BHC Northshore

17 Karakul Road, Hamilton QLD 4007

Civil Engineering Report

Site Based Stormwater Management & Engineering Services

Brisbane Housing Company Ltd

November 2024

PLANS AND DOCUMENTS
referred to in the PDA
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EXECUTIVE SUMMARY

ADG Engineers (Aust.) Pty Ltd (ADG) was engaged by Brisbane Housing Company Pty Ltd (BHC) to prepare a Civil Engineering Report suitable for submission to Economic Development Queensland (EDQ) in support of a Development Application for a site located at 17 Karakul Road, Hamilton in Queensland. The proposed development is part of an affordable housing development.

The purpose of this Civil Engineering Report is to provide civil engineering advice on the proposed development as detailed in Hayball's architectural drawings. The works described herein are subject to further approvals and cover works required to service the proposed development including earthworks, roadworks, stormwater quantity and quality management, stormwater drainage, sewerage and water supply, electricity, communications, and gas.

The stormwater quantity objective was to demonstrate that downstream properties are not adversely affected by the proposed development. Despite the increase in impervious areas due to the development, ADG proposes no detention system. This is discussed further in **Section 8.2**.

In addition to stormwater quantity, this report includes a summary of the modelled water quality results. Water Sensitive Urban Design (WSUD) features and/or Council Approved Proprietary Water Quality Treatment Products have been included in the design to achieve the water quality objectives for South East Queensland specified in the State Planning Policy 2017, namely the removal of gross pollutants, suspended solids, nitrogen, and phosphorus to target reduction levels. ADG recommends the use of the following devices to meet the water quality objectives identified within the SPP:

- Min. 3No. *OceanGuards* with 200micron mesh bags (OG-200); and
- Min. 19No. 690mm PSorb cartridge *Stormfilter* system within treatment tanks.

The site appears to be adequately serviced by reticulated water, sewerage, stormwater infrastructure, gas, telecommunications, and electricity. These services will need to be connected during development with advice being provided by suitably qualified consultants.

All relevant standards and guidelines are addressed in this report including criteria from:

- BCC Planning Scheme Policy
- BCC Land Development Guidelines
- State Planning Policy (SPP) 2017
- Queensland Urban Drainage Manual (QUDM) 2013
- Plumbing and Drainage Code AS3500.3
- Australian Rainfall and Runoff Guideline (ARR)

1 INTRODUCTION

1.1 Background

ADG Engineers (Aust.) Pty Ltd (ADG) is engaged by Brisbane Housing Company (BHC) to complete a Civil Engineering Report and a Site Based Stormwater Management Plan in support of a Development Application submission to Economic Development Queensland (EDQ) and any required referral agencies for a site located at 17 Karakul Road, Hamilton QLD 4007. The proposed development is a medium rise residential development, including a single level basement car parking.

The purpose of this Civil Engineering Report is to provide advice on the proposed development regarding earthworks, roadworks, stormwater quantity and quality management, stormwater drainage, sewerage and water supply, electricity, communications, gas, stormwater quality and quantity measures, and flooding. The required infrastructure will be subject to the conditions attached to the Development Approval to be provided by EDQ.

1.2 Property Detail

The details of the property for the proposed development can be seen in **Table 1** below.

Table 1 - Property Detail

Title	Lot 1 on SP337697
Street Address	17 Karakul Road, Hamilton QLD 4007
Site Area	Approximately 7980 m^2

The location of the proposed development is demonstrated in **Figure 1**.

Figure 1 - Site Location (as accessed from BCC City Plan 2014, dated 15.05.24)

2 EXISTING SITE

2.1 Existing Site Features

The subject site has recently been subdivided from the neighbouring lot and currently vacant entirely with grass.

- The site is bound by:
  - MacArthur Avenue to the north;
  - Vacant lot to the east (330 MacArthur Avenue);
  - Karakul Road to the south; and
  - Barcham Road to the west.

Based on the provided survey, the site slopes towards a low point at the centre of the site at approximately 1.5%. The falls are from the south-western boundary towards the centre and the north western boundary towards the centre. The existing site layout can be seen in **Figure 2.**

Figure 2 - Site Layout (as accessed from NearMap 15.05.24)

The existing contours, surface levels and the location of the existing buildings are identified on the survey plan drawing as attached in **Appendix A** of this report.

3 ACID SULFATE SOILS

Review of available acid sulphate soil mapping provided as a Planning Scheme Policy overlay by Brisbane City Council (BCC) has identified that the subject site as being within an area of potential and actual acid sulfate soils.

Figure 3 indicates that there is potential for the site to encounter acid sulfate contamination at 5m AHD or below. It is expected that the development will require excavations below 5m AHD due to the presence of a basement level. Therefore, any potential contamination will be addressed in accordance with the Brisbane City Council Potential and Actual Acid Sulphate Soil Planning Scheme Policy. Refer to **Appendix C** for the BCC Potential and Actual Acid Sulfate Soil Code.

A preliminary site investigation (and report) completed by Core Consultants, dated June 2024, reference no. J002388-001-R-Rev1 indicate that:

The results of ground analysis do not suggest the presence of any potential contamination associated with fill materials and dredged sands and clays encountered. The elevated heavy metals are likely attributed to background conditions.

Based on the above report by Core Consultants, it appears to be unlikely that the site will encounter acid sulfate soil. Should acid sulfate be encountered on-site, the contractor shall notify a suitably qualified geotechnical or environmental consultant for further advice.

Figure 3 - Actual and Potential Acid Sulphate Soils Mapping (accessed from BCC City Plan 2014, dated 15.05.24)

4 EARTHWORKS

4.1 Bulk Earthworks

The subject site will require excavation to facilitate basement construction for the development. Indicative earthworks quantities are provided as part of this Development Approval (DA) submission.

Note - earthworks quantities will be further reviewed and refined as part of the Operational Works phase of the development.

A copy of ADG's Preliminary Bulk Earthworks Plan and BCC Filling and Excavation Code is attached to **Appendix B** and **Appendix C** respectively.

5 ROADWORKS

5.1 Existing Infrastructure

The subject site is adjacent to the following roads:

- MacArthur Avenue to the North
  - MacArthur Avenue is an existing two-lane suburban road, accompanied by street parking and a bike lane on both sides. The two lanes are divided by a landscape traffic median. The road consists of kerb and channel drainage on each side and a two-way crossfall.
- Karakul Road to the South
  - Karakul Road is a newly constructed two-lane neighbourhood road, accompanied by on-street parking and kerb & channel drainage on each side with a two-way crossfall.
- Barcham Road to the West
  - Barcham Road is a newly constructed two-lane neighbourhood road, accompanied by on-street parking and kerb & channel on each side with a two-way crossfall.

5.2 Proposed Infrastructure

As part of the previous subdivision by EDQ, it has always been intended for the lot access to be from Karakul Road. Therefore, the development proposes one (1) new vehicle crossover from Karakul Road and associated access ramp for basement access. ADG expects loss of on-street carparks along Karakul Road to facilitate the new vehicle crossover, with new type 'E' barrier kerbs (in accordance with BCC's standards) to be constructed to match existing kerb and channel levels. The proposed works and removal of existing on-street parking will be subject to approval of traffic assessment by the governing authority, traffic report, and detailed design and documentation.

A copy of ADG's Preliminary Engineering Plans and BCC's Infrastructure Design Code is attached to **Appendix B** and **Appendix C** respectively.

6 FLOODING

A desktop investigation was completed to review the potential and historical flooding using available Brisbane City Council Flood Awareness Mapping and FloodWise report at the subject site. **Figure 4** below provides an extract of the Flood Awareness Mapping within the vicinity of the proposed development, which demonstrates that the subject site has historically remained immune from flooding during the 2022, 2011, and 1974 Brisbane flood events. In addition, the subject site remains flood immune from the potential flooding events categorised by river or creek flooding as documented in the Brisbane City Council Overlay.

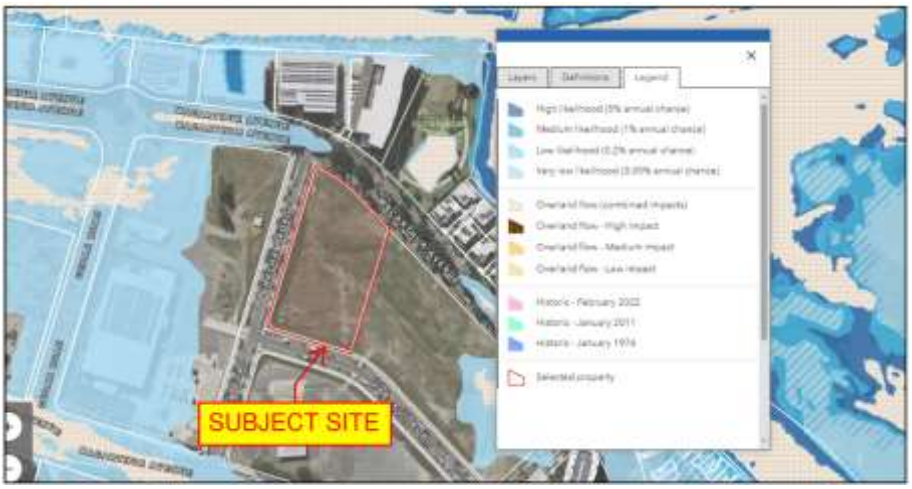


Figure 4 - BCC Flood Awareness Mapping for Potential and Historical Flooding (extracted 26.04.24)

Further checks revealed that the site is historically affected by overland flow paths. However, the overland flow path is no longer applicable due to the newly constructed Karakul Road and Barcham Road. This is discussed in detail as part of a separate Flood Impact Assessment.

Figure 5 - Overland Flow Path Overlay (extracted from BCC City Plan, dated 26.04.24)

A Flood Emergency Management Plan (FEMP) will be completed as part of the detailed design as required. A copy of BCC FloodWise Report and Flood Impact Assessment Report is provided in **Appendix I** and **Appendix J** respectively.

7 STORMWATER INFRASTRUCTURE

7.1 Existing Infrastructure

A BYDA search identified the following stormwater infrastructure within the vicinity of the subject site:

- One (1) field inlet to the north of the property along MacArthur Avenue with DN375 pipe outlet;
- A series of stormwater gully pits approximately 25m northeast of the property boundary, that discharges into 351 MacArthur Avenue (an adjacent parkland), via a DN900mm headwall.

Refer to the BYDA information in **Appendix G** for further information regarding the existing stormwater infrastructure.

Further desktop investigations via NearMap and GoogleMap indicates recent upgrades to Barcham Road and Karakul Road where new roadwork and stormwater infrastructures were constructed. However, this is not yet available on BCC's GIS data.

7.2 Lawful Point of Discharge

7.2.1 Existing LPD

The current Lawful Point of Discharge (LPD) appears to be the two (2) existing stormwater connections, sized DN600 and DN375 respectively. The DN600 stormwater connection is located at the southwest and the DN375 stormwater connection is located at the northwest. This information was based on ADG's access to stormwater design drawings by SMEC, that was made available due to ADG's involvement in the wider Northshore precinct road upgrades. Despite the available information, it is still crucial to for qualified service locators to verify this information prior to detailed design phase.

7.2.2 Proposed LPD

Further to **Section 7.2.1**, it is further noted in SMEC's stormwater design drawings that there is an unaccounted catchment area. **Figure 5** below shows an indicative location of the development site boundary over the catchment areas adopted by SMEC in the stormwater design which demonstrates the unaccounted area of the development site without an outlet (highlighted in cyan).

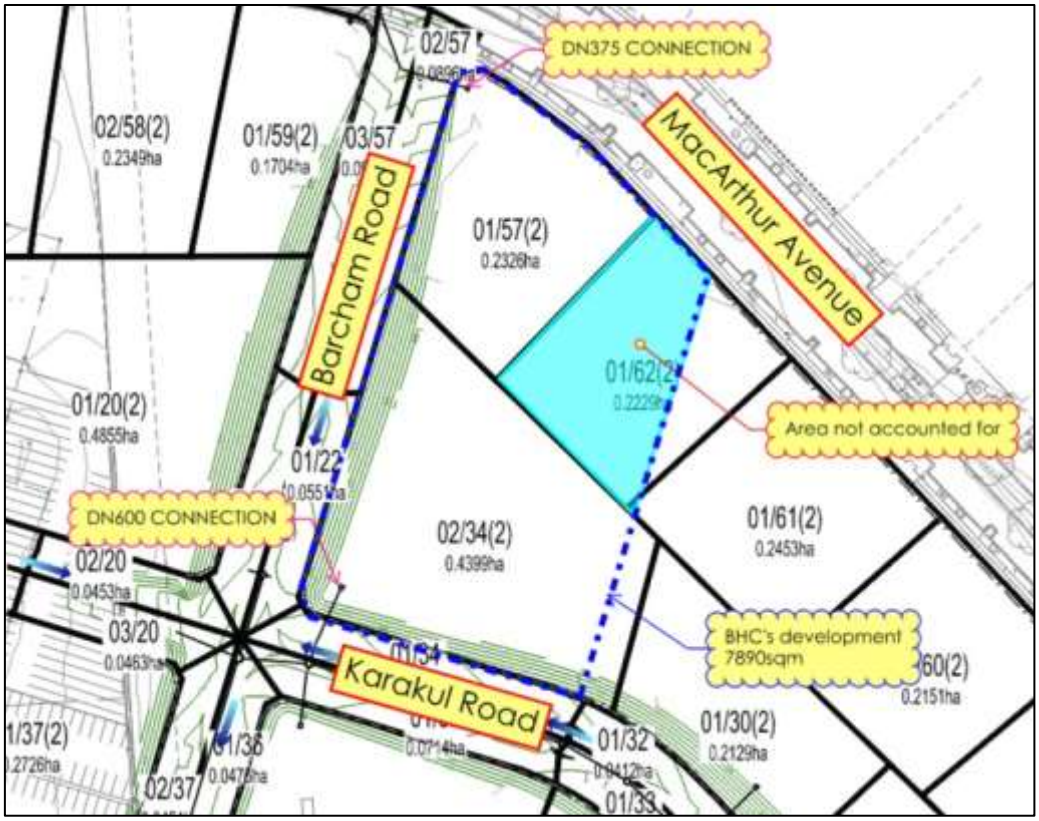


Figure 5 - Mark-up over SMEC's design drawings

The current assumption is that the development will provide an additional stormwater property connection adequately sized to service the unaccounted catchment area. Further details of the new connection are provided in ADG's Civil Engineering Plans in **Appendix B** for assessment.

8 STORMWATER QUANTITY ASSESSMENT

The aim of the stormwater quantity assessment is to ensure that the development shall impose no adverse effects on downstream properties or receiving water bodies and that the conveyance of flows will be in a safe manner with minimal risk of human endangerment as well as the following objectives:

- Address the need for stormwater quantity control measures.
- Ensure there is no increase in peak discharges from the subject site for events up to and including the 1 in 100-year ARI event.
- Ensure proposed quantity control measures detain and convey flows in accordance with QUDM (2013) minimum freeboard recommendations.

8.1 Proposed Development and Associated Issues

One of the implications of an increase in impervious area is that the total volume and flow rate of stormwater runoff from the catchment will increase. It is essential that these increases are mitigated such that post-developed peak flows do not exceed those for the pre-developed case.

8.2 Recommendation

As part of ADG's involvement with the wider Northshore precinct road upgrades, ADG was given access to the stormwater design drawings completed by SMEC for the upgrades along Karakul Road and Barcham Road. These documents confirm the presence of two (2) existing stormwater connection (DN600 and DN375) for the development site. The stormwater catchment calculation table provided by SMEC indicated that these stormwater connections were designed based on the capacity to capture and convey a fully developed site with 86% impervious area. Therefore, no detention system will be required for this site.

A copy of SMEC design drawings is attached in **Appendix H** for reference.

9 STORMWATER QUALITY ASSESSMENT

9.1 Treatment Objectives

This assessment identifies issues relating to stormwater quality runoff and assesses possible methods of treatment if required. The aim of this section of the report is to determine practical approaches to achieving improvements in the quality of the stormwater run-off from the site that can be readily implemented.

The SPP 2017 proposes criteria which apply to 'high-risk' development for stormwater. The criteria include one or more of the following:

- A Material Change of Use (MCU) for an urban purpose which involves greater than 2,500m^2 of land that:
  - will result in an impervious area greater than 25% of the net developable area; or
  - will result in six (6) or more dwellings
- A Reconfiguration of a Lot (ROL) for urban purposes that involves a land area greater than 2,500m^2 and will result in six (6) or more lots; or
- Operational works for urban purposes that involve disturbing more than 2,500m^2 of land.

The proposal includes an MCU for a land area greater than 2,500m^2 results in an impervious area greater than 25% of the developable area as well as more than six (6) dwellings. Hence, the development is classed as 'high risk' for water quality and the SPP 2017 applies. The SPP 2017 suggests the development aims to:

- Avoid or otherwise minimise adverse impacts on the environmental values of receiving waters arising from:
  - Altered stormwater quality or flows;
  - Wastewater (other than contaminated stormwater and sewage); and
  - Creation or expansion of non-tidal artificial waterways.
- Demonstrate compliance with the treatment targets as depicted in Appendix 2 of the SPP.

The treatment targets noted in Appendix 2 (Table B) of SPP 2017 suggests the following:

Table 2 - South East Queensland (SEQ) Targets

Total Suspended Solids (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants >5mm
80% Removal	60% Removal	45% Removal	90% Removal

The objective is to provide the following:

- Nitrogen and phosphorous removal;
- Gross pollutant and suspended solids removal;
- All the site's impervious areas discharge to suitable treatment devices;
- Treatment device selection criteria are to be in accordance with Industry Best Practice and WSUD Engineering Guidelines;
- Provide engineering diagrams of the stormwater quality treatment for the development.

9.2 Erosion and Sediment Control

9.2.1 Erosion Hazard Assessment

The erosion risk has been assessed against the BCC Erosion hazard guidelines and found to be 'Medium Risk'. Refer to the Erosion Hazard Form attached in **Appendix D.**

9.2.2 Pre-Development Phase

Prior to construction commencing, the following erosion and sediment control measures will need to be installed around the subject site to minimise disturbance and ensure the quality of runoff discharging from the site is of an acceptable standard:

- Sediment barriers to be installed on all entrances to downstream stormwater infrastructure (i.e. gully pits);
- Designation of transport routes through the site to minimise vegetation disturbance;
- Maximise retention of existing vegetation to reduce soil disturbance and provide filter strip treatment for runoff (if required);
- Install construction entry and exit shakedown areas;
- Sediment fences are to be installed on the downstream boundaries of the subject site; and
- Install dust control measures as required.

All erosion and sediment control measures are to be designed and installed in accordance with IECA Guidelines. Further details regarding the proposed erosion and sediment control measures will be provided during the detailed design phase of the development.

9.2.3 Bulk Earthworks Phase

During the bulk earthworks phase, the following erosion and sediment control measure will need to be installed in addition to the measures discussed in **Section 9.2.2** to ensure that there is minimal disturbance to downstream receiving water bodies:

- Construction chutes to control runoff over earthworks batters;
- Construction of temporary bunds at the top of all earthworks batters to ensure runoff is directed away from exposed batters;
- Sediment basins to be constructed at low points within each stage of the proposed development;
- Construction of temporary diversion drains to divert water to sediment basins and around any stockpiles;
- Sediment fences to be installed on the downstream side of any stockpiles; and
- Stabilisation of all batters upon reaching the finished earthworks levels.

All erosion and sediment control measures are to be designed and installed in accordance with IECA Guidelines. Further details regarding the proposed erosion and sediment control measures will be provided during the detailed design phase of the development.

9.2.4 Construction Phase

During the construction phase of the development, there is a risk of sedimentation transport due to large areas of disturbed land. The following erosion and sediment control measure will need to be installed in addition to the measures discussed in **Section 9.2.3** and **Section 9.2.4** to ensure there is minimal disturbance and the quality of runoff is maintained to an acceptable standard:

- Construction of temporary diversion drains to divert water to sediment basins;
- Construction of temporary diversion drains to divert water to protect bioretention and treatment devices as required;
- Sediment barriers to be installed on all entrances to newly constructed stormwater infrastructure (i.e. gully pits);
- Sediment fences to be installed on the downstream side of any stockpiles and batters; and
- Re-vegetation of all disturbed areas within two (2) weeks of completion.

All erosion and sediment control measures are to be designed and installed in accordance with IECA Guidelines. Further details regarding the proposed erosion and sediment control measures will be provided during the detailed design phase of the development.

9.2.5 Maintenance

All erosion and sediment control devices are to be maintained through the entire phase of the development leading up to the operational phase. Erosion and sediment control devices will need to be monitored closely throughout the entire project to ensure they are operating correctly and efficiently. No erosion and sediment control devices are to be removed unless otherwise authorised by a suitably qualified engineer or the site superintendent.

9.3 Operational Phase Treatment

During the operational phase, it is proposed to have the roof area drain through *OceanGuards* and a *Stormfilter* device before discharging to the road reserve.

Internal stormwater drainage shall be designed and constructed in accordance with AS3500.3 and all other relevant standards and guidelines.

9.4 Stormwater Quality Improvement Devices (SQIDs)

The proposed stormwater quality treatment measures for the development will consist of the following:

- Min. 3No. *OceanGuards* with 200micron mesh bags (OG-200); and
- Min. 19No. 690mm PSorb cartridge *Stormfilter* system within treatment tanks.

As the development anticipates three (3) stormwater property connections, the above treatment measures will be separated for each connection. Further details are provided in Civil Engineering Plans in **Appendix B**.

Note: The above quality modelling is derived based on assumption that stormwater generated from all catchment areas are pre-treated by a pit insert. All catchment areas must be directed through an *OceanGuard* by either installing an *OceanGuard* at each pit or implementing an *OceanGuard* within the treatment tank itself.

9.4.1 OceanGuard

OceanGuards consist of a steel frame and a cage. Within the cage, a screening bag is attached to capture litter, debris, sediment, and other pollutants from stormwater flows. The mesh size of the screening bag

proposed for each *OceanGuard* within the site is 200 micro-meters. This mesh size is small enough to capture heavy metals and hydrocarbons associated with the solids in stormwater flows. *OceanGuards* are effective when utilised as a pre-treatment device upstream of a *Stormfilter* and this system shall e adopted within the site.

9.4.2 StormFilter

The *Stormfilter* consists of rechargeable, media filled cartridges that can be placed within standard manholes and/or tank vaults, to filter pollutants such as Hydrocarbons from stormwater. If the treatable flows generated from the development are greater than 80L/s a by-pass inlet pit shall be placed in front of (and upstream) of the *Stormfilter*.

9.5 MUSIC Model

The site's stormwater run-off was modelled using MUSIC (version 6.3.0) and the water quality objectives for South East Queensland specified in the SPP 2017 of 80% TSS reduction, 60% TP reduction, 45% TN reduction, and 90% Gross Pollutants reduction.

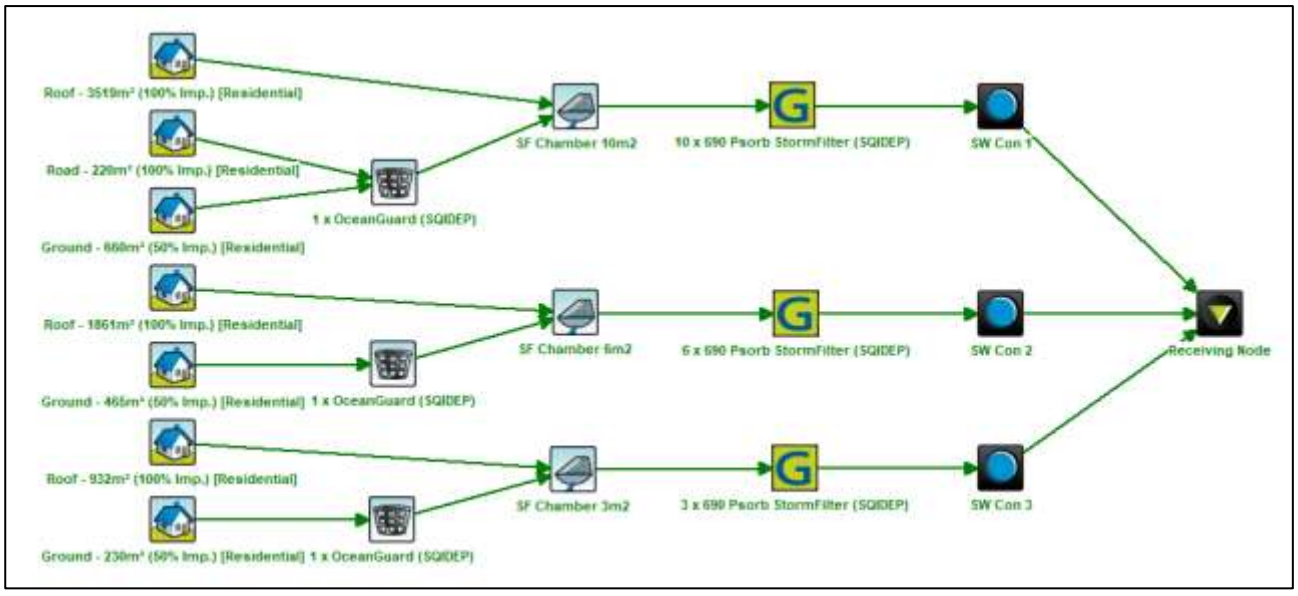


Figure 6 - Treatment train

The results of the above MUSIC model are presented in **Figure 7**.

	Sources	Residual Load	% Reduction
Flow (ML/yr)	7.92	7.92	0
Total Suspended Solids (kg/yr)	491	96.4	80.4
Total Phosphorus (kg/yr)	1.67	0.497	70.2
Total Nitrogen (kg/yr)	16.5	7.88	52.3
Gross Pollutants (kg/yr)	187	0	100

Figure 7 - Results for the treatment train

The above results meet the percent reduction water quality objectives required by the SPP 2017. Details of the MUSIC model is attached within **Appendix E** for further information.

9.6 On-site Treatment Lifecycle Costs

A lifecycle cost analysis is not a part of the scope of this report. All the recommended water quality treatment infrastructure lies within the development site, and it shall be maintained and serviced by the owners of the development at no cost to Council.

9.7 Water Quality Monitoring

No water quality monitoring is proposed for this development at this stage due to the nature of the development and the expected pollutant levels. This would not be considered a high-risk source.

9.8 Maintenance

Maintenance of the SQIDs will be the responsibility of the owners of the development. The maintenance should be carried out in accordance with the manufacturer's recommendations and as a minimum shall include the following:

9.8.1 OceanProtect *'OceanGuards'*

Maintenance to be carried out by manufacturer's maintenance staff including but not limited to inspection of basket, and the removal and lawful disposal of trapped litter or sediment. Refer to **Appendix F** for further information regarding the maintenance of *OceanGuards*.

9.8.2 OceanProtect *'Stormfilter'*

Maintenance to be carried out by manufacturer's maintenance staff including but not limited to de-silting of cartridges. Refer to **Appendix F** for further information regarding the maintenance of *StormFilter*.

10 SEWERAGE & WATER DEMAND

As the subject site is located within Urban Utilities (UU) service area, sewerage and water demands for the proposed development and their impacts on the current reticulation infrastructure will be calculated by UU as part of the sewerage and water approval. Thus, no water or sewerage demand calculations have been provided as part of this report.

11 WATER SUPPLY

11.1 Existing Infrastructure

A review of available BCC eBIMAP2 and BYDA data demonstrate that the proposed development is situated in an area of existing water reticulation infrastructure. The subject site is adjacent to:

- Existing 180mm Polyethylene (PE) water main (RS569921) located along Barcham Road, along the northwest RP boundary.
- Three (3) existing in-line fire hydrants (RHY465240, RHY465241 and RHY465243) located on existing 180mm PE water main (RS569921).
- Existing 150mm Unplasticized Poly Vinyl Chloride (uPVC) water main (RS503027) located along MacArthur Avenue, parallel to the southeast RP boundary.
- Existing in-line fire hydrant (RHY404723) located on existing 150mm uPVC water main (RS503027).
- Two (2) existing 20mm uPVC water property connections that services the site. They are connected to 150mm uPVC water main (RS503027).
- Existing 180mm PE water main (RS569926) located along Karakul Road, across the development.
- Existing In Line Fire Hydrant (RHY265238) located on existing 180mm PE water main (RS569926).

Refer to the BYDA information in **Appendix G** for further information regarding the existing water infrastructure.

11.2 Point Of Connection

Due to the demand for the proposed development, ADG Engineers anticipate that the two (2) existing 20mm uPVC water connections will be removed. New water connections and meters will be provided to meet the expected fire and domestic supply demand for the development. Pipe size and details of the proposed water connections will be provided at detailed design, subject to the hydraulic consultant's design advice.

To understand with greater certainty, an Urban Utilities 'Flow and Pressure Service Advice Notice' was lodged by the hydraulic consultant to seek advice from UU pertaining the flow and pressure of the existing water main

A Preliminary Civil Services Layout Plan is attached in **Appendix B** for reference.

12 SEWERAGE RETICULATION

12.1 Existing Infrastructure

A BYDA search identified the following sewerage infrastructure relevant to the subject site:

- Two (2) existing 275mm Glass Reinforced Pipe sewer main (LS988715 and LS988716) located along MacArthur Avenue, to the north of the development site.
- An existing 1200mm diameter sewer maintenance hole (MH571882), which connects sewer main (LS988715 and LS988716).

Refer to the BYDA information in **Appendix G** for further information regarding the existing sewerage infrastructure.

12.2 Point Of Connection

It appears that the site does not currently have a sewer property connection. As part of ADG's involvement in the wider Northshore precinct road upgrades, ADG was engaged by EDQ to complete a sewer connection design to service 17 Karakul Road. The new sewer connection is a DN250 PE pipe which connects into the downstream sewer maintenance hole (MH571882). At present, ADG is unaware and are not involved in the construction process of the new sewer connection.

Early engagement with EDQ have confirmed that the construction of the DN250 PE sewer connection will be completed and provided to 17 Karakul Road by December 2024. This forms part of the commercial agreement between EDQ and Brisbane Housing Company (BHC).

A Preliminary Civil Services Layout Plan is attached in **Appendix B** for reference.

13 ELECTRICAL SUPPLY

The BYDA information has identified that the following infrastructure is present within the vicinity of the subject site:

- Underground electrical cables (less than 33kV) along MacArthur Avenue.
- Existing streetlights along MacArthur Avenue.
- An existing streetlight within the property.
- Underground conduit located beneath MacArthur Avenue located northeast of the subject site.

Due to the presence of a streetlight within the property, a suitably qualified electrical consultant should be engaged to provide advice pertaining the removal of the streetlight. It is also understood that the proposed vehicle access for the development will require a relocation of an existing streetlight along Karakul Road which will be facilitated by the electrical consultant.

The above items will be provided as part of detailed design.

A copy of ADG Preliminary Civil Services Layout Plan is attached in **Appendix B** for further information on the removal and relocation of the streetlights.

