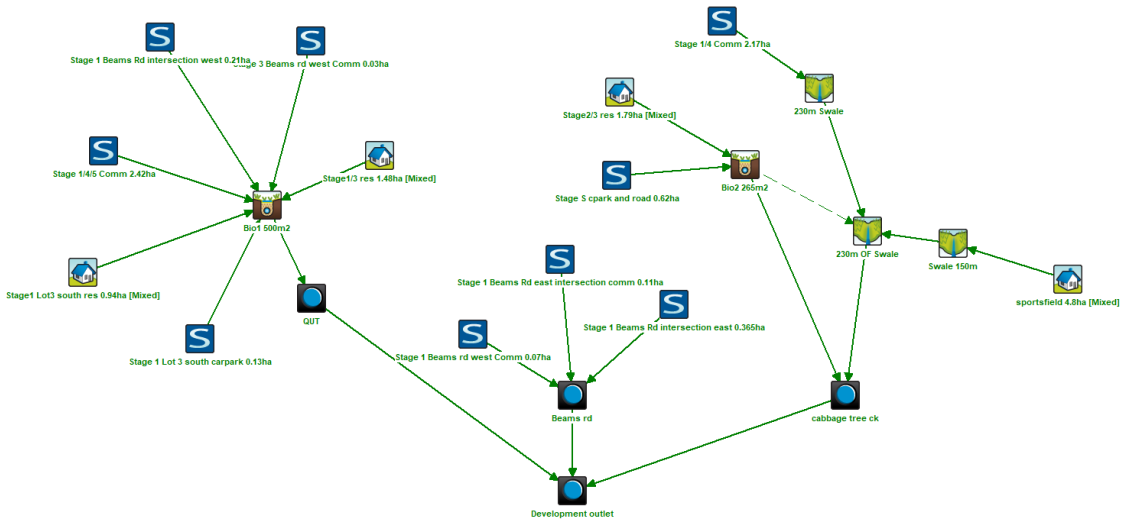


Figure 8 MUSIC model

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

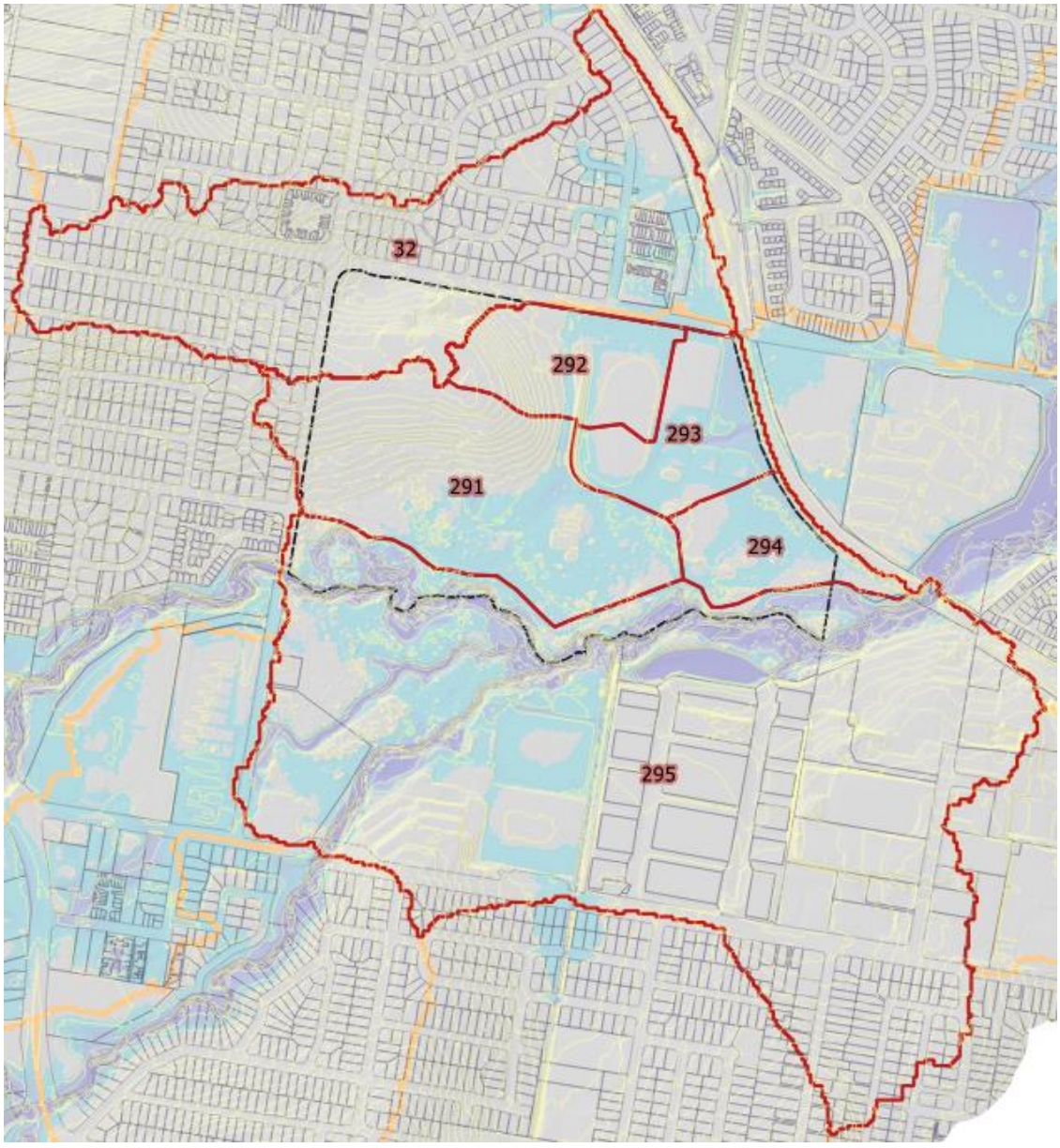


Figure 9 Refined URBS sub-catchments relevant to the development – base case

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.

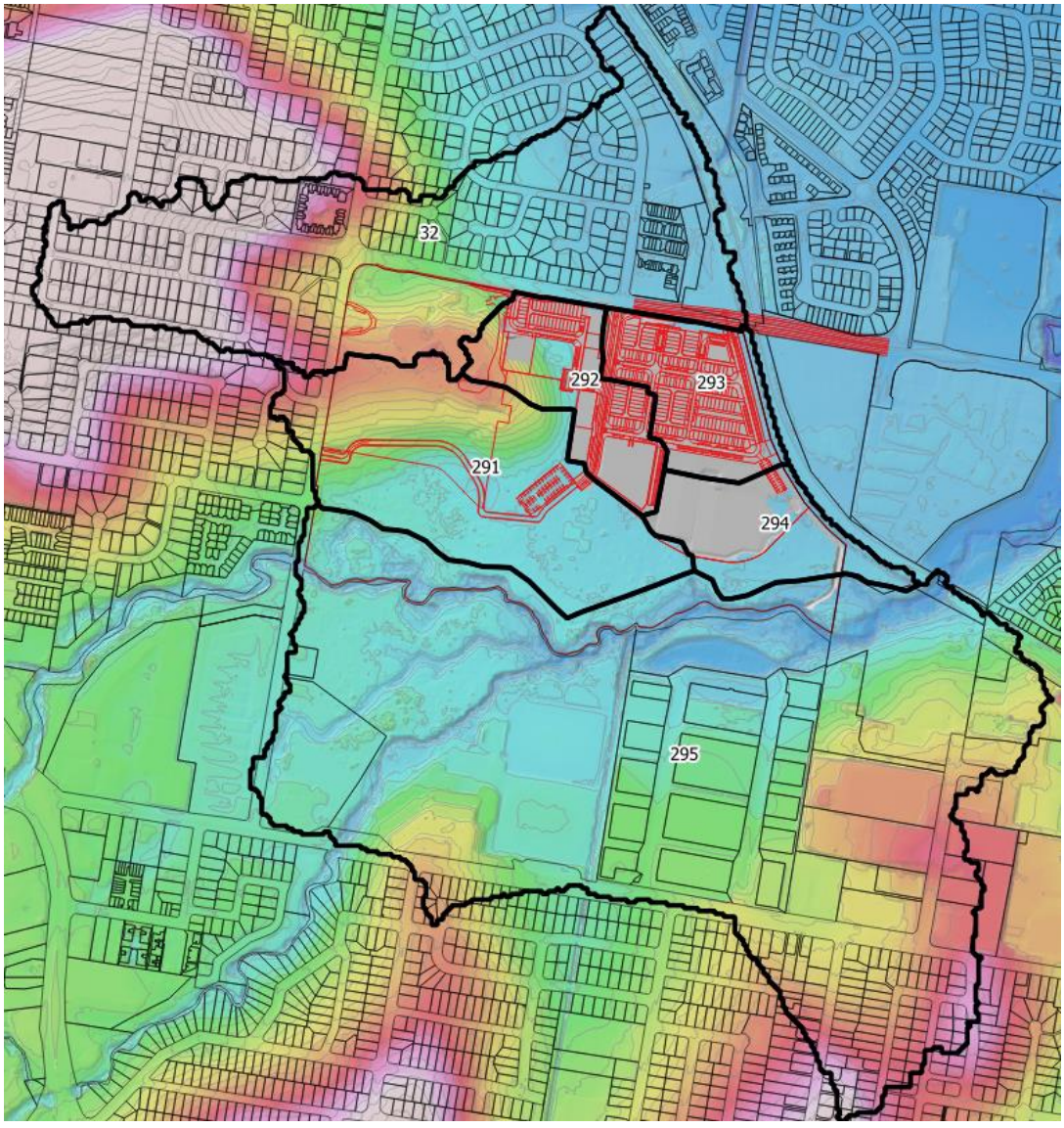


Figure 10 Developed case sub-catchments

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.

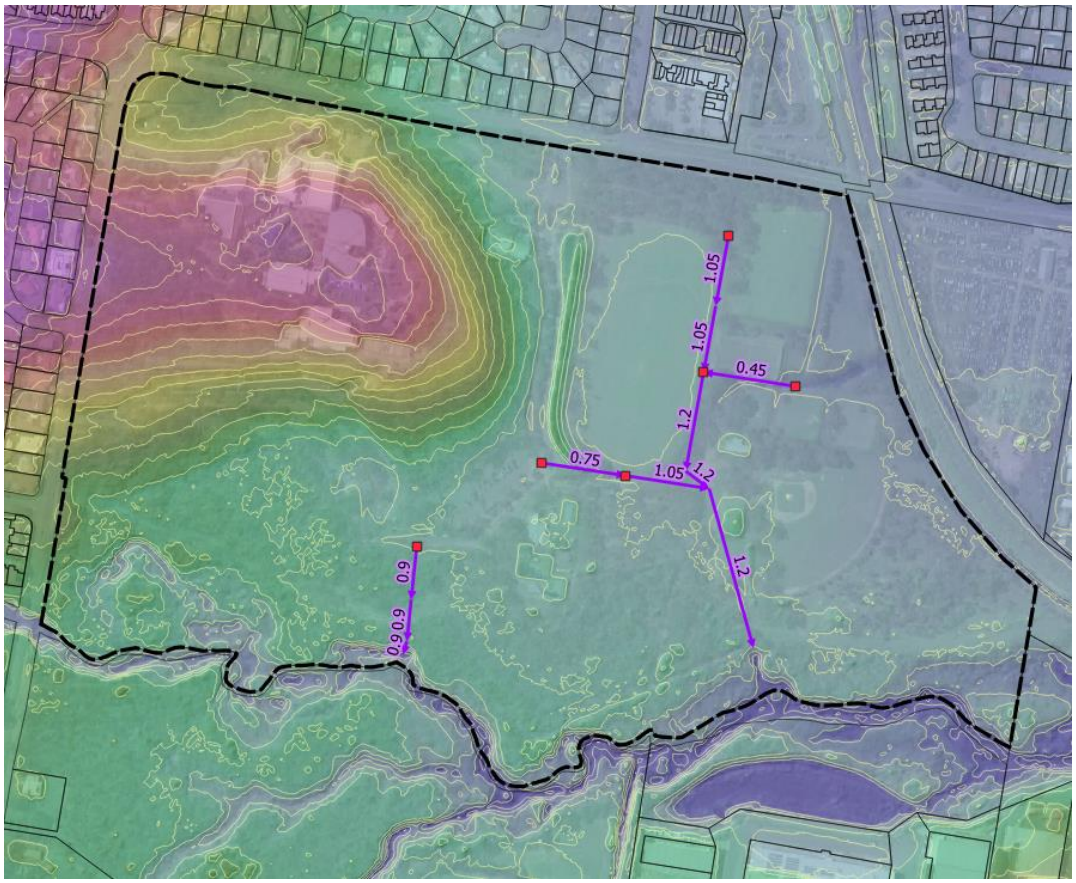


Figure 11 Existing site pipe drainage

5.2.1 Development earthworks

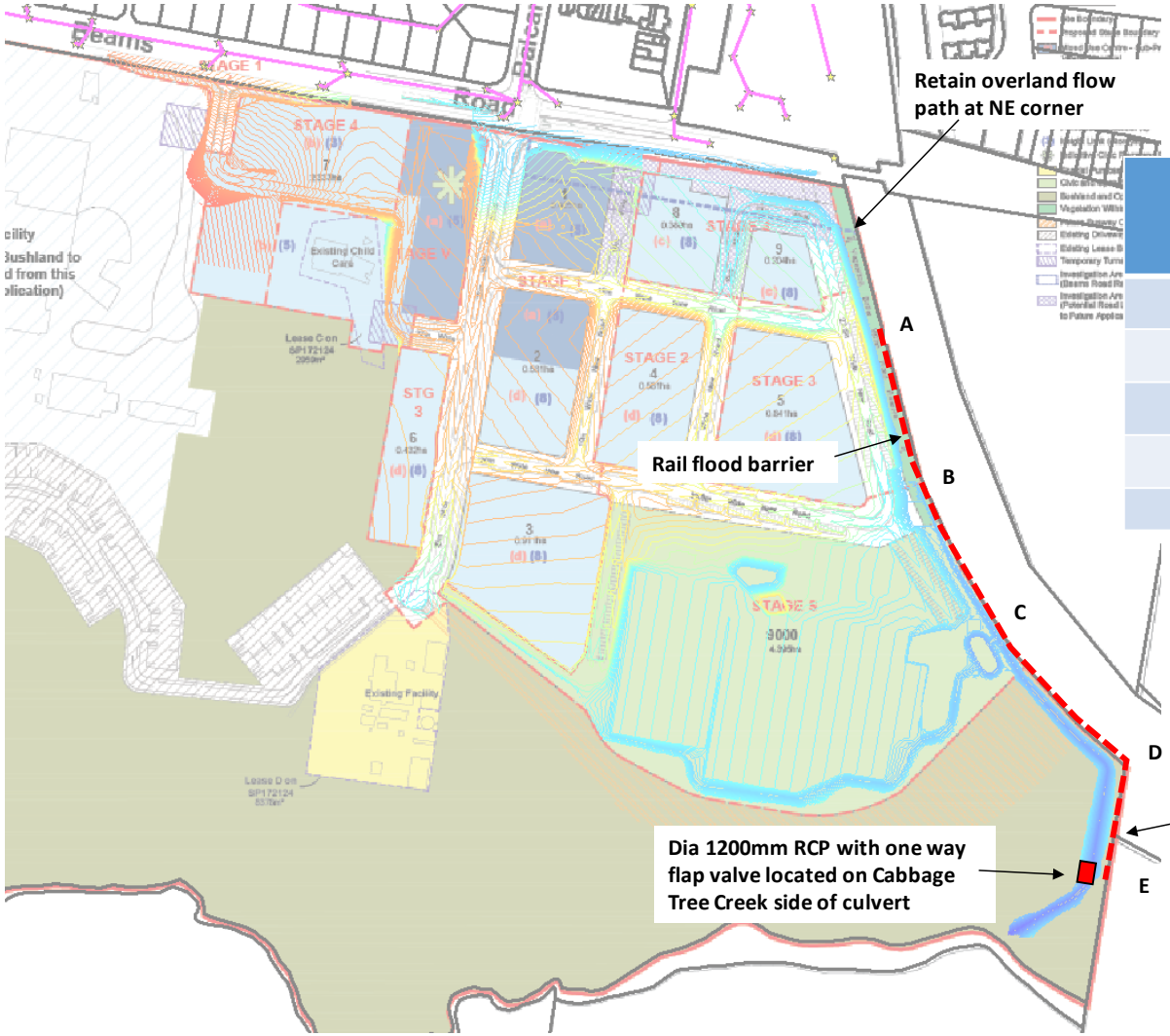
The proposed development has been incorporated into the TUFLOW model based on the latest earthworks design tin provided by the project civil engineers (Calibre Consulting).

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%

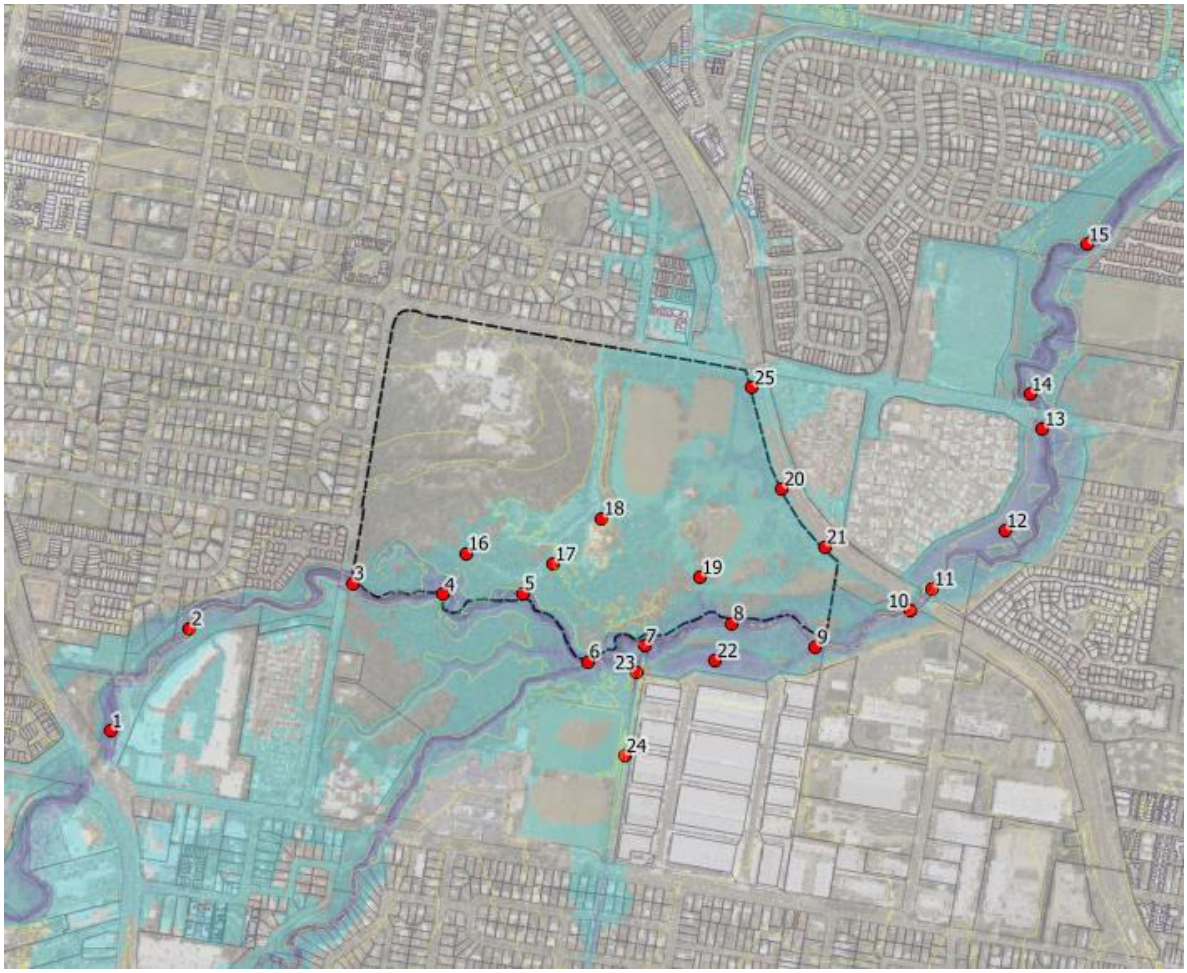


Figure 13 Reporting locations

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.