Refer to the BYDA Information in **Appendix G** for further details on the existing electrical infrastructure.

14 TELECOMMUNICATIONS

The BYDA information has identified that the following infrastructure is present within the vicinity of the subject site:

- Existing Telstra conduits located along MacArthur Avenue adjacent to the subject site.

It is recommended to engage a suitably qualified telecommunications consultant to negotiate with the relevant carriers regarding the requirements of the proposed development telecommunications connection and the extent of any upgrading and possible relocation works to the system if necessary.

Refer to the BYDA Information in **Appendix G** for further details on the existing telecommunications infrastructure.

15 GAS

The BYDA information has identified the following APA Gas infrastructure within the vicinity of the subject site:

- Underground high pressure gas pipeline beneath the verge on MacArthur Avenue along the frontage of the subject site.
- Underground medium pressure gas pipeline beneath MacArthur Avenue on the subject site.

It is proposed that the gas consultant will negotiate with the relevant carriers regarding the requirements of the proposed development gas connection and the extent of any upgrading and possible relocation works to the system if necessary.

Refer to the BYDA Information in **Appendix G** for further details on the existing gas infrastructure.

16 CONCLUSION

As a result of the investigations carried out to date, it is understood that the subject site is suitably serviced by both existing road infrastructure and utility infrastructure. It is anticipated that new connections will need to be completed to adequately service the development with advice being provided by suitably qualified consultants, in accordance with the relevant Brisbane City Council Planning Scheme Policy.

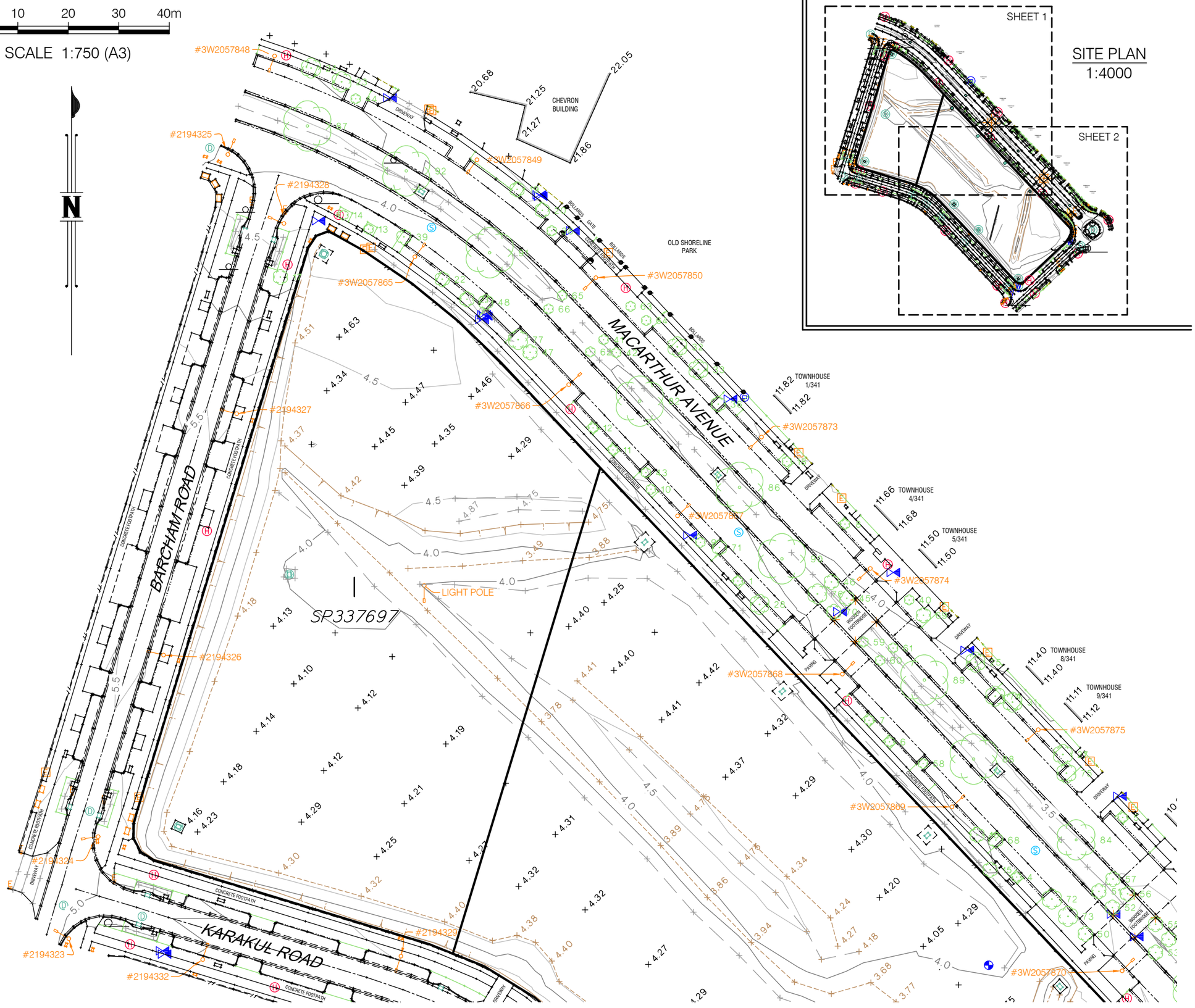
Recommendations for stormwater quantity and quality are discussed in **Section 8** and **Section 9**. Detailed engineering diagrams and management requirements for the proposed development will be submitted to EDQ for approval prior to any works commencing on-site with design certification prepared by a qualified stormwater engineer.

Appendix A
Site Survey Plan

0m 5 10 20 30 40m

SCALE 1:750 (A3)

N



SITE PLAN
1:4000

CLIENT

BHC

PROJECT

DETAIL SURVEY
OF
LOTS 1 & 5 ON SP337697 and SURROUNDING ROADS
(KARAKUL ROAD, HAMILTON)

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 visible by field survey.

(iii) See Sheet 3 for Tree Table

(iv) 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.

REV	DATE	DRAWN	CHECKED	APPROVED	SURVEY DATE
1	9/05/2024	AJG	AJG	MLM	8/05/2024

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

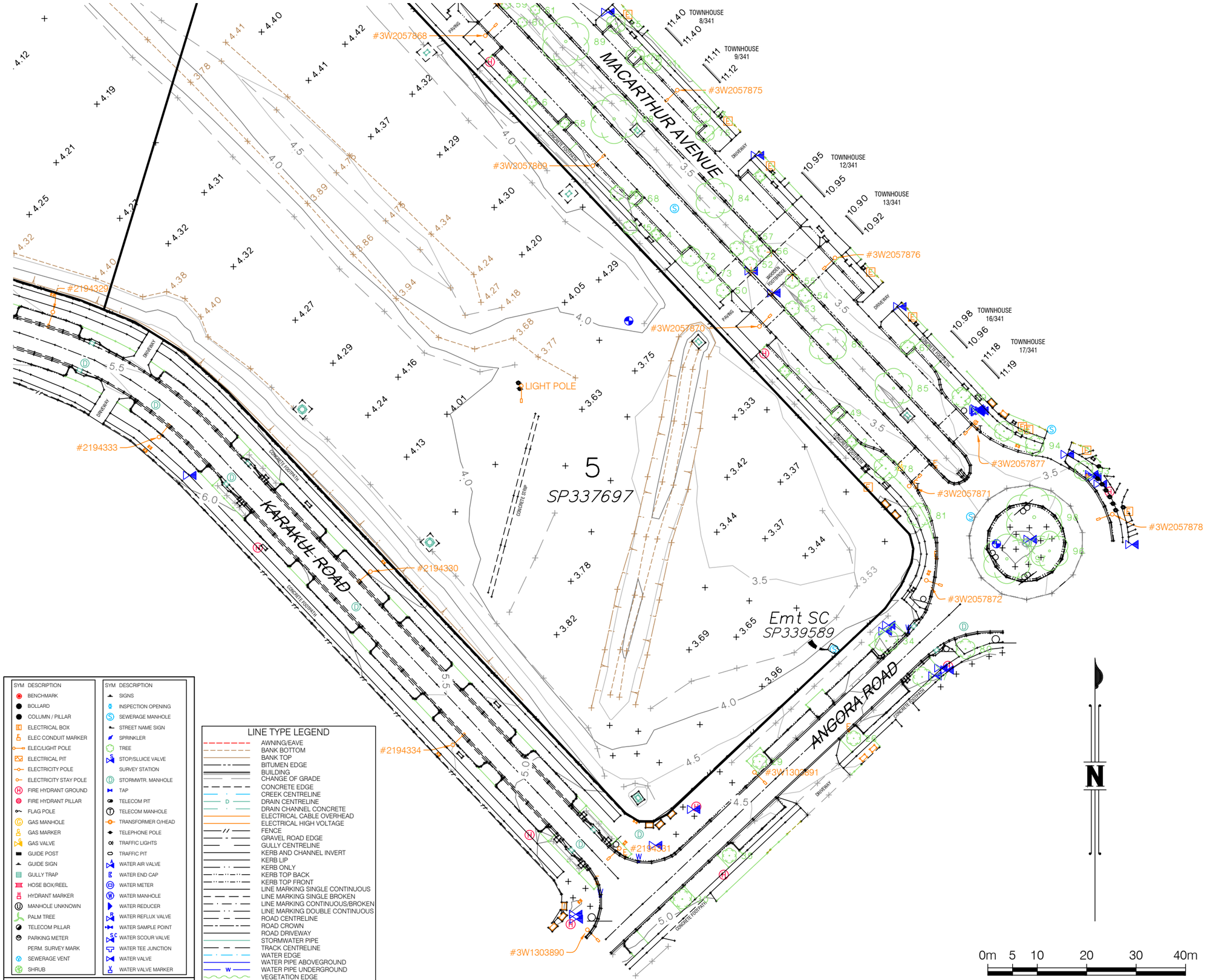
p: (07) 3842 1000
f: (07) 3842 1001
e: info@landpartners.com.au
w: www.landpartners.com.au

LEVEL DATUM AHD	LOCAL AUTHORITY BRISBANE C.C.
LEVEL ORIGIN PSM186779 RL 4.325m	CONTOUR INTERVAL 0.5 Metre
MERIDIAN SP337697	CO-ORD SYSTEM LOCAL ARBITRARY

UDN

SHEET 1 OF 3

BRMM8489-000-3-1



SYM	DESCRIPTION
	BENCHMARK
	BOLLARD
	COLUMN / PILLAR
E	ELECTRICAL BOX
	ELEC CONDUIT MARKER
	ELEC/LIGHT POLE
	ELECTRICAL PIT
	ELECTRICITY POLE
	ELECTRICITY STAY POLE
H	FIRE HYDRANT GROUND
	FIRE HYDRANT PILLAR
	FLAG POLE
G	GAS MANHOLE
	GAS MARKER
	GAS VALVE
	GUIDE POST
	GUIDE SIGN
	GULLY TRAP
	HOSE BOX/REEL
	HYDRANT MARKER
U	MANHOLE UNKNOWN
	PALM TREE
	TELECOM PILLAR
	PARKING METER
	PERM. SURVEY MARK
V	SEWERAGE VENT
	SHRUB

SYM	DESCRIPTION
	SIGNS
I	INSPECTION OPENING
S	SEWERAGE MANHOLE
	STREET NAME SIGN
	SPRINKLER
	TREE
S	STOP/SLUICE VALVE
	SURVEY STATION
D	STORMWTR. MANHOLE
	TAP
	TELECOM PIT
T	TELECOM MANHOLE
	TRANSFORMER O/HEAD
	TELEPHONE POLE
	TRAFFIC LIGHTS
	TRAFFIC PIT
	WATER AIR VALVE
	WATER END CAP
	WATER METER
W	WATER MANHOLE
	WATER REDUCER
	WATER REFLUX VALVE
	WATER SAMPLE POINT
SC	WATER SCOUR VALVE
	WATER TEE JUNCTION
	WATER VALVE
	WATER VALVE MARKER

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

LINE TYPE LEGEND

- AWNING/EAVE
- BANK BOTTOM
- BANK TOP
- BITUMEN EDGE
- BUILDING
- CHANGE OF GRADE
- CONCRETE EDGE
- CREEK CENTRELINE
- DRAIN CENTRELINE
- DRAIN CHANNEL CONCRETE
- ELECTRICAL CABLE OVERHEAD
- ELECTRICAL HIGH VOLTAGE
- FENCE
- GRAVEL ROAD EDGE
- GULLY CENTRELINE
- KERB AND CHANNEL INVERT
- KERB LIP
- KERB ONLY
- KERB TOP BACK
- KERB TOP FRONT
- LINE MARKING SINGLE CONTINUOUS
- LINE MARKING SINGLE BROKEN
- LINE MARKING CONTINUOUS/BROKEN
- LINE MARKING DOUBLE CONTINUOUS
- ROAD CENTRELINE
- ROAD CROWN
- ROAD DRIVEWAY
- STORMWATER PIPE
- TRACK CENTRELINE
- WATER EDGE
- WATER PIPE ABOVEGROUND
- WATER PIPE UNDERGROUND
- VEGETATION EDGE
- WALL BOTTOM
- WALL TOP

0m 5 10 20 30 40m

SCALE 1:750 (A3)

CLIENT

BHC

PROJECT

DETAIL SURVEY
OF
LOTS 1 & 5 ON SP337697 and SURROUNDING ROADS
(KARAKUL ROAD, HAMILTON)

NOTES

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(iii) See Sheet 3 for Tree Table

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1	9/05/2024	AJG	AJG	MLM	8/05/2024

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w: www.landpartners.com.au

LEVEL DATUM	LOCAL AUTHORITY
AHD	BRISBANE C.C.
LEVEL ORIGIN	CONTOUR INTERVAL
PSM186779 RL 4.325m	0.5 Metre
MERIDIAN	CO-ORD SYSTEM
SP337697	LOCAL ARBITRARY

UDN

SHEET 2 OF 3

BRMM8489-000-3-1

Tree Number	Height (m)	Trunk Diameter (mm)	Canopy Diameter (m)
1	2	100	2
2	3	100	2
3	3	100	2
4	3	100	2
5	3	100	2
6	3	100	2
7	3	100	2
8	3	100	2
9	3	100	2
10	3	100	2
11	3	100	2
12	3	100	2
13	3	100	2
14	3	100	2
15	3	100	3
16	3	100	3
17	3	100	3
18	4	100	2
19	4	100	3
20	4	100	3
21	4	100	3
22	4	100	3
23	4	100	4
24	4	100	4
25	4	200	4
26	5	100	3
27	5	100	4
28	5	100	4
29	5	150	3
30	5	150	4
31	5	150	4
32	5	150	4
33	5	150	4
34	5	150	5
35	5	200	3
36	5	200	3
37	6	100	4
38	6	150	2
39	6	200	3
40	8	200	2
41	8	200	2
42	8	200	2
43	8	200	2
44	8	200	2
45	8	200	3
46	8	200	3
47	8	200	3
48	8	200	3
49	8	250	3
50	8	250	3
51	8	250	3
52	8	250	3
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73	8	300	4
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75	8	300	4
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77	8	300	4
78	8	300	5
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80	10	400	4
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82	5	1000	10
83	5	500	8
84	5	500	8
85	5	600	8
86	5	900	10
87	6	1000	10
88	6	500	10
89	6	500	10
90	6	800	10
91	6	900	10
92	6	900	10
93	10	400	4
94	10	400	4
95	10	400	4
96	4	400	8
97	4	500	10
98	5	500	12

EXAMPLE LOCATION OF TOWNHOUSE MEASUREMENTS

CLIENT

BHC

PROJECT

DETAIL SURVEY
OF
LOTS 1 & 5 ON SP337697 and SURROUNDING ROADS
(KARAKUL ROAD, HAMILTON)

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MERIDIAN SP337697	CO-ORD SYSTEM LOCAL ARBITRARY

UDN

BRMM8489-000-3-1

Appendix B
Preliminary Engineering Plans

LEGEND

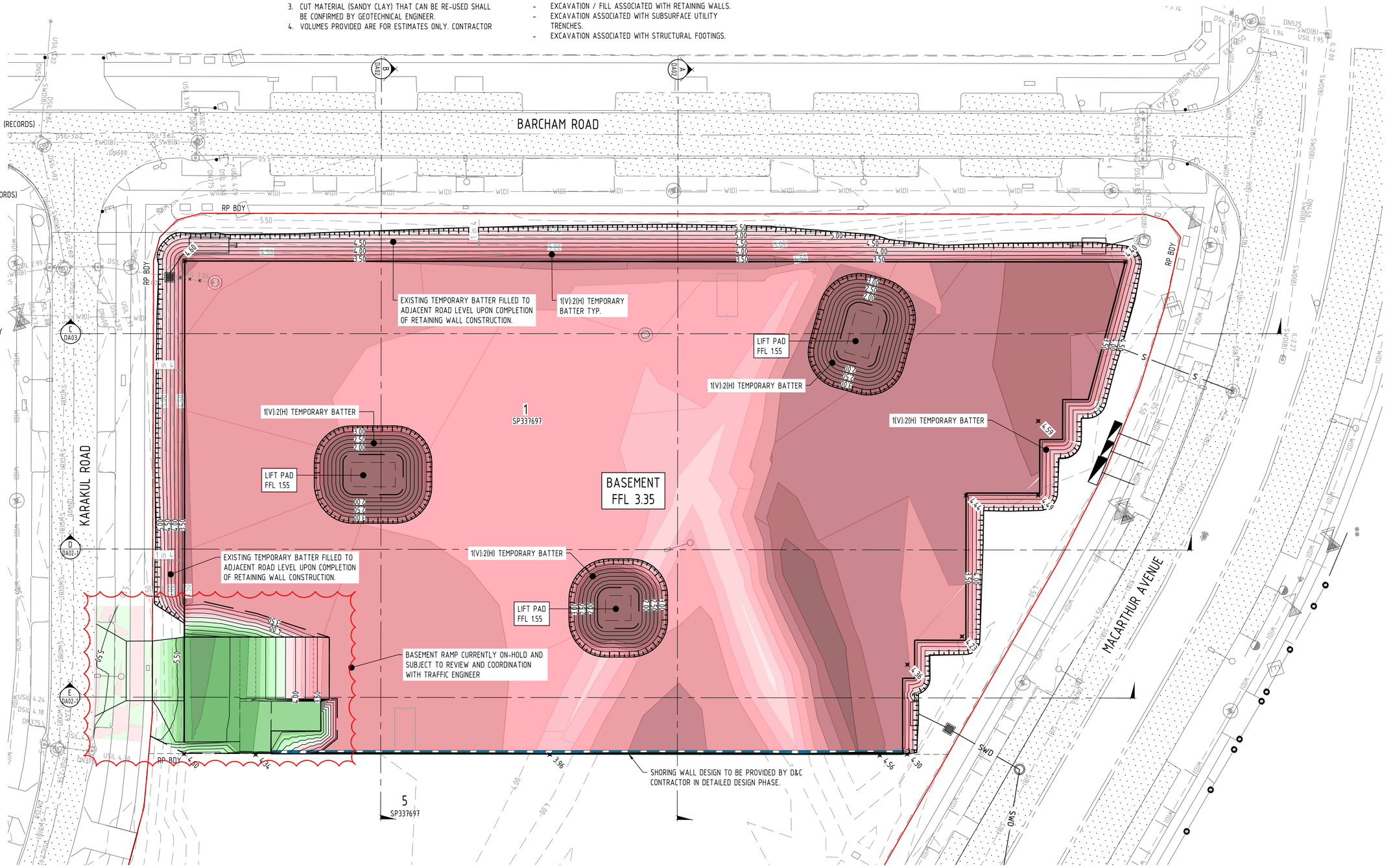
- SITE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- EXISTING SURFACE CONTOURS
- EARTHWORKS CONTOURS
- EXISTING SURFACE LEVEL
- EXISTING NOMINAL KERB LINE
- EXISTING ROAD CENTERLINE
- PROPOSED NOMINAL KERB LINE
- EXISTING SEWER (RECORDS)
- EXISTING WATER (RECORDS)
- EXISTING UNDERGROUND ELECTRICITY (RECORDS)
- EXISTING OVERHEAD ELECTRICITY
- EXISTING GAS (RECORDS)
- EXISTING NBN (RECORDS)
- EXISTING TELECOMMUNICATIONS (RECORDS)
- EXISTING FIBER OPTIC (RECORDS)
- EXISTING COMMUNICATIONS
- ABANDONED SERVICE
- EXISTING BATTER
- EXISTING EARTHWORKS DRAIN
- PROPOSED BATTER
- BUILDING OUTLINE
- PROPOSED SHORING WALL DESIGN BY D&C CONTRACTOR.
- PROPOSED EARTHWORKS PAD
- PROPOSED EARTHWORKS CUT
- PROPOSED EARTHWORKS FILL
- EXISTING ROAD

EARTHWORKS VOLUMES

(EXISTING SURFACE TO DESIGN SURFACE)

	TOTAL CUT	-6231m³
	TOTAL FILL	197m³
TOTAL BALANCE (SPOIL)		-6034m³

NOTE:
1. VOLUME IN THE TABLE IS THE DIFFERENCE BETWEEN THE DESIGN SURFACE AND EXISTING SURFACE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REFER TO THE STRUCTURAL DRAWINGS FOR SLAB THICKNESS PRIOR TO EXCAVATION ON-SITE.
2. DEEPER EXCAVATION MAY BE REQUIRED IN SOME LOCALISED AREA. CONTRACTOR TO CONSULT GEOTECHNICAL ENGINEER FOR RECOMMENDATIONS PRIOR TO EXCAVATION.
3. CUT MATERIAL (SANDY CLAY) THAT CAN BE RE-USED SHALL BE CONFIRMED BY GEOTECHNICAL ENGINEER.
4. VOLUMES PROVIDED ARE FOR ESTIMATES ONLY. CONTRACTOR TO MAKE APPROPRIATE ALLOWANCES TO OBTAIN ACCURATE BULK EARTHWORKS VOLUMES.
5. NO ALLOWANCE HAS BEEN MADE FOR:
   - COMPACTON / BULKING FACTORS.
   - REMOVAL AND / OR SUBSEQUENT REPLACEMENT OF CONTAMINATED LAND.
   - REMOVAL AND / OR SUBSEQUENT REPLACEMENT OF UNSUITABLE, HAZARDOUS, OR DELETERIOUS MATERIAL OF ANY KIND.
   - EXCAVATION / FILL ASSOCIATED WITH RETAINING WALLS.
   - EXCAVATION ASSOCIATED WITH SUBSURFACE UTILITY TRENCHES.
   - EXCAVATION ASSOCIATED WITH STRUCTURAL FOOTINGS.



LEGEND

- CUT >1.4m
- CUT 1.2m - 1.4m
- CUT 1.0m - 1.2m
- CUT 0.8m - 1.0m
- CUT 0.6m - 0.8m
- CUT 0.4m - 0.6m
- CUT 0.2m - 0.4m
- CUT 0.0m - 0.2m
- FILL 0.0m - 0.2m
- FILL 0.2m - 0.4m
- FILL 0.4m - 0.6m
- FILL 0.6m - 0.8m
- FILL 0.8m - 1.0m
- FILL 1.0m - 1.2m
- FILL 1.2m - 1.4m
- FILL >1.4m

NOTES

1. FOR SITE SECTIONS REFER DRG No. DA02 and DA02-1
2. BATTERS ARE SHOWN INDICATIVELY ONLY. CONTRACTOR TO CONFIRM ACTUAL BATTER EXTENTS DURING CONSTRUCTION AND SUBJECT TO GEOTECHNICAL ENNGINEER'S ADVICE.
3. LANDSCAPE SWALES ARE SHOWN INDICATIVELY. FURTHER DETAIL IS TO BE PROVIDED IN THE NEXT PHASE.

BASEMENT EXCAVATION

CUT TO SPOIL: NO STOCKPILE OF SOILS IS ALLOWED FOR. ALL EXCAVATION IS TO BE TAKEN OFF SITE AND DISPOSED IMMEDIATELY U.N.O.

LAYOUT PLAN

SCALE 1:250

ALL DETAILS SHOWN ARE SUBJECT TO FURTHER DETAILED DESIGN

PRELIMINARY

NOT FOR CONSTRUCTION

Rev	Date	Description	By	Chk
02	20.09.24	ISSUED FOR INFORMATION	NS	ETY
01	14.06.24	ISSUED FOR INFORMATION	MW	ETY

0 5 10 15m

SCALE 1:250

AT ORIGINAL SIZE (A1)

ADG

T:1300 657 402 E: info@adgce.com W: www.adgce.com

Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: BRISBANE HOUSING COMPANY LTD

Project Name: NORTHSHORE HAMILTON
PROPOSED AFFORDABLE HOUSING
17 KARAKUL ROAD
HAMILTON, QLD 4010

Discipline: CIVIL

Status: PRELIMINARY

Designed By: JE | Checked By: ETY | Approved By: DS

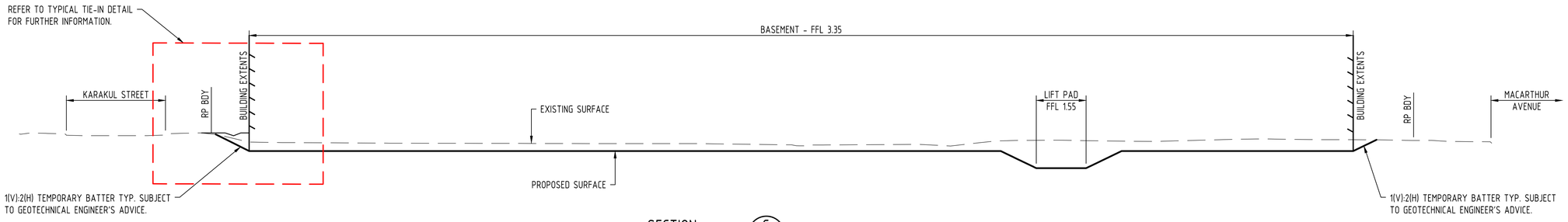
Project No.: 27933 | Drawn By: MW | Scale at A1: AS SHOWN

Title: PRELIMINARY EARTHWORKS LAYOUT PLAN

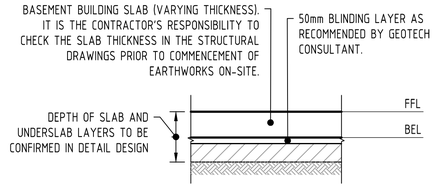
Drawing No.: DA01 | Revision: 02

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

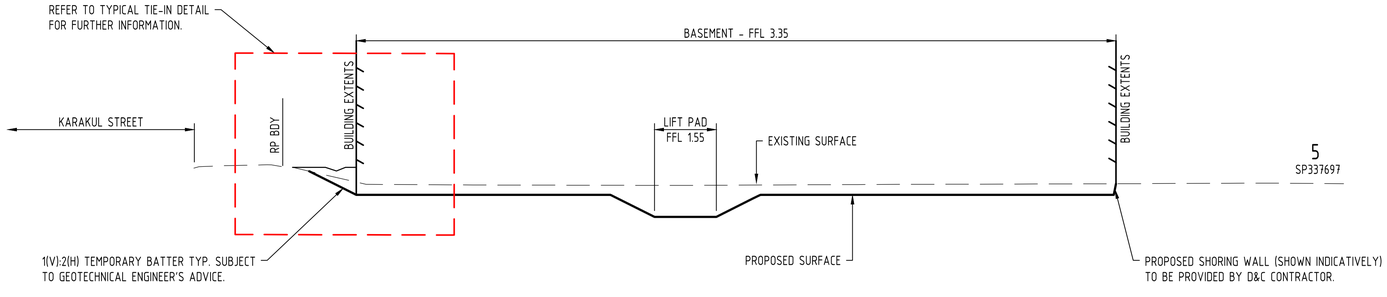
PLOT DATE: 9/20/2024 12:48 PM FILENAME: \\ADGCE.LOCAL\PROJECTS\BNE\27000\27933\CVL\DWG\27933_DA01_PRELIMINARY EARTHWORKS LAYOUT PLAN.DWG



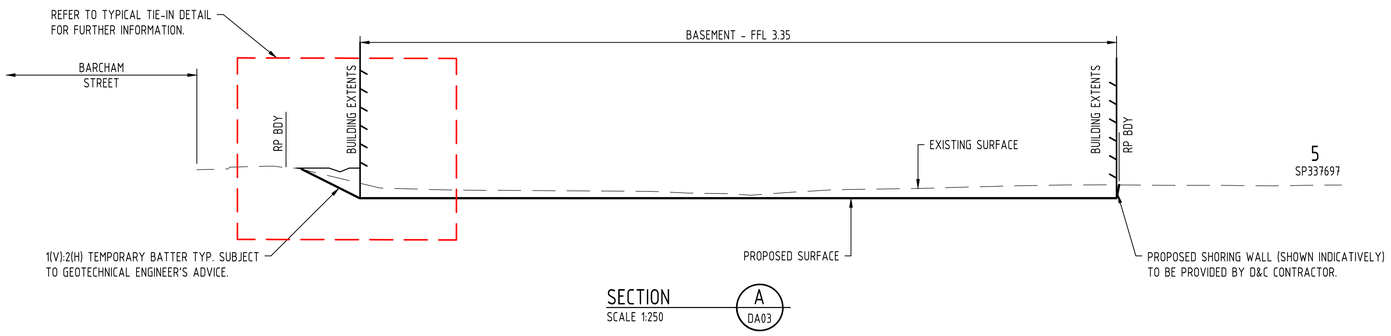
SECTION C
SCALE 1:250
DA03



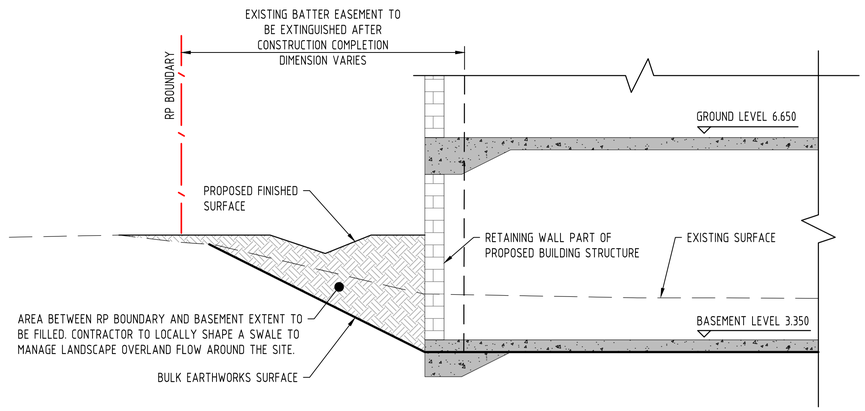
BASEMENT SLAB
SCALE 1:25



SECTION B
SCALE 1:250
DA03



SECTION A
SCALE 1:250
DA03



TYPICAL TIE-IN DETAIL
SCALE 1:50

PRELIMINARY
NOT FOR CONSTRUCTION

Rev	Date	Description	By	Chk
02	20.09.24	ISSUED FOR INFORMATION	NS	ETY
01	14.06.24	ISSUED FOR INFORMATION	MW	ETY

0 5 10 15m
SCALE 1:250
AT ORIGINAL SIZE (A1)

ADG
T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

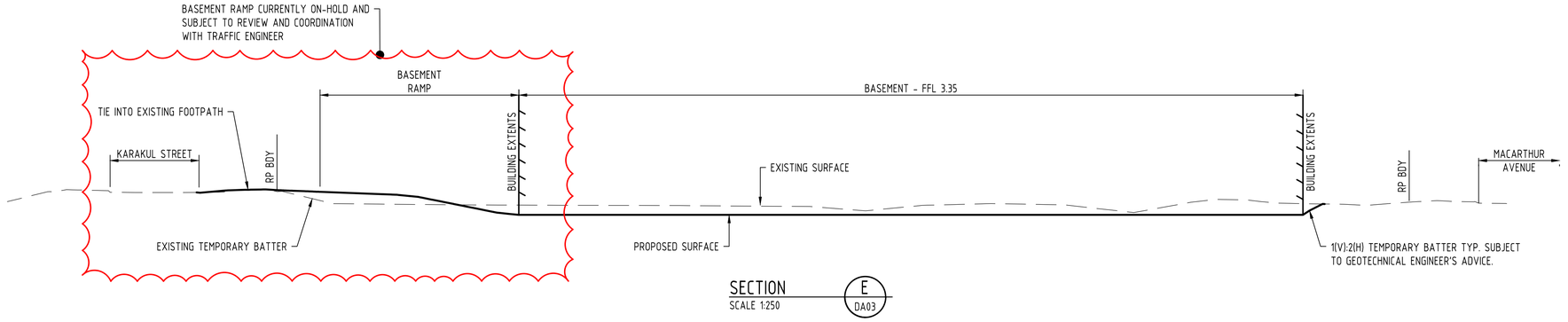
Client: BRISBANE HOUSING COMPANY LTD
Project Name: NORTHSHORE HAMILTON
PROPOSED AFFORDABLE HOUSING
17 KARAKUL ROAD
HAMILTON, QLD 4010

Discipline: CIVIL
Status: PRELIMINARY
Designed By: JE
Checked By: ETY
Approved By: DS
Project No.: 27933
Drawn By: MW
Scale at A1: AS SHOWN

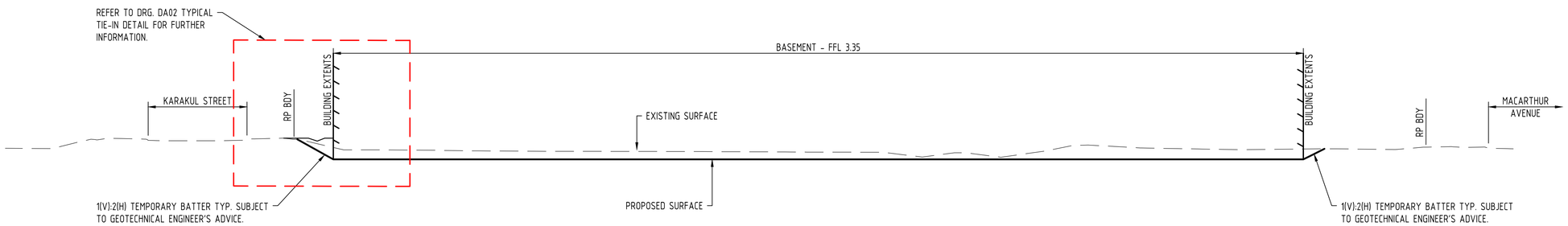
Title: PRELIMINARY EARTHWORKS SITE SECTIONS SHEET 1
Drawing No.: DA02
Revision: 02

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

PLOT DATE: 9/20/2024 2:49 PM FILENAME: \\ADGCE.LOCAL\PROJECTS\BNE\27000\27933\CVL\DWG\27933_DA02_PRELIMINARY EARTHWORKS SITE SECTIONS SHEET 1.DWG



SECTION E
SCALE 1:250
DA03



SECTION D
SCALE 1:250
DA03

PRELIMINARY
NOT FOR CONSTRUCTION

Rev	Date	Description	By	Chk
01	20.09.24	ISSUED FOR INFORMATION	NS	ETY

0 5 10 15m
SCALE 1:250
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: BRISBANE HOUSING COMPANY LTD
Project Name: NORTHSHORE HAMILTON
PROPOSED AFFORDABLE HOUSING
17 KARAKUL ROAD
HAMILTON, QLD 4010

Discipline: CIVIL
Status: PRELIMINARY
Designed By: JE
Checked By: ETY
Approved By: DS
Project No.: 27933
Drawn By: NS
Scale at A1: AS SHOWN

Title: PRELIMINARY EARTHWORKS
SITE SECTIONS
SHEET 2

Drawing No.: DA02-1
Revision: 01

PLOT DATE: 9/20/2024 2:42 PM FILENAME: \\ADGCE.LOCAL\PROJECTS\BNE\27000\27933\CVL\DWG\27933_DA02-1_PRELIMINARY EARTHWORKS SITE SECTIONS SHEET 2.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS
- PROPOSED FINISHED CONTOURS
- EXISTING NOMINAL KERB LINE
- EXISTING EDGE OF BUILDING
- EXISTING STORMWATER DRAINAGE (RECORDS) — dSWD
- EXISTING WATER (RECORDS) — dW
- EXISTING TELECOMMUNICATIONS (RECORDS) — dT
- PROPOSED STORMWATER DRAINAGE — SWD
- PROPOSED RETAINING THROUGH STRUCTURE
- PROPOSED RETAINING WALL
- EXISTING ROAD
- EXISTING DRIVEWAY CROSSOVER
- PROPOSED CARPARK/INTERNAL DRIVEWAY

901
SP326594

BARCHAM ROAD

KARAKUL ROAD

MACARTHUR AVENUE

1
SP337697

5
SP337697

BASEMENT
FFL: 3.35m

SW TREATMENT TANK 1
FITTED WITH OCEANGUARD. TANK SIZE TO BE MIN. 10m² STORMFILTER CHAMBER WITH 10 No. PSORB CARTRIDGE STORMFILTER SYSTEM.

PROPOSED HYDRAULIC ROOFWATER STUB. SIZE TO BE PROVIDED BY INTERNAL HYDRAULIC CONSULTANT IN DETAILED DESIGN.

PROPOSED 900SQ PIT WITH GRATED LID AS SURCHARGE PIT

STORMWATER CONNECTION 1
EXISTING DN600 STORMWATER PROPERTY CONNECTION, REFER TO NOTE 1

DEMOLISH AND REMOVE EXISTING REDUNDANT STORMWATER PIPE ANND INLET STRUCTURE.

PROPOSED SWALE TO MANAGE LANDSCAPE FLOWS. DETAILS TO BE PROVIDED IN DETAILED DESIGN.

EXISTING ON-STREET CAR PARKS TO BE REMOVED. ROAD VERGE TO BE REINSTATED TO BCC'S STANDARD. DETAILS TO BE PROVIDED BY THE TRAFFIC CONSULTANT.

EXISTING LIGHT POLES TO BE RELOCATED. DETAILS TO BE PROVIDED BY THE ELECTRICAL CONSULTANT.

BASEMENT RAMP CURRENTLY ON-HOLD AND SUBJECT TO REVIEW AND COORDINATION WITH TRAFFIC ENGINEER

NEW CONCRETE VEHICLE CROSSOVER TO TIE NEATLY INTO EXISTING KERB AND CHANNEL PROFILE

PROPOSED TYPE 'B2' 7.5m WIDE CONCRETE VEHICLE CROSSOVER IN ACCORDANCE WITH BCC STD DRG BSD-2021.

NO CHANGE TO EXISTING STORMWATER GULLY PIT.

EXISTING STORMWATER MANHOLE WITH AN UNKNOWN OUTLET. BHC TO VERIFY PIT STRUCTURE AND OUTLET. BHC TO INFORM ADG PRIOR TO PROCEEDING WITH REMOVAL.

EXISTING LIGHTPOLE TO BE REMOVED. DETAILS TO BE PROVIDED BY THE ELECTRICAL CONSULTANT

NO CHANGES TO EXISTING GULLY PIT.

EXISTING DN375 STORMWATER PROPERTY CONNECTION. UPGRADES MAY BE REQUIRED, SUBJECT TO CAPACITY ANALYSIS IN DETAIL DESIGN. REFER TO NOTE 1.

STORMWATER CONNECTION 2
NO CHANGES TO EXISTING DN375 STORMWATER PROPERTY CONNECTION

PROPOSED SWALE TO MANAGE LANDSCAPE FLOWS. DETAILS TO BE PROVIDED IN DETAILED DESIGN.

SW TREATMENT TANK 2
FITTED WITH OCEANGUARD, TANK SIZE TO BE MIN 6m² STORMFILTER CHAMBER WITH 6 No. PSORB CARTRIDGE STORMFILTER SYSTEM.

PROPOSED HYDRAULIC ROOFWATER STUB. SIZE TO BE PROVIDED BY INTERNAL HYDRAULIC CONSULTANT IN DETAILED DESIGN.

EXISTING STORMWATER MANHOLE, REFER TO NOTE 1. MANHOLE LID TO BE UPGRADED TO A 900SQ GRATED LID FOR SURCHARGE.
GRATE: 4.30m
IL: 3.22m (ASSUMED)

PROPOSED SWALE TO MANAGE LANDSCAPE FLOWS. DETAILS TO BE PROVIDED IN DETAILED DESIGN.

PROPOSED HYDRAULIC ROOFWATER STUB. SIZE TO BE PROVIDED BY INTERNAL HYDRAULIC CONSULTANT IN DETAILED DESIGN.

SW TREATMENT TANK 3
FITTED WITH OCEANGUARD, TANK SIZE TO BE MIN 3m² STORMFILTER CHAMBER WITH 3 No. PSORB CARTRIDGE STORMFILTER SYSTEM.

PROPOSED 900SQ PIT WITH GRADED LID AS SURCHARGE PIT.

STORMWATER CONNECTION 3
NEW DN375 STORMWATER PROPERTY CONNECTION TO BE PROVIDED BY BHC. DETAILS AND INVERT LEVELS TO BE PROVIDED IN DETAIL DESIGN.

NEW DN1050 STORMWATER MAINTENANCE HOLE IN ACCORDANCE WITH BCC STD BSD-8021. INVERT LEVELS TO BE PROVIDED IN DETAILED DESIGN

DN375 CONCRETE PIPE

CONNECTED TO EXISTING MAINTENANCE STRUCTURE ALONG MACARTHUR AVENUE.

ALL DETAILS SHOWN ARE SUBJECT TO FURTHER DETAILED DESIGN

GENERAL NOTE:
1. INFORMATION EXTRACTED FROM SURVEY DETAILS (LANDPARTNERS, MAY 2024) AND STORMWATER DESIGN DRAWING (SMEC, JUNE 2021). AS-CONSTRUCTED INFORMATION (PIPE MATERIAL, SIZE, DETAILED DESIGN.
2. PROPOSED STORMWATER PIPES TO BE SIZED AT DETAILED DESIGN IN ACCORDANCE WITH CAPACITY REQUIREMENTS TO CONVEY NOMINATED FLOWS.
3. SHOWN HYDRAULIC ROOFWATER STUBS ARE INDICATIVE ONLY AND TO BE SIZED AND LOCATED IN COORDINATION WITH THE HYDRAULIC CONSULTANT AT DESIGN DESIGN.

Rev	Date	Description	By	Chk
01	14.06.24	ISSUED FOR INFORMATION	MW	ETY

SCALE 1:250
AT ORIGINAL SIZE (A1)

ADG
T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: BRISBANE HOUSING COMPANY LTD
Project Name: NORTHSHORE HAMILTON
PROPOSED AFFORDABLE HOUSING
17 KARAKUL ROAD
HAMILTON, QLD 4010

Discipline: CIVIL
Status: PRELIMINARY
Designed By: LS
Checked By: ETY
Approved By: DS
Project No.: 27933
Drawn By: MW
Scale at A1: AS SHOWN

Title: PRELIMINARY ROADWORKS AND DRAINAGE LAYOUT PLAN
Drawing No.: DA03
Revision: 01

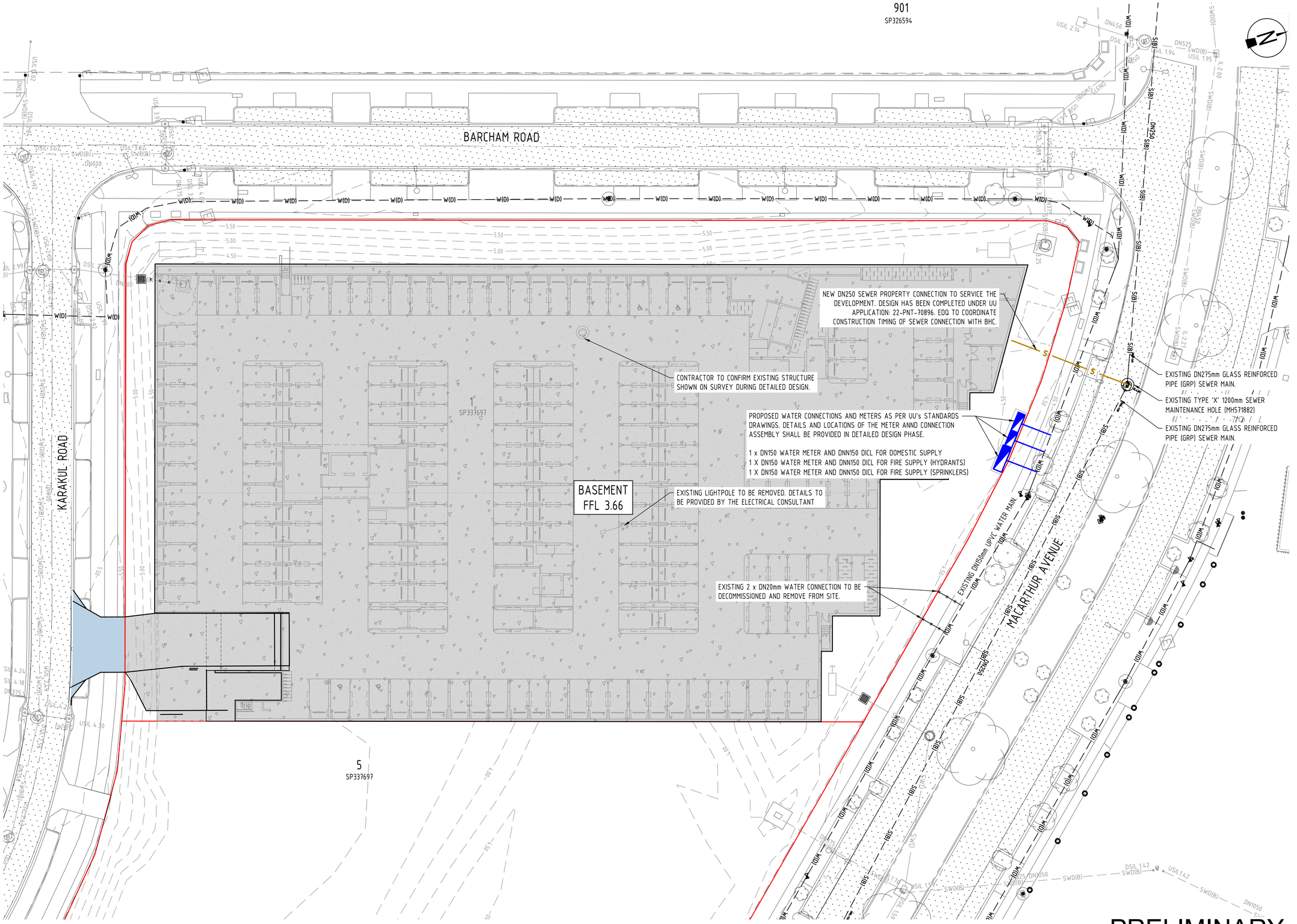
PRELIMINARY
NOT FOR CONSTRUCTION

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

PLOT DATE: 6/14/2024 11:52 AM FILENAME: J:\BNE\27000\27933\CIVIL\DWG\27933_DA03_PRELIMINARY ROADWORKS AND DRAINAGE LAYOUT PLAN.DWG

LEGEND

- FINISHED SURFACE CONTOURS (12.0)
- SITE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- EXISTING EASEMENT BOUNDARY
- EXISTING NOMINAL KERB LINE
- EXISTING ROAD CENTERLINE
- EXISTING STORMWATER DRAINAGE (RECORDS) (dSWD)
- EXISTING SEWER (RECORDS) (dS)
- EXISTING WATER (RECORDS) (dW)
- EXISTING UNDERGROUND ELECTRICITY (RECORDS) (dE)
- EXISTING TELECOMMUNICATIONS (RECORDS) (dT)
- EXISTING GAS (RECORDS) (dG)
- ABANDONED SERVICE
- EXISTING BATTER
- EXISTING FENCE
- LIMIT OF WORKS
- PROPOSED STORMWATER DRAINAGE (SWD)
- PROPOSED GRAVITY SEWER MAIN (S)
- PROPOSED WATER MAIN (W)
- PROPOSED SLEEPER RETAINING WALL
- PROPOSED BLOCK RETAINING WALL
- EXISTING ROAD
- PROPOSED DRIVEWAY CROSSOVER
- PROPOSED CARPARK/INTERNAL DRIVEWAY



LAYOUT PLAN
SCALE 1:250

PRELIMINARY
NOT FOR CONSTRUCTION

Rev	Date	Description	By	Chk

0 5 10 15m
SCALE 1:250
AT ORIGINAL SIZE (A1)

ADG
T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: BRISBANE HOUSING COMPANY LTD	Discipline: CIVIL		Status: PRELIMINARY
Project Name: NORTHSHORE HAMILTON PROPOSED AFFORDABLE HOUSING 17 KARAKUL ROAD HAMILTON, QLD 4010	Designed By: LS	Checked By: ETY	Approved By: DS
	Project No.: 27933	Drawn By: MW	Scale at A1: AS SHOWN

Title: PRELIMINARY SEWER AND WATER LAYOUT PLAN

Drawing No.: DA04 | Revision: 01

PLOT DATE: 6/14/2024 11:53 AM FILENAME: J:\BNE\27000\27933\CVL\DWG\27933_DA04_PRELIMINARY SEWER AND WATER LAYOUT PLAN.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

Appendix C
BCC Code Response

8.2.11 Flood overlay code

8.2.11.1 Application

1. This code applies to assessing development in the Flood overlay, if:
    a. accepted development subject to compliance with identified requirements, where acceptable outcomes of this code are identified requirements in a table of assessment for an overlay (section 5.10); or
    b. assessable development where this code is an applicable code identified in the assessment benchmarks column of a table of assessment for an overlay (section 5.10); or
    c. impact assessable development.
2. Land in the Flood overlay is identified on the Flood overlay map and is included in the following sub-categories:
    a. Brisbane River flood planning area 1 sub-category;
    b. Brisbane River flood planning area 2a sub-category;
    c. Brisbane River flood planning area 2b sub-category;
    d. Brisbane River flood planning area 3 sub-category;
    e. Brisbane River flood planning area 4 sub-category;
    f. Brisbane River flood planning area 5 sub-category;
    g. Creek/waterway flood planning area 1 sub-category;
    h. Creek/waterway flood planning area 2 sub-category;
    i. Creek/waterway flood planning area 3 sub-category;
    j. Creek/waterway flood planning area 4 sub-category;
    k. Creek/waterway flood planning area 5 sub-category;
    l. Overland flow flood planning area sub-category.

Editor's note—For the purposes of the overlay, the Pine and South Pine rivers are treated as Creek/waterway flood planning area sub-categories.

Note—The Flood overlay is a 'natural hazard area' for the purpose of the State Planning Policy. Within this area, susceptibility to flooding has been identified. The natural hazard area identified on the Flood overlay map may not reflect the full extent of the flood affected area.

3. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to:

- management of flood hazard or hydraulic hazard, guidance is provided in the Flood planning scheme policy;
- filling or excavation within the Creek/waterway flood planning area sub-categories, guidance is provided in the Compensatory earthworks planning scheme policy;
- handling or storage of hazardous materials, guidance is provided in the Management of hazardous chemicals in flood affected areas planning scheme policy;
- standards and specifications for public assets in a park, guidance is provided in the Infrastructure design planning scheme policy;
- standards and specifications for stormwater drainage assets, guidance is provided in the Infrastructure design planning scheme policy.

Editor's note—For a proposal to be accepted development subject to compliance with identified requirements, it must meet all the identified acceptable outcomes of this code that relate to the applicable sub-category and any other applicable code. Where it does not meet all identified acceptable outcomes, the proposal becomes assessable development and a development application is required. Where a development application is required, only the specific acceptable outcomes that the proposal fails to meet need to be assessed against the corresponding assessable acceptable outcomes or performance outcomes and relevant overall outcomes. Other identified acceptable outcomes that are met are not assessed as part of the development application.

8.2.11.2 Purpose

1. The purpose of the Flood overlay code is to:
   a. Implement the policy direction in the Strategic framework, in particular:
      i. Theme 2: Brisbane's outstanding lifestyle, and Element 2.3 – Brisbane's healthy and safe communities;
      ii. Theme 4: Brisbane's highly effective transport and infrastructure networks, and Element 4.3 – Brisbane's coordinated infrastructure planning and delivery.
   b. Provide for the assessment of the suitability of development in the Flood overlay.
2. The purpose of the Flood overlay code will be achieved through the following overall outcomes:
   a. Development minimises exposure of people and property to unacceptable risk from flood hazard in all flood events.
   b. Development and infrastructure mitigates the flood risk through its location, siting, design, construction and operation whilst maintaining amenity.
   c. Development does not unduly burden the city's counter-disaster response capacity, including emergency services access during a flood emergency.
   d. Development provides for efficient evacuation and access for evacuation resources including emergency services during flood events, or otherwise plans for the prospect and impact of isolation or hindered evacuation during flooding.
   e. Development involving essential community infrastructure remains functional during and immediately after flood events.
   f. Development ensures that emergency management plans respond to the number and capacity of future users of the development to safely participate in emergency measures such as evacuation.
   g. Development ensures that essential building services or services essential for the development are designed, located and operated to minimise the flood risk to people, minimise damage to property, disruption to building function, and re-establishment time after a flood event.
   h. Development involving hazardous materials manufactured, handled or stored in bulk does not adversely impact on public safety and the environment as a result of the impacts of floodwater.
   i. Development does not, directly or cumulatively, cause or increase adverse impacts on other properties or land within the floodplain from flooding.
   j. Development and infrastructure mitigates the impacts of hydraulic hazard due to predictable future increases in rainfall intensity on flooding.
   k. Development prioritises, in order, the safety of people, protection of public infrastructure and protection of private property, in the management of the economic, social and environmental impacts of flooding.

8.2.11.3 Performance outcomes and acceptable outcomes

Table 8.2.11.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments

Section A—If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development for a dwelling house including any secondary dwelling Note—Development for a dwelling house does not require assessment against any other sections of this code.		
PO1 Development involving any habitable or non-habitable part of a dwelling house, including any secondary dwelling, is located and designed to: a. minimise the risk to people from flood hazard; b. achieve acceptable flood immunity; c. minimise property impacts from a flood event up to and including the defined flood event; d. minimise disruption to residents, recovery time and rebuilding or restoration costs after a flood event up to and including the defined flood event.	**AO1.1** Development for a dwelling house including any secondary dwelling: a. is not located in the Brisbane River flood planning area 1, 2a or 2b sub-categories or the Creek/waterway flood planning area 1 or 2 sub-categories; or b. is only located in these sub-categories, if a Registered Professional Engineer Queensland certifies that the dwelling house and any secondary dwelling are structurally designed to be able to resist hydrostatic and hydrodynamic loads associated with flooding up to and including the defined flood event.	N/A
	AO1.2 Development for a dwelling house and any secondary dwelling complies with the minimum flood planning levels in Table 8.2.11.3.B. Note—If located in an area that has no flood level information available from the Council such as an overland flow path, a Registered Professional Engineer of Queensland with expertise in undertaking flood studies is to certify that the flood level and development levels for the dwelling house and any secondary dwelling achieve the required flood planning levels in Table 8.2.11.3.B.	
	AO1.3 Development involving a building undercroft complies with the minimum clearance requirements in Table 8.2.11.3.E. Editor's note—For creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. Note—The Flood planning scheme policy provides guidance on undercroft design.	

PO2 Development within the Creek/waterway flood planning area sub-categories or Overland flow flood planning area sub-category: a. maintains the conveyance of flood waters to allow 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.	**AO2** Development: a. is not located within the Creek/waterway flood planning area 1, 2 or 3 sub-categories or the Overland flow flood planning area sub-category; or b. provides an open undercroft area from natural ground level to habitable floor level for any area inundated by the defined flood event; or Note—This undercroft area is not suitable for providing non-habitable rooms, secure storage of valuables, or future enclosing for storage or car parking. The clear area may include structural elements such as columns and floor substructure. The Flood planning scheme policy provides guidance on undercroft design. Editor's note—An open undercroft design may be achieved through a 'valance' treatment around the perimeter of an otherwise internally clear undercroft. Editor's note—For Creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. c. a report from a Registered Professional Engineer Queensland certifies that the development in the Creek/waterway flood planning area or Overland flow flood planning area sub-categories will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties. Note—Flood studies demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	Performance outcome. Refer to ADG Civil Reporting.
Section B—If accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development other than for a dwelling house or reconfiguring a lot Note—If development that is accepted development subject to compliance with identified requirements complies with the acceptable outcomes of this part, no further assessment against this code is required.		
PO3 Development: a. is compatible with flood hazard in a defined flood event;	**AO3** Development for a material change of use is identified in Table 8.2.11.3.C as compatible with the flood hazard in the relevant flood planning area.	N/A

b. minimises the risk to people from flood hazard; c. does not reduce the ability of evacuation resources including emergency services to access and evacuate the site in a flood emergency, with consideration to the scale of the development; d. minimises impacts on property from flooding; e. minimises disruption to residents, business or site operations and recovery time due to flooding; f. minimises the need to rebuild structures after a flood event greater than the defined flood event. Note—Where Table 8.2.11.3.C identifies that a flood risk assessment is required, compliance with this performance outcome can be achieved by submitting a flood risk assessment, which may be included within a flood study, addressing the criteria within this performance solution. Preparing flood risk assessments and flood studies is required to be in accordance with the Flood planning scheme policy. Note—An emergency management plan prepared in accordance with the Flood planning scheme policy, which sets out procedures for evacuation due to flooding may be used to demonstrate compliance with this performance outcome.		
PO4 Development for a park ensures that the design of a park and location of structures and facilities responds to the flood hazard and balances the safety of intended users with: a. maintaining continuity of operations; b. impacts of flooding on asset life and ongoing maintenance costs; c. efficient recovery after flood events; d. recreational benefits to the city; e. availability of suitable land within the park.	**AO4.1** Development involving a building or structure in a park complies with the flood planning levels specified in Table 8.2.11.3.D. **AO4.2** Development involving a building or structure in a park where Table 8.2.11.3.D does not apply: a. is not located within the 20% AEP flood extent of any creek/waterway or overland flow path; or b. is located above the 20% AEP flood level of any creek/waterway or overland flow path.	N/A
Section C—If for assessable development other than for a dwelling house		
PO5 Development is located and designed to:	**AO5.1** Development complies with the flood planning levels specified in Table 8.2.11.3.D.	N/A

a. minimise the risk to people from flood hazard on the site; b. minimise flood damage to the development and contents of buildings up to the defined flood event; c. provide suitable amenity; d. minimise disruption to residents, recovery time and the need to rebuild structures after a flood event up to and including the defined flood event.	Note—If located in an area with no Council-derived flood levels such as an overland flow path, a Registered Professional Engineer Queensland with expertise in undertaking flood studies is to derive the applicable flood level and certify that the development meets the required flood planning levels in Table 8.2.11.3.D. The study is to demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO5.2** Development is: a. not located in the: i. Brisbane River flood planning area 1, 2a, or 2b sub-categories; ii. Creek/waterway flood planning area 1 or 2 sub-categories; iii. Overland flow flood planning area sub-category; or b. only located in these sub-categories if a Registered Professional Engineer Queensland with expertise in undertaking flood studies certifies that: i. the development design, siting and any mitigation measures will ensure the development is structurally adequate to resist hydrostatic, hydrodynamic and debris impact loads associated with flooding up to the defined flood event; and ii. the risk to people is managed to an acceptable level.	
PO6 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise flood recovery and economic consequences of damage during a flood.	**AO6.1** Development ensures that: a. all areas containing essential electrical services comply with the flood planning levels in Table 8.2.11.3.D; or b. if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors	N/A

	impermeable to the passage of water with all entry points and services located at or above the relevant flood planning level in Table 8.2.11.3.D. Note—A basement storage area does not include a bike storage room, change room, building maintenance storage and non-critical electrical services. **AO6.2** Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood provides a secondary pump system with a backup power source for the pump.	
PO7 Development does not directly or indirectly create a material adverse impact on flood behaviour or drainage on properties that are upstream, downstream or adjacent to the development.	**AO7.1** Development: a. does not block, or divert floodwaters for any area affected by creek/waterway or overland flow flooding, excluding storm-tide flooding and Brisbane River flooding sources; or b. does not result in a material increase in flood level or hydraulic hazard on upstream, downstream or adjacent properties. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO7.2** Development retains existing overland flow paths and does not rely wholly on piped solutions to manage major flows.	N/A
	AO7.3 Development which creates a new overland flow path or significantly modifies an existing overland flow path via earthworks does not materially worsen hydraulic hazard on the site from existing conditions.	

	Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	
PO8 Development for filling or excavation in an area affected by creek/waterway flooding does not directly, indirectly or cumulatively cause any material increase in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the floodplain. Note—This can be demonstrated by undertaking earthworks in compliance with the Compensatory earthworks planning scheme policy. Note—This part of the code applies to all development other than a dwelling house and any secondary dwelling which involves filling or excavation, whether or not the development application comprises a separate development application for operational work involving filling or excavation.	**AO8** Development ensures that no filling or excavation greater than 100mm is located in the Creek/waterway flood planning area 1, 2 or 3 sub-categories if contained in the 5% AEP flood extent of any Creek/waterway flood planning area sub-category for which no waterway corridor has been mapped in the Waterway corridors overlay.	N/A
PO9 Development ensures that the building and site design: a. maintains the conveyance capacity of existing overland flow paths and creek/waterways; b. ensures floodwaters and flood debris can pass predominantly unimpeded under a structure or building to minimise property or building damage, including for a flood larger than the defined flood event; c. mitigates flood impacts by ensuring that filling, excavation and location of services are designed to allow for the conveyance of floodwater across the site. Note—The Flood planning scheme policy provides guidance on relevant considerations in determining minimum undercroft clearances and treatment of ground level in undercroft areas where floodwater conveyance is required underneath development.	**AO9.1** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub-category: a. complies with the minimum building undercroft clearance requirements in Table 8.2.11.3.E; b. not located directly above any part of a waterway corridor as mapped in the Waterway corridors overlay. **AO9.2** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub category: a. has a ground level within the undercroft area that is free draining; b. does not involve excavation below ground level of more than 300mm within the undercroft area.	N/A

PO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by flood hazard, in order to: a. protect safety of users and emergency services personnel; b. support efficient emergency services access and site evacuation with consideration to the scale of development. Note—A flood risk assessment may be required to address the performance outcomes or acceptable solutions which deal with evacuation and isolation arrangements, and the ability to take refuge. The Flood planning scheme policy provides information for undertaking flood risk assessments.	**AO10** Development for vulnerable uses, difficult to evacuate uses or assembly uses: a. is not isolated in any event up to the relevant flood planning level specified in Table 8.2.11.3.L; or b. has direct vehicle access to a critical route or interim critical route in the Critical infrastructure and movement network overlay for evacuation in a flood; or c. can achieve vehicular evacuation to a suitable flood-free location. Note—A suitable flood-free location is of a size and nature sufficient to provide for the size and characteristics of the population likely to need evacuation to that area.	
PO11 Development has access which, having regard to hydraulic hazard, provides for safe vehicular and pedestrian movement and emergency services access to adjoining roads.	**AO11.1** Development provides an access or driveway into the site which is: a. trafficable during the defined flood event; b. not located in the Creek/waterway flood planning area 1 sub-category; c. not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event; d. the access or driveway is not inundated by a 10% AEP flood. **AO11.2** Development located in the Creek/waterway flood planning area 1, 2, 3 or 4 sub-categories locates any disabled access in the highest part of the site. Note—explanation of hydraulic hazard provided in the Flood planning scheme policy.	N/A
PO12 Development involving a new road, a bridge or culvert is designed to minimise impacts to flood behaviour,	**AO12** Development involving a new road complies with the flood planning levels in Table 8.2.11.3.F.	N/A

minimise disruption to traffic during a flood and allow for emergency access.		
PO13 Development for pedestrian and cyclist paths: a. provides a suitable level of trafficability; b. manages the impacts of flooding on asset life and ongoing maintenance costs; c. balances route availability with recreational and transport connectivity benefits to the city.	**AO13.1** Development for cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, are located above the 39% AEP (2 year ARI) flood immunity from all flooding sources. Note—If the site is subject to more than one type of flooding, the requirement that affords the greatest level of protection will apply. **AO13.2** All new on-road cyclist and pedestrian facilities comply with the flood planning levels and trafficability standards for the applicable category of road in Table 8.2.11.3.F or Table 8.2.11.3.K.	N/A
PO14 Development which increases the residential population within the Brisbane River flood planning area sub-categories minimises the risk to people in all flood events with consideration to flood hazard, including warning time.	**AO14** Development in the Brisbane River flood planning area sub-categories in areas where the residential flood level is greater than 12.8m AHD involving: a. an increase in the number of residential dwellings; or b. additional residential lots is not subject to an unsafe hydraulic hazard in the 0.2% AEP flood event. Note—Explanation of a hydraulic hazard is provided in the Flood planning scheme policy.	N/A
Additional performance outcomes and acceptable outcomes for essential community infrastructure		
PO15 Development involving essential community infrastructure: a. remains functional to serve community need during and immediately after a flood event, or is part of a network that is able to maintain the function of the	**AO15** Development involving essential community infrastructure: a. is ancillary to and not relied upon for the provision of the essential service during a flood; or	N/A

essential community infrastructure when parts of the development are unable to function during or after a flood; b. is designed, sited and operated to avoid adverse impacts on the community or the environment due to the impacts of flooding on infrastructure, facilities or access and egress routes; c. is able to remain functional or is part of a network which is able to remain functional even when other infrastructure or services (such as electricity supply) may be compromised in a flood event; d. contains mitigation measures which are not entirely dependent on human activation to respond to a flood event. Note—Protection of function is required up to and including the flood event in Table 8.2.11.3.G.	b. is located above the flood planning levels in Table 8.2.11.3.G; c. has access to or provides the necessary back-up emergency electricity and communications supply in times of flood; d. is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the flood event listed for the development type in Table 8.2.11.3.G; e. that services a local area: i. is able to be accessed in times of flood to service local community needs up to the event listed for that development type in Table 8.2.11.3.G; or ii. has a service continuity plan that demonstrates the continued provision of service during the relevant flood event.	
Additional performance outcomes and acceptable outcomes if development involves the processes in Table 8.2.11.3.H		
PO16 Development involving the storage and handling of hazardous materials avoids or minimises risks to public health and safety and the environment, by: a. protecting underground tanks for hazardous materials against the forces of buoyancy, velocity flow and debris impacts; b. securing above-ground tanks for hazardous materials against flotation and lateral movement; c. preventing damage to hazardous materials pipework or entry of floodwater into hazardous materials pipework; d. preventing damage to or off-site release of packages, drums or containers storing hazardous materials.	**AO16** a. Development does not include the storage or handling of hazardous chemicals that exceed the hazardous chemicals flood hazard threshold quantities in Table 8.2.11.3.M. b. Development involving the processes listed in Table 8.2.11.3.H: i. where located in the Flood overlay area, occurs only in the Creek/waterway flood planning area 5 sub-category or the Brisbane River flood planning area 5 sub-category; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood affected areas planning scheme policy	N/A

Note—A chemical hazards flood risk report prepared in accordance with the Management of hazardous chemicals in flood affected areas planning scheme policy can assist in demonstrating achievement of this performance outcome. Note—A pump drainage system is not an acceptable measure to meet the performance outcome.	and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood affected areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.	
Additional performance outcomes and acceptable outcomes for reconfiguring a lot		
PO17 Development locates and designs all lots resulting from reconfiguring a lot to: a. minimise the risk to people from flood hazard; b. minimise damage to property from flood hazard; c. facilitate safe and efficient evacuation. Note— • Consideration of all floods up to the probable maximum flood is relevant to minimising the risk to people. • Flood warning time is not considered sufficient in the Creek/waterway planning area sub-categories or the Overland flow flood planning area sub-category. • Filling above the flood planning level for a flood event greater than the defined flood event cannot be assumed to mitigate the flood hazard.	**AO17.1** Development creating new lots is identified in Table 8.2.11.3.I as suitable within the relevant flood planning area. **AO17.2** Development provides for reconfiguring a lot design that achieves a road and lot layout which: a. provides trafficable vehicular egress for evacuation during a defined flood event; b. optimises hazard-free movement away from sources of flood hazard within the development. Note—Further advice on road and lot layout is contained in the Flood planning scheme policy.	N/A
	AO17.3 Development which creates a new residential lot in an area subject to Brisbane River flooding, if the residential flood level is greater than 12.8m AHD is not subject to a hydraulic hazard greater than 0.6m^2/s DV or 0.6m deep in a 0.2% AEP flood. Note—Refer to the Flood planning scheme policy for further explanation on the 0.2% AEP flood.	
PO18 Development involving reconfiguring a lot: a. minimises the risk to people from flood hazard; b. creates safe evacuation routes or avoids isolation of the development during a flood greater than the defined flood event;	**AO18.1** Development involving reconfiguring a lot ensures: a. all lots comply with the flood planning levels in Table 8.2.11.3.J; b. a new road complies with the flood planning levels in Table 8.2.11.3.F.	N/A

c. minimises damage to property and services; d. provides lots and roads that are not frequently flooded or subject to nuisance ponding or seepage; e. ensures lots created for park or private open space minimise the risk to people from flood hazard and are fit for purpose; f. provides a lot that is not substantially burdened by flood mitigation infrastructure.	**AO18.2** Development involving reconfiguring a lot creating more than 6 residential lots or a lot for industry ensures the flood planning levels of a dedicated road fronting the development or providing primary access within 200m of the development: a. complies with Table 8.2.11.3.K; or b. has acceptable trafficability in accordance with the requirements in the Flood planning scheme policy and the Queensland Urban Drainage Manual. Note—The Flood planning scheme policy contains supporting information about trafficability on existing roads and serviceability during floods.	
	AO18.3 Development protects the conveyance of flood hazard area by providing an easement over the: a. 2% AEP flood extent for overland flow flooding; b. 1% AEP flood extent for creek/waterway flooding.	

Table 8.2.11.3.B—Flood planning levels for a dwelling house (BCA building classification 1a)

Flooding source	**Minimum habitable floor level**	**Minimum non-habitable floor level (i.e. utility areas, garage, laundry, storage room and basement entries)**
Brisbane River	RFL + 500mm	2% AEP flood level + 300mm
Creek/ waterway	1% AEP flood level + 500mm	1% AEP flood level + 300mm
Overland flow	2% AEP flood level + 500mm	2% AEP level + 300mm
	Note—Where no detailed flood level information is available from the Council such as an overland flow path, a Registered Professional Engineer Queensland with expertise in flood studies is to derive the relevant flood level and certify that the development level for the dwelling house, including any secondary dwelling, meets the required flood immunity standards.	

Note—
- Where the site is subject to more than one flooding source, the minimum flood planning level is the highest level determined from these flooding sources.
- Flood planning levels for a dwelling house from storm-tide inundation are located in the Coastal hazard overlay code.

- A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.
- A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Table 8.2.11.3.C—Land use compatibility with flood hazard

C – Land use is compatible with the flood hazard subject to meeting all other relevant requirements.

– Flood risk assessment in accordance with requirements of the Flood planning scheme policy is required to demonstrate the use is compatible with the flood hazard.

Accommodation activities	**Brisbane River flood planning area sub-category**						**Creek/waterway flood planning area sub-category**					**Overland flow flood planning area sub-category**
	5	4	3	2B	2A	1	5	4	3	2	1	
Community residence	C	#	#	#	#	#	C	#	#	#	#	#
Dual occupancy	C	C	#	#	#	#	C	#	#	#	#	C
Dwelling unit	C	C	#	#	#	#	C	#	#	#	#	C
Multiple dwelling (1–3 storeys)	C	C	#	#	#	#	C	#	#	#	#	C
Multiple dwelling (4+ storeys)	C	C	C	#	#	#	C	#	#	#	#	C
Nature-based tourism	C	C	C	#	#	#	C	#	#	#	#	C
Relocatable home park	C	#	#	#	#	#	C	#	#	#	#	C
Residential care facility	#	#	#	#	#	#	#	#	#	#	#	#
Resort complex	C	C	C	#	#	#	C	#	#	#	#	C
Retirement facility	C	#	#	#	#	#	#	#	#	#	#	C

Rooming accommodation, short-term accommodation or hotel where including accommodation (1–3 storeys)	C	C	#	#	#	#	C	#	#	#	#	C
Rooming accommodation, short-term accommodation or hotel where including accommodation (4+ storeys)	C	C	C	#	#	#	C	#	#	#	#	C
Tourist park	C	C	#	#	#	#	C	C	#	#	#	C
Commercial land uses	**Brisbane River flood planning area sub-category**						**Creek/waterway flood planning area sub-category**					**Overland flow flood planning area sub-category**
	5	4	3	2B	2A	1	5	4	3	2	1	
Agricultural supplies store	C	C	#	#	#	#	C	#	#	#	#	C
Animal husbandry	C	C	#	#	#	#	C	#	#	#	#	C
Animal keeping	C	C	#	#	#	#	C	#	#	#	#	C
Aquaculture	C	C	#	#	#	#	C	#	#	#	#	C
Bulk landscape supplies	C	C	C	C	C	C	C	C	C	#	#	C

Car park ancillary to another use	C	C	C	C	C	#	C	C	#	#	#	C
Car wash	C	C	C	C	C	#	C	C	#	#	#	C
Food and drink outlet	C	C	#	#	#	#	C	C	#	#	#	C
Function facility	C	C	#	#	#	#	C	#	#	#	#	C
Garden centre	C	C	C	#	#	#	C	C	#	#	#	C
Hardware and trade supplies	C	C	#	#	#	#	C	C	#	#	#	C
Home-based business	C	C	#	#	#	#	C	#	#	#	#	C
Hotel (where not including accommodation)	C	C	#	#	#	#	C	#	#	#	#	C
Market	C	C	C	#	#	#	C	C	#	#	#	C
Nightclub entertainment facility	C	C	#	#	#	#	C	#	#	#	#	C
Office	C	C	#	#	#	#	C	#	#	#	#	C
Outdoor sales	C	C	#	#	#	#	C	C	#	#	#	C
Parking station	C	C	C	C	C	#	C	C	#	#	#	C
Roadside stalls	C	C	C	#	#	#	C	C	#	#	#	C
Sales office	C	C	#	#	#	#	C	C	#	#	#	C
Shop, Adult store	C	C	#	#	#	#	C	#	#	#	#	C
Shopping centre	C	#	#	#	#	#	C	#	#	#	#	C
Showroom	C	C	#	#	#	#	C	C	#	#	#	C

Theatre	C	C	#	#	#	#	C	#	#	#	#	C
Tourist attraction	C	C	C	#	#	#	C	C	#	#	#	C
Veterinary service	C	C	#	#	#	#	C	#	#	#	#	C
Wholesale nursery	C	C	C	C	C	C	C	C	C	#	#	C
Community land uses	**Brisbane River flood planning area sub-category**						**Creek/waterway flood planning area sub-category**					**Overland flow flood planning area sub-category**
	5	4	3	2B	2A	1	5	4	3	2	1	
Childcare centre	C	#	#	#	#	#	C	#	#	#	#	#
Club	C	C	#	#	#	#	C	C	#	#	#	C
Community care centre	C	#	#	#	#	#	C	#	#	#	#	C
Community use	C	#	#	#	#	#	C	C	#	#	#	C
Educational establishment (and outdoor education centre)	C	#	#	#	#	#	C	#	#	#	#	C
Environment facility	C	C	C	C	C	C	C	C	C	C	C	C
Health care service	C	#	#	#	#	#	C	#	#	#	#	C
Hospital	#	#	#	#	#	#	#	#	#	#	#	#
Indoor sport and recreation	C	C	#	#	#	#	C	C	#	#	#	C

Major sport, recreation and entertainment facility	C	#	#	#	#	#	C	C	#	#	#	C
Motor sport facility	C	C	C	#	#	#	C	C	C	#	#	C
Outdoor sport and recreation	C	C	C	#	#	#	C	C	#	#	#	C
Park	C	C	C	C	C	C	C	C	C	C	C	C
Place of worship	C	#	#	#	#	#	C	C	#	#	#	C
Special purpose land uses	**Brisbane River flood planning area sub-category**						**Creek/waterway flood planning area sub-category**					**Overland flow flood planning area sub-category**
	5	4	3	2B	2A	1	5	4	3	2	1	
Air service	C	#	#	#	#	#	C	#	#	#	#	C
Cemetery	C	C	C	#	#	#	C	C	#	#	#	C
Crematorium	C	#	#	#	#	#	C	#	#	#	#	C
Detention facility	#	#	#	#	#	#	#	#	#	#	#	C
Emergency services	#	#	#	#	#	#	#	#	#	#	#	#
Funeral parlour	C	#	#	#	#	#	C	#	#	#	#	C
Landing	C	C	C	C	C	C	C	C	C	C	#	C
Major electricity infrastructure	#	#	#	#	#	#	#	#	#	#	#	#

Port service	C	C	C	#	#	#	C	C	C	C	#	C
Substation	C	#	#	#	#	#	C	#	#	#	#	#
Telecommunications facility	C	#	#	#	#	#	C	#	#	#	#	#
Utility installation	C	#	#	#	#	#	#	#	#	#	#	#
Industry land uses	**Brisbane River flood planning area sub-category**						**Creek/waterway flood planning area sub-category**					**Overland flow flood planning area sub-category**
	5	4	3	2B	2A	1	5	4	3	2	1	
Extractive industry	C	C	C	#	#	#	C	C	C	#	#	C
High impact industry	C	C	#	#	#	#	C	C	#	#	#	C
Intensive animal industry	C	C	#	#	#	#	C	#	#	#	#	C
Intensive horticulture	C	C	C	#	#	#	C	C	#	#	#	C
Low impact industry	C	C	#	#	#	#	C	C	#	#	#	C
Marine industry	C	C	C	#	#	#	C	C	#	#	#	C
Medium impact industry	C	C	#	#	#	#	C	C	#	#	#	C
Research and technology industry	C	#	#	#	#	#	C	#	#	#	#	C
Rural industry	C	C	C	C	C	C	C	C	C	#	#	C

Service industry	C	C	#	#	#	#	C	C	#	#	#	C
Service station	C	#	#	#	#	#	C	#	#	#	#	C
Special industries	C	#	#	#	#	#	#	#	#	#	#	C
Transport depot	C	#	#	#	#	#	C	#	#	#	#	C
Warehouse	C	C	#	#	#	#	C	#	#	#	#	C

Note—Caretaker's accommodation and home-based business are considered ancillary to the dominant land use.

Table 8.2.11.3.D—Flood planning categories for development types

BCA building classification(1)	**Development types and design levels, assigned design floor or pavement levels**	**Category – refer to Table 8.2.11.3.L for flood planning levels**
Class 1–4	Habitable room(2)	Category A
	Non-habitable room including patio and courtyard	Category B
	Non-habitable part of a Class 2 or Class 3 building excluding the essential services(2) control room	Category B Risk management approach to Brisbane River flooding is permitted (refer to Flood planning scheme policy)
	Parking located in the building undercroft of a multiple dwelling	Category C
	Carport(4), unroofed car park; vehicular manoeuvring area	Category D
	Essential electrical services(2) of a Class 2 or Class 3 building only	Category A(6)
	Basement parking entry(3)	Category C + 300mm
Class 5, Class 6, or Class 8	Building floor level	Category C Risk management approach to Brisbane River flooding is permitted (refer to Flood planning scheme policy)
	Garage or car park located in the building undercroft(3)	Category C

	Carport[4] or unroofed car park	Category D
	Vehicular access and manoeuvring areas	Category D
	Basement parking entry[3]	Category C
	Essential electrical services[2]	Class 8 – Category C[6] Class 5 & 6 – Category A[6]
Class 7a	Refer to the relevant building class specified in this table	
Class 7b	Building floor level	Category C Risk management approach to Brisbane River flooding is permitted (refer to Flood planning scheme policy)
	Vehicular access and manoeuvring area	Category D
	Essential electrical services[2]	Category C
Class 9	Building floor level	Category A
	Building floor level for habitable rooms in Class 9a or 9c where for a residential care facility	0.2% AEP flood
	Building floor level for habitable rooms in Class 9b where involving children, such as a childcare centre	0.2% AEP flood
	Garage or car park located in the building undercroft[3]	Category C
	Carport[5] or unroofed car park	Category D
	Vehicular access and manoeuvring areas	Category D
	Essential electrical services[2]	Category A
Class 10a	Car parking facility	Refer to the relevant building class specified in this table
	Shed[5] or the like	Category D

Class 10b	Swimming pool	Category E
	Associated mechanical and electrical pool equipment	Category C
	Other structures	Flood planning levels do not apply

Notes—
(1) Refer to the Building Code of Australia for definitions of building classifications.
(2) Essential electrical services include any area or room used for fire control panel, telephone PABX, sensitive substation equipment including transformers, low voltage switch gear, high voltage switch gear, battery chargers, protection control and communication equipment, low voltage cables, high voltage cables, and lift or pump controls.
(3) Basement car parks must be suitably waterproofed and all air vents, air-conditioning ducts, pedestrian access and entry and exit ramps into the basement must comply with the applicable flood planning levels in this table.
(4) A shelter for a motor vehicle, which has a roof and one or more open sides, and which can be built against the side of a building.
(5) A slight or rough structure built for shelter and storage; or a large strongly built structure, often open at the sides or end.
(6) Where essential electrical services are proposed in a basement below the specified flood planning level, the flood immunity of all air vents, air-conditioning ducts, pedestrian access, lift shafts and entry/exit ramps at the basement entrance and any other openings into that basement must conform with the flood planning levels for Category A for Residential development, and the relevant basement entry level of all other uses. To ensure flood immunity, basements require a waterproof basement design to prevent flood waters entering the basement.

- A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.
- A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.
- Where a building has a combination of uses that includes a component of classes 2, 3 or 9, the essential services for that building shall comply with the requirements of the building class with the greatest flood planning level requirement.
- Use classes for residential development also include basement storage.

Table 8.2.11.3.E— Building undercroft clearances

Flooding source	**Minimum clearance requirement(1)(3)**
Overland flow– Hydraulic Hazard (DV <0.6 m^2/s and depth <600mm in 2% AEP flood event)	Lowest floor level is to be 1.5m(2) above the highest ground elevation in undercroft area
Overland flow– Hydraulic Hazard (DV >0.6 m^2/s or depth >600mm in 2% AEP flood event)	Lowest floor level is to be 2.5m(2) above the highest ground elevation in undercroft area
Creek/waterway (Flood planning area 1, 2 or 3 sub-categories)	Lowest floor level is to be 2.5m(2) above the highest ground elevation in undercroft area
Creek/waterway (Flood planning area 4 sub-category)	Lowest flood level is to be 1.5m(2) above the highest ground elevation in undercroft area

Notes—

(1) The minimum undercroft only relates to the minimum clearance requirements from ground level to the finished floor level and not minimum flood planning levels. Where the flood planning level requirement with freeboard results in a higher finished floor level that higher level needs to be adopted.
(2) Refer to the Flood planning scheme policy for explanatory material regarding clearances and considerations.
(3) The minimum undercroft clearance only applies to the area of undercroft above the relevant flood extent or flood planning area sub-category.

Table 8.2.11.3.F—Flood planning levels for a new road

Flooding source(1)	**Minimum design levels at the crown of the road (m AHD)(2)**	
	Residential development	**Industrial or commercial development**
Brisbane River(3)	Defined flood level	5% AEP flood level
Creek/waterway	1% AEP flood level	2% AEP flood level
Overland flow	2% AEP flood level	2% AEP flood level

Notes—
(1) Where the road is subject to more than one flooding source, the minimum flood planning level is the highest level determined from these sources.
(2) Where flood levels are not available from Council's FloodWise Property Report, such as for overland flow flooding, a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies is required to estimate the relevant flood level.
(3) A risk management approach determining flood planning levels of roads for Brisbane River flooding can be applied as an alternative to Table 8.2.11.3.F. Typically such roads would have a flood immunity no worse than the surrounding roads that support a similar land use, otherwise a Flood Risk Assessment which complies with the relevant requirements of the Flood planning scheme policy is provided.

Table 8.2.11.3.G—Flood planning levels for essential community infrastructure

Type of essential community infrastructure	**Minimum design levels**
Emergency services	0.2% AEP flood
Emergency services, where for an emergency shelter	0.5% AEP flood
Emergency services, where for police facilities	0.5% AEP flood
Hospital and health care service where associated with a hospital	0.2% AEP flood
Community facility where involving storage of valuable records or items of historic or cultural significance (e.g. galleries and libraries)	0.5% AEP flood

State-controlled roads Major or minor electricity infrastructure not otherwise listed in this table Utility installation where for rail transport services Air service Telecommunications facility	No specific recommended level but development proponents should ensure that the infrastructure is optimally located and designed to achieve suitable levels of service, having regard to the processes and policies of the administering government agency.
Power stations (as defined in the *Electricity Act 1994*) or renewable energy facility.	0.2% AEP flood
Major electricity infrastructure where a major switch yard	0.2% AEP flood
Substations	0.5% AEP flood
Utility installation where for a sewage treatment plant	Defined flood event
Utility installation where for a water treatment plant	0.5% AEP flood

Note—A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.

Note—A flood event with an AEP of 0.5% is the equivalent of a 200 year ARI flood event.

Table 8.2.11.3.H—Table of processes requiring additional assessment in a flood planning area

Process
(1) Oil refining or processing
(2) Producing, refining or processing gas or fuel gas
(3) Power station, including the activity of generating electricity by using fuel
(4) Producing, quenching, cutting, crushing or grading coke
(5) Waste incinerator, including thermal treatment of waste
(6) Pulp or paper manufacturing
(7) Tannery or works for curing animal skins, hides or finishing leather
(8) Textile manufacturing, including carpet manufacturing, wool scouring or carbonising, cotton milling, or textile bleaching, dyeing or finishing
(9) Rendering plant, including meat processing

(10) Manufacturing chemicals, poisons and explosives
(11) Manufacturing fertilisers involving ammonia
(12) Manufacturing polyvinyl chloride plastic
(13) Major hazard facilities for the storage and handling of dangerous goods
(14) Storage of hazardous chemicals in quantities that would exceed the hazardous chemicals flood hazard threshold set out in Table 8.2.11.3.M
(15) Manufacturing medium-density fibreboard, chipboard, particle board, plywood, laminated board or wood veneer products
(16) Manufacturing or processing plaster
(17) Enamelling workshop
(18) Galvanising works
(19) Anodising or electroplating workshop
(20) Powder coating workshop
(21) Treating timber for preservation using chemicals including copper, chromium, arsenic, borax and creosote
(22) Manufacturing soil conditioners by receiving, blending, storing, processing, drying or composting organic material or organic waste, including animal manures, sewage, septic sludges and domestic waste
(23) Manufacturing tyres, asbestos products, asphalt, cement, glass or glass fibre, mineral wool or ceramic fibre
(24) Abattoir, including meat processing
(25) Recycling chemicals, oils or solvents
(26) Waste disposal activity (other than waste incinerator), including waste transfer station operation
(27) Recycling, storing or reprocessing regulated waste, including regulated waste treatment
(28) Manufacturing batteries and battery recycling
(29) Drum and container reconditioning

(30) Water treatment
(31) Sewage treatment

Table 8.2.11.3.I—Suitability of reconfiguring a lot within a flood planning area

C – Reconfiguring a lot is suitable within a flood planning area

– Flood risk assessment in accordance with the requirements of the Flood planning scheme policy is required to demonstrate the mitigation of risk from flood hazard

Flood planning area	**Creek/waterway flood planning area sub-categories**			**Brisbane River flood planning area sub-categories**		
	Residential	**Industrial**	**Other**	**Residential**	**Industrial**	**Other**
1	#	#	#	#	#	#
2/2a;2b	#	#	#	#	C	#
3	#	#	#	#	C	C
4	C	C	C	C	C	C
5	C	C	C	C	C	C

Notes—
- A flood risk assessment is required for residential reconfiguring a lot development where creating more than two new lots in the overland flow flood planning area sub-category.
- Additional requirements apply for the Brisbane River flood planning area sub-category if the residential flood level is greater than 12.8m AHD.
- Minimum site levels, requirements for no adverse off site impacts and other provisions in the planning scheme still apply.

Table 8.2.11.3.J—Flood planning levels for reconfiguring a lot

Flooding source(1)	**Minimum lot levels (m AHD)(2)**		
	Residential (creating 6 or less lots with no new road)	**Residential (creating more than 6 lots), or a new road**	**Other than residential**
Brisbane River	2% AEP flood level + 300mm	RFL + 0.3m	1% AEP flood level

Creek/waterway	Minimum 300m^2 area at the 1% AEP flood level + 300mm[3]	1% AEP flood level + 300mm	2% AEP flood level
Overland flow	Minimum 300m^2 area at the 2% AEP flood level + 300mm[3]	2% AEP flood level + 300mm	2% AEP flood level

Notes—
[1] Where the site is subject to more than one flooding source, the minimum flood planning level is the highest level determined from these sources.
[2] Where flood levels are not available from Council's FloodWise Property Report such as for overland flow flooding, a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies is required to estimate the relevant flood level.
[3] The 300m^2 area is considered suitable for siting a dwelling house with open space area at or above the nominated flood planning level.

Table 8.2.11.3.K—Flood planning levels for existing road providing access to or fronting a development

Flooding source[1]	**Minimum design levels at the crown of the road (m AHD)[2][3]**		
	Local road	**Neighbourhood road**	**District road, suburban road, arterial road**
Brisbane River	5% AEP flood level	2% AEP flood level	2% AEP flood level
Creek/waterway	5% AEP flood level	2% AEP flood level	2% AEP flood level
Overland flow	5% AEP flood level	5% AEP flood level	5% AEP flood level

Notes—
[1] Where the site is subject to more than one flooding source, the minimum flood planning level is the highest level determined from these sources.
[2] Where flood levels are not available from Council's FloodWise Property Report such as overland flow flooding a suitably qualified Registered Professional Engineer in Queensland with expertise in undertaking flood studies is required to estimate the relevant flood level. The Flood planning scheme policy sets out the requirements for a flood risk assessment process.
[3] The design standard for industry access is the 5% AEP flood level for all flooding sources.

Table 8.2.11.3.L—Categories of flood planning levels

Flooding source[1]	**Minimum design floor or pavement levels (m AHD)[2] (refer to Table 8.2.11.3.D for assignment of these categories)**				
	Category A	**Category B**	**Category C**	**Category D**	**Category E**

Brisbane River	RFL + 500mm	RFL + 300mm	DFL	5% AEP flood level	5% AEP flood level
Creek/ waterway	1% AEP flood level + 500mm	1% AEP flood level + 300mm	1% AEP flood level	1% AEP flood level	5% AEP flood level
Overland flow	2% AEP flood level + 500mm	2% AEP flood level + 300mm	2% AEP flood level	2% AEP flood level	5% AEP flood level

Notes—
(1) Where the site is subject to more than one type of flooding that is overland flow flooding, creek or waterway flooding or river flooding, the minimum flood immunity level is the highest level determined from these sources.
(2) Where flood levels are not available from Council's FloodWise Property Report such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies required to estimate the relevant flood level. The Flood planning scheme policy sets out the requirements for a flood risk assessment process.

- A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.
- A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.
- A flood event with an AEP of 5% is the equivalent of a 20 year ARI flood event.

Table 8.2.11.3.M—Hazardous chemicals flood hazard threshold

Hazardous chemicals flood hazard threshold means any of the following:
A hazardous chemical listed in schedule 11 of the Work Health and Safety Regulation 2011 in a quantity that exceeds a threshold quantity stated in column 5 of schedule 11
A chemical classified as hazardous to the aquatic environment under the Australian Dangerous Goods Code in the Acute I or Chronic I category that exceeds 2500 litres or kilograms
A chemical classified as hazardous to the aquatic environment under the Australian Dangerous Goods Code in the Chronic II category that exceeds 10,000 litres or kilograms
A chemical classified as hazardous to the aquatic environment under the Australian Dangerous Goods Code and assigned to Packing Group III that exceeds 10,000 litres or kilograms
A chemical classified as hazardous to the aquatic environment under the Globally Harmonised System of Classification and Labelling of Chemicals that exceeds 10,000 litres or kilograms

8.2.15 Potential and actual acid sulfate soils overlay code

8.2.15.1 Application

1. This code applies to assessing development in the Potential and actual acid sulfate soils overlay, if:
   a. assessable development where this code is an applicable code identified in the assessment benchmarks column of a table of assessment for an overlay (section 5.10); or
   b. impact assessable development.