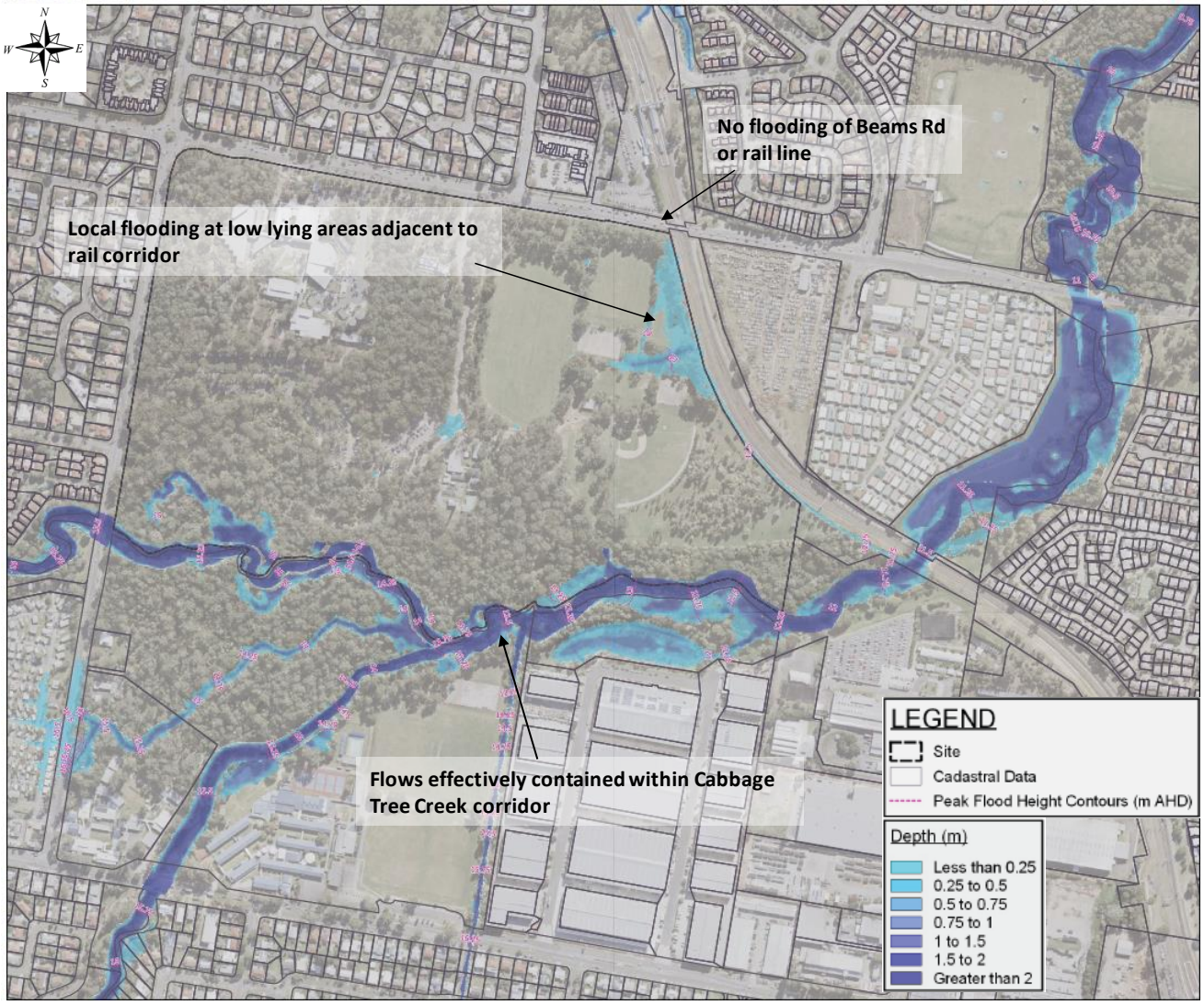


Figure 14 39% AEP flood inundation - existing conditions

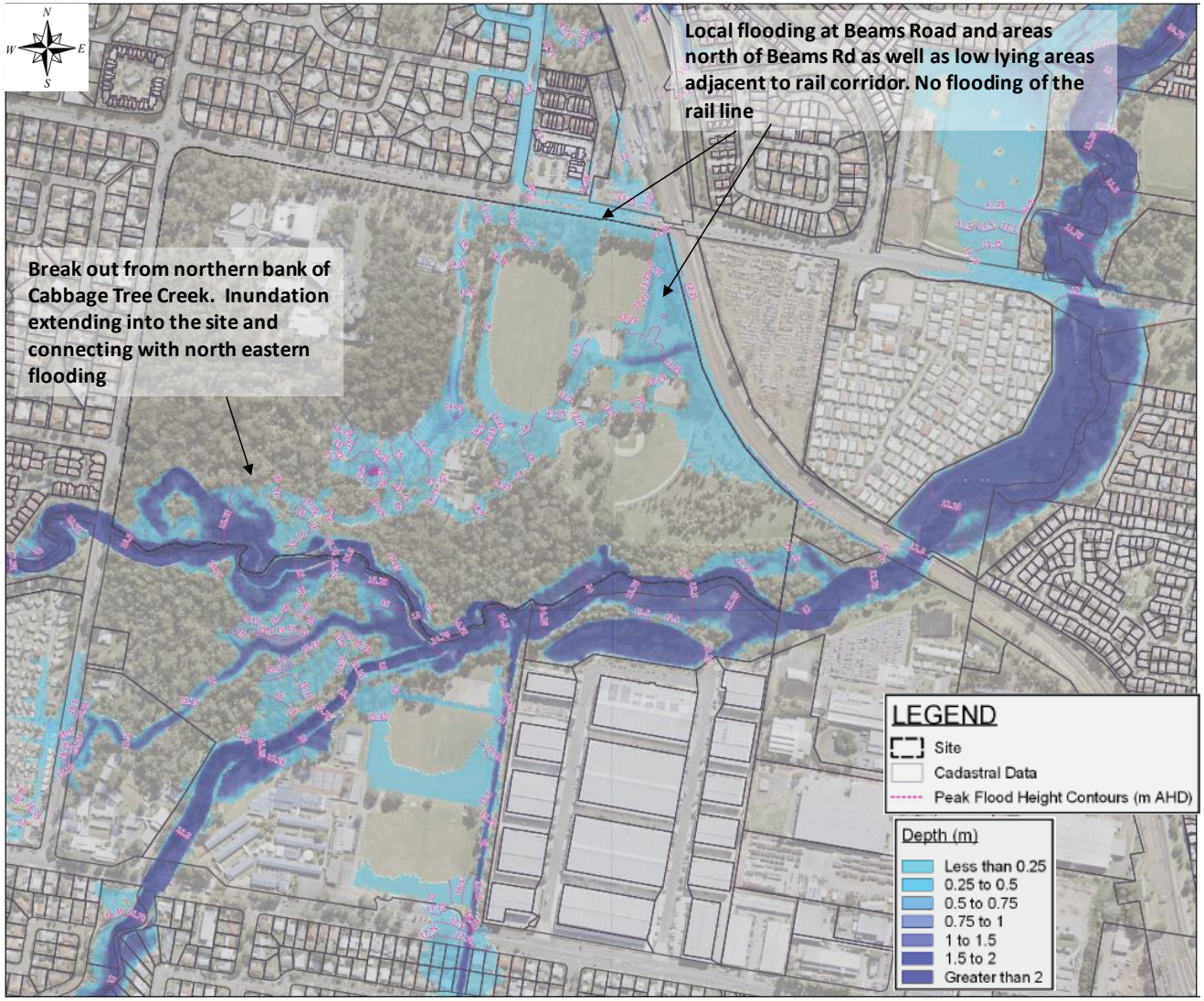


Figure 15 5% AEP flood inundation - existing conditions

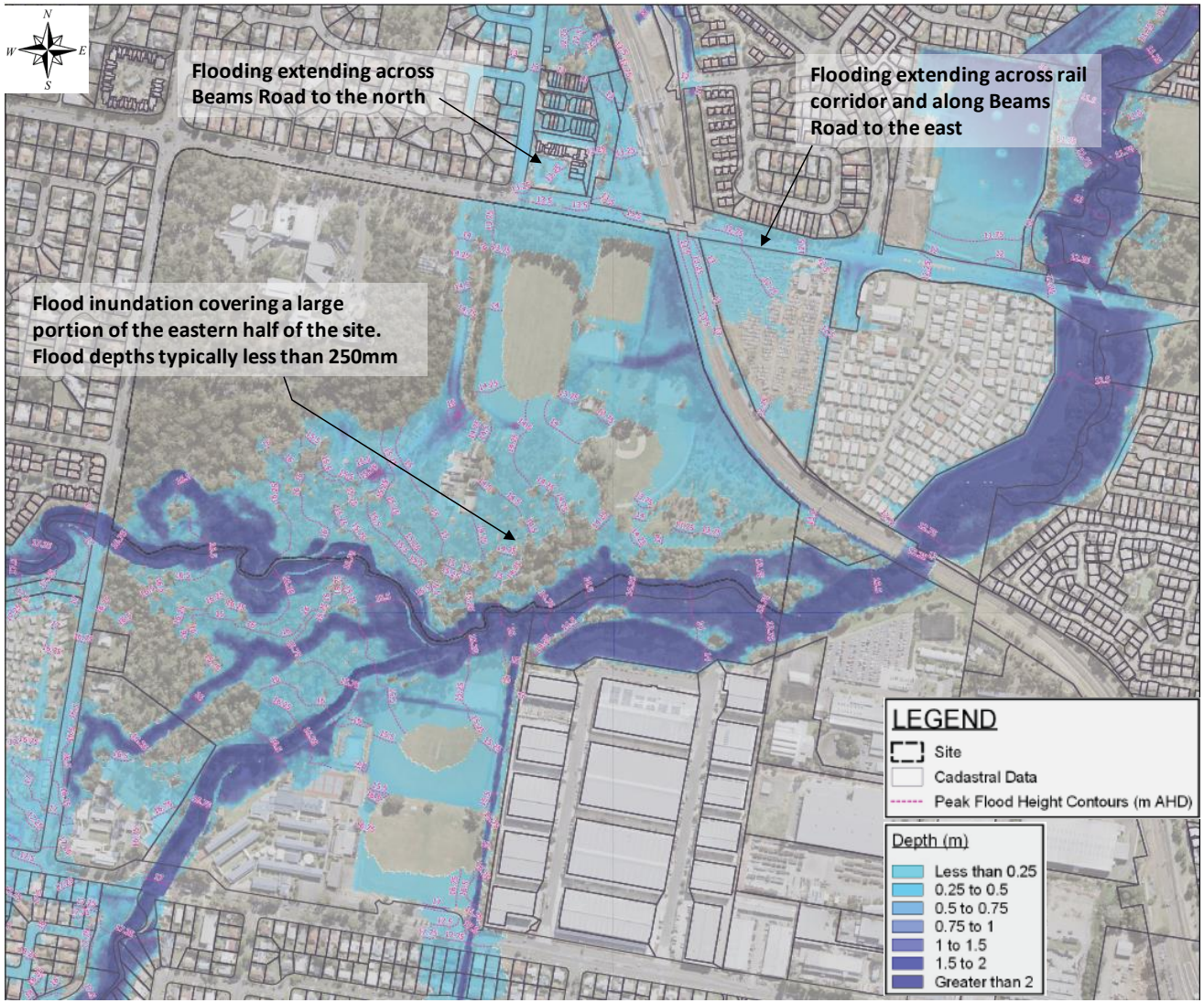


Figure 16 1% AEP flood inundation - existing conditions

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.

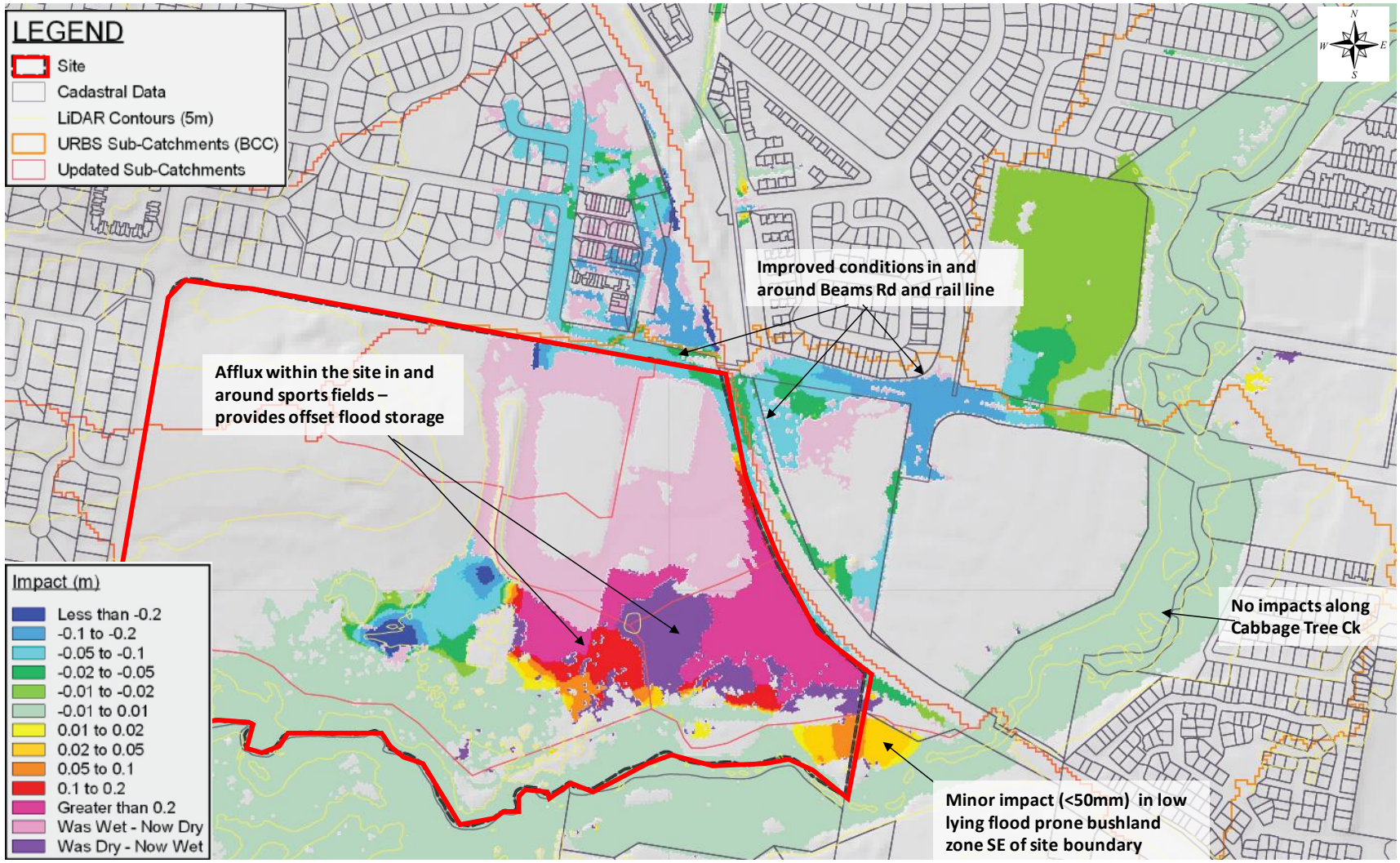


Figure 17 1% AEP flood impacts

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.

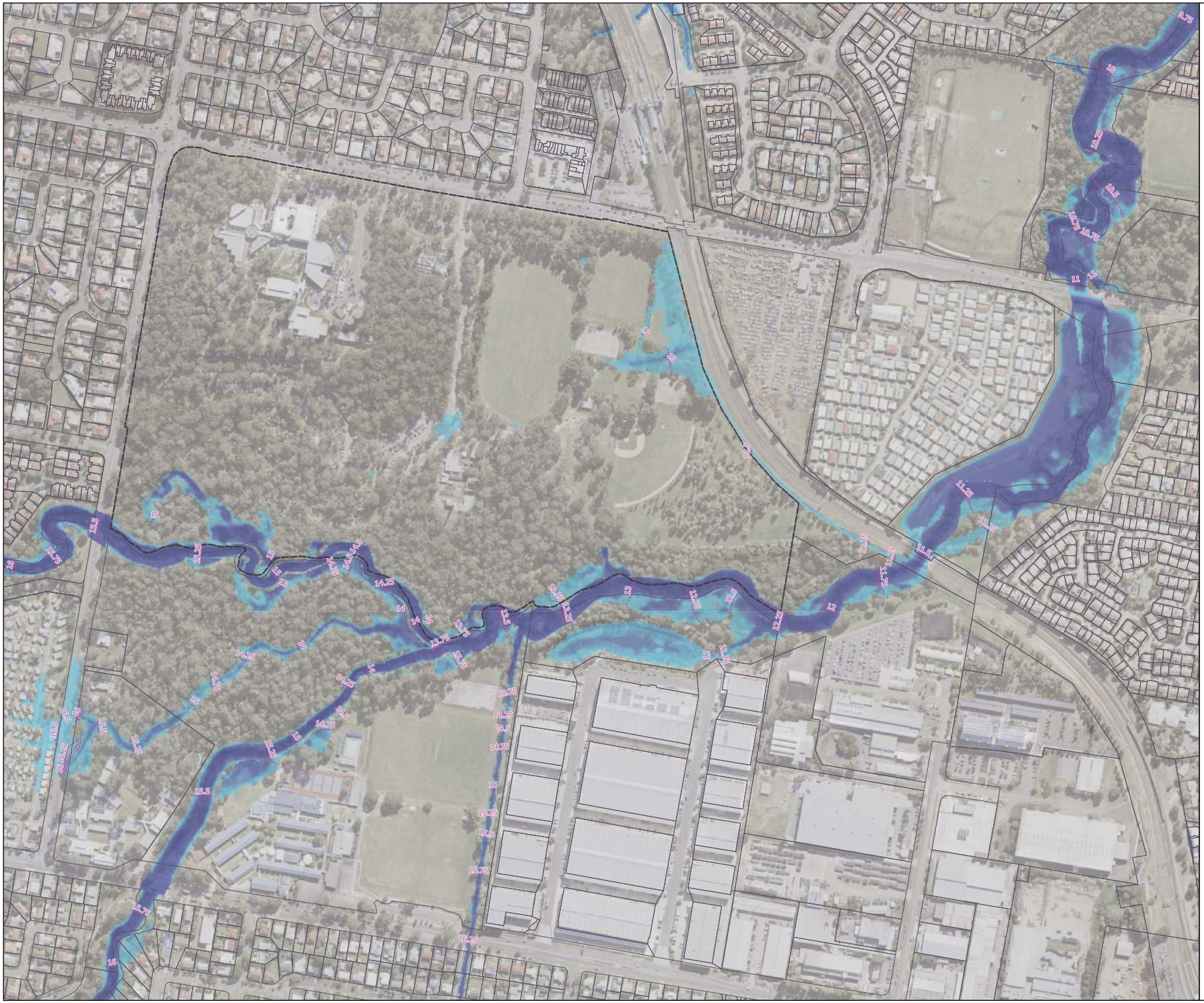
DLGIP (2017). *State Planning Policy*

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

FIGURE A1

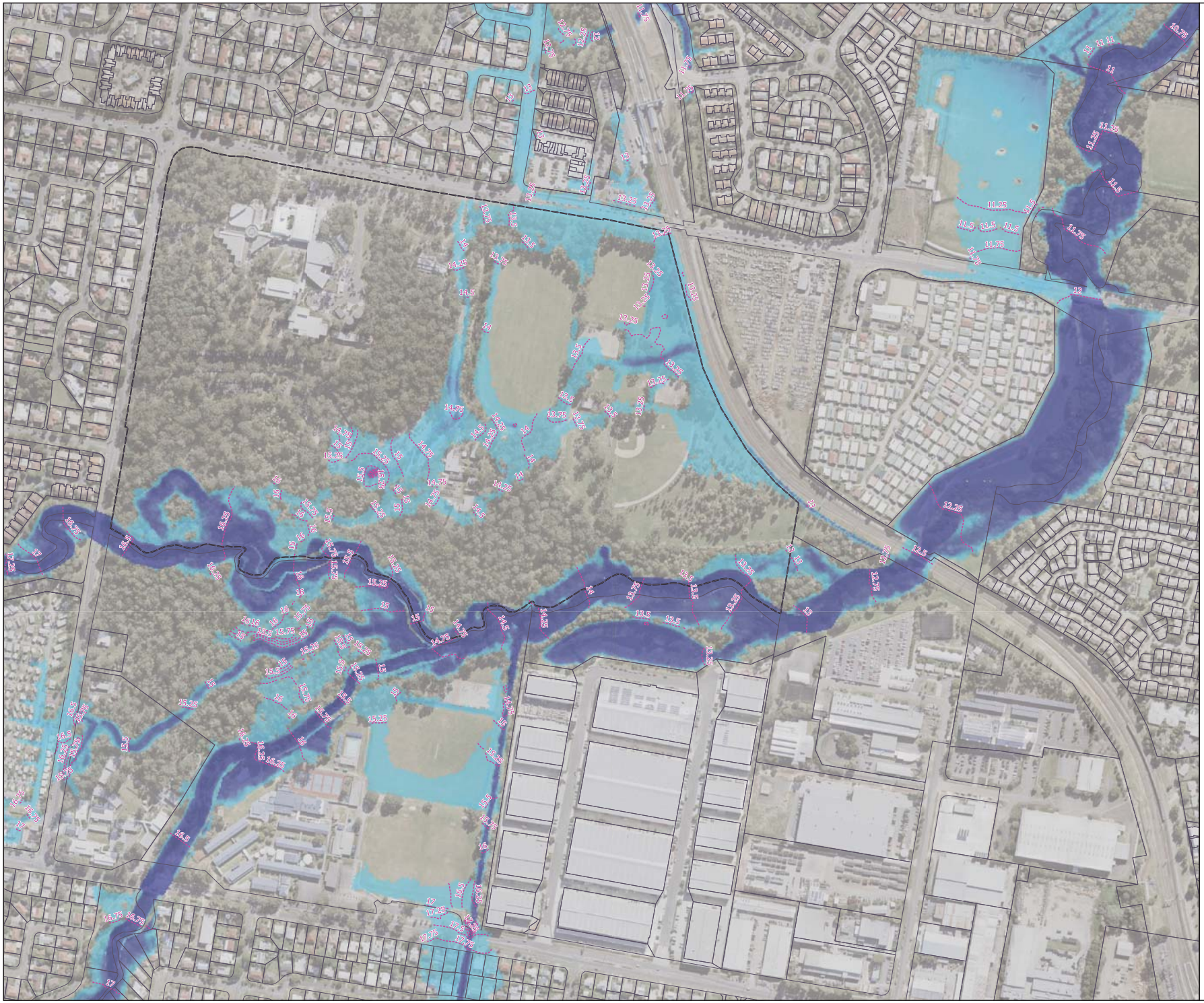
Carseldine Urban Village

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

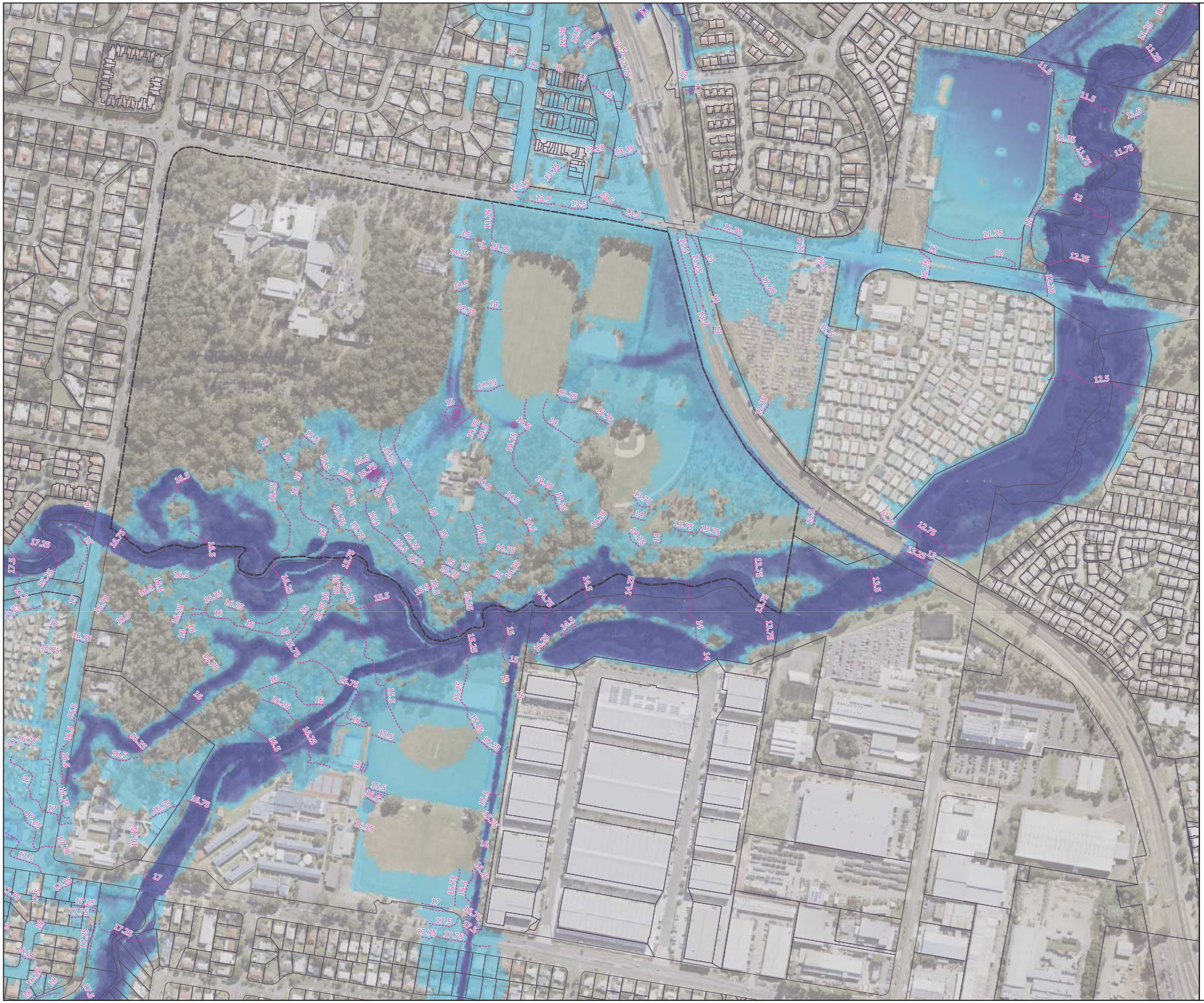
Carseldine Urban Village

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

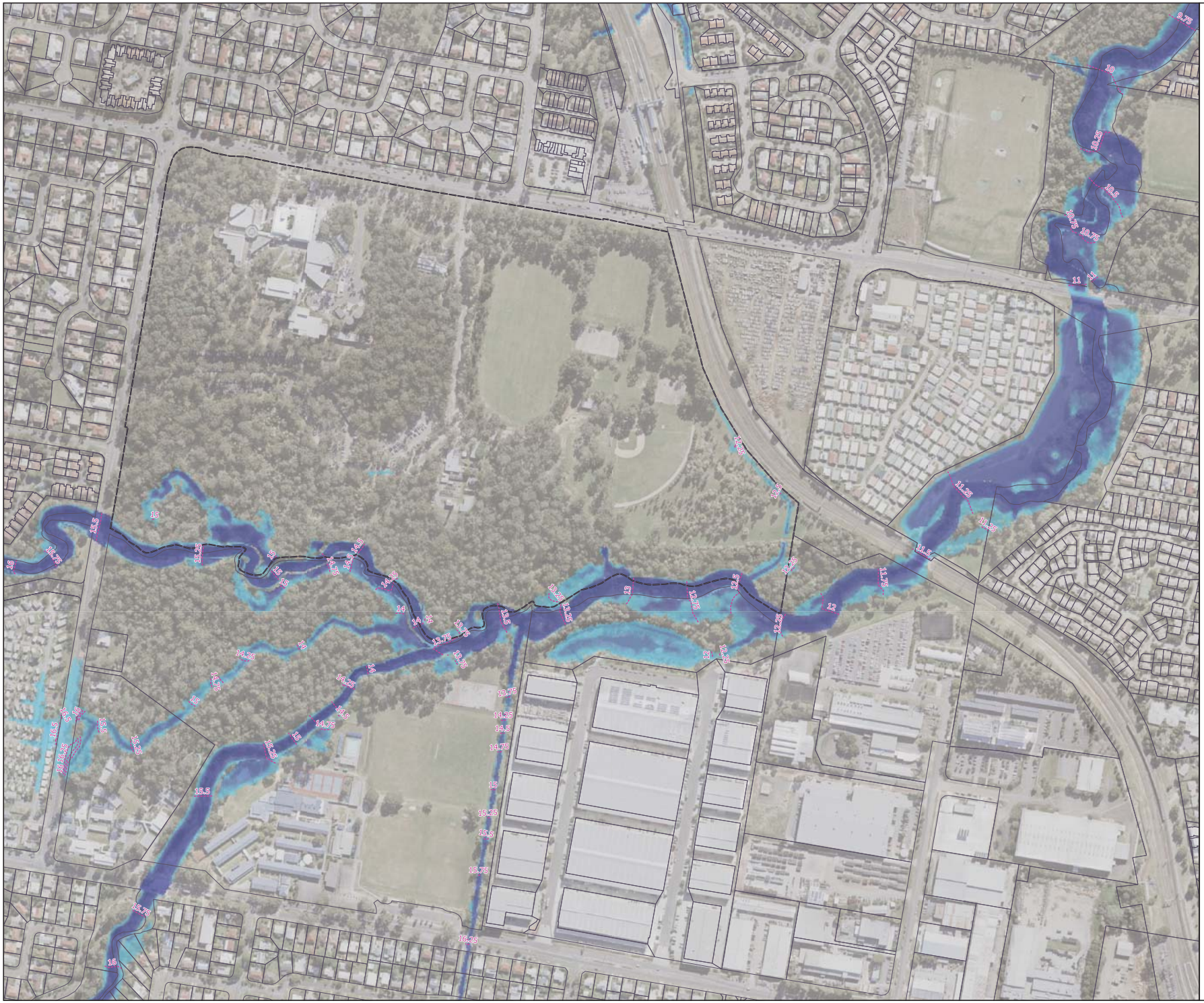
Carseldine Urban Village

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

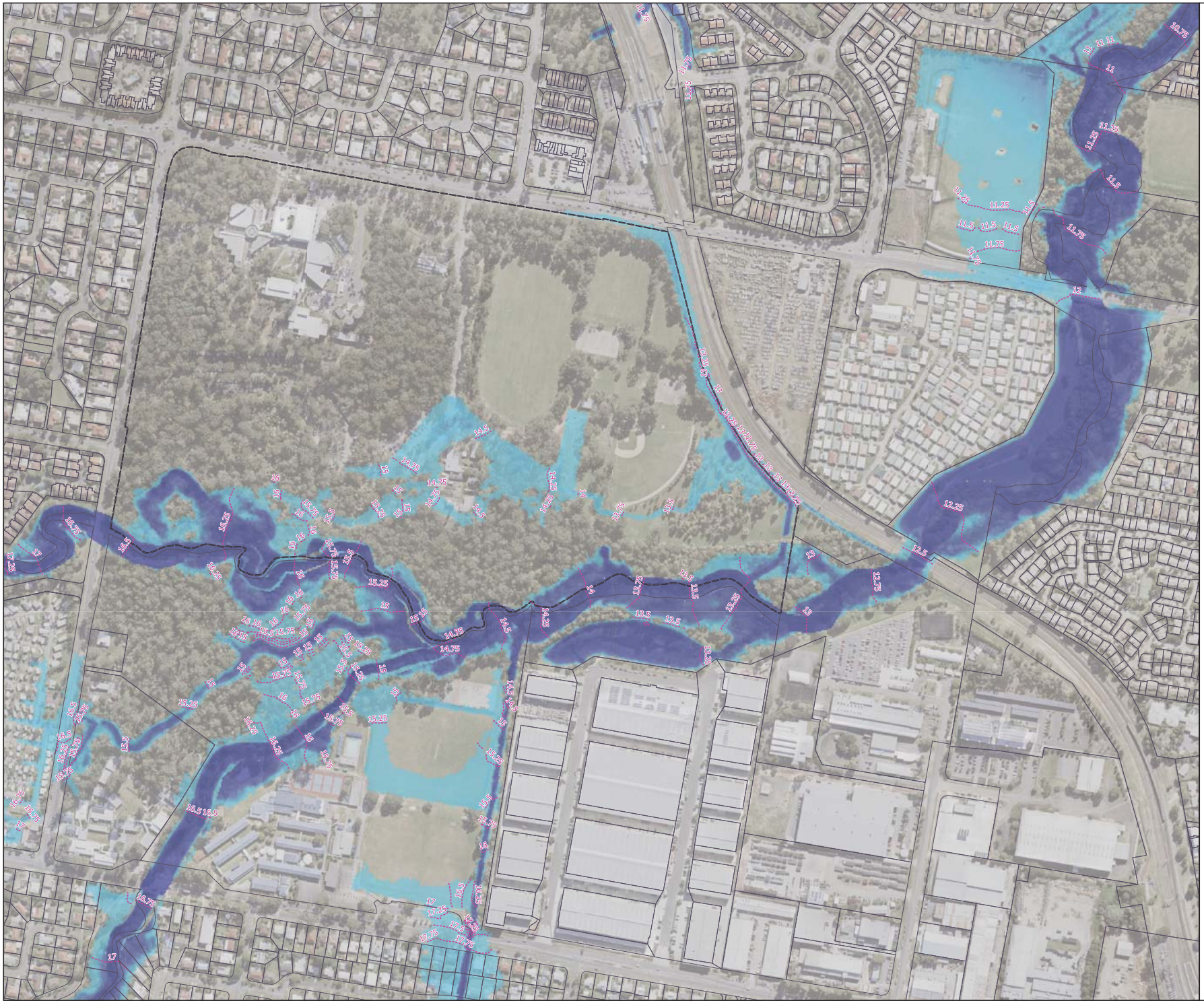
Carseldine Urban Village

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

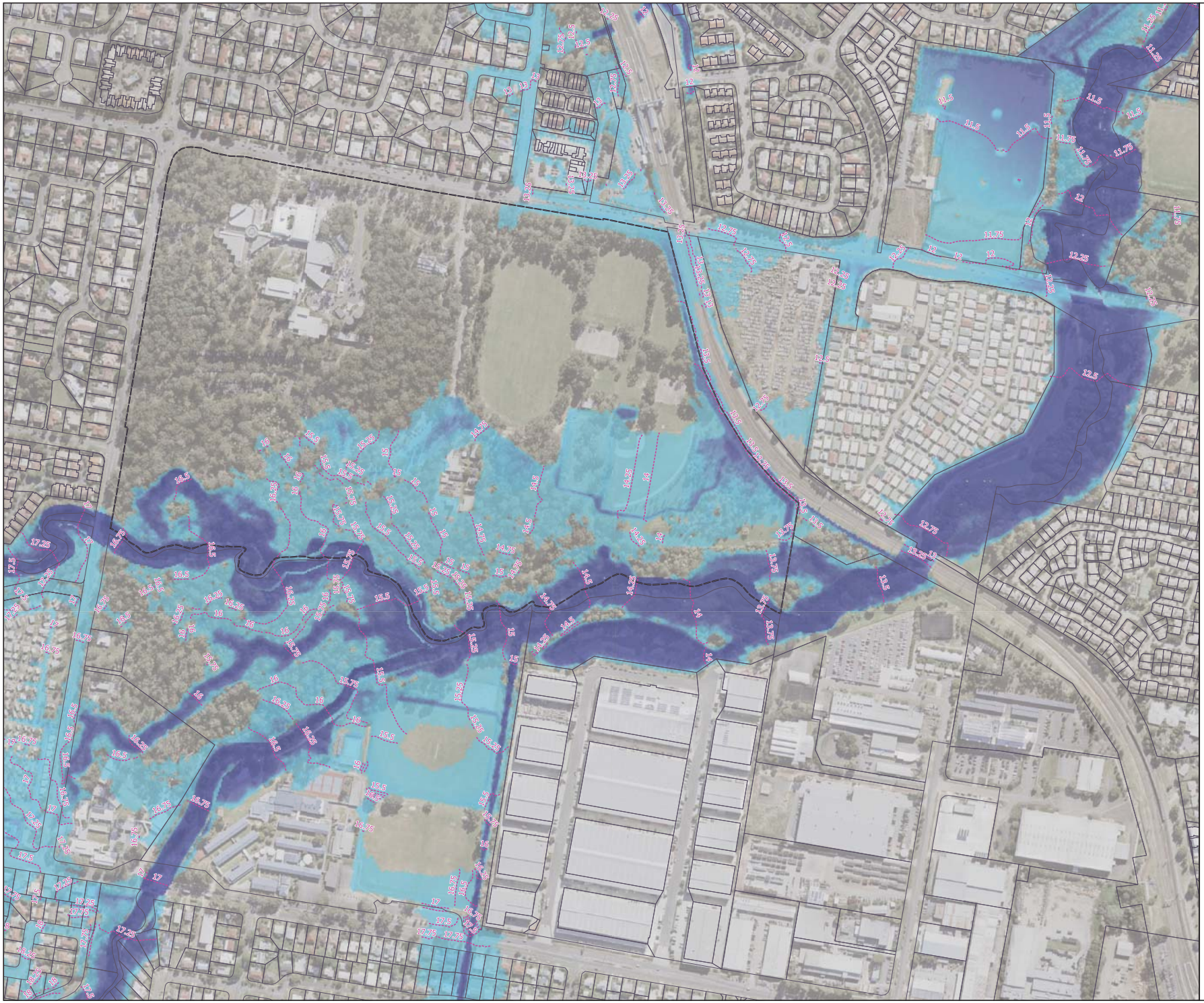
Carseldine Urban Village