Note—Where the natural ground level is greater than 20m AHD, the Potential and actual acid sulfate soils overlay code does not apply.

Editor's note—Where the Potential and actual acid sulfate soils overlay code does not apply, it is recommended that acid sulfate soil be appropriately managed in other circumstances as well. For example, installing a piped drain may not disturb much soil but could result in a degraded asset.

2. Land in the Potential and actual acid sulfate soils overlay is identified on the Potential and actual acid sulfate soils overlay map and is included in the following sub-categories:
   a. Potential and actual acid sulfate soils sub-category;
   b. Land at or below 5m AHD sub-category;
   c. Land above 5m AHD and below 20m AHD sub-category.
3. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to acid sulfate soils, an acid sulfate soil investigation report, or an acid sulfate soil management plan, guidance is provided in the Potential and actual acid sulfate soils planning scheme policy.

8.2.15.2 Purpose

1. The purpose of the Potential and actual acid sulfate soils overlay code is to:
   a. Implement the policy direction in the Strategic framework, in particular Theme 2: Brisbane's outstanding lifestyle and Element 2.3 — Brisbane's healthy and safe communities.
   b. Provide for the assessment of the suitability of development in the Potential and actual acid sulfate soils overlay.
2. The purpose of the code will be achieved through the following overall outcomes:
   a. Development ensures that the release of an acid and associated metal contaminant is avoided by not disturbing acid sulfate soils when excavating, removing soil or extracting groundwater or filling land.
   b. Development ensures that disturbed acid sulfate soils or drainage waters are treated and, if required, ongoing management practices are adopted that minimise the potential for environmental harm from acid sulfate soil and protect corrodible assets from acid sulfate soil.
   c. Development is located, designed and constructed to avoid the mobilisation and release of iron compounds for coastal algal blooms.

8.2.15.3 Performance outcomes and acceptable outcomes

Table 8.2.15.3—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
PO1 Development protects the environmental values and ecological health of receiving waters and does not subject assets to accelerated corrosion.	**AO1** Development ensures that: a. no potential or actual acid sulfate soils are disturbed; or Note—This can be demonstrated through the submission of an acid sulfate soil investigation report with reference to the Potential and actual acid sulfate soils planning scheme policy. b. the disturbance impacts in an area that hosts potential acid sulfate soils are appropriately managed, if less than 500m^3 of soil is disturbed and the watertable is not affected; or Note—This can be demonstrated through the submission of an acid sulfate soil investigation report and a preliminary acid sulfate soil management plan, with reference to the Potential and actual acid sulfate soils planning scheme policy. c. impacts are appropriately managed if 500m^3 or more of soil is disturbed or the watertable in an area that hosts potential or actual acid sulfate soils is affected. Note—This can be demonstrated through the submission of an acid sulfate soil investigation report and a full acid sulfate soil management plan, with reference to the Potential and actual acid sulfate soils planning scheme policy using levels of testing commensurate with the level of risk. If the investigation demonstrates that an acid sulfate soil management plan is not required, only an investigation report is required.	There is a total cut of around 5000m^3 expected for the development. Therefore, this will be a performance solution. Please refer to ADG's engineering services report for further information.

9.4.3 Filling and excavation code

9.4.3.1 Application

1. This code applies to assessing:
    a. accepted development subject to compliance with identified requirements, where acceptable outcomes of this code are identified requirements in a table of assessment for an overlay (section 5.10); or
    b. operational work for filling or excavation which is assessable development if this code is an applicable code identified in the assessment benchmarks column of a table of assessment for operational work (section 5.8) or an overlay (section 5.10); or
    c. a material change of use or reconfiguring a lot if:
        i. assessable development where this code is identified as a prescribed secondary code in the assessment benchmarks column of a table of assessment for material change of use (section 5.5) or reconfiguring a lot (section 5.6); or
        ii. impact assessable development, to the extent relevant.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—This code does not apply to building work as defined in the Act.

Note—A development application involving a rock anchor within an adjoining site is submitted with proof of consent from an adjoining land and building owner.

Editor's note—Guidance on managing the spread of invasive species in filling or excavation activities is provided in Minimising Pest Spread Advisory Guidelines prepared for the Petroleum industry.

Editor's note—Where filling or excavation is conducted on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register, the relevant Queensland Government department should be contacted for advice and guidelines.

2. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to:

- air quality assessment, guidance is provided in the Air quality planning scheme policy;
- ecological assessment, koala habitat or development design, guidance is provided in the Biodiversity areas planning scheme policy;
- retaining wall construction, guidance is provided in the Infrastructure design planning scheme policy;
- landscape design, guidance is provided in the Landscape design guidelines for water conservation planning scheme policy;
- noise and dust impacts during construction and/or demolition, guidance is provided in the Management plans planning scheme policy;
- noise impact assessment, guidance is provided in the Noise impact assessment planning scheme policy;
- the selection of planting species, guidance is provided in the Planting species planning scheme policy;
- significant vegetation, guidance is provided in the Vegetation planning scheme policy.

Editor's note—For a proposal to be accepted development, subject to compliance with identified requirements, it must meet all the identified acceptable outcomes of this code and any other applicable code. Where it does not meet all identified acceptable outcomes, the proposal becomes assessable development and a development application is required. Where a development application is triggered, only the specific acceptable outcome that the proposal fails to meet needs to be assessed against the corresponding acceptable outcome or performance outcome and relevant overall outcomes. Other identified acceptable outcomes that are met are not assessed as part of the development application.

9.4.3.2 Purpose

1. The purpose of the Filling and excavation code is to assess the suitability of development for filling or excavation.
2. The purpose of the code will be achieved through the following overall outcomes:
    a. filling or excavation does not adversely affect the visual character and amenity of the site or the surrounding area and provides access for maintenance to any structure as a result of filling or excavation.
    b. filling or excavation does not adversely impact significant vegetation, water quality or drainage of upstream, downstream and adjoining land.
    c. filling or excavation effectively manages the impacts associated with the activity.
    d. filling or excavation and any retaining structure is designed and constructed to be fit for purpose and to protect services and utilities.

9.4.3.3 Performance outcomes and acceptable outcomes

Table 9.4.3.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
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.	N/A
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 vegetation is included in the Biodiversity areas planning scheme policy.	**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 of lower wall to face of	N/A

	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.	
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.	To be further explored by an appropriately qualified consultant during detailed design.
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	To be further explored and confirmed by an appropriately qualified consultant during detailed design.

	public utilities meets the standard design specifications of the responsible service authorities.	
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.	To be further explored and confirmed by an appropriately qualified consultant during detailed design.
PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	**AO6** Filling or excavation does not involve the construction of open drainage.	Acceptable outcome. Proposed development does not include the implementation of open drainage.
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.	To be further explored and implemented by an appropriately qualified consultant during detailed design.

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. 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.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site. **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.	To be further explored and implemented by an appropriately qualified consultant during detailed design.
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.	To be further explored and confirmed by an appropriately qualified consultant during detailed design.
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.	To be further explored and confirmed by an appropriately qualified consultant during detailed design.
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**AO11** Development does not involve: a. excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b. filling with material containing a contaminant.	To be further explored and confirmed by an appropriately qualified consultant during detailed design.

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.	To be further explored and implemented by an appropriately qualified consultant during detailed design.
	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.	
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	**AO13** Development does not involve the creation of canals or artificial waterways.	Acceptable outcome. Development does not include the creation of a canal, waterway, or otherwise open conveyance of water.

Table 9.4.3.3.B— Recommended intermittent vibration levels for cosmetic damage

Type of building	**Peak particle velocity (mm/s)**		
Reinforced or framed structures; industrial and heavy commercial buildings	50mm/s at 4Hz and above		
Unreinforced or light-framed structures; residential or light-commercial type buildings	Below 4Hz	4Hz to 15Hz	15Hz and above
	0.6mm/s	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to

			50mm/s at 40Hz and above

Table 9.4.3.3.C— Recommended blasting vibration levels for human comfort

Type of building	Type of blasting operations	Peak component particle velocity (mm/s)
Residences, educational establishments and places of worship	Operation blasting longer than 12 months or more than 20 blasts	5mm/s for 95% blasts per year 10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Residences, educational establishments and places of worship	Operations lasting for less than 12 months or less than 20 blasts	10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Industry or commercial premises	All blasting	25 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that do not adversely affect the equipment operation.

Table 9.4.3.3.D— Recommended levels for continuous and impulsive vibration acceleration (m/s^2) 1–80Hz for human comfort

Location	Assessment period(1)	Preferred values(3)		Maximum values(3)	
Continuous vibration		z-axis	x and y axes	z-axis	x and y axes
Critical areas(2)	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.01 m/s^2	0.0071 m/s^2	0.02 m/s^2	0.014 m/s^2
-	Night	0.007 m/s^2	0.005 m/s^2	0.014 m/s^2	0.01 m/s^2

Offices, educational establishments and places of worship	Day or night	0.02 m/s^2	0.014 m/s^2	0.04 m/s^2	0.028 m/s^2
Workshops	Day or night	0.04 m/s^2	0.029 m/s^2	0.08 m/s^2	0.058 m/s^2
Impulsive vibration					
Critical areas	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.3 m/s^2	0.21 m/s^2	0.6 m/s^2	0.42 m/s^2
-	Night	0.1 m/s^2	0.071 m/s^2	0.2 m/s^2	0.14 m/s^2
Offices, educational establishments and places of worship	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2
Workshops	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2

Note—

(1) Day is 7am to 10pm and night is 10pm to 7am.

(2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(3) Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.

Table 9.4.3.3.E— Recommended vibration dose values for intermittent vibration ($m/s^{1.75}$) for human comfort

Location	**Daytime(1)**		**Night time(1)**	
	Preferred value	**Maximum value**	**Preferred value(3)**	**Maximum value(3)**
Critical areas(2)	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$
Residences	0.2 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.13 $m/s^{1.75}$	0.26 $m/s^{1.75}$
Offices, educational establishments and places of worship	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$

Workshops	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$

Note—

(1) Day is 7am to 10pm and night is 10pm to 7am.

(2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(3) Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.

9.4.4 Infrastructure design code

9.4.4.1 Application

1. This code applies to assessing a material change of use, reconfiguring a lot or building work if:
   a. assessable development where this code is identified as a prescribed secondary code in the assessment benchmarks column of a table of assessment for a material change of use (section 5.5), reconfiguring a lot (section 5.6),operational work (section 5.8), or an overlay (section 5.10); or
   b. impact assessable development, to the extent relevant.
2. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to:

- ecological assessment, koala habitat or development design, guidance is provided in the Biodiversity areas planning scheme policy;
- infrastructure design and construction works, guidance is provided in the Infrastructure design planning scheme policy;
- noise and dust impacts during construction and/or demolition, guidance is provided in the Management plans planning scheme policy;
- noise impact assessment, guidance is provided in the Noise impact assessment planning scheme policy;
- refuse and recycling, guidance is provided in the Refuse planning scheme policy;
- parking or servicing management during construction, guidance is provided in the Transport, access, parking and servicing planning scheme policy.

9.4.4.2 Purpose

1. The purpose of the Infrastructure design code is to assess the suitability of infrastructure for development.
2. The purpose of the code will be achieved through the following overall outcomes:
   a. Development is provided with a safe, connected and efficient transport network for all modes that has a minimal whole-of-life cost.
   b. Development provides for public utilities and services to the standards acceptable to the Council and the reasonable expectations of service providers.
   c. Development involving infrastructure which is intended to become a Council asset is safe, aesthetically pleasing, functional, fit for purpose, durable, minimises environmental impacts and has minimal whole-of-life cost.
   d. Development provides for a public space to be safe and inviting, allowing high levels of pedestrian activity.
   e. Development ensures that the community and environment are not unreasonably disrupted or impacted by construction or demolition for the development.
   f. Development involving infrastructure is designed with consideration of, and to integrate with, other related and interfacing infrastructure components.
   g. Development accessed by common private title is provided with appropriate fire hydrant infrastructure and has unimpeded access for refuse vehicles and for emergency service vehicles to protect people, property and the environment.
   h. Development ensures major electricity infrastructure and bulk water supply infrastructure identified on the State Planning Policy Interactive Mapping System is not compromised.
   i. Development for major electricity infrastructure and bulk water supply infrastructure identified on the State Planning Policy Interactive Mapping System avoids or otherwise minimises adverse impacts on surrounding land uses.

9.4.4.3 Performance outcomes and acceptable outcomes

Table 9.4.4.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
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.	N/A
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;	**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.	N/A

d. allows for reasonable travel comfort.		
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.	N/A
PO4 Development provides verges which are designed and constructed to: a. provide safe access for pedestrians clear of obstructions and access areas for vehicles onto properties; b. provide a sufficient area for public utility services; c. be maintainable by the Council.	**AO4** Development provides verges which are designed and constructed in compliance with the road corridor design and streetscape locality advice standards in the Infrastructure design planning scheme policy.	To be explored at detailed design by a suitably qualified consultant.
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
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;	**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:	To be explored at detailed design by a suitably qualified consultant.

c. safe, high-quality vehicle crossings over channels and verges; d. safe, accessible, high-quality verges compatible and integrated with the surrounding environment; e. safe vehicle access to the site that enables ingress and egress in a forward gear; f. provision of and required alterations to public utilities; g. effective drainage; h. appropriate conduits to facilitate the provision of required street-lighting systems and traffic signals.	a. concrete kerb and channel; 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 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.	**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.	To be further explored at detailed design by a suitably qualified consultant.

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 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.	To be further explored at detailed design by a suitably qualified consultant.
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.	To be further explored at detailed design by a suitably qualified consultant.
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 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**	To be further explored at detailed design by a suitably qualified consultant.

	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.	To be further explored at detailed design y a suitably qualified consultant.
PO12 Development ensures that major public projects promote the provision of affordable, high-bandwidth telecommunications services throughout the city.	**AO12** Development provides conduits which are provided in all major Council and government works projects to enable the future provision of fibre optic cabling, if: a. the additional expense is unlikely to be prohibitive; or b. further major work is unlikely or disruption would be a major concern, such as where there is a limited capacity road; or c. there is a clear gap in the telecommunications network; or d. there is a clear gap in the bandwidth available to the area. Editor's note—An accurate, digital 'as built' three-dimensional location plan is to be supplied for all infrastructure provided in a road.	To be further explored at detailed design y a suitably qualified consultant.
PO13 Development provides public art identified in a neighbourhood plan or park concept plan which:	**AO13** Development provides public art identified in a neighbourhood plan or park concept plan which is sited	To be further explored at detailed design y a suitably qualified consultant.

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; iii. to reflect and respond to the cultural values of the community; iv. to promote local character in a planned and informed manner.	and designed in compliance with the public art standards in the Infrastructure design planning scheme policy.	
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. Editor's note—Signage is to be in accordance with Local Law Number 1 (Control of Advertisements Local Law).	To be further explored at detailed design by a suitably qualified consultant.
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.	N/A
PO16 Development provides public toilets which: a. are required as part of a community facility or park; b. are located, designed and constructed to be: i. safe; ii. durable; iii. resistant to vandalism;	**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

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
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.	**AO18** Development that provides culverts is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	N/A

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.		
PO19 Development provides batters, retaining walls, and seawalls and river walls which are designed and constructed using proven methods, materials and technology to provide for: a. safety; b. an attractive appearance appropriate to the surrounding area; c. easy maintenance; d. minimal whole-of-life cost; e. longevity; 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.	**AO19** Development that provides batters, retaining walls, seawalls and river walls is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	N/A
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. Note—The Transport, access, parking and servicing planning scheme policy provides advice on the management of vehicle parking and deliveries during construction.	**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 wider network are maintained.	To be explored and confirmed at detailed design by a suitably qualified consultant.
PO21 Development ensures that construction and demolition activities are guided by measures that prevent or minimise adverse impacts including sleep disturbance at	**AO21.1** Development ensures that demolition and construction: a. only occur between 6:30am and 6:30pm Monday to Saturday, excluding public holidays;	To be further explored and confirmed at detailed design by a suitably qualified consultant.

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.	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.	
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 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.	**AO22** Development ensures that the nature and scale of construction and demolition do not generate noticeable levels of vibration.	To be further explored and confirmed at detailed design by a suitably qualified consultant.
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. **AO23.2** Fire hydrants are identified by:	To be further explored and confirmed at detailed design by a suitably qualified consultant.

	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.	
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.	N/A
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
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; c. ensure the physical integrity and operation, maintenance and expansion of the infrastructure is not compromised.	**AO26** No acceptable outcome is prescribed.	N/A

Table 9.4.4.3.B—Recommended intermittent vibration levels for cosmetic damage

Type of building	**Peak particle velocity (mm/s)**		
Reinforced or framed structures; industrial and heavy commercial buildings	50mm/s at 4Hz and above		
Unreinforced or light-framed structures; residential or light commercial type buildings	Below 4Hz	4Hz to 15Hz	15Hz and above
	0.6mm/s	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

Table 9.4.4.3.C—Recommended blasting vibration levels for human comfort

Type of building	**Type of blasting operations**	**Peak component particle velocity (mm/s)**
Residences, educational establishments and places of worship	Operation blasting longer than 12 months or more than 20 blasts	5mm/s for 95% blasts per year 10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Residences, educational establishments and places of worship	Operation blasting longer than 12 months or more than 20 blasts	10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Industry or commercial premises	All blasting	25mm/s maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing

		equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that do not adversely affect the equipment operation.

Table 9.4.4.3.D—Recommended levels for continuous and impulsive vibration acceleration (m/s^2) 1–80Hz for human comfort

Location	**Assessment period(1)**	**Preferred values(3)**		**Maximum values(3)**	
Continuous vibration		z-axis	x and y axes	z-axis	x and y axes
Critical areas(2)	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.01 m/s^2	0.0071 m/s^2	0.02 m/s^2	0.014 m/s^2
-	Night	0.007 m/s^2	0.005 m/s^2	0.014 m/s^2	0.01 m/s^2
Offices, educational establishments and places of worship	Day or night	0.02 m/s^2	0.014 m/s^2	0.04 m/s^2	0.028 m/s^2
Workshops	Day or night	0.04 m/s^2	0.029 m/s^2	0.08 m/s^2	0.058 m/s^2
Impulsive vibration					
Critical areas	Day or night	0.005 m/s^2	0.0036 m/s^2	0.01 m/s^2	0.0072 m/s^2
Residences	Day	0.3 m/s^2	0.21 m/s^2	0.6 m/s^2	0.42 m/s^2
-	Night	0.1 m/s^2	0.071 m/s^2	0.2 m/s^2	0.14 m/s^2
Offices, educational establishments and places of worship	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2
Workshops	Day or night	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2

Note—

(1) Day is 7am to 10pm and night is 10pm to 7am.

(2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(3) Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.

Table 9.4.4.3.E—Recommended vibration dose values for intermittent vibration ($m/s^{1.75}$) for human comfort

Location	**Daytime(1)**		**Night time(1)**	
	Preferred value	**Maximum value**	**Preferred value(3)**	**Maximum value(3)**
Critical areas(2)	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$	0.1 $m/s^{1.75}$	0.2 $m/s^{1.75}$
Residences	0.2 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.13 $m/s^{1.75}$	0.26 $m/s^{1.75}$
Offices, educational establishments and places of worship	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$	0.4 $m/s^{1.75}$	0.8 $m/s^{1.75}$
Workshops	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$	0.8 $m/s^{1.75}$	1.6 $m/s^{1.75}$

Note—

(1) Day is 7am to 10pm and night is 10pm to 7am.

(2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(3) Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.

9.4.9 Stormwater code

9.4.9.1 Application

1. This code applies to assessing a material change of use, reconfiguring a lot or operational work if:
   a. assessable development where this code is identified as a prescribed secondary code in the assessment benchmarks column of a table of assessment for a material change of use (section 5.5), reconfiguring a lot (section 5.6) operational work (section 5.8) or an overlay (section 5.10); or
   b. impact assessable development, to the extent relevant.
2. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to infrastructure design and construction works, guidance is provided in the Infrastructure design planning scheme policy.

9.4.9.2 Purpose

1. The purpose of the Stormwater code is to assess the suitability of the stormwater aspects of development.
2. The purpose of the code will be achieved through the following overall outcomes:
   a. Development achieves acceptable levels of stormwater run-off quality and quantity by applying water sensitive urban design principles as part of an integrated stormwater management framework.
   b. Development protects public health and safety and protects against damage or nuisance caused by stormwater flows.
   c. Development has a stormwater management system which maintains, recreates or minimises impact to natural catchment hydrological processes.
   d. Development ensures that the environmental values of the city's waterways are protected or enhanced.
   e. Development minimises run-off, including peak flows.
   f. Development maintains or enhances the efficiency and integrity of the stormwater infrastructure network.
   g. Development minimises the whole of life cycle cost of stormwater infrastructure.

9.4.9.3 Performance outcomes and acceptable outcomes

Table 9.4.9.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
Section A—If for a material change of use, reconfiguring a lot, operational work or building work Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only.		

PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: a. minimise flooding; b. protect environmental values of receiving waters; c. maximise the use of water sensitive urban design; d. minimise safety risk to all persons; e. maximise the use of natural waterway corridors and natural channel design principles. Editor's note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.	**AO1** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	Acceptable Outcome. Refer to ADG Civil Reporting.
PO2 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	**AO2.1** Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises. **AO2.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	Acceptable Outcome. Refer to ADG Civil Reporting.
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**	Acceptable Outcome. Refer to ADG Civil Reporting.

	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.	
PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.	**AO4.1** Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy. **AO4.2** Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.	Acceptable Outcome. Refer to ADG Civil Reporting.
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
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.	N/A

PO7 Development is designed, including any car parking areas and channel works to: a. reduce property damage; b. provide safe access to the site during the defined flood event.	**AO7.1** Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F. Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan). **AO7.2** Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.	N/A
PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.	**AO8.1** Development ensures natural waterway corridors and drainage paths are retained. **AO8.2** Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	N/A
	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.	Acceptable Outcome. Refer to ADG Civil Reporting.
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	**AO10** No acceptable outcome is prescribed.	Acceptable Outcome. Refer to ADG Civil Reporting.
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.	Acceptable Outcome. Refer to ADG Civil Reporting.
PO12 Development provides stormwater infrastructure which: a. remains fit for purpose for the life of the development and maintains full functionality in the design flood event; b. can be safely accessed and maintained cost effectively; c. ensures no structural damage to existing stormwater infrastructure.	**AO12.1** The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy. **AO12.2** Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	Acceptable Outcome. Refer to ADG Civil Reporting.

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.	To be further explored at detailed design by an appropriately qualified consultant.
PO14 Development ensures that: a. unnecessary disturbance to soil, waterways or drainage channels is avoided; b. all soil surfaces remain effectively stabilised against erosion in the short and long term.	**AO14** No acceptable outcome is prescribed.	To be further explored at detailed design by an appropriately qualified consultant.
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.	To be further explored at detailed design by an appropriately qualified consultant.
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*. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	**AO16** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	To be further explored at detailed design by an appropriately qualified consultant.
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.	To be further explored at detailed design by an appropriately qualified consultant.
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 Local government infrastructure plan;	**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 government infrastructure plan;	Acceptable Outcome. Refer to ADG Civil Reporting.

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.	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 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.	**AO19** No acceptable outcome is prescribed.	N/A

Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the *Planning Act 2016*.		

Table 9.4.9.3.B—Categories of flood planning levels

Flooding type(1)	**Minimum design floor or pavement levels (m AHD)(2) (refer to Table 9.4.9.3.C for assignment of these categories)**				
	Category A	**Category B**	**Category C**	**Category D**	**Category E**
Waterway(A) or open channel	1% AEP flood level + 500mm	1% AEP flood level + 300mm	1% AEP flood level	1% AEP flood level	5% AEP flood level
Overland flow flooding(B)	2% AEP flood level +500mm	2% AEP flood level +300mm	2% AEP flood level	2% AEP flood level	5% AEP flood level

Notes—

(1) Where the site is subject to more than one type of flooding that is overland flow flooding, creek or waterway flooding or river flooding, the minimum flood immunity level is the highest level determined from these sources.

(2) Where flood levels are not available from Council's Floodwise Property Report such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note (A) A waterway, including any indicated on the planning scheme maps, is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks, typically with a catchment area greater than 30ha.

Note (B) Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded and/or when the overland flow path is blocked. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 5% is the equivalent of a 20 year ARI flood event.

Note—The flood immunity level in some older inner-city areas is often controlled by local ponding.

Table 9.4.9.3.C—Flood planning level categories for development types

BCA building classification(1)	**Development types and design levels, assigned design floor or pavement levels**	**Category Refer to Table 8.2.11.3.L**

Class 1–4	Habitable room	Category A
	Non-habitable room including patio and courtyard	Category B
	Non-habitable part of a Class 2 or Class 3 building excluding the essential services(2) control room	Category B
	Parking located in the building undercroft of a multiple dwelling	Category C
	Carport(4), unroofed car park; vehicular manoeuvring area	Category D
	Essential electrical services(2) of a Class 2 or Class 3 building only	Category A(6)
	Basement parking entry(3)	Category C + 300mm
Class 5, Class 6, or Class 8	Building floor level	Category C
	Garage or car park located in the building undercroft(3)	Category C
	Carport(4) or unroofed car park	Category D
	Vehicular access and manoeuvring areas	Category D
	Basement parking entry(3)	Category C
	Essential electrical services(2)	Class 8 – Category C(6) Class 5 & 6 – Category A(6)
Class 7a	Refer to the relevant building class specified in this table	
Class 7b	Building floor level	Category C
	Vehicular access and manoeuvring area	Category D
	Essential electrical services(2)	Category C

Class 9	Building floor level	Category A
	Building floor level for habitable rooms in Class 9a or 9c where for a residential care facility	0.2% AEP flood
	Garage or car park located in the building undercroft(3)	Category C
	Carport(4) or unroofed car park	Category D
	Vehicular access and manoeuvring areas	Category D
	Essential electrical services(2)	Category A
Class 10a	Car parking facility	Refer to the relevant building class specified in this table
	Shed(5) or the like	Category D
Class 10b	Swimming pool	Category E
	Associated mechanical and electrical pool equipment	Category C
	Other structures	Flood immunity standard does not apply

Notes—

(1) Refer to the Building Code of Australia for definitions of building classifications.

(2) Essential services include any room used for fire control panel, telephone PABX, sensitive substation equipment including transformers, low voltage switch gear, high-voltage switch gear, battery chargers, protection control and communication equipment, low voltage cables, high-voltage cables and lift controls.

(3) Basement car parks must be suitably waterproofed and all air vents, air-conditioning ducts, pedestrian access and entry and exit ramps at the car park entrance have flood immunity in accordance with this table.

(4) A shelter for a motor vehicle, which has a roof and one or more open sides, and which can be built against the side of a building.

(5) A slight or rough structure built for shelter and storage; or a large strongly built structure, often open at the sides or end.

(6) Where essential services are proposed in a basement below the specified flood planning level, the flood immunity of all air vents, air-conditioning ducts, pedestrian access, lift shafts and entry/exit ramps at the basement entrance and any other openings into that basement must conform to Category A for Residential development, and the relevant basement entry level of all other uses. This will require a waterproof basement design to prevent floodwaters entering the basement to ensure flood immunity.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.

Note—Where a building has a combination of uses that includes a component of class 2, 3 or 9, the essential services for that building shall comply with the requirements of the building class with the greatest flood immunity requirement.

Note—Use classes for residential development also include basement storage.

Table 9.4.9.3.D—Flood planning levels for a new road

Flooding type[1]	**Minimum design levels at the crown of the road (m AHD) [2]**	
	Residential development	**Industrial or commercial development**
Waterway[A] or open channel	1% AEP flood level	2% AEP flood level
Overland flow flooding[B]	2% AEP flood level	2% AEP flood level

Notes—

[1] Where the site is subject to more than 1 type of flooding, the minimum flood planning level is the highest level determined from these sources. It should be noted that the flooding planning level in some older areas is often controlled by local ponding.

[2] Where flood levels are not available from Council's Floodwise Property Report, such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note [A] A waterway including any indicated on the planning scheme maps is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks typically with a catchment area greater than 30ha.

Note [B] Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded and/or when the overland flow path is blocked. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 5% is the equivalent of a 20 year ARI flood event.

Table 9.4.9.3.E—Flood planning levels for essential community infrastructure

Type of essential community infrastructure	**Minimum design levels**
Emergency services	0.2% AEP flood
Emergency services, where for an emergency shelter	0.5% AEP flood
Emergency services, where for police facilities	0.5% AEP flood
Hospital and health care service, where associated with a hospital	0.2% AEP flood

Community facility where involving storage of valuable records or items of historic or cultural significance (e.g. galleries and libraries)	0.5% AEP flood
State-controlled roads Major or minor electricity infrastructure not otherwise listed in this table Utility installation where for rail transport services Air service Telecommunications facility	No specific recommended level but development proponents should ensure that the infrastructure is optimally located and designed to achieve suitable levels of service, having regard to the processes and policies of the administering government agency.
Power stations (as defined in the *Electricity Act 1994*) or renewable energy facility.	0.2% AEP flood
Major electricity infrastructure where a major switch yard	0.2% AEP flood
Substations	0.5% AEP flood
Utility installation where for a sewage treatment plant	DFE
Utility installation where for a water treatment plant	0.5% AEP flood

Note—A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.

Note—A flood event with an AEP of 0.5% is the equivalent of a 200 year ARI flood event.

Table 9.4.9.3.F—Flood planning levels for reconfiguring a lot

Flooding type(1)	**Minimum lot levels (m AHD)(2)**	
	Residential	**Other than residential**
Waterway(A) or open channel	1% AEP flood level + 300mm	1% AEP flood level
Overland flow flooding(B)	1% AEP flood level + 300mm	2% AEP flood level

Notes—

(1) Where the site is subject to more than one type of flooding, the minimum flood immunity level is the highest level determined from these sources.

(2) Where flood levels are not available from Council's Floodwise Property Report such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note (A) A waterway including any indicated on the planning scheme maps is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks typically with a catchment area greater than 30ha.

Note [(B)] Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded or when the overland flow path is blocked. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Appendix D
BCC 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

17 Karakul Road, Hamilton 4007

Postcode

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*

Certifier's signature

Date

/ /

Stock Code no. 262006

Assessment Table

Table 1: Low Risk Test

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

Have you answered 'yes' to any of the questions in Table 1?	*Yes*	*No*	
	✔		**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		✔	**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

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 E
MUSIC Model Information

MUSIC Model Information

Introduction:

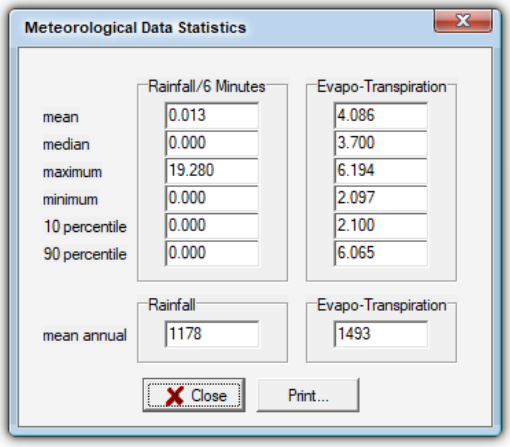
The quality of stormwater runoff and the impact of the proposed stormwater quality improvement measures were analysed using MUSIC Version 6.3.0 according to the MUSIC Modelling Guidelines Version 1.0, Water by Design 2010. A summary of the modelled catchment is presented in the table below.