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

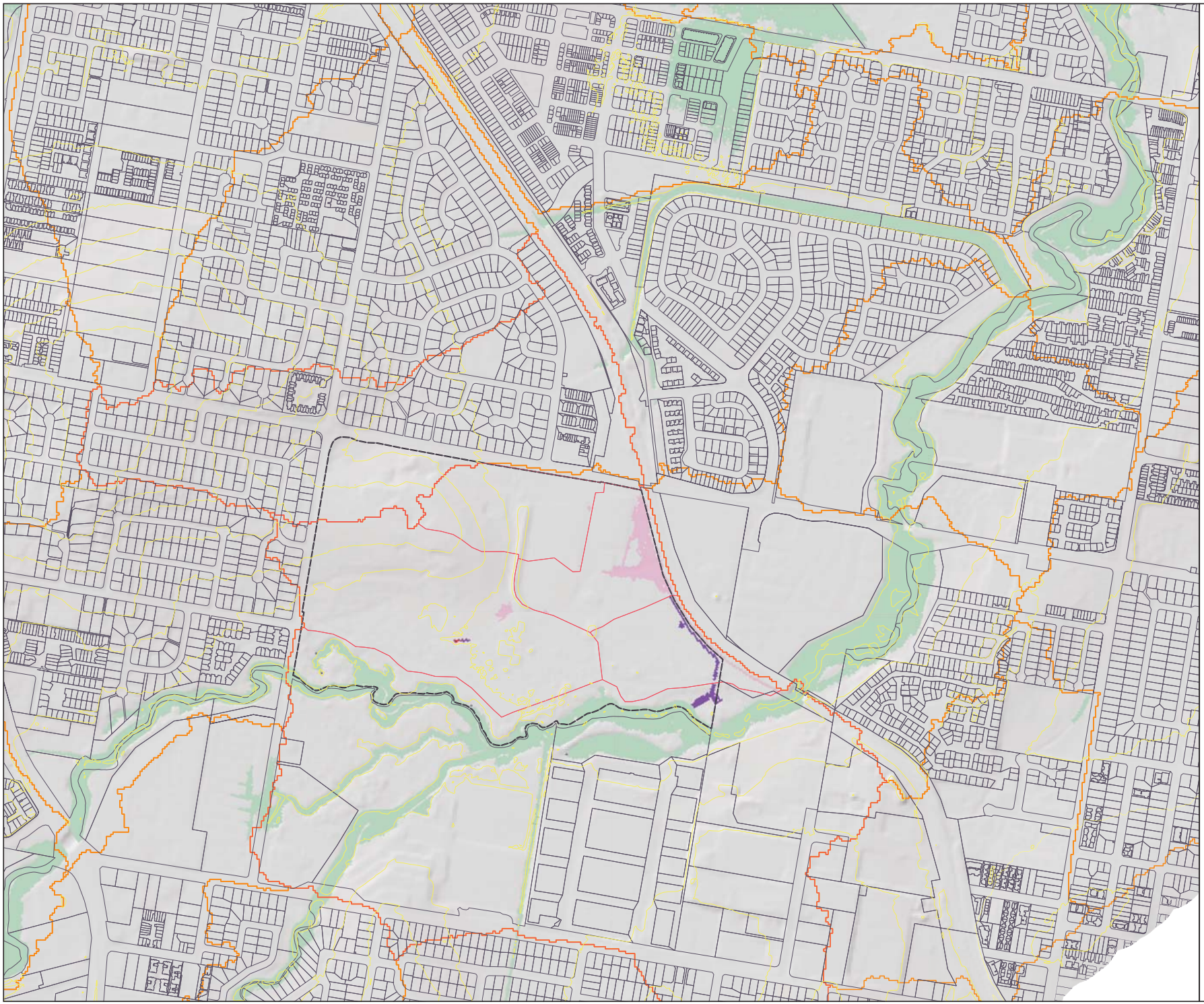
Carseldine Urban Village

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

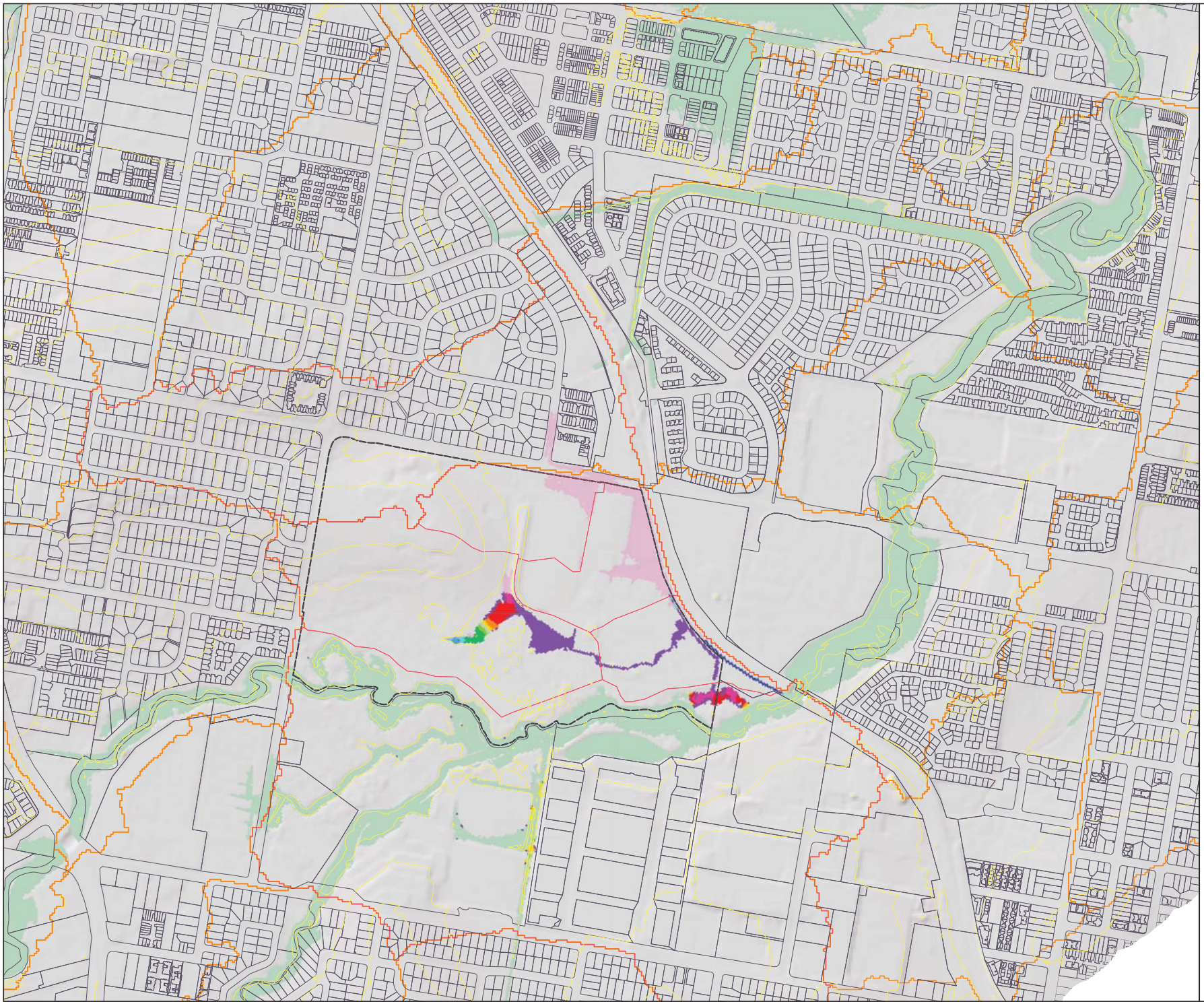
Carseldine Urban Village

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

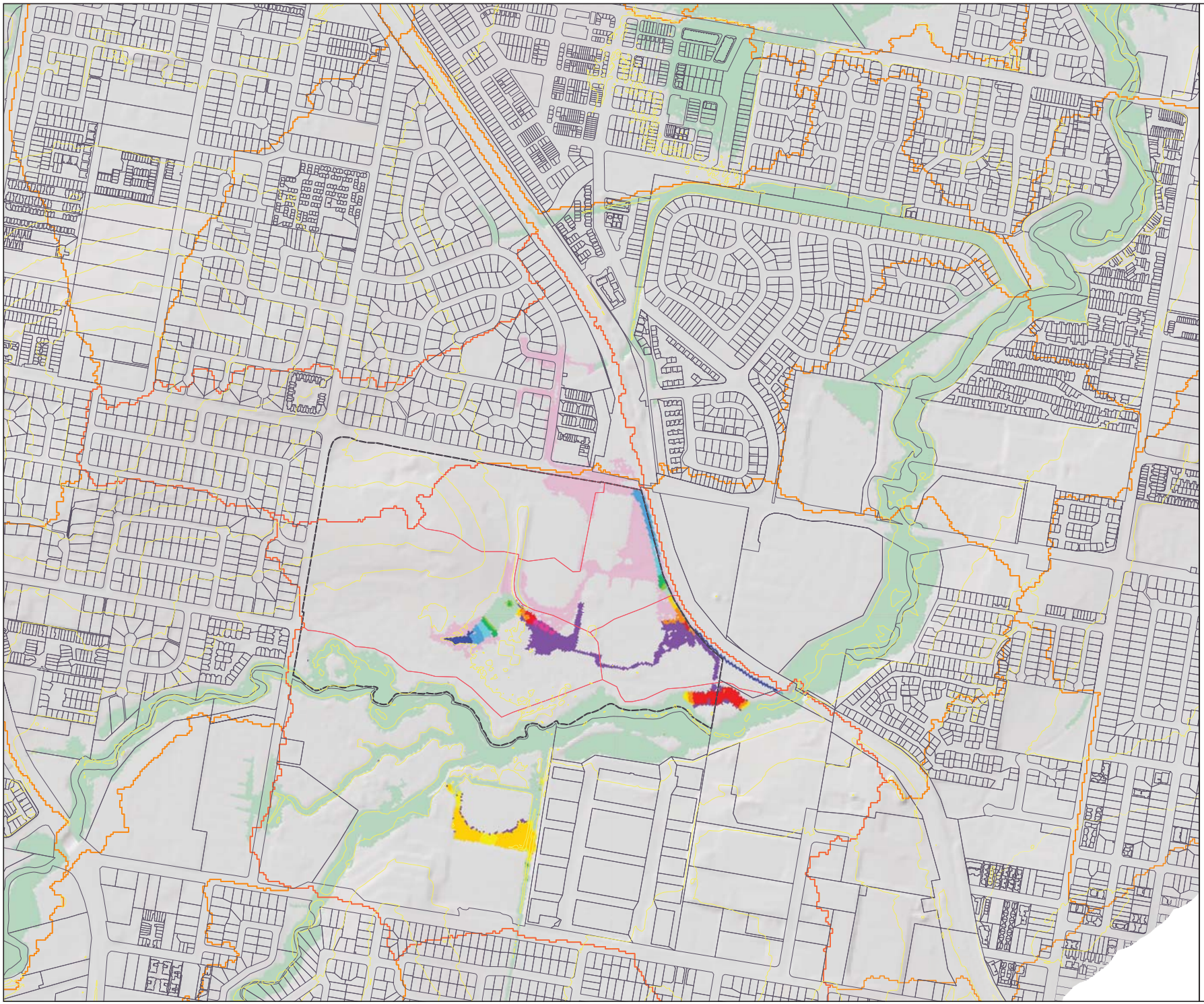
Carseldine Urban Village

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

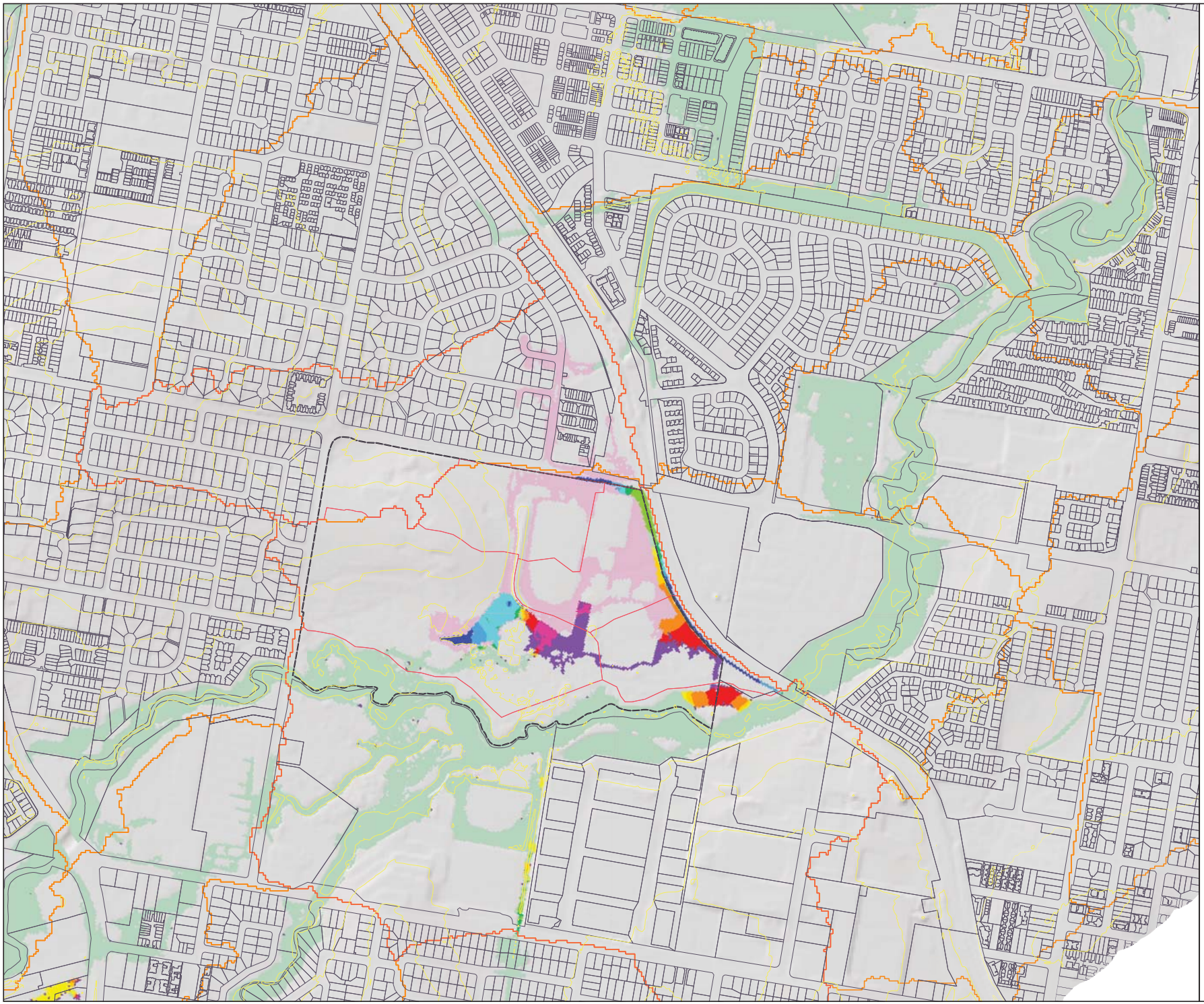
Carseldine Urban Village

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

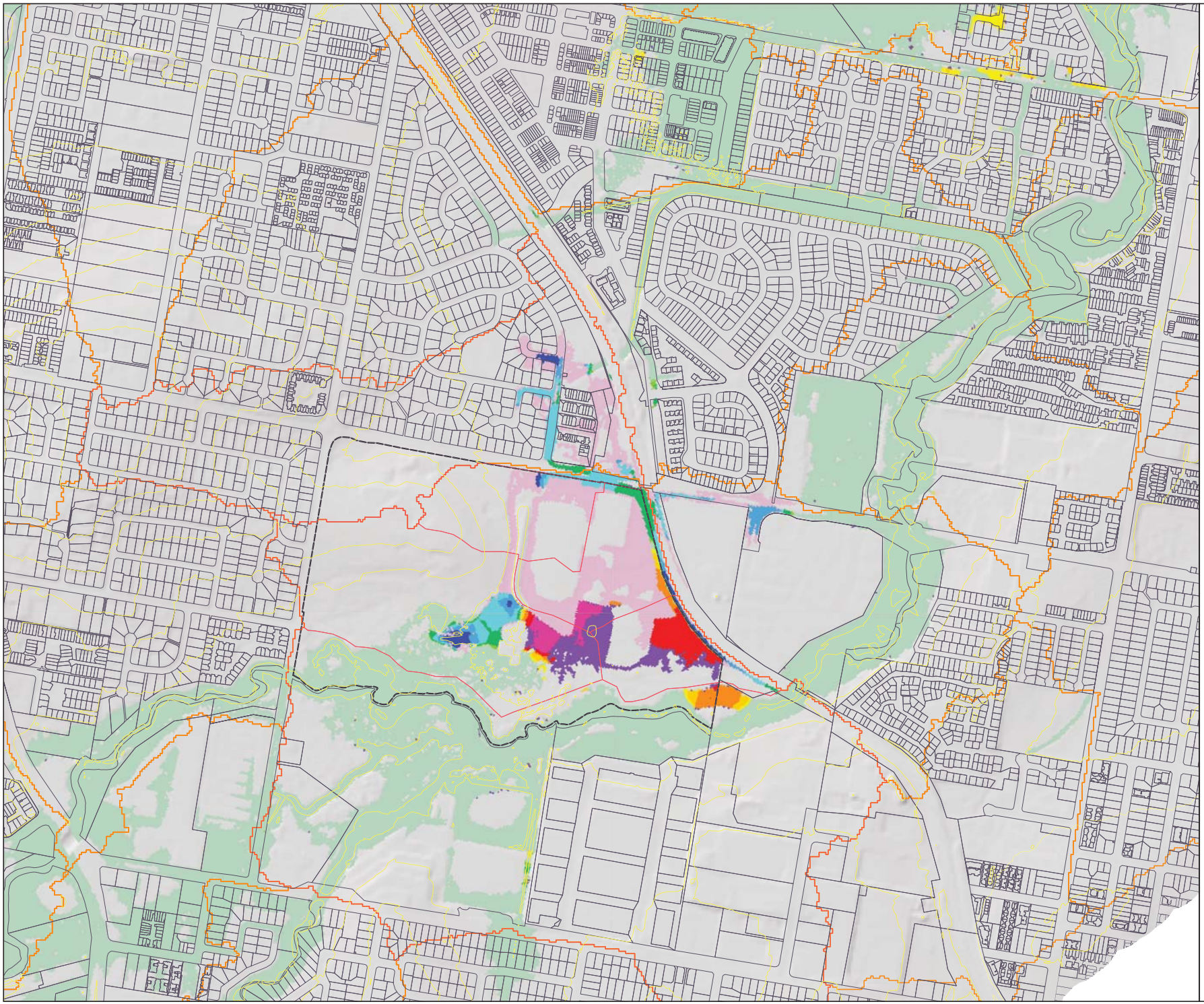
Carseldine Urban Village

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

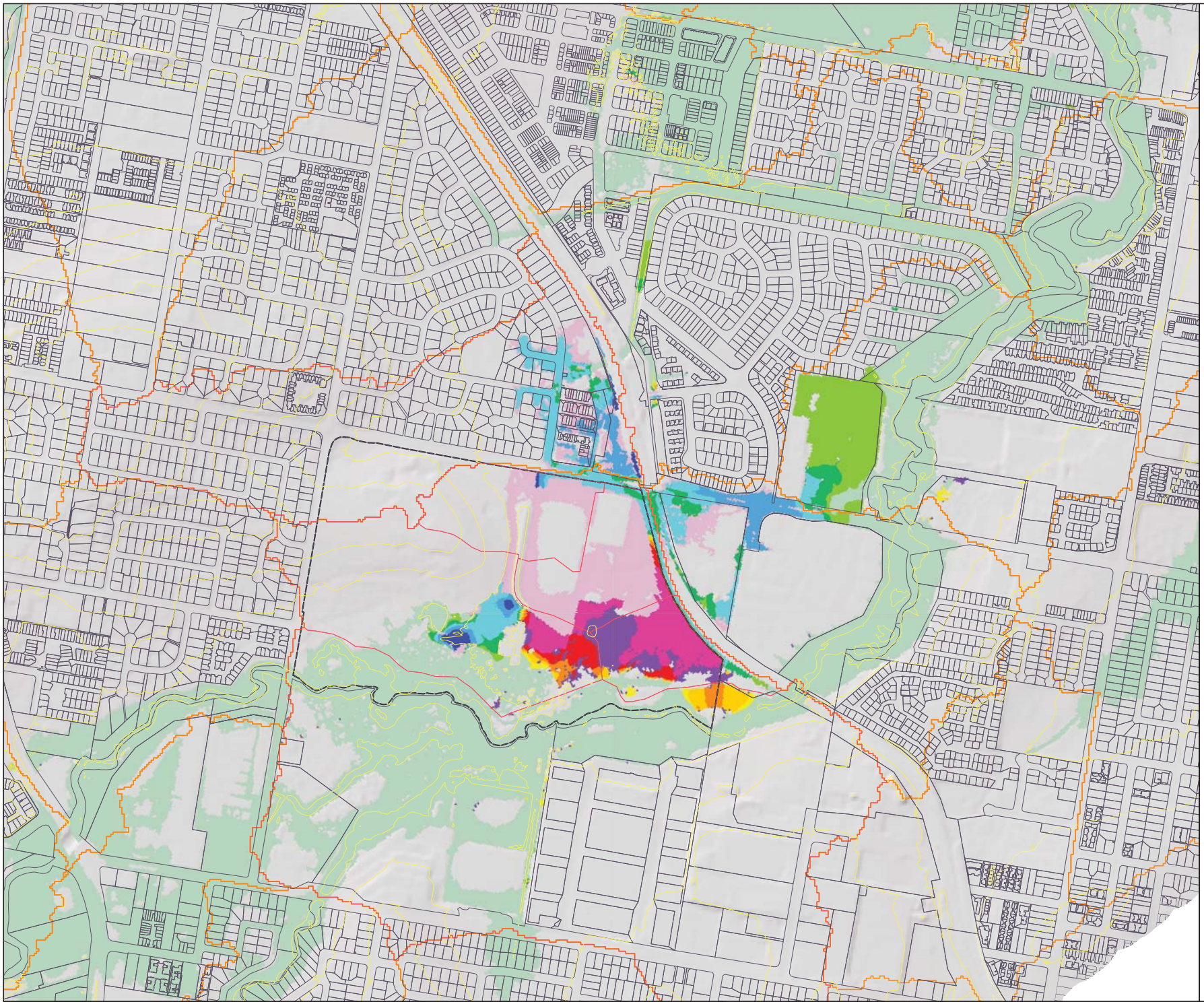
Carseldine Urban Village

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

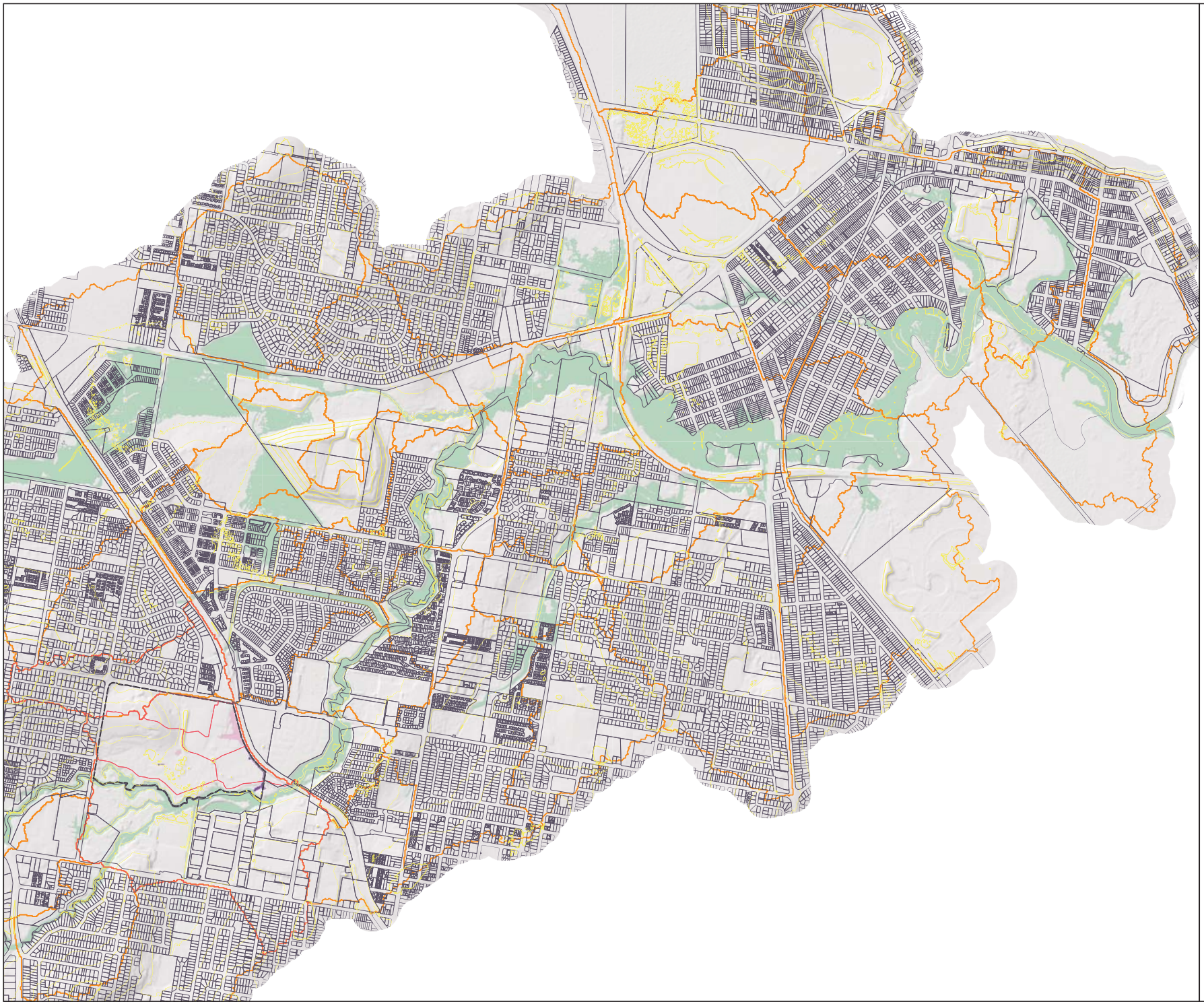
Carseldine Urban Village

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

FIGURE A13

200 0 200 400 m

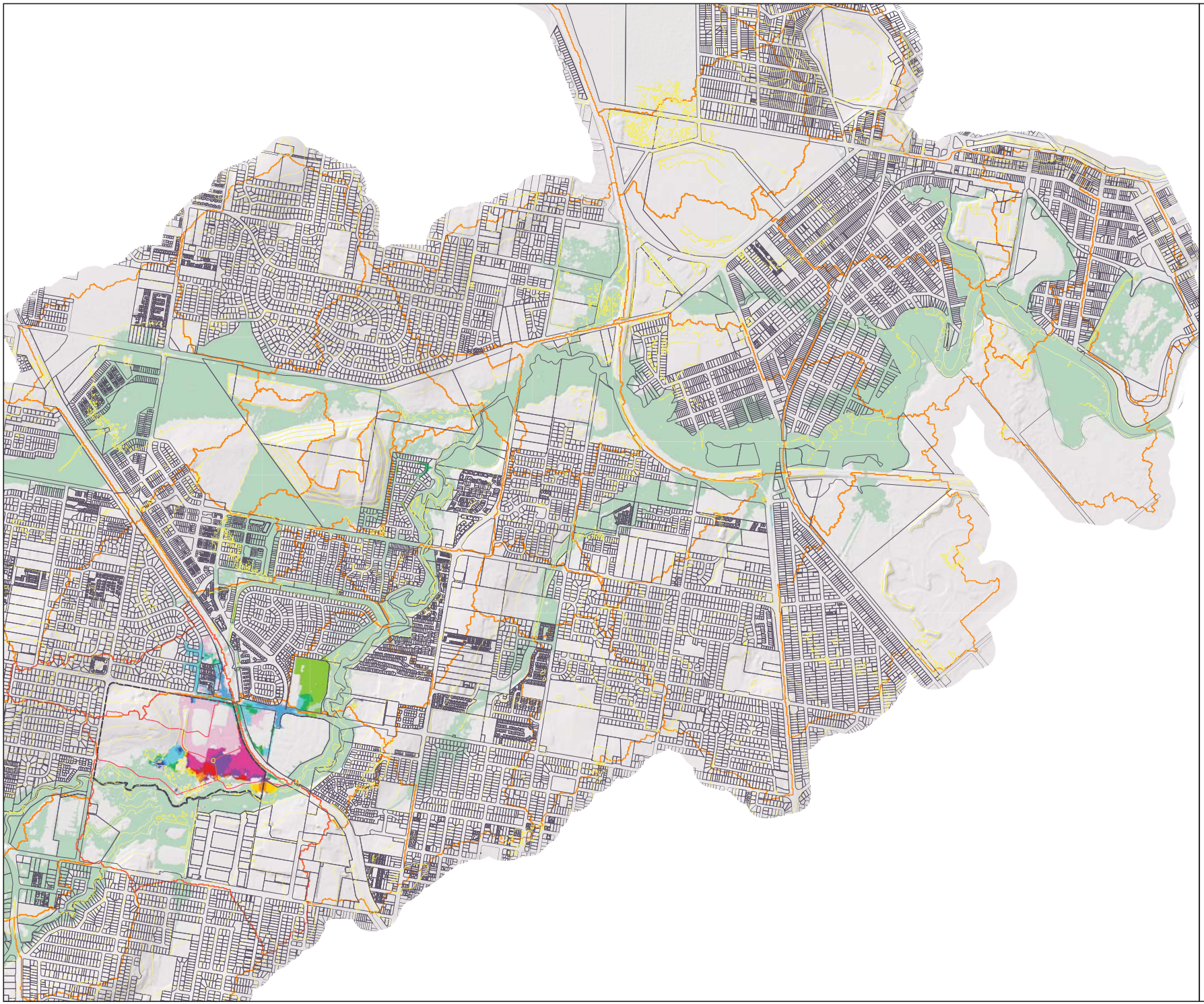
Carseldine Urban Village

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

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

Appendix E – Erosion Hazard Assessment

BRISBANE CITY COUNCIL ABN 72 002 765 795

Erosion Hazard Assessment - June 2014

Brisbane City Council (BCC), *Erosion Hazard Assessment* form must be read in conjunction with the *Erosion Hazard Assessment- Supporting Technical Notes* (June 2014 or later version) for explanatory terms and Certification information.