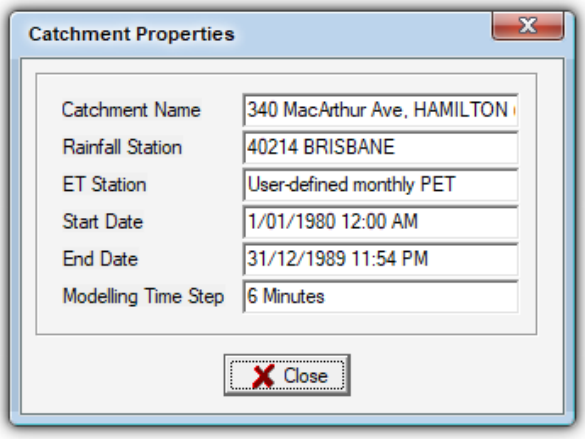
SW Connection #	Catchment I.D	Land Use	Area (m^2)	% Impervious
1	Roof	Residential	3519	100%
	Driveway	Residential	220	100%
	Landscape	Residential	660	50%
2	Roof	Residential	1861	100%
	Landscape	Residential	465	50%
3	Roof	Residential	932	100%
	Landscape	Residential	230	50%

Meteorological Data:

The MUSIC model was carried out using the following parameters:

- The modelling period should be 10 years with a time step of 6 minutes.





- The nearest available 6-minute time step rainfall series to the subject site is Shailer.

Source Nodes – Pollutant Exports:

Pollutant export parameters were assigned as per Table 3.8 of the MUSIC Modelling Guidelines.

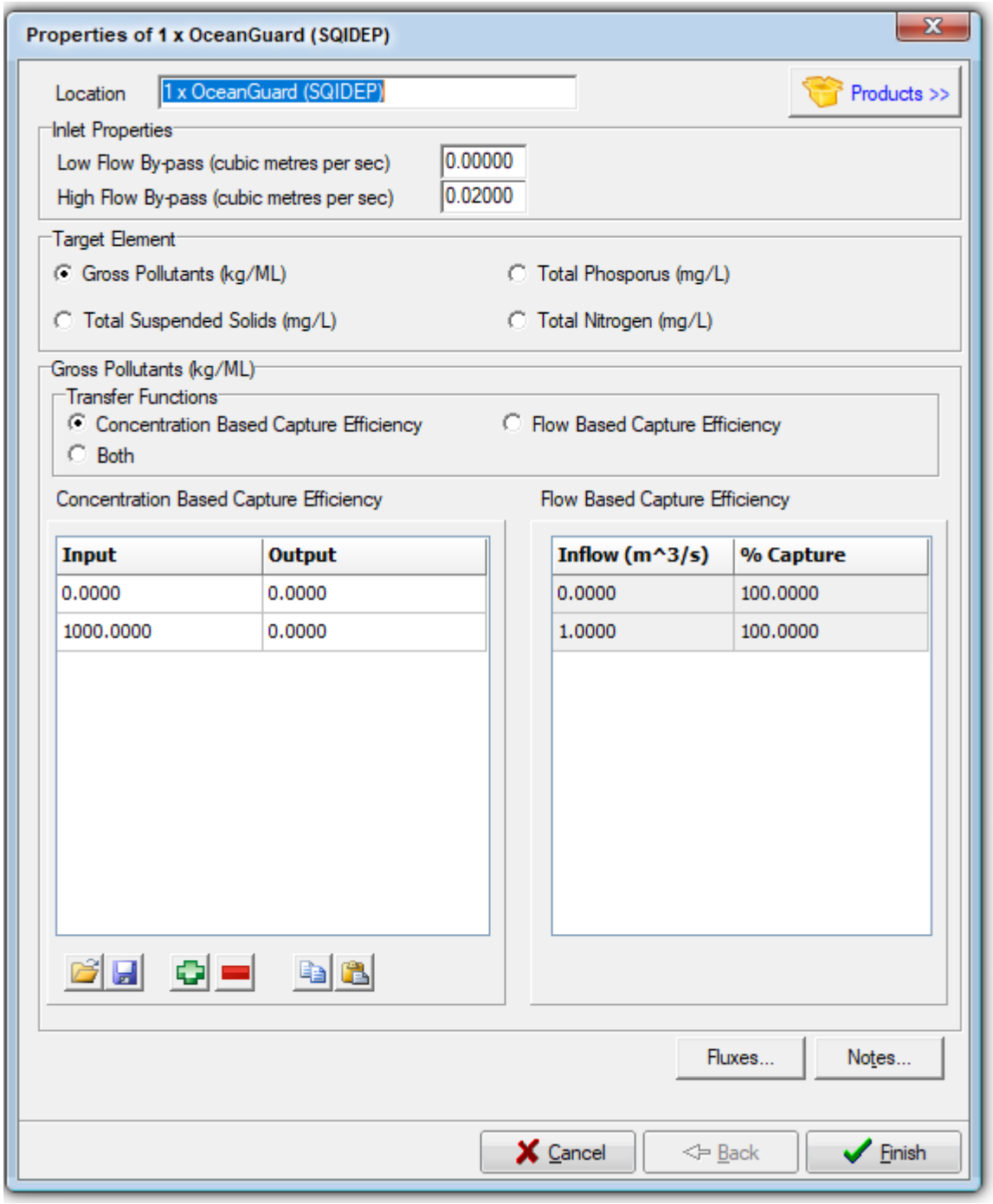
The pollutant exports parameters adopted in the MUSIC model are summarized in the table below.

Table 3.8 Pollutant export parameters for split catchment land use (log^{10} values)

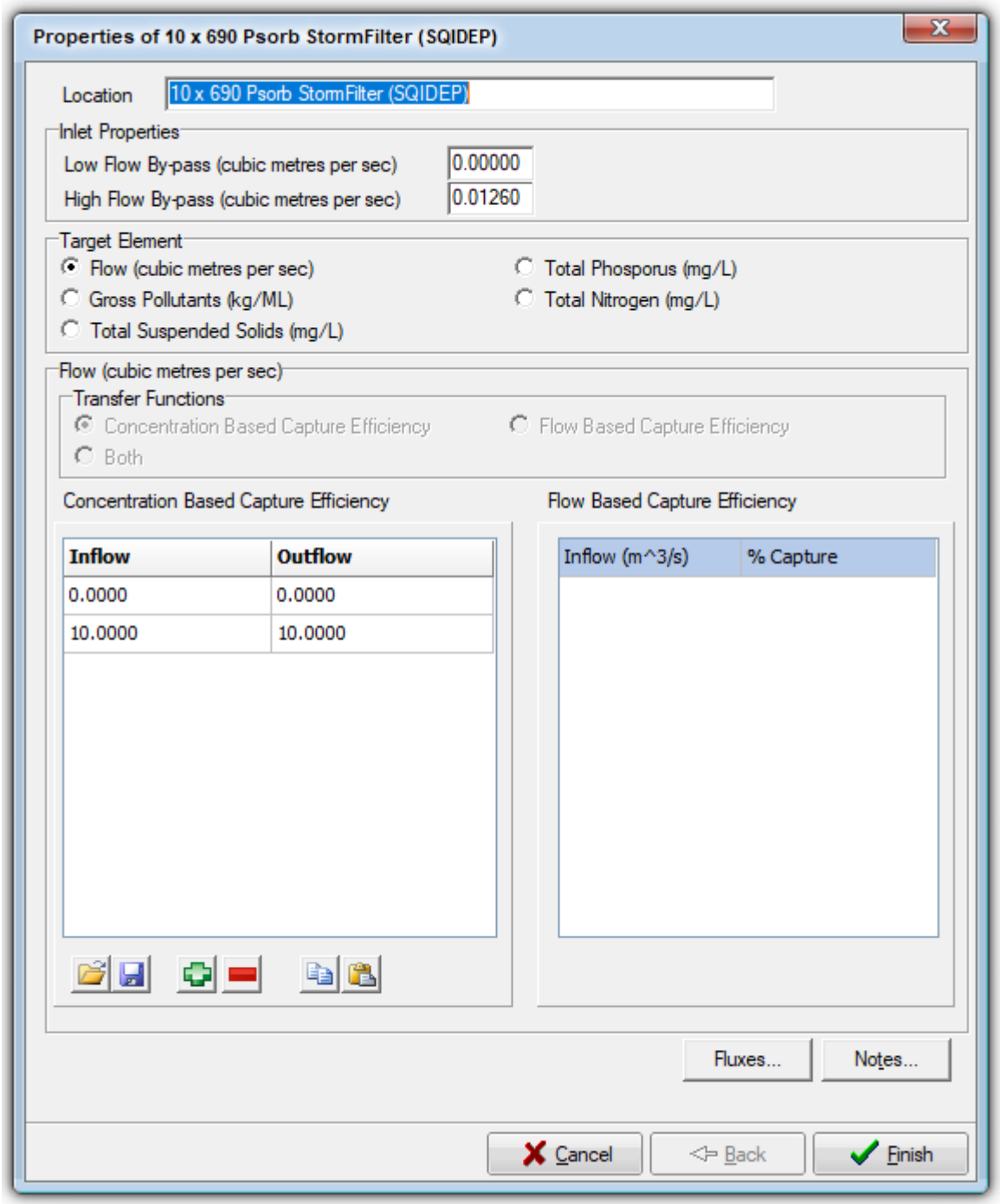
FLOW TYPE	SURFACE TYPE	TSS log^{10} values		TP log^{10} values		TN log^{10} values	
		Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
	Urban residential						
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	1.00	0.34	-0.97	0.31	0.20	0.20
	Ground level	1.00	0.34	-0.97	0.31	0.20	0.20
Stormflow parameters	Roof	1.30	0.39	-0.89	0.31	0.26	0.23
	Roads	2.43	0.39	-0.30	0.31	0.26	0.23
	Ground level	2.18	0.39	-0.47	0.31	0.26	0.23
	Industrial						
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.45	-1.11	0.48	0.14	0.20
	Ground level	0.78	0.45	-1.11	0.48	0.14	0.20
Stormflow parameters	Roof	1.30	0.44	-0.89	0.36	0.25	0.32
	Roads	2.43	0.44	-0.30	0.36	0.25	0.32
	Ground level	1.92	0.44	-0.59	0.36	0.25	0.32
	Commercial						
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.39	-0.60	0.50	0.32	0.30
	Ground level	0.78	0.39	-0.60	0.50	0.32	0.30
Stormflow parameters	Roof	1.30	0.38	-0.89	0.34	0.37	0.34
	Roads	2.43	0.38	-0.30	0.34	0.37	0.34
	Ground level	2.16	0.38	-0.39	0.34	0.37	0.34

Input Parameters:

OceanGuards:



StormFilter:



Appendix F
SQID Maintenance

OCEAN PROTECT

OceanGuard™

Operations & Maintenance Manual

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Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The OceanGuard technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of Filtration liners, designed to remove gross pollutants, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the OceanGuard.

Health and Safety

Access to pits containing an OceanGuard typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard pit insert, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

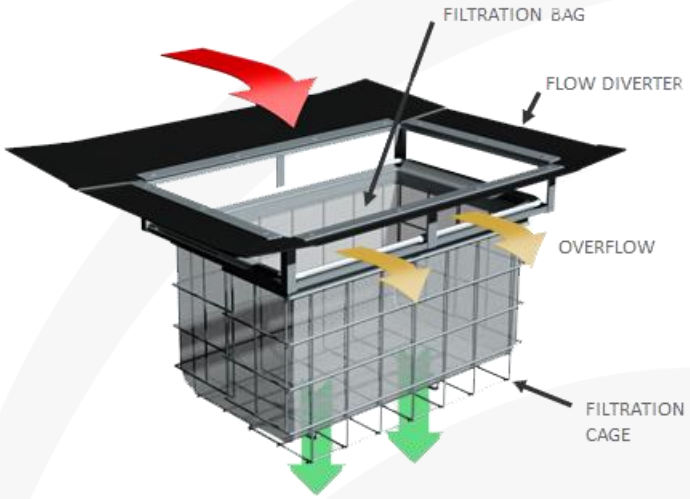
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard pit insert is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it Work?

OceanGuard is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).



During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard Filtration bag dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, pending the outcome of these inspections additional maintenance servicing may be required.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard.

	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	2-4 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard device back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Use two lifting hooks to remove the filtration bag
4. Empty the contents of the filtration bag into a disposal container
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Vacuum captured pollutants from the filtration bag
4. Remove filtration bag
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard system, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components[1]

[1] Replacement filtration bags and components are available for purchase from Ocean Protect.

Additional Reasons of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard pits that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

1. Inspect the OceanGuard flow diverter, ensuring that they are free of debris and pollutants
2. Perform a minor service on the OceanGuard
3. Remove the OceanGuard insert to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard pit insert after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

The accumulated pollutants found in the OceanGuard must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit www.OceanProtect.com.au

OCEAN PROTECT

StormFilter

Operations & Maintenance Manual

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Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.

Health and Safety

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

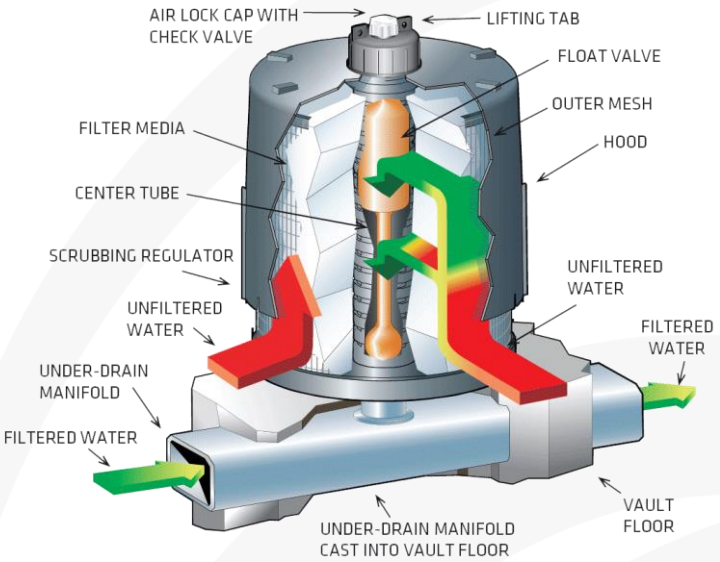
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it Work?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.



As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber
   (if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted[1]	Replace StormFilter cartridge media[2]

[1] Multiple assessment methods are available, contact Ocean Protect for assistance
[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our StormFilter system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement media for cartridges.

For more information please visit www.OceanProtect.com.au

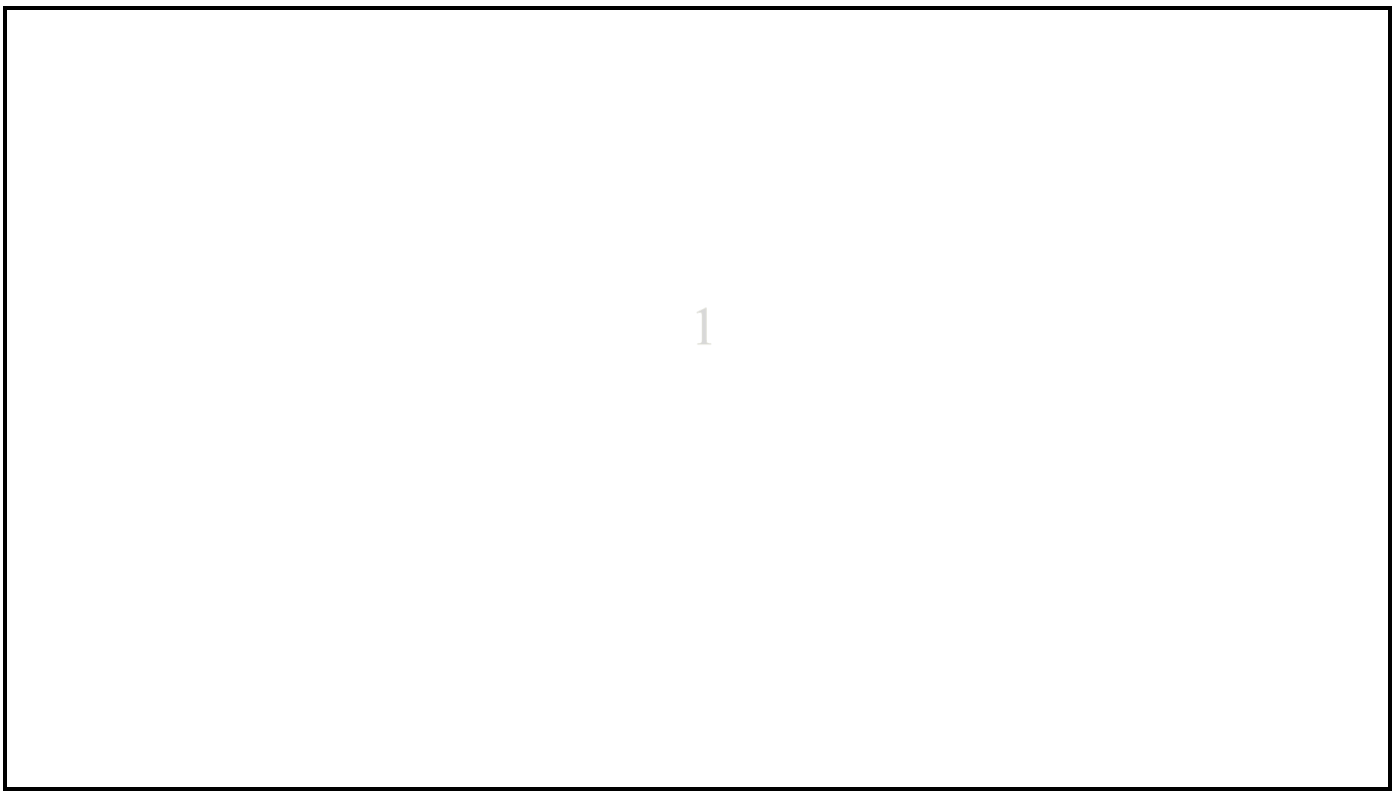
Appendix G
BYDA Information

To:	Chanlyly Chea
Phone:	Not Supplied
Fax:	Not Supplied
Email:	cchea@adgce.com

Dial before you dig Job #:	36548339
Sequence #	238436602
Issue Date:	26/04/2024
Location:	340 Macarthur Av , Hamilton , QLD , 4007

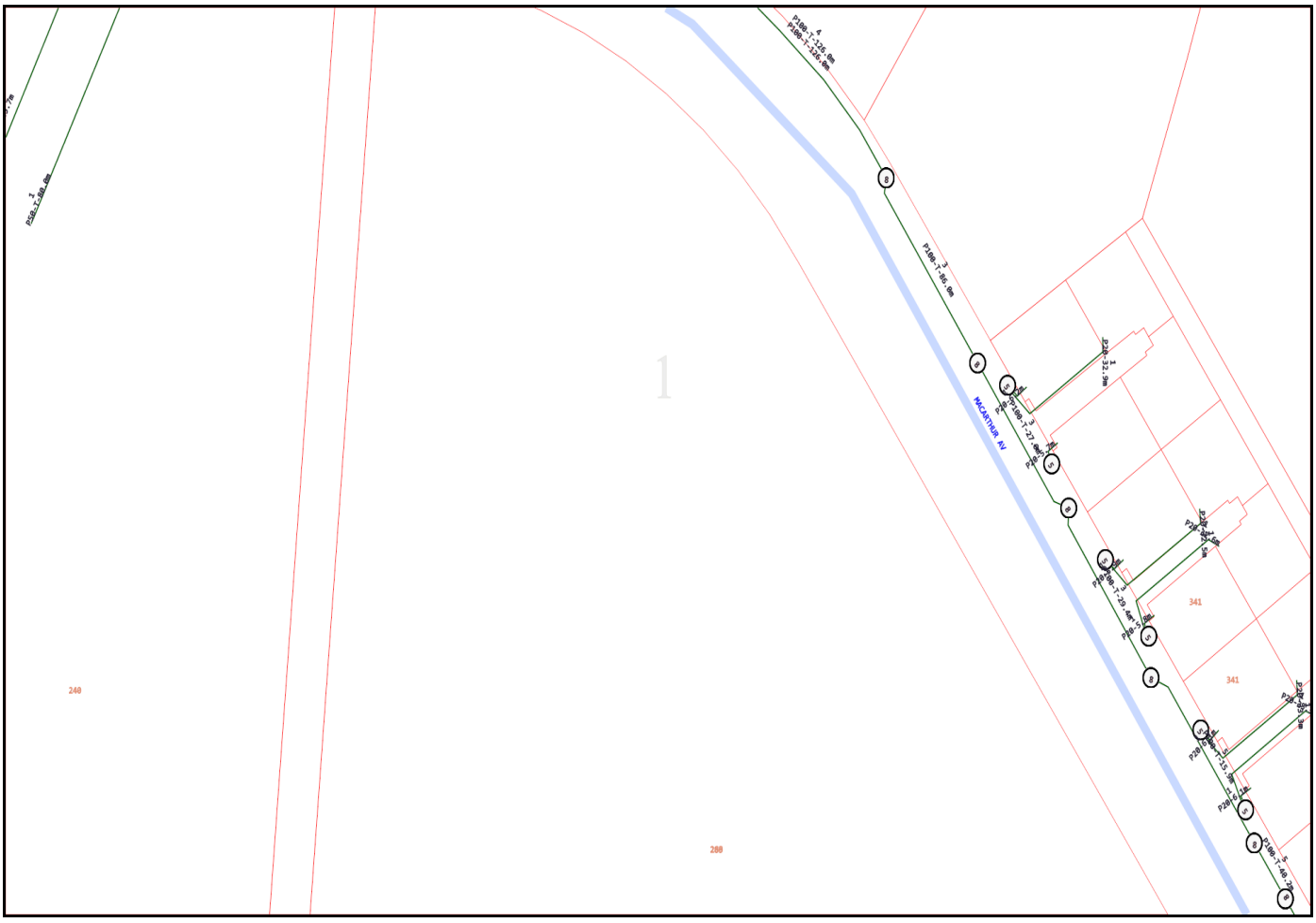
BEFORE YOU DIG www.byda.com.au Zero Damage - Zero Harm

Indicative Plans are tiled below to demonstrate how to layout and read nbn asset plans



LEGEND

34	Parcel and the location
5	Pit with size "5"
2E	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
2 PO – T- 25.0m P40 – 20.0m 5 9	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
2 10.0m 5 9	2 Direct buried cables between pits of sizes ,"5" and "9" are 10.0m apart.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
5 9	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
BROADWAY ST	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m



Emergency Contacts

You must immediately report any damage to the **nbn™** network that you are/become aware of. Notification may be by telephone - 1800 626 329.

APA Group
PO Box 6014 Halifax Street,
South Australia 5000

For your immediate information THERE IS A CRITICAL GAS PIPELINE OR INFRASTRUCTURE (Gas Assets) located in close vicinity to your works.

26/04/2024

Company:
Chanlyly Chea
596 Milton Road
Toowong
QLD 4066

cchea@adgce.com

Dear Chanlyly Chea

Sequence Number: 238436603
Worksite Address: 340 Macarthur Av
Hamilton
QLD 4007

Thank you for your Before You Dig enquiry regarding the location of Gas Assets.

We confirm there are CRITICAL Gas Assets located in close vicinity of the above location. Damage to gas assets may result in explosion, fire and personal injury.

You are hereby notified before you commence any works you are required to complete the Work In The Vicinity Of Critical Gas Assets request form and forward this to APA as soon as practicable.

Any work activity in vicinity of Critical Gas Assets operated by APA requires an **Authority to Work Permit** and may require attendance by an APA Site Watch representative whilst work is in progress. Please ensure you read and comply with all the relevant requirements contained in this response to your enquiry.

Contacts – APA Group	
Enquiry	**Contact Numbers**
General enquiries or feedback regarding this information or gas assets. QLD Only All other States	**APA - Before You Dig Officer** Phone: 1800 085 628 Email: PermitsQld@apa.com.au Phone: 1800 085 628 Email: DBYDNetworksAPA@apa.com.au
Gas Emergencies	Phone: 1800 GAS LEAK (1800 427 532)

Please find below the following information:

1. **Duty of Care** - If you are unclear of your obligations under these requirements please contact the Before You Dig officer for clarification.
2. **An overview map** highlighting the area of your intended works.
3. **Map(s) showing APA operated Gas Assets** within the area of your intended works.
4. **Work In The Vicinity Of Critical Gas Assets request form** - Please complete and forward to APA as soon as practicable via email DBYDNetworksAPA@apa.com.au or PermitsQld@apa.com.au (QLD only), or the address at the top of this document. **A minimum of three (3) business days in advance of any work commencement** is required to process Authority To Work Request applications and provide a response.
5. **Site Watch** – Following consideration of the information received by APA in the Work In The Vicinity Of Critical Gas Assets request form, we may require an APA Site Watch representative to be present on site whilst some or all of the proposed site works are undertaken. Refer information for Site Watch in the Duty of Care section of this document.

Important Information:

- This information is valid for 30 days from the date of this response.
- This information shall be available on site whilst conducting works.
- This information has been generated by an automated system based on the area highlighted in your BYDA request and has not been independently verified. Please check the maps represent the area you requested. If they do not, please contact the APA - Before You Dig officer.
- For some BYDA enquiries, you may receive two (2) responses from APA. Please read both responses carefully as they relate to different assets.

Yours Faithfully,

APA Group

Duty of Care - Working Around Gas Assets

General Conditions

- BYDA enquiries are valid for 30 days. If your works commence after 30 days from the date of this response a new enquiry is required to validate location information.

- The location information supplied in this document shall be used as a guide only. APA does not guarantee the accuracy or completeness of the map and does not make any warranty about the data. APA is not under any liability to the user for any loss or damage (including consequential loss or damage) which the user may suffer resulting from the use of this information or maps.

- It is the responsibility of the excavator to expose all Gas Assets by hand digging**.** Gas Asset depths may vary according to ground conditions.

- Gas (inlet) Services connecting Gas Assets in the street to the gas meter on the property are not marked on the map. South Australia Only - If a meter box is installed on the property, a sketch of the gas service location may be found inside the gas meter box. APA does not guarantee the accuracy or completeness of these sketches.

- Road authorities, council's, and their authorised contractors and agents are responsible to pot-hole or use other suitable methods to verify the location and depth of all gas assets, including Gas (inlet) Services, prior to commencing any works.

- The location and depth of underground mains & services, including those in the road corridor and footpath, may vary in alignment and depth of cover, as a result of changes to road, footpath or surface levels subsequent to installation.

- Some Gas Assets may be installed inside a casing. Locations where a Gas Asset changes from being located within, to being located outside a casing may not be marked on the maps provided.

- The use of hydro-vacuum excavation in vicinity to Gas Assets is permitted under the following conditions:
  - Maximum water pressure of 1000psi unless otherwise advised.
  - A minimum distance of 100mm shall be maintained between the end of the pressure wand nozzle and gas assets.
  - Vertical movements of the pressure wand nozzle or inserting the nozzle in vicinity of the gas asset prohibited
  - The use of root cutting heads is prohibited.

  Where a gas asset has been exposed via hydro-vacuum excavation a visual check must be undertaken to ensure no damage has occurred to the pipe or it's coating. If any damage has occurred notify the APA Before You Dig Officer.

Critical Gas Assets - Conditions

It is your responsibility to follow these important conditions when working in vicinity of Critical Gas Assets

- A Work In The Vicinity Of Critical Gas Assets request form must be submitted to APA Group prior to any work commencing.

- Prior to any works commencing in the vicinity of Critical Gas Assets the person undertaking the work must receive from APA an Authority to work permit.

- The work in the vicinity of Critical Gas Assets will require attendance by an APA Site Watch representative whilst work is in progress unless stated otherwise on the Authority to work permit.

- Penalties apply to excavators commencing work in the vicinity of Critical Gas Assets prior to receiving an APA Group 'Authority to Work' permit and/or if an APA Site Watch representative is not in attendance where required.

Site Watch / Locate Services

Site Watch - A condition of an APA Authority To Work permit is for an APA Site Watch representative be present on site whilst conducting works. The purpose is to monitor works and protect gas assets in the vicinity from potential damage by the works.

Locate – This service is available on request, where an APA representative will visit your work site before work commencement to electronically locate and mark on the ground surface all gas assets in vicinity of the work site.

These services are provided under the following conditions:

- Contact APA - Before You Dig officer to make a booking. Contact details in the table above.
- The following rates are chargeable for these services:

Item	Rate (excl. gst)
Site Watch – Business Hours	$143.42 per hour
Site Watch - After Hours	$175.06 per hour
Electronic Locate – Business Hours	$143.42 per hour
Electronic Locate – After Hours	$175.06 per hour
Cancellation Fee	2 hrs Business Hours rate (where cancellations received after 12pm (midday) 1 business day prior to the booking)
Mains Proving	Quoted on request

Notes:

- 1hr minimum charge applies.
- A Cancellation Fee applies where cancellations are received after 12pm (midday) one(1) business day prior to the booked Site Watch / Locate service
- Contact APA - Before You Dig officer for state specific hours of business.

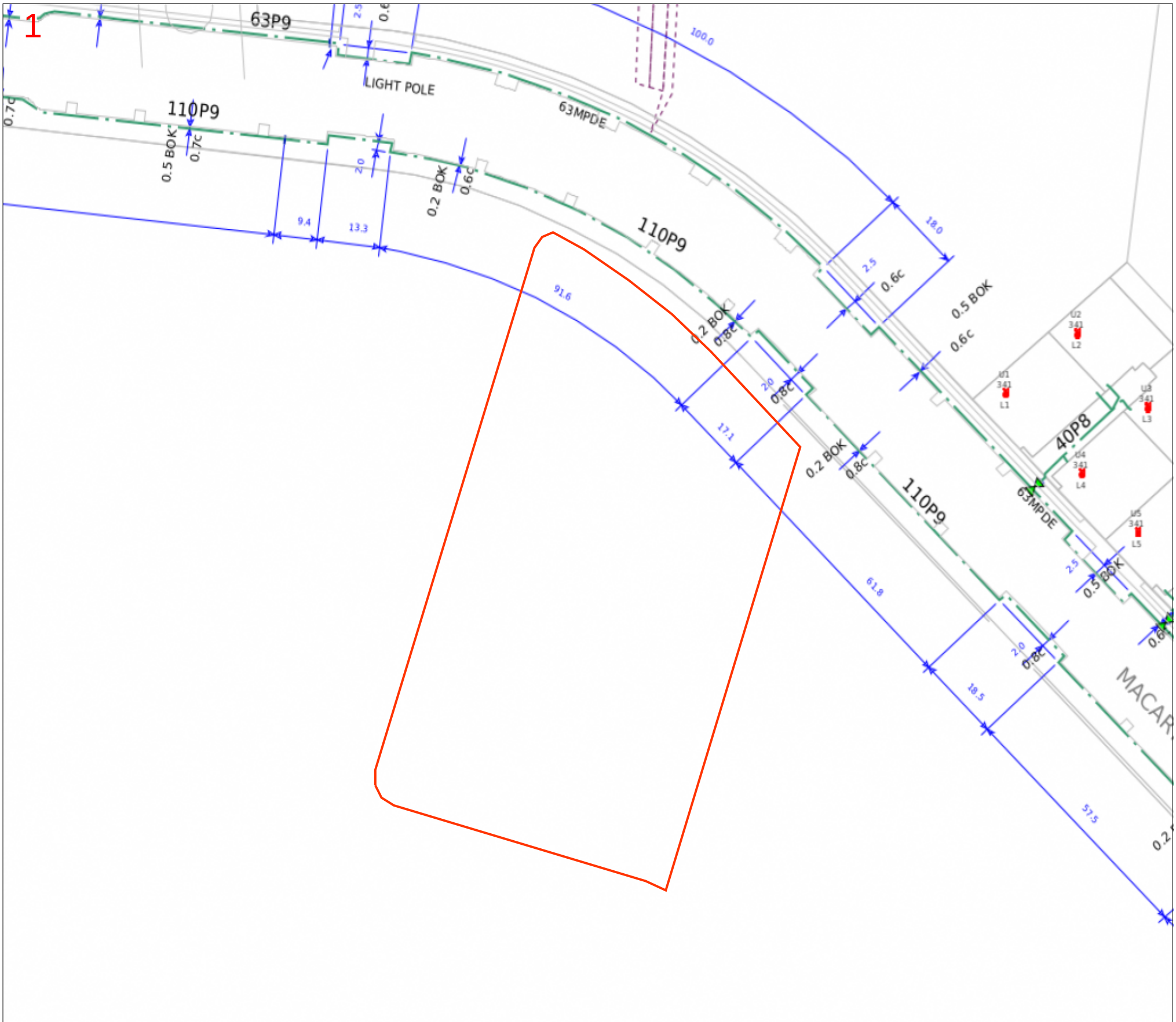
Site Address	340 Macarthur Av Hamilton 4007	**Sequence No**	238436603
Name	Chanlyly Chea		
Email	cchea@adgce.com		

Map Sources: Esri, Garmin, HERE, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Scale 1: 6000	N	Enquiry Area / Map Key Area

Site Address	340 Macarthur Av Hamilton 4007	Sequence No	238436603

Before you commence any works you are required to complete the attached 'Work In The Vicinity Of Critical Gas Assets' request form and forward this to APA as soon as practicable.



LEGEND

PIPE AND BOUNDARIES	PIPE CODE / MATERIALS		OBJECTS or TERMS	
LOW PRESSURES	C# *(e.g. C2)*	Cast Iron	VALVES	
MEDIUM PRESSURES	CU	Copper	BURIED VALVES	
HIGH PRESSURES	N2	Nylon	REGULATORS	
TRANSMISSION PRESSURES	P# *(e.g. P6)*	Polyethylene (PE)	GAS SUPPLIED = YES	
PRIORITY MAIN (BEHIND PIPE)	P6,P7,P9-P12	Medium Density PE	CP RECTIFIER UNIT	
PROPOSED (COLOUR BY PRESSURE)	P2,P4,P8	High Density PE	CP TEST POINT/ ANODE	
LPG (COLOUR BY PRESSURE)	S# *(e.g. S8)*	Steel	SYPHON	
ABANDONED	W2	Wrought Galv. Iron	TRACE WIRE POINT	
IDLE	W3	Poly Coat Wrought Galv. Iron	PIPELINE MARKER	
SLEEVE	*Pipe diameter in millimetres is shown before pipe code* *e.g. 40P6 = 40mm nominal diameter*		NOT TIED IN	N.T.I.
CASING / SPLIT (BEHIND PIPE)			DEPTH OF COVER	C
EASEMENT/ JURISDICTION			BACK / FRONT OF KERB	Bok Fok

EXAMPLES

40P6 in 80C2 — 40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing

63S8 — 63mm Medium Pressure Steel

This map is created in colour and shall be printed in colour

Line / Polygon Request

Map Key

1

Scale 1:700

0 0.009km

N

REQUEST TO WORK IN THE VICINITY OF CRITICAL GAS ASSETS CONDITIONS

It is the proponent's* responsibility to read these conditions and complete the request form

1. **A minimum of three (3) business days** in advance of any work commencement is required to process Authority To Work Request applications and provide a response.
2. This request form must be accompanied by a detailed schedule of works.
3. For any gas leak related work this request form must include a detailed sequence of events, outlining all aspects of work. Work is not permitted to proceed until an APA Authority to Work permit has been issued.
4. When an APA Authority to Work permit is issued, the permit will provide any applicable conditions whilst conducting excavation or work in vicinity of the Gas Assets.
5. APA Group Site Watch may be required to be on site during the proposed excavation or work.
6. When an APA Authority to Work permit is issued, the proponent is responsible for complying with all permit conditions.
7. Where applicable, excavation or work must not commence until the requestor has received an APA Authority to Work Permit.
8. Where applicable, penalties apply to excavators commencing work in the vicinity of Critical Gas Assets prior to receiving an APA Group 'Authority to Work Permit'. For further information, as relevant, refer to:
    - NSW Gas Supply Act 1996 – Sec 64 C, Requirements in relation to carrying out of certain excavation work.
    - NSW Gas Supply Act 1996 Sec 50A, Excavation work affecting gas work.
    - Victoria: Pipelines Act 2005 – Section 118, Digging near pipelines and Section 119, Interference with pipeline.
    - South Australia: Gas Act 1997 – Section 83, Notice of work that may affect gas infrastructure.
    - Northern Territory: Energy Pipelines Act as in force at 14 October 2015 Section 66, Threat to pipeline.
    - QLD: Gas Supply Act 2003 – 90, 91 Requirement to consult if gas infrastructure affected.

** Person or company requesting to undertake works in proximity to critical gas assets.*

WORK IN THE VICINITY OF CRITICAL GAS ASSETS REQUEST FORM

Return this form to: DBYDNetworksAPA@apa.com.au or (QLD only) PermitsQld@apa.com.au

Enquiries: Contact APA Before You Dig officer - 1800 085 628

Work / Excavation Site Details

Number:	Street:
Suburb:	State:
Sequence Number / 238436603 :	
Requestors Name:	
Company Name:	
Name of Authorised Company Site Representative:	
Email:	
Phone:	Mobile:
Signature:	

Description of Work / Excavation

Activity/Excavation Details:			
Tick Applicable			
Excavation		Change to surface level	
Service crossing		Boring	
Proving		Other *(provide details)*	
Earthworks			
Excavator Size, Tooth Type & Tooth Size *(provide details)*			

Work / Excavation Drawings Attached (circle) Yes No

Proposed Work Dates and Times

From			To	
Excavation	**Date**	**Time**	**Date**	**Time**
	/ /	am/pm	/ /	am/pm
Backfill	**Date**	**Time**	**Date**	**Time**
	/ /	am/pm	/ /	am/pm

Work Classification Self-Assessment (circle)

Class 1		**Class 2**		**Class 3**	
Works crossing a critical gas asset		Works within 3m of a critical gas asset		Works involving large excavations, vibrations or blasting beyond 3m of the critical gas asset	

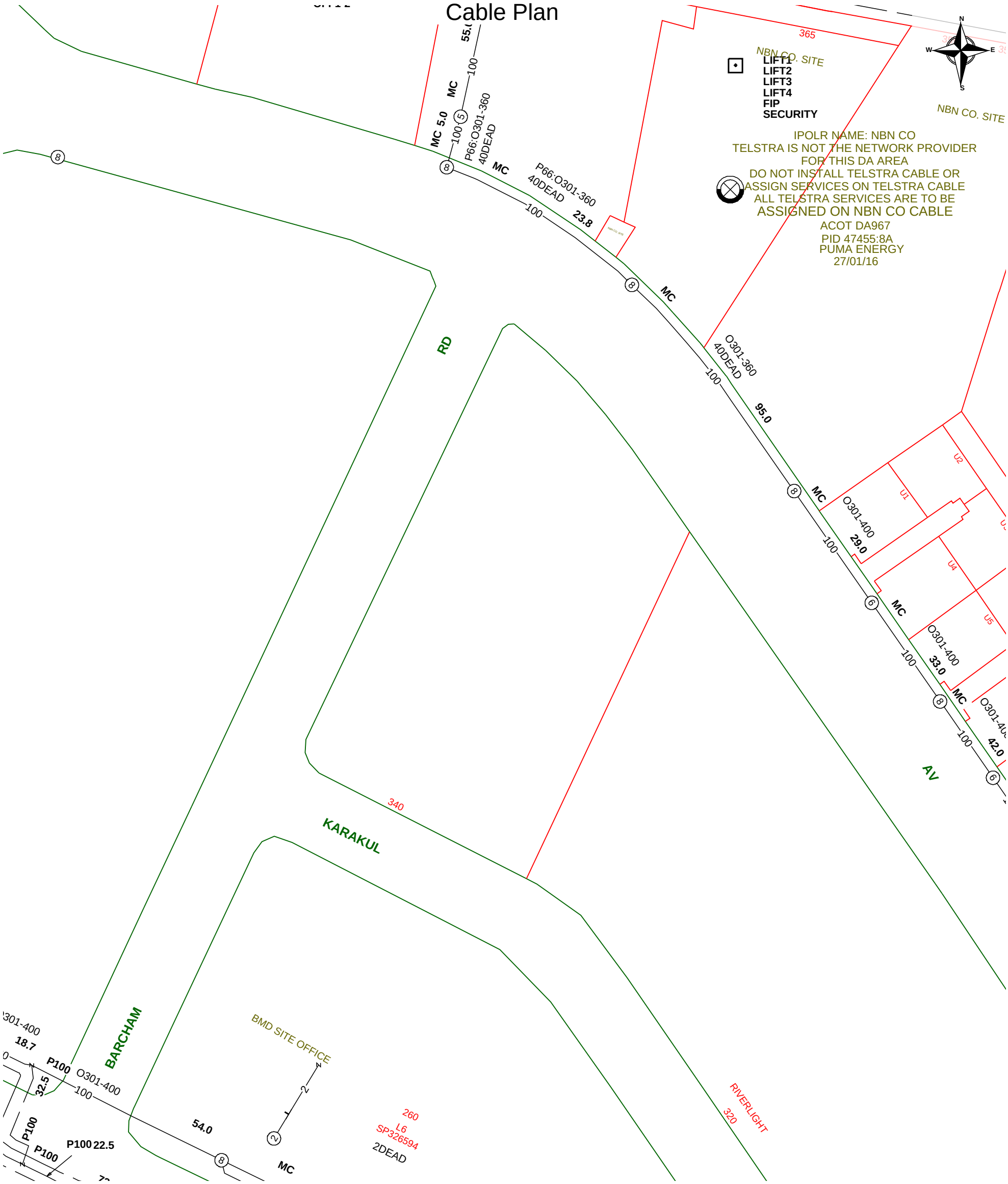
Insurer and Policy Details

Policy Number		**Policy Expiry Date**	
Insurance Cover – Current Level ($)			

*Requestor / Billing Details – Mandatory Information

Company / Requestor Name:	
Address:	
Purchase Order:	Email:
Phone:	
Requestor Name:	Requestor Signature:

Cable Plan



Report Damage: https://service.telstra.com.au/customer/general/forms/report-damage-to-telstra-equipment
Ph - 13 22 03
Email - Telstra.Plans@team.telstra.com
Planned Services - ph 1800 653 935 (AEST bus hrs only) General Enquiries

TELSTRA LIMITED A.C.N. 086 174 781

Generated On 26/04/2024 10:54:13

Sequence Number: 238436604

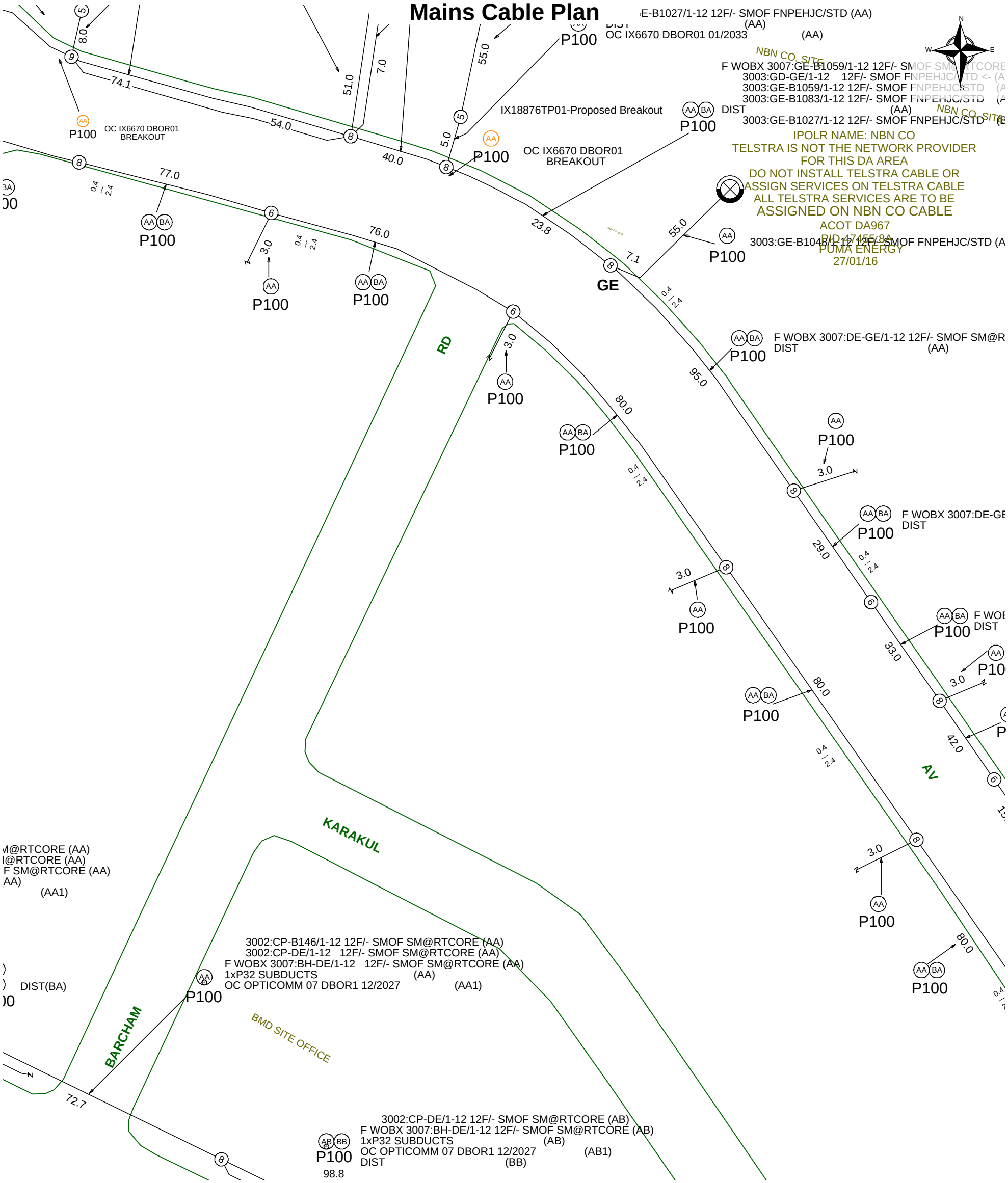
CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

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

WARNING
Telstra plans and location information conform to Quality Level "D" of the Australian Standard AS 5488-Classification of Subsurface Utility Information.
As such,Telstra supplied location information is indicative only.Spatial accuracy is not applicable to Quality Level D.
Refer to AS 5488 for further details. The exact position of Telstra assets can only be validated by physically exposing it.
Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy.
Further on site investigation is required to validate the exact location of Telstra plant prior to commencing construction work.
A Certified Locating Organisation is an essential part of the process to validate the exact location of Telstra assets and to ensure the asset is protected during construction works.

See the Steps- Telstra Duty of Care that was provided in the email response.

Mains Cable Plan



Report Damage: https://service.telstra.com.au/customer/general/forms/report-damage-to-telstra-equipment
Ph - 13 22 03
Email - Telstra.Plans@team.telstra.com
Planned Services - ph 1800 653 935 (AEST bus hrs only) General Enquiries

TELSTRA LIMITED A.C.N. 086 174 781

Generated On 26/04/2024 10:54:15

Sequence Number: 238436604

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

WARNING
Telstra plans and location information conform to Quality Level "D" of the Australian Standard AS 5488-Classification of Subsurface Utility Information.
As such,Telstra supplied location information is indicative only.Spatial accuracy is not applicable to Quality Level D.
Refer to AS 5488 for further details. The exact position of Telstra assets can only be validated by physically exposing it.
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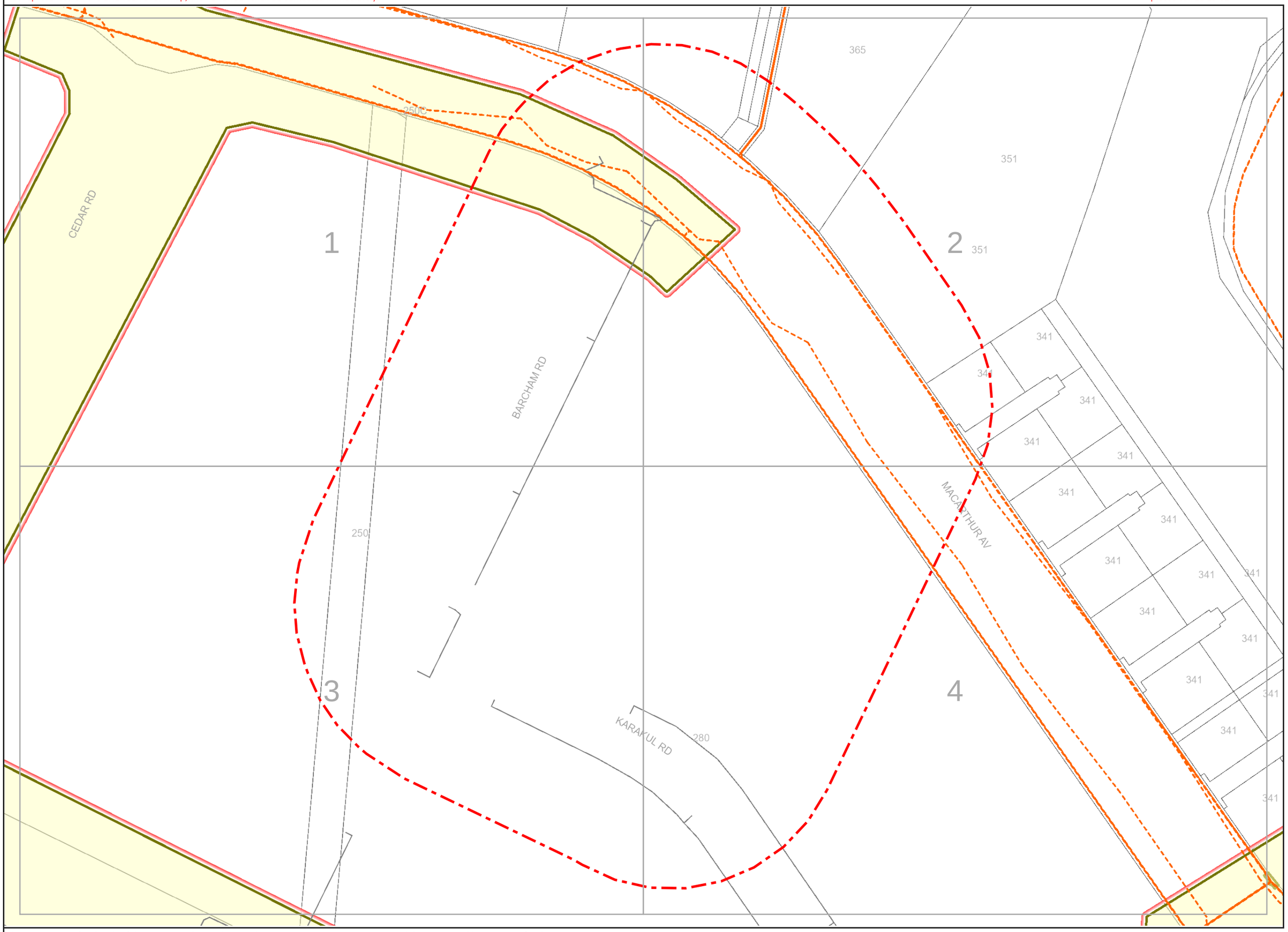
Further on site investigation is required to validate the exact location of Telstra plant prior to commencing construction work.
A Certified Locating Organisation is an essential part of the process to validate the exact location of Telstra assets and to ensure the asset is protected during construction works.

See the Steps- Telstra Duty of Care that was provided in the email response.

All underground cables shall be treated as being energised. Where a cable is located that is not represented on the ENERGEX BYDA map, then ENERGEX shall be contacted immediately.

For Emergency Situations please call 13 19 62



This output provides details of the ENERGEX electrical network. As variations map exist no responsibility is incurred by ENERGEX for the accuracy or completeness of the information provided. Exact positions of cables and electrical connectivity should be confirmed on site.

BYDA

Sequence: 238436606
Date: 26/04/2024

Scale: 1:1025
OVERVIEW

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

AS5488 Category “D” Plan

N
W E
S

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Energex nor PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

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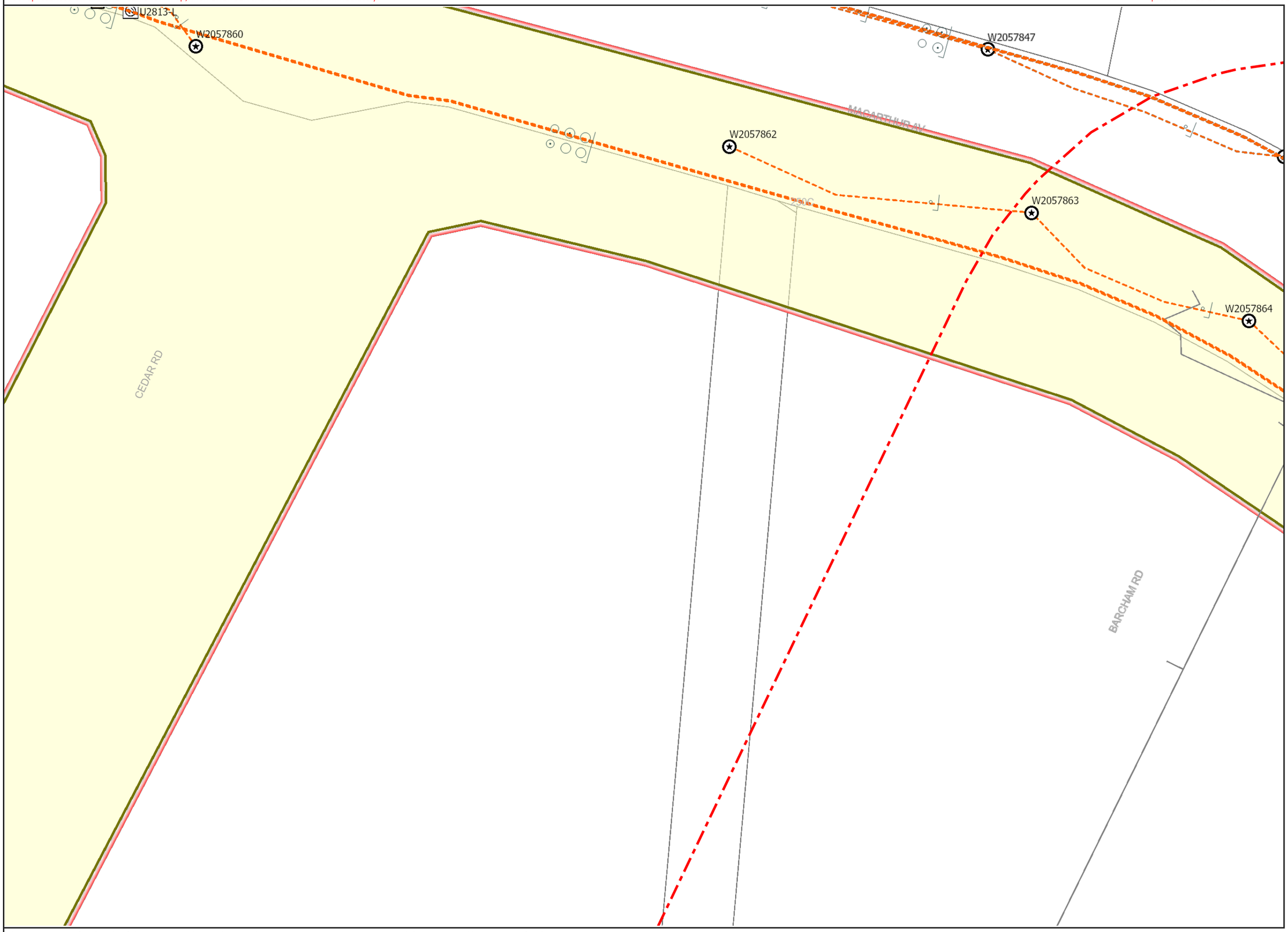

energex

BYDA

Sequence: 238436606
Date: 26/04/2024

Scale: 1:500
Tile No: 1

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

AS5488 Category "D" Plan

N
W E
S

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This output provides details of the ENERGEX electrical network. As variations map exist no responsibility is incurred by ENERGEX for the accuracy or completeness of the information provided. Exact positions of cables and electrical connectivity should be confirmed on site.

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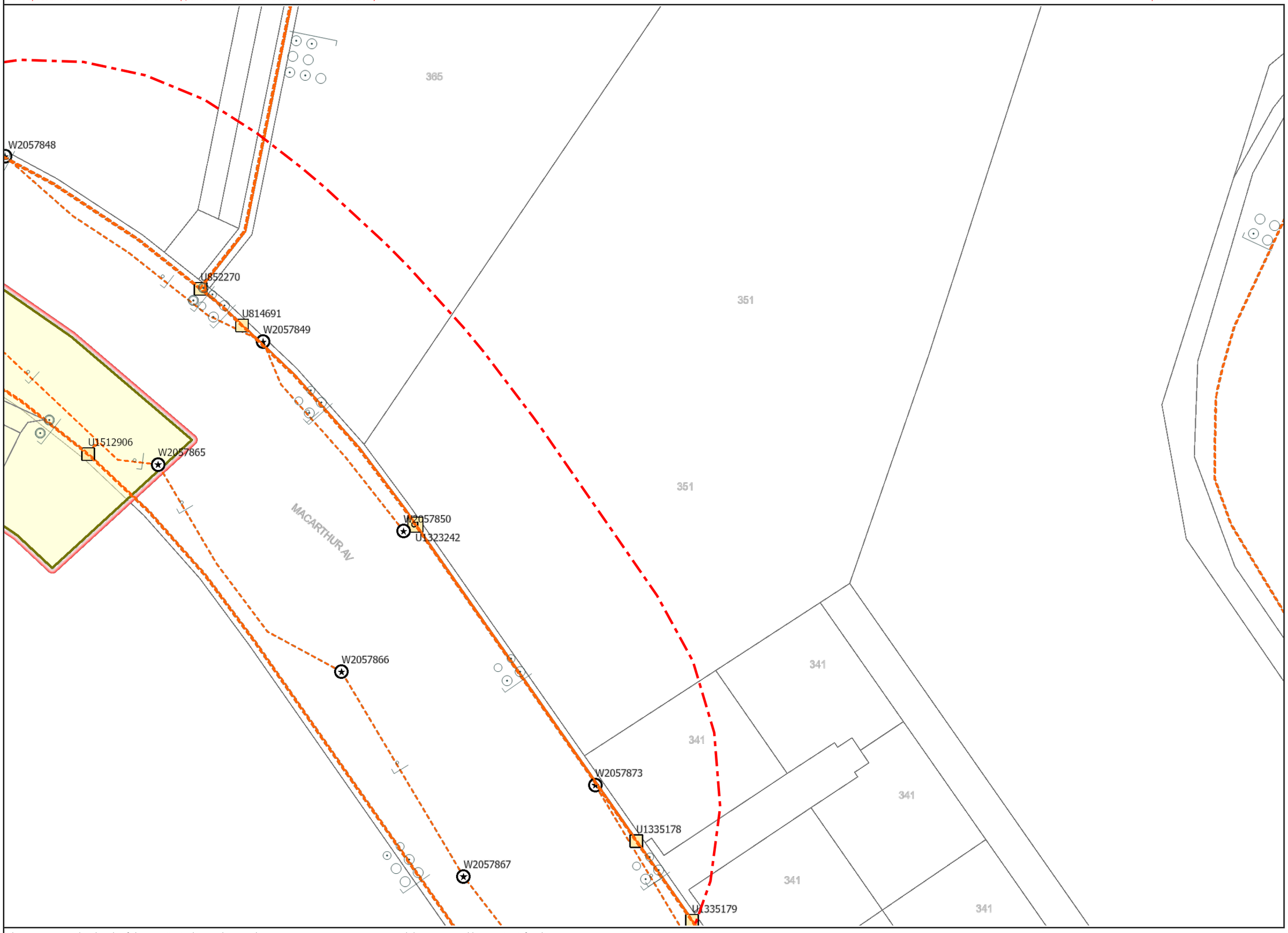