What is an Erosion Hazard Assessment?
Soil erosion and sediment from urban development, particularly during construction activities, is a significant source of sediment pollution in Brisbane's waterways. The Erosion Hazard Assessment determines whether the risk of soil erosion and sediment pollution to the environment is 'low' , 'medium' or 'high'.

When is the EHA required?
An *Erosion Hazard Assessment* form must be completed and lodged with BCC for any Development Application (ie MCU or ROL) that will result in soil disturbance OR Operational Works or Compliance Assessment Application for 'Filling' or Excavation.

Failure to submit this form during lodgement of an application may result in assessment delays or refusal of the application.

Privacy Statement
The personal information collected on this form will be used by Brisbane City Council for the purposes of fulfilling your request and undertaking associated Council functions and services. Your personal information will not be disclosed to any third party without your consent, unless this is required or permitted by law.

Assessment Details

1 Please turn over and complete the erosion hazard assessment.

2 Based on the erosion hazard assessment overleaf, is the site:

☐ ***A 'low' risk site***

Best practice erosion and sediment control (ESC) must be implemented but no erosion and sediment control plans need to be submitted with the development application. Factsheets outlining best practice ESC can be found at http://www.waterbydesign.com.au/factsheets

☒ ***A 'medium' risk site***

If the development is approved, the applicant will need to engage a Registered Professional Engineer (RPEQ) or Certified Professional in Erosion and Sediment Control (CPESC) to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy.

☐ ***A 'high' risk site***

If the development is approved, the applicant will need to engage a RPEQ and CPESC to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy. The plans and program will need to be certified by a CPESC.

3 Site Information and Certification

Application number (if known)

Site address

41 & 49 Plaza Place, Carseldine

Postcode 4034

I certify that:

☒ I have made all relevant enquiries and am satisfied no matters of significance have been withheld from the assessment manager.

☒ I am a person with suitable qualifications and/or experience in erosion and sediment control.

☒ The Erosion Hazard Assessment was completed in accordance with the Erosion Hazard Assessment Supporting Technical Notes and the BCC Infrastructure Design Planning Scheme Policy.

☒ The Erosion Hazard Assessment accurately reflects the site's overall risk of soil erosion and sediment pollution to the environment.

☒ I acknowledge and accept that the BCC, as assessment manager, relies, in good faith, on this certification as part of its development assessment process and the provision of false or misleading information to the BCC constitutes an offence for which BCC may take punitive steps/ action against me/ enforcement action against me.

Certified by *Print name*

Callie Omlid

Certifier's signature

Date

17 / 07 / 2024

Assessment Table

Table 1: Low Risk Test

		Yes	*No*
1.1	is the area of land disturbance > 1000 m^2	X	
1.2	does any land disturbance occur in a BCC mapped waterway corridor		X
1.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 5%		X
1.4	does any land disturbance occur below 5 m AHD		X
1.5	does development involve endorsement of a staging plan		X
1.6	is there an upstream catchment passing through the site > 1 hectare		X

Have you answered 'yes' to any of the questions in Table 1?	*Yes*	*No*	
	X		**If '*No*' then site is <u>low risk</u> with respect to erosion and sediment control**

If '*Yes*' then proceed to Table 2

Table 2: Medium Risk Test

		Yes	*No*	
2.1	is the area of land disturbance > 1 hectare		X	**If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control**

If '*Yes*' then proceed to Table 3

Table 3: High Risk Test

		Yes	*No*
3.1	is there an upstream catchment passing through the site > 1 hectare		
3.2	does any land disturbance occurs in a BCC mapped waterway corridor		
3.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 15%		

Have you answered 'yes' to any of the questions in Table 3?	*Yes*	*No*	
			If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control

If '*Yes*' then site is <u>high risk</u> with respect to erosion and sediment control

Appendix F – BCC Codes

Project Location: 41 & 49 Plaza Place, Carseldine Job Reference: 10898

BCC – Filling and Excavation Code

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**AO1** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: (a) 2.5m in a zone in the Industry zones category; (b) 1m in all other zones, or if adjoining a sensitive zone.	**AO**	The proposed retaining walls and earthworks will not create adverse visual impacts to the surrounding properties.	
PO2 Development of a retaining wall proposed as a result of filling or excavation: (a) is designed and constructed to be fit for purpose; (b) does not impact adversely on significant vegetation; (c) is capable of easy maintenance. Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with the Building Regulation. Note—Guidance on the protection of native	**AO2.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: a) is wholly contained within the site; b) if the total height to be retained is greater than 1m, then: (i) the retaining wall at the property boundary is no greater than 1m above the ground level; (ii) all further terracing from the 1m high boundary retaining wall is 1 vertical unit:1 horizontal unit; (iii) the distance between each successive retaining wall (back	**AO**	No significant vegetation is located in or near the subject site. Retaining wall finishes will be acceptable to Council standards. Clean fill will be used where required.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
vegetation is included in the Biodiversity areas planning scheme policy.	of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas. **AO2.2** Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland. **AO2.3** Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary. **AO2.4** Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy. .			

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	**AO3** Development ensures that a rock anchor: a) is constructed in accordance with the standards in the Infrastructure design planning scheme policy; b) where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owners.	**N/A**	No rock anchors are required as a part of this development	
PO4 Development protects all services and public utilities.	**AO4** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	**AO**	Construction of the development will take necessary precautions and actions to ensure the protection of existing services and public utilities.	
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**AO5** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	**AO**	Acceptable surface drainage has been designed in accordance with the infrastructure design planning scheme policy. Appropriate subsoil drainage will be designed at the detailed design stage according to the infrastructure design planning scheme policy.	
PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural	**AO6** Filling or excavation does not involve the construction of open drainage.	**AO**	No major open drainage works are proposed as a part of the development.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.				
PO7 Development for filling or excavation: a) does not degrade water quality or adversely affect environmental values in receiving waters; b) ensures site sediment and erosion control standards are best practice.	**AO7.1** Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy. **AO7.2** Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	**AO**	Water quality treatment has been designed in accordance with the infrastructure design planning scheme policy and the State Planning Policy. An erosion and sediment control plan will be designed at the detailed design stage and will be in accordance with the infrastructure design planning scheme policy.	
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site.	**AO**	Erosion and sediment control measures will be implemented on site to ensure no dust emissions. Earthworks will be restricted to the	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO8.2** Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.		recommended working hours.	
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO9** Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	**AO**	Filling and excavation activities undertaken on site will ensure that ground-borne vibration does not exceed the criteria set out by BCC.	
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**AO10** Development ensures that heavy trucks hauling material to and from the site: a) occur for a maximum of 3 weeks; b) use a major road to access the site; c) only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	**AO**	Truck movements to and from site will be restricted as per BCC guidelines.	
PO11 Development for filling or excavation	**AO11** Development does not involve:	**AO**	Due to the existing nature of the site it is not expected that the site is listed on the contaminated land register. A search can	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	a) excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b) filling with material containing a contaminant.		be undertaken if requested. All fill material sourced for the development will be free of contaminants.	
PO12 Development provides for: a) landscaping for water conservation purposes; b) water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; c) stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	**AO12.1** Development provides landscaping which is designed using the standards in the Landscape design guidelines for water conservation planning scheme policy. **AO12.2** Development ensures that the design and requirements for irrigation are in compliance with the standards in the Landscape design guidelines for water conservation planning scheme policy. **AO12.3** Development provides areas of pavement, turf and mulched garden beds which are drained. Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	**AO**	Landscaping areas are provided throughout the proposed development. Where appropriate, surface drainage has been provided to remove excess runoff from the site.	
PO13	**AO13**	**AO**	The development does not involve the	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	Development does not involve the creation of canals or artificial waterways.		creation of canals or artificial waterways.	

BCC – Stormwater Code

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
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: (c) minimise flooding; (d) protect environmental values of receiving waters; (e) maximise the use of water sensitive urban design; (f) minimise safety risk to all persons; (g) 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.	**AO1** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	**AO**	The proposed stormwater quantity and quality management system is designed in accordance with the Infrastructure design planning scheme policy. Please refer to the report for further design details relating to the stormwater management system. Please also refer to the existing and developed catchment plans and the proposed stormwater drainage layout.	
PO2 Development ensures that the stormwater management system and site work does not adversely impact	**AO2.1** Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises.	**AO**	The proposed stormwater management system is designed in compliance with the standards in the Infrastructure design planning scheme policy and will not result in an increase in flood level or	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	**AO2.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.		flood hazard on upstream, downstream or surrounding 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. **AO3.4** Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	**AO**	The stormwater management system and lawful point of discharge is in compliance with the infrastructure design planning scheme policy. Easements have been provided over stormwater infrastructure where applicable.	
PO4	**AO4.1**	**AO**	The development provides a stormwater	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
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.	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.		conveyance system which is designed to safely convey stormwater runoff in accordance with the infrastructure design planning scheme policy. The development provides sufficient area to convey runoff in accordance with the infrastructure design planning scheme policy.	
PO5 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**	No stormwater channels or creek modification works are proposed as a part of the development.	
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. **AO6.2** Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.	**AO**	The proposed stormwater quality and quantity management system is not located within a waterway corridor and is in accordance with the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
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).	**AO**	The development achieves the minimum flood immunity levels nominated. Safe pedestrian and vehicle access has been designed in accordance with the planning scheme policy.	
	AO7.2 Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in 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.	**AO**	Development ensures natural waterway corridors and drainage paths are retained. Appropriate energy dissipation devices have been provided at stormwater outlets to minimise scour where required.	
	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.			

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
	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.			
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.	**PO**	Development has incorporated landscaping to minimise impervious area and allowed for stormwater re-use where appropriate.	
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management	**AO10** No acceptable outcome is prescribed.	**PO**	There is sufficient area on-site to accommodate an effective stormwater management system.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
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.				
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 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.	**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** Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Infrastructure design planning scheme policy.	**AO**	There are no major external catchments draining through the site that need to be provided with a drainage connection.	
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	**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	**AO**	The stormwater management system is in compliance with the infrastructure design planning scheme policy. No existing stormwater manholes are located on the subject site.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
existing stormwater infrastructure.	minimum height clearance of 2.5m.			
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 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.	**AO13** No acceptable outcome is prescribed.	**PO**	An erosion and sediment control plan will be designed at the detailed design stage, which will incorporate industry best practice methods to reduce any possible impacts to receiving waters and stormwater infrastructure.	
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	**AO14** No acceptable outcome is prescribed.	**PO**	The development will avoid unnecessary disturbance to soil, waterways and drainage channels and erosion control measures will be implemented for both short and long term stabilisation.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
and long term.				
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.	**PO**	The development will be designed to minimise increases in run-off and TSS concentrations during construction.	
Section B—Additional performance outcomes and acceptable outcomes 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*.	**AO16** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	**AO**	The proposed stormwater quality management system is designed in accordance with the standards in the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
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 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.	**AO17** No acceptable outcome is prescribed.	**PO**	The development will ensure that wastewater discharge is managed in accordance with the Infrastructure design planning scheme policy.	
Section C—Additional performance outcomes and acceptable outcomes for assessable development for a material change of use or reconfiguring a lot				
PO18 Development protects stormwater infrastructure to ensure the following are not compromised: a) the long term infrastructure for the stormwater network in the Long term infrastructure plans; b) the existing and planned infrastructure for the stormwater network in the	**AO18** Development protects stormwater infrastructure in compliance with the following: a) for long term infrastructure for the stormwater network, the Long term infrastructure plans; b) for existing and planned infrastructure for the stormwater network, the Local	**AO**	The development will not adversely impact on existing or future planned stormwater infrastructure and is in compliance with the standards of the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
Local government infrastructure plan; c) the provision of long term, existing and planned infrastructure for the stormwater network which: I. is required to service the development or an existing and future urban development in the planning scheme area; or II. is in the interests of rational development or the efficient and orderly planning of the general area in which the site is situated. Editor's note—A condition which requires a proposed development to keep permanent improvements and structures associated with the approved development clear of the area of long term infrastructure, may be imposed.	government infrastructure plan; c) the standards for stormwater drainage in the Infrastructure design planning scheme policy.			
PO19 Development provides for the payment of extra trunk infrastructure costs for the following: a) for development completely or partly outside the priority infrastructure area in the Local government infrastructure plan; b) for development completely inside the priority infrastructure area in the Local government infrastructure plan	**AO19** No acceptable outcome is prescribed.	**PO**	The developer will pay the appropriate infrastructure costs in accordance with Council's infrastructure plans.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
involving: I. trunk infrastructure that is to be provided earlier than planned in the Local government infrastructure plan; II. long term infrastructure for the stormwater network which is made necessary by development that is not assumed future urban development; III. other infrastructure for the stormwater network associated with development that is not assumed future urban development which is made necessary by the development. Editor's note—The payment of extra trunk infrastructure costs for development completely inside the priority infrastructure area in the Local government infrastructure plan is to be worked out in accordance with the Charges Resolution. Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the *Planning Act 2016*.				

BCC – Infrastructure Design Code

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO1 Development provides roads, pavement, edging and landscaping which: a) are designed and constructed in accordance with the road hierarchy; b) provide for safe travel for pedestrians, cyclists and vehicles; c) provide access to properties for all modes; d) provide utilities; e) provide high levels of aesthetics and amenity, improved liveability and future growth; f) provide for the amelioration of noise and other pollution; g) provide a high-quality streetscape; h) provide a low-maintenance asset with a minimal whole-of-life cost. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**AO1** Development provides roads and associated pavement, edging and landscaping which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	**AO**	The development will provide pavement, edging and landscaping to be in compliance with the road corridor design standards in the infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO2 Development provides road pavement surfaces which: a) are well designed and constructed; b) durable enough to carry the wheel loads of the intended types and numbers of travelling and parked vehicles; c) ensures the safe passage of vehicles, pedestrians and cyclists, the discharge of stormwater run-off and the preservation of all-weather access; d) allows for reasonable travel comfort.	**AO2** Development provides road pavement surfaces which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	**AO**	Any required pavements will be designed in accordance with BCC Standard Drawings and the road corridor design standards in the Infrastructure design planning scheme policy at the detailed design stage.	
PO3 Development provides a pavement edge which is designed and constructed to: a) control vehicle movements by delineating the carriageway for all users; b) provide for people with disabilities by allowing safe passage of wheelchairs and other mobility aids.	**AO3** Development provides pavement edges which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	**AO**	Any required pavement edges will be designed in accordance with BCC Standard Drawings and the road corridor design standards in the Infrastructure design planning scheme policy at the detailed design stage.	
PO4 Development provides verges which are designed and constructed to: a) provide safe access for pedestrians	**AO4** Development provides verges which are designed and constructed in compliance with the road corridor design and	**AO**	The development will achieve the requirements set out in the road corridor design standards in the infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
clear of obstructions and access areas for vehicles onto properties; b) provide a sufficient area for public utility services; c) be maintainable by the Council.	streetscape locality advice standards in the Infrastructure design planning scheme policy.			
PO5 Development provides a lane or laneway identified on the Streetscape hierarchy overlay map or in a neighbourhood plan which: a) allows equitable access for all modes; b) is safe and secure; c) has 24-hour access; d) is a low-speed shared zone environment; e) has a high-quality streetscape.	**AO5** Development provides a lane or laneway identified on the Streetscape hierarchy overlay map or in a neighbourhood plan which is embellished in compliance with the streetscape locality advice standards in the Infrastructure design planning scheme policy.	**N/A**	No lanes or laneways are proposed as a part of this development.	
PO6 Development of an existing premises provides at the frontage to the site, if not already provided, the following infrastructure to an appropriate urban standard: a) an effective, high-quality paved roadway; b) an effective, high-quality roadway kerb and channel; c) safe, high-quality vehicle crossings	**AO6** Development of an existing premises provides at the frontage of the site, if not already existing, the following infrastructure to the standard that would have applied if the development involved new premises as stated in the road corridor design standards in the Infrastructure design planning scheme policy: a) concrete kerb and channel;	**AO**	Infrastructure at the frontages of the site will be provided in accordance with BCC Standard Drawings and the road corridor design standards in the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
over channels and verges; d) safe, accessible, high-quality verges compatible and integrated with the surrounding environment; e) safe vehicle access to the site that enables ingress and egress in a forward gear; f) provision of and required alterations to public utilities; g) effective drainage; h) appropriate conduits to facilitate the provision of required street-lighting systems and traffic signals.	b) forming and grading to verges; c) crossings over channels and verges; d) a constructed bikeway; e) a constructed verge or reconstruction of any damaged verge; f) construction of the carriageway; g) payment of costs for required alterations to public utility mains, services or installations; h) construction of and required alterations to public utility mains, services or installations; i) drainage works; j) installation of electrical conduits.			
PO7 Development provides both cycle and walking routes which: a) are located, designed and constructed to their network classification (where applicable); b) provide safe and attractive travel routes for pedestrians and cyclists for commuter and recreational	**AO7** Development provides cycle and walking routes which are located, designed and constructed in compliance with the road corridor design and off-road pathway design standards in the Infrastructure design planning scheme policy.	**AO**	Cycle and walking routes will be designed in accordance with BCC Standard Drawings and the road corridor design standards in the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
purposes; c) provide safe and comfortable access to properties for pedestrians and cyclists; d) incorporate water sensitive urban design into stormwater drainage; e) provide for utilities; f) provide for a high level of aesthetics and amenity, improved liveability and future growth; g) are a low-maintenance asset with a minimal whole-of-life cost; h) minimise the clearing of significant native vegetation. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.				
PO8 Development provides refuse and recycling collection, separation and storage facilities that are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised.	**AO8.1** Development provides refuse and recycling collection and storage facilities in accordance with the Refuse planning scheme policy. **AO8.2** Development ensures that refuse and recycling collection and storage location	**AO**	The development provides refuse and recycling collection and storage facilities that will not adversely impact on land uses within or adjoining the development in accordance with the Refuse planning scheme policy. Please refer to architectural drawings for further details.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
	and design do not have any adverse impact including odour, noise or visual impacts on the amenity of land uses within or adjoining the development. Note—Refer to the Refuse planning scheme policy for further guidance.			
PO9 Development ensures that: a) land used for an urban purpose is serviced adequately with regard to water supply and waste disposal; b) the water supply meets the stated standard of service for the intended use and fire-fighting purposes.	**AO9.1** Development ensures that the reticulated water and sewerage distribution system for all services is in place before the first use is commenced. **AO9.2** Development provides the lot with reticulated water supply and sewerage to a standard acceptable to the distributor–retailer.	**AO**	The development will be provided with reticulated water supply and sewerage connections to QUU's network prior to use commencing. Please refer to the concept services layout for details on how the site can be serviced by sewer and water infrastructure.	
PO10 Development provides public utilities and street lighting which are the best current or alternative technology and facilitate accessibility, easy maintenance, minimal whole-of-life costs, and minimal adverse environmental impacts.	**AO10.1** Development provides public utilities and street lighting which are located and aligned to: a) avoid significant native vegetation and areas identified within the Biodiversity areas overlay map; b) minimise earthworks; c) avoid crossing waterways, waterway corridors and wetlands or if a crossing is unavoidable, tunnel-boring techniques are used to minimise disturbance, and a	**AO**	Public utilities and street lighting location and alignment will be optimised to avoid significant native vegetation, minimise earthworks and avoid crossing waterways in accordance with the standards in the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
	disturbed area is reinstated and restored on completion of the work. Note—Guidance on the restoration of habitat is included in the Biodiversity areas planning scheme policy.			
	AO10.2 Development provides compatible public utility services and street-lighting services which are co-located in common trenching for underground services.			
	AO10.3 Development provides public utilities and street lighting which are designed and constructed in compliance with the public utilities standards in the Infrastructure design planning scheme policy.			
PO11 Development ensures that land used for urban purposes is serviced adequately with telecommunications and energy supply.	**AO11** Development provides land with the following services to the standards of the approved supplier: a) electricity; b) telecommunications services; c) gas service where practicable.	**AO**	The development can be serviced adequately with gas, telecommunications, and electricity supply.	
PO12 Development ensures that major public projects promote the provision of affordable, high-bandwidth	**AO12** Development provides conduits which are provided in all major Council and government works projects to enable the	**AO**	Conduits will be provided where appropriate to enable the future provision of fibre optic cabling.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
telecommunications services throughout the city.	future provision of fibre optic cabling, if: a) the additional expense is unlikely to be prohibitive; or b) further major work is unlikely or disruption would be a major concern, such as where there is a limited capacity road; or c) there is a clear gap in the telecommunications network; or d) there is a clear gap in the bandwidth available to the area. Editor's note—An accurate, digital 'as built' three-dimensional location plan is to be supplied for all infrastructure provided in a road.			
PO13 Development provides public art identified in a neighbourhood plan or park concept plan which: a) is provided commensurate with the status and scale of the proposed development; b) is sited and designed: I. as an integrated part of the project design; II. as conceptually relevant to the context of the location;	**AO13** Development provides public art identified in a neighbourhood plan or park concept plan which is sited and designed in compliance with the public art standards in the Infrastructure design planning scheme policy.	**N/A**	No public art is proposed as a part of this development.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
III. to reflect and respond to the cultural values of the community; IV. to promote local character in a planned and informed manner.				
PO14 Development provides signage of buildings and spaces which promote legibility to help users find their way.	**AO14** Development provides public signage: a) at public transport interchanges and stops, key destinations, public spaces, pedestrian linkages and at entries to centre developments; b) which details the location of the key destinations, public spaces and pedestrian linkages in the vicinity, the services available within the development and where they are located.	**N/A**	Public signage is not required as a part of this development.	
PO15 Development that provides community facilities which form part of the development is functional, safe, low maintenance, and fit for purpose.	**AO15** Development that provides community facilities which form part of the development is designed in compliance with the community facilities standards in the Infrastructure design planning scheme policy.	**AO**	Community facilities will be designed in compliance with the community facilities standards in the Infrastructure design planning scheme policy.	
PO16 Development provides public toilets which: a) are required as part of a community facility or park;	**AO16** Development that provides public toilets is designed and constructed in compliance with the public toilets standards in the Infrastructure design planning scheme policy.	**N/A**	No public toilets are proposed as a part of this development.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
b) are located, designed and constructed to be: i. safe; ii. durable; iii. resistant to vandalism; iv. able to service expected demand; v. fit for purpose.				
PO17 Development provides bridges, tunnels, elevated structures and water access structures that are designed and constructed using proven methods, materials and technology to provide for: a) safe movement of intended users; b) an attractive appearance appropriate to the general surroundings and any adjacent structures; c) functionality and easy maintenance; d) minimal whole-of-life cost; e) longevity; f) current and future services. Note—All bridges and elevated and associated elements must be designed and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**AO17** Development that provides bridges, tunnels, elevated structures and water access structures is designed and constructed in compliance with the standards in the Infrastructure design planning scheme policy.	**N/A**	No bridges, tunnels, elevated structures or water access structures are proposed as a part of the development.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO18 Development provides culverts which are designed and constructed using proven methods, materials and technology to provide for: a) safety; b) an attractive appearance appropriate to the general surroundings; c) functionality and easy maintenance; d) minimal whole-of-life cost; e) longevity; f) future widening; g) current and future services; h) minimal adverse impacts, such as increase in water levels or flow velocities, and significant change of flood patterns. Note—All culverts and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards.	**AO18** Development that provides culverts is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	**N/A**	No culverts are proposed as a part of the development.	
PO19 Development provides batters, retaining walls, and seawalls and river walls which are designed and constructed using proven methods, materials and	**AO19** Development that provides batters, retaining walls, seawalls and river walls is designed and constructed in compliance with the structures standards in the	**AO**	Batters and retaining walls will be designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
technology to provide for: a) safety; b) an attractive appearance appropriate to the surrounding area; c) easy maintenance; d) minimal whole-of-life cost; e) longevity; f) minimal water seepage. Note—All retaining walls and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards.	Infrastructure design planning scheme policy.			
If for development with a gross floor area greater than 1,000m^2				
PO20 Development ensures that construction is managed so that use of public spaces and movement on pedestrian, cyclist and other traffic routes is not unreasonably disrupted and existing landscaping is adequately protected from short- and long-term impacts. Note—The preparation of a construction management plan can assist in demonstrating achievement of this performance outcome.	**AO20** Development ensures that during construction: a) the ongoing use of adjoining and surrounding parks and public spaces, such as malls and outdoor dining, is not compromised; b) adjoining and surrounding landscaping is protected from damage; c) safe, legible, efficient and sufficient pedestrian, cyclist and vehicular accessibility and connectivity to the	**AO**	A construction management plan will be prepared prior to works commencing to ensure that surrounding parks, public spaces and landscaping is protected during construction and that pedestrian, cyclist and vehicular movements can be managed effectively.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
Note—The Transport, access, parking and servicing planning scheme policy provides advice on the management of vehicle parking and deliveries during construction.	wider network are maintained.			
PO21 Development ensures that construction and demolition activities are guided by measures that prevent or minimise adverse impacts including sleep disturbance at a sensitive use, due to noise and dust, including dust from construction vehicles entering and leaving the site. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO21.1** Development ensures that demolition and construction: a) only occur between 6:30am and 6:30pm Monday to Saturday, excluding public holidays; b) do not occur over periods greater than 6 months. **AO21.2** Development including construction and demolition does not release dust emissions beyond the boundary of the site. **AO21.3** Development construction and demolition does not involve asbestos-containing materials.	**AO**	Demolition and construction works will be limited to the approved working hours. Dust will be managed during construction to ensure it is not blown beyond the property boundary.	
PO22 Development ensures that: a) construction and demolition do not result in damage to surrounding property as a result of vibration; b) vibration levels achieve the vibration criteria in Table 9.4.4.3.B, Table	**AO22** Development ensures that the nature and scale of construction and demolition do not generate noticeable levels of vibration.	**AO**	Vibration levels will be effectively managed during demolition and construction works.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
9.4.4.3.C, Table 9.4.4.3.D and Table 9.4.4.3.E. Note—A vibration impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.				
If for a material change of use or reconfiguring a lot in an urban area (as defined in the Regulation) involving premises that is, or will be, accessed by common private title, where involving buildings, either attached or detached, that are not covered by other legislation mandating fire hydrants				
PO23 Development ensures that fire hydrants are: a) installed and located to enable fire services to access water safely, effectively and efficiently; b) suitably identified so that fire services can locate them at all hours.	**AO23.1** Above or below ground fire hydrants are provided on residential, commercial and industrial streets and private roads, at not more than 90m intervals, and at each street intersection. Note—On residential streets, above ground fire hydrants may be single outlet. On commercial and industrial streets above ground fire hydrants should have dual valved outlets.	**AO**	Fire hydrants will be provided at no more than 90m spacings and will be identified by marker posts and RRPMs.	
	AO23.2 Fire hydrants are identified by: a) raised reflectorised pavement markers (RRPM) on sealed roads; b) marker posts at the fence line where on an unsealed road, as road (HR) or path (HP) hydrants.			

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
PO24 Development ensures road widths and construction within the development, are adequate for refuse vehicles and for fire emergency vehicles to gain access to a safe working area close to buildings and near water supplies whether or not on-street parking spaces are occupied.	**AO24** Internal private roads have a minimum roadway clearance between obstructions of 3.5m wide and 4.8m high in addition to any width required for on-street parking.	**AO**	Internal private roads have been provided with a minimum roadway clearance of 3.5m wide and 4.8m high for fire emergency vehicles to gain access to a safe working area.	
Development for major electricity infrastructure and bulk water supply infrastructure identified on the State Planning Policy Interactive Mapping System where not in the Utility services zone precinct of the Special purpose zone				
PO25 Development avoids or otherwise minimises adverse impacts on surrounding land uses through the use of buffers and setbacks and the appropriate design and location of plant and operational areas within the site.	**AO25** No acceptable outcome is prescribed.	**N/A**	The development does not involve major electricity infrastructure or bulk water supply infrastructure.	
Development potentially impacting on major electricity infrastructure and bulk water supply infrastructure identified on the State Planning Policy Interactive Mapping System where the infrastructure is not in the Utility services zone precinct of the Special purpose zone				
PO26 Development is sited and designed to: a) avoid safety risks to people or property; b) minimise noise and visual impacts to people and property;	**AO26** No acceptable outcome is prescribed.	**N/A**	The development is not located near major electricity infrastructure or bulk water supply infrastructure.	

Performance outcomes	Acceptable outcomes	Solutions*	Comments	Council Use
c) ensure the physical integrity and operation, maintenance and expansion of the infrastructure is not compromised.				

INERTIA ENGINEERING PTY LTD

2/139 Coronation Drive, MILTON 4064

P I 07 3857 7868 E I info@inertiaeng.com.au