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energex

BYDA

Sequence: 238436606
Date: 26/04/2024

Scale: 1:500
Tile No: 2

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

AS5488 Category "D" Plan

N
W E
S

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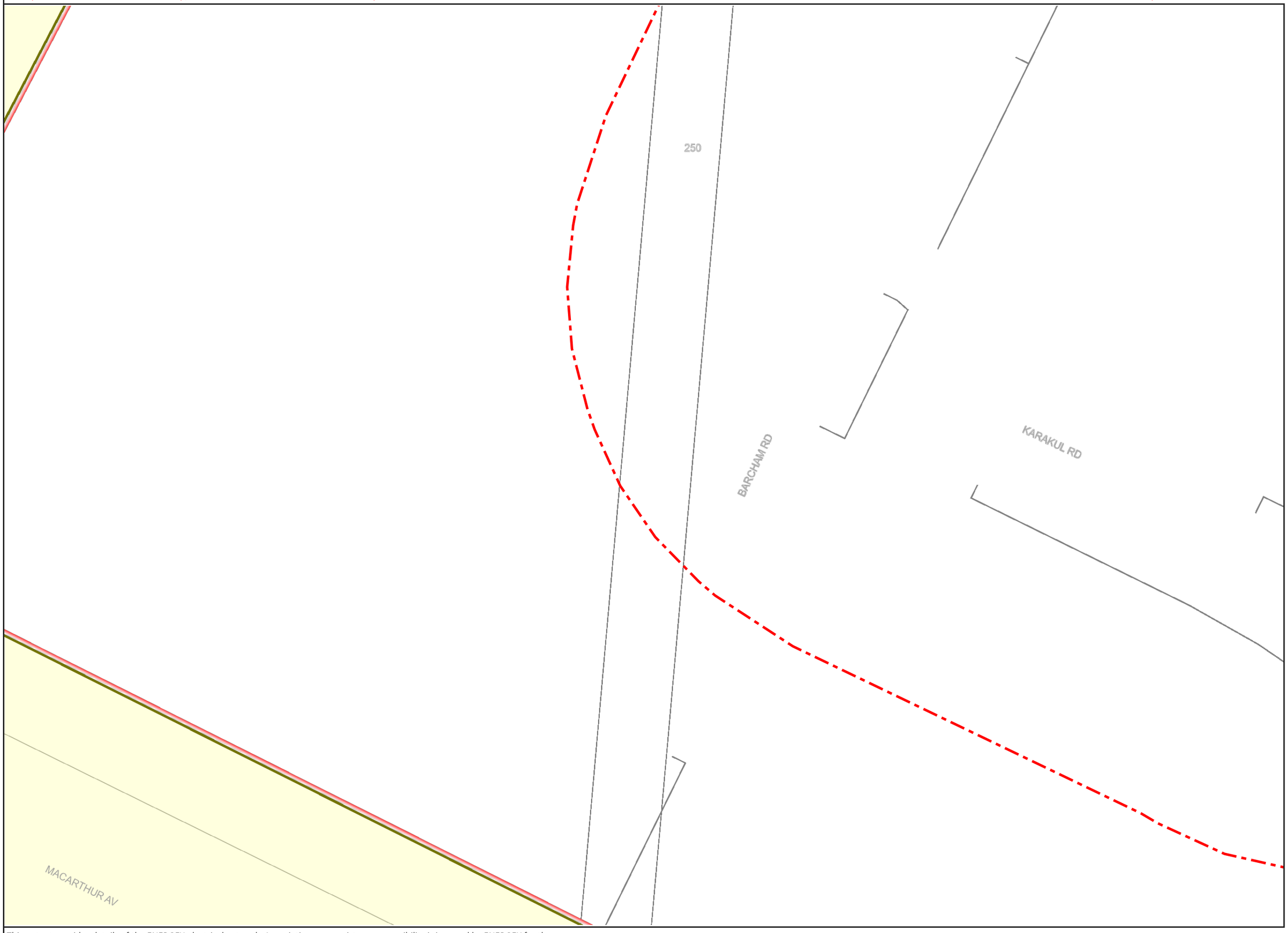

energex

BYDA

Sequence: 238436606
Date: 26/04/2024

Scale: 1:500
Tile No: 3

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

AS5488 Category "D" Plan

N
W E
S

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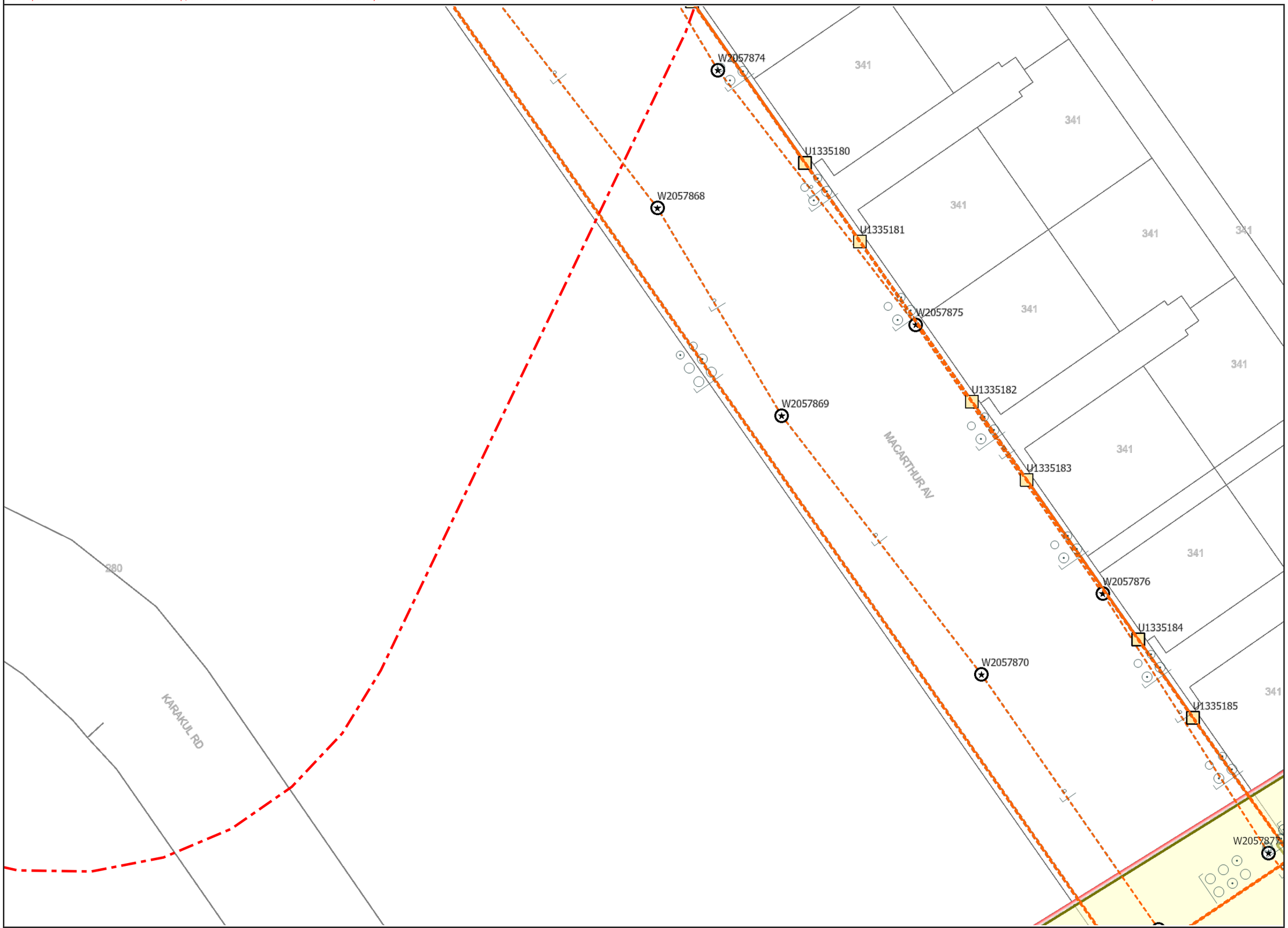
For Emergency Situations please call 13 19 62



This output provides details of the ENERGEX electrical network. As variations map exist no responsibility is incurred by ENERGEX for the accuracy or completeness of the information provided. Exact positions of cables and electrical connectivity should be confirmed on site.

BYDA

Sequence: 238436606
Date: 26/04/2024

Scale: 1:500
Tile No: 4

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

AS5488 Category "D" Plan

N
W E
S

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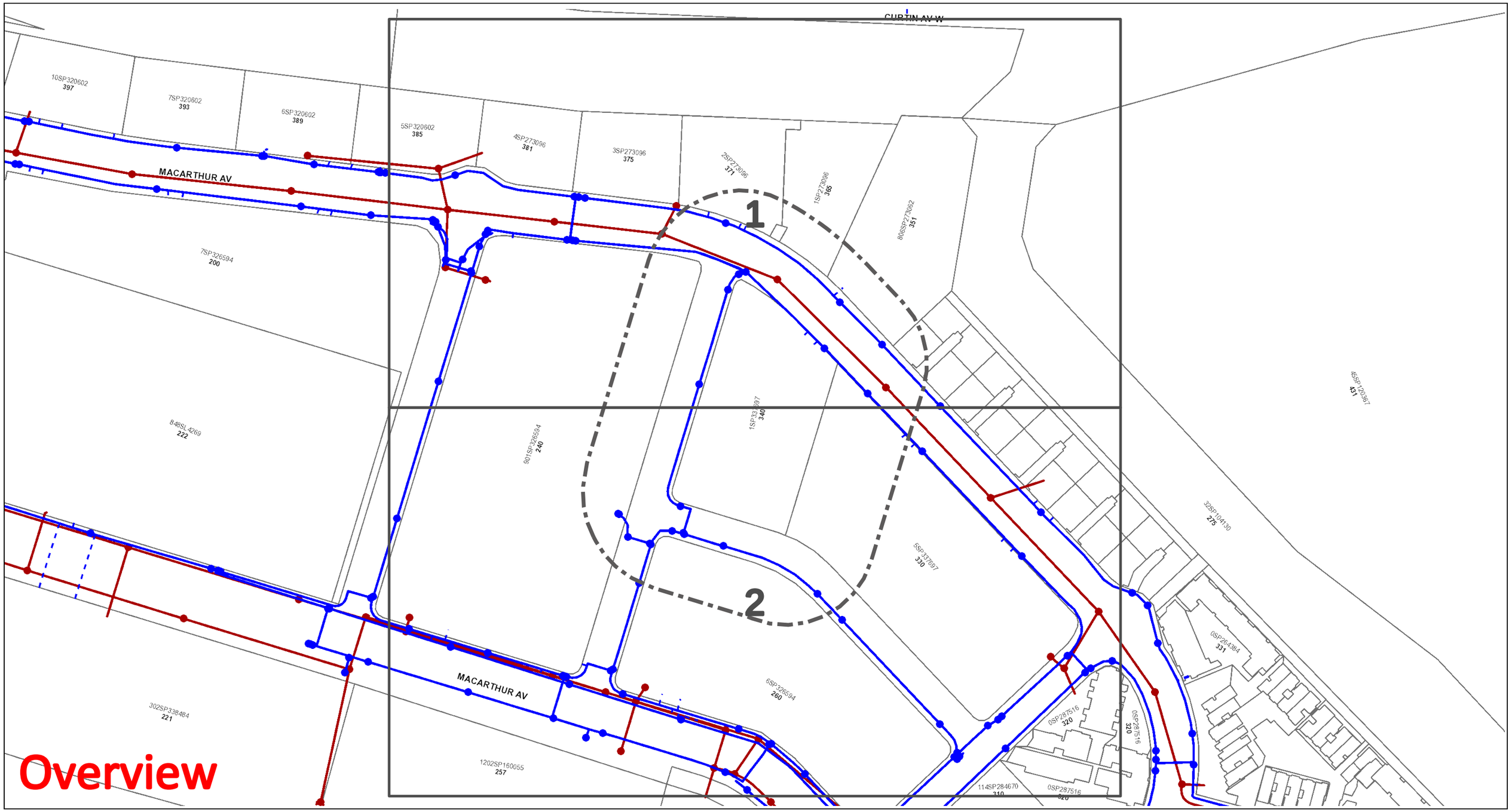
Urban Utilities - Water, Recycled Water and Sewer Infrastructure



Overview

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

BYDA Reference No: **238436607**

Date BYDA Ref Received: 26/04/2024

Date BYDA Job to Commence: 30/04/2024

Date BYDA Map Produced: 26/04/2024

This Map is valid for 30 days Produced By: Urban Utilities

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

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

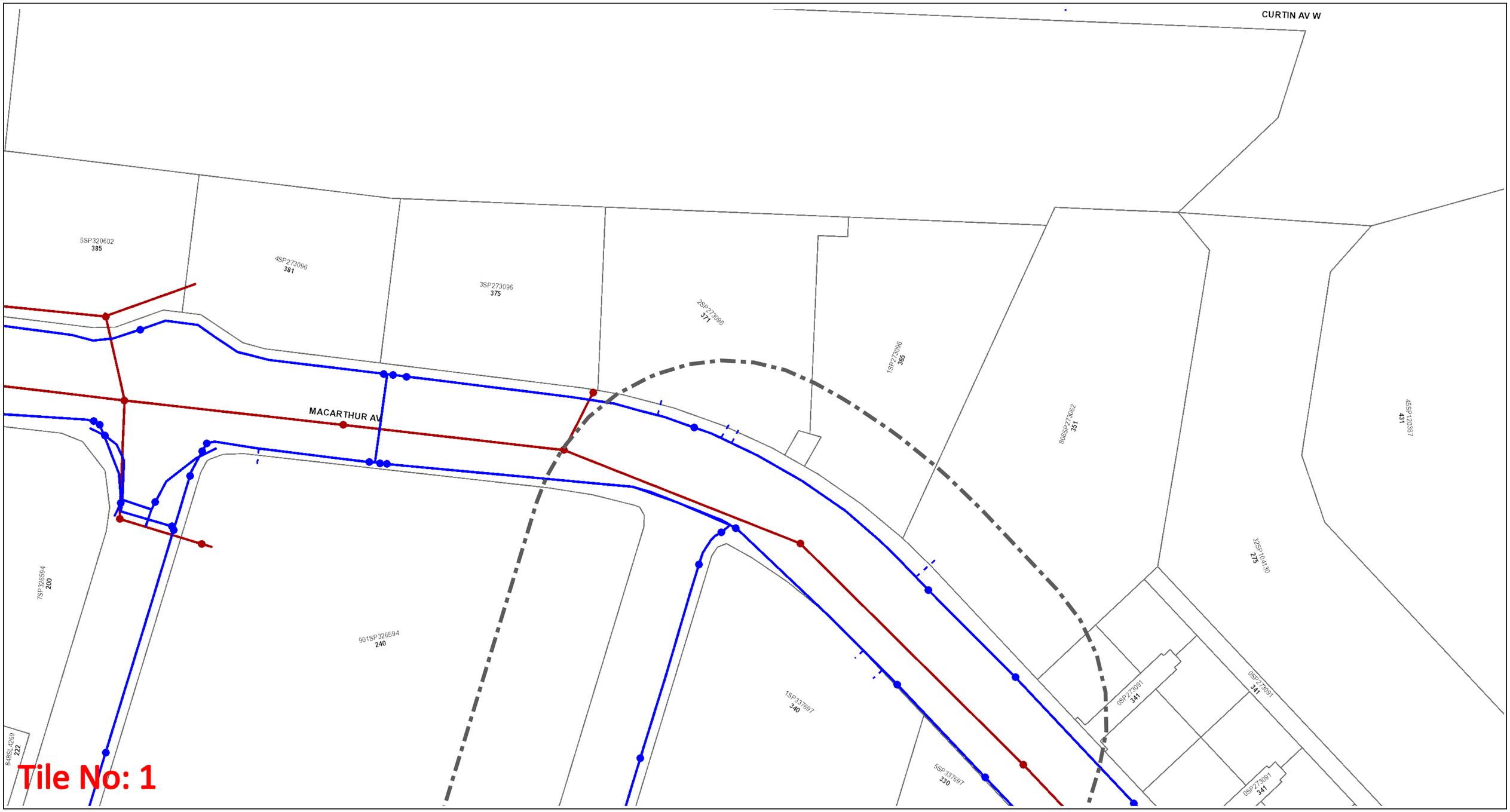
N

Map Scale 1:2050

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

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

Urban Utilities - Water, Recycled Water and Sewer Infrastructure



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

BYDA Reference No: **238436607**

Date BYDA Ref Received: 26/04/2024

Date BYDA Job to Commence: 30/04/2024

Date BYDA Map Produced: 26/04/2024

This Map is valid for 30 days Produced By: Urban Utilities

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

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

N

Map Scale 1:1000

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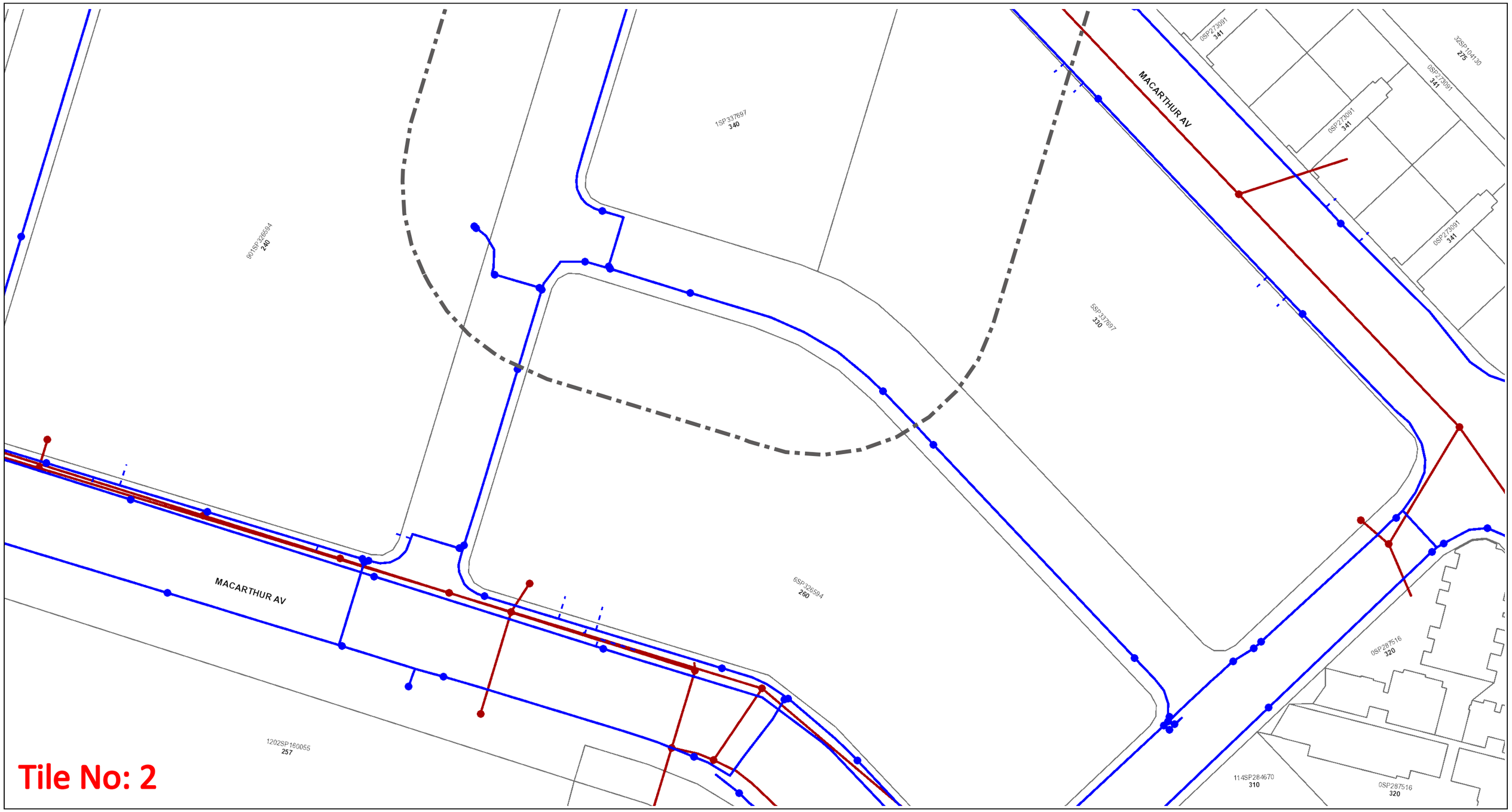
www.urbanutilities.com.au ABN 86 673 835 011

Urban Utilities - Water, Recycled Water and Sewer Infrastructure



Tile No: 2

UrbanUtilities

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

BYDA Reference No: **238436607**

Date BYDA Ref Received: 26/04/2024

Date BYDA Job to Commence: 30/04/2024

Date BYDA Map Produced: 26/04/2024

This Map is valid for 30 days Produced By: Urban Utilities

Sewer

- Infrastructure
- Major Infrastructure
- Network Pipelines
- Network Structures

Water

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

N

Map Scale
1:1000

Job # 36548339
Seq # 238436605
Provider: Brisbane City Council
Telephone: 07 3403 8888

Legend

BYDA Enquiry

Detailed map page

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

In an emergency contact Brisbane City Council on 07 3403 8888

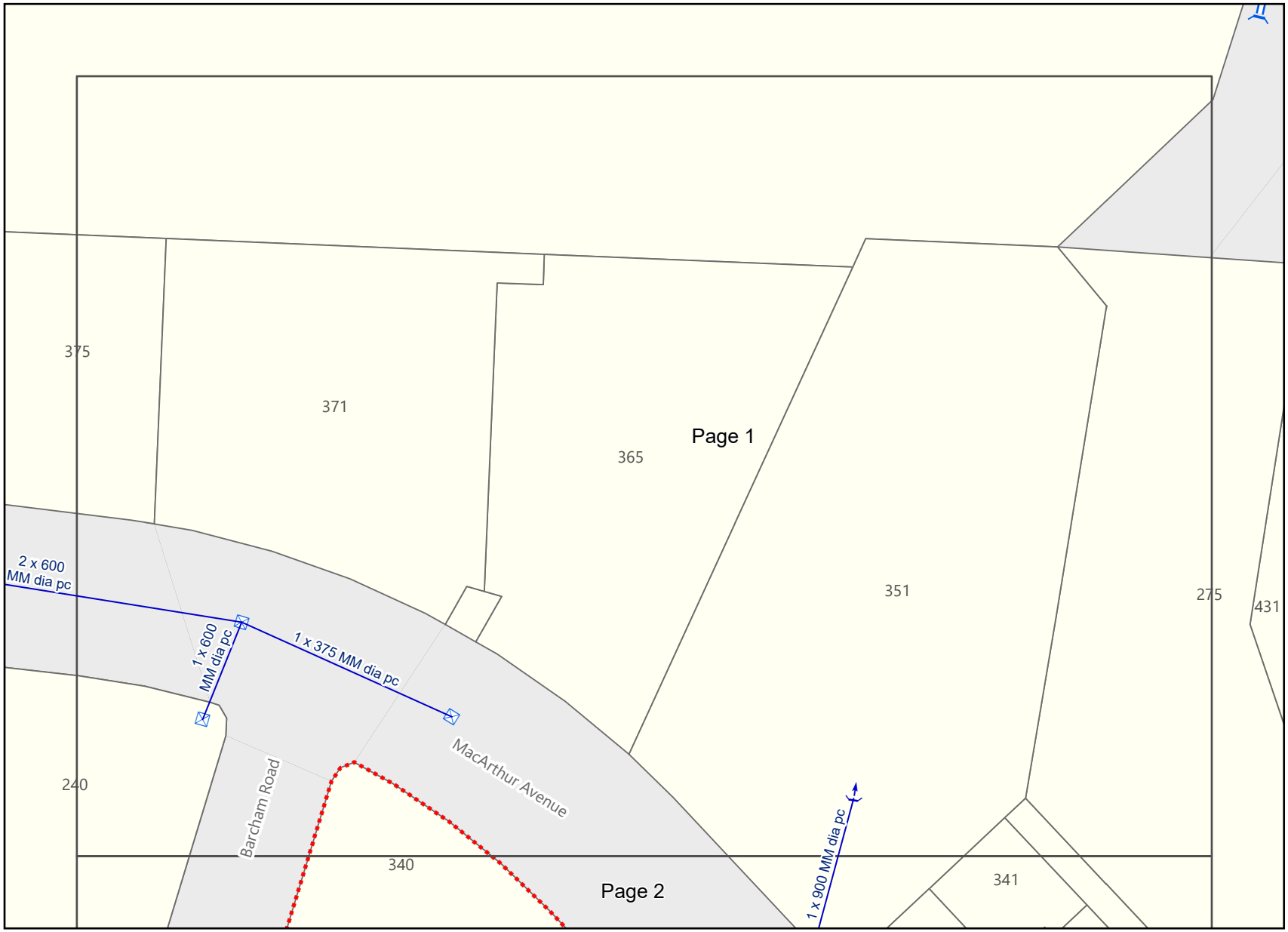
Index Sheet

0 25 50 100 m

Scale 1:2,500

Plans generated by SmarterWX™ Automate

Job # 36548339
Seq # 238436605
Provider: Brisbane City Council
Telephone: 07 3403 8888



Legend

BYDA Enquiry

Stormwater Network

- Stormwater Gully / Roofwater Connection
- Stormwater Field Inlet
- Stormwater Culvert
- Pipe End Outlet

In an emergency contact Brisbane City Council on 07 3403 8888
26/04/24 (valid for 30 days)

0 10 20 40 m

Scale 1:1,000

Plans generated by SmarterWX™ Automate

Job # 36548339
Seq # 238436605
Provider: Brisbane City Council
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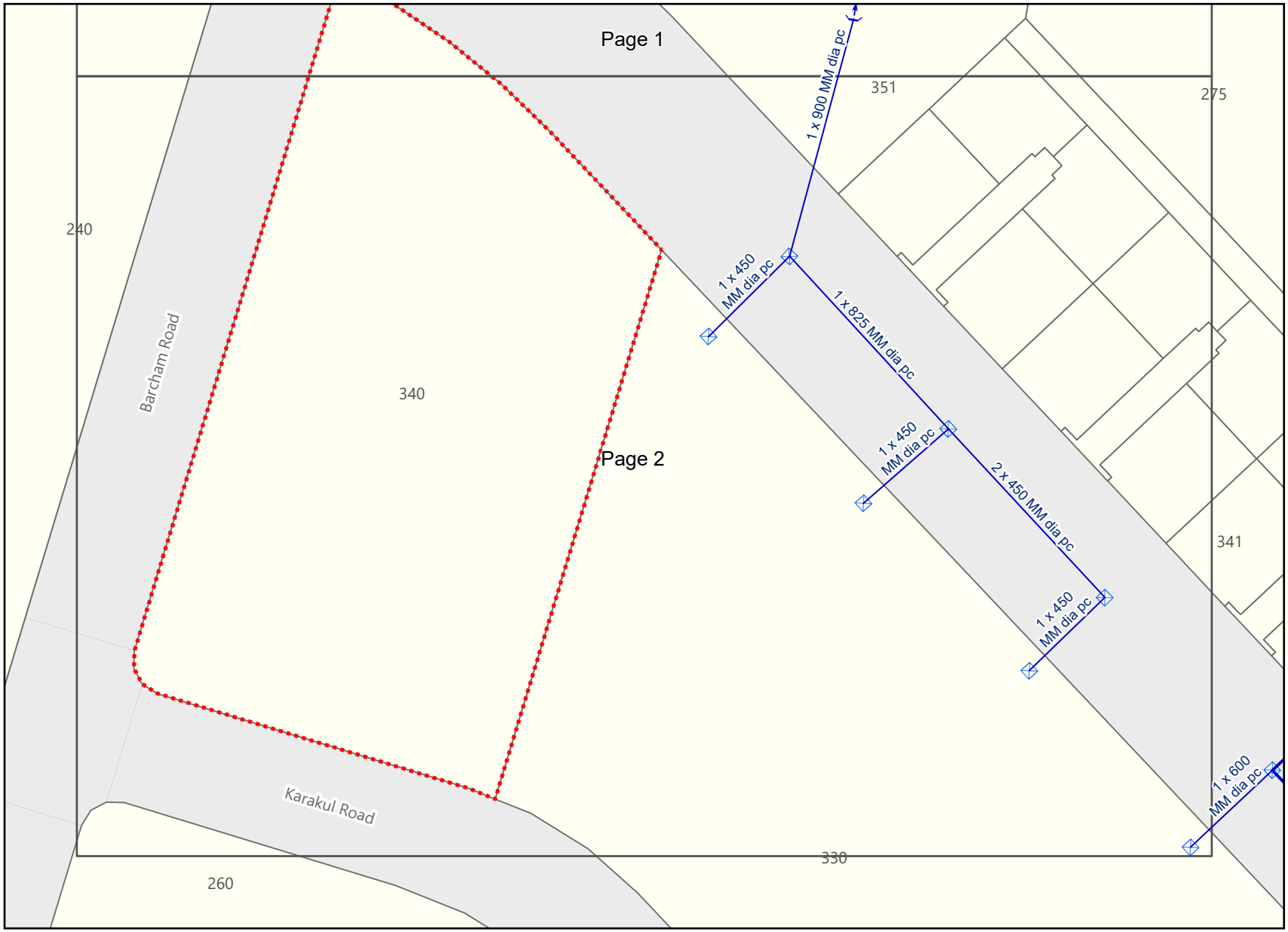

Legend

BYDA Enquiry

Stormwater Network

- Stormwater Drain
- Stormwater Gully / Roofwater Connection
- Stormwater Field Inlet
- Pipe End Outlet

In an emergency contact Brisbane City Council on 07 3403 8888
26/04/24 (valid for 30 days)

0 10 20 40 m

Scale 1:1,000

Plans generated by SmarterWX™ Automate

Appendix H
SMEC Stormwater Design Drawings

Northshore, Hamilton

Package 01

Economic Development Queensland

Civil Works

Cover Sheet, Drawing Index & Locality Plan

DRAWING INDEX

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2521E-01-011	Demolition Layout Plan (Sheet 1 of 4)
2521E-01-012	Demolition Layout Plan (Sheet 2 of 4)
2521E-01-013	Demolition Layout Plan (Sheet 3 of 4)
2521E-01-014	Demolition Layout Plan (Sheet 4 of 4)
2521E-01-020	Erosion & Sediment Control Notes (Sheet 1 of 1)
2521E-01-021	Erosion & Sediment Control Details (Sheet 1 of 1)
2521E-01-031	Erosion & Sediment Layout Plan (Clearing & Grubbing) (Sheet 1 of 2)
2521E-01-032	Erosion & Sediment Layout Plan (Clearing & Grubbing) (Sheet 2 of 2)
2521E-01-041	Erosion & Sediment Layout Plan (Construction) (Sheet 1 of 2)
2521E-01-042	Erosion & Sediment Layout Plan (Construction) (Sheet 2 of 2)
2521E-01-051	Erosion & Sediment Layout Plan (Maintenance) (Sheet 1 of 2)
2521E-01-052	Erosion & Sediment Layout Plan (Maintenance) (Sheet 2 of 2)
2521E-01-101	Earthworks Layout Plan (Sheet 1 of 2)
2521E-01-102	Earthworks Layout Plan (Sheet 2 of 2)
2521E-01-200	Roadworks Notes and Details (Sheet 1 of 1)
2521E-01-201	Roadworks Typical Sections (Sheet 1 of 1)
2521E-01-211	Roadworks Layout Plan (Sheet 1 of 2)
2521E-01-212	Roadworks Layout Plan (Sheet 2 of 2)
2521E-01-221	Roadworks Centreline Setout Plan & Pavement Plan (Sheet 1 of 2)
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2521E-01-223	Roadworks Parking Bay and Bio-Pods Setout Plans (Sheet 1 of 2)
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2521E-01-262	Roadworks Intersection Layout Plan (Sheet 2 of 4)
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2521E-01-264	Roadworks Intersection Layout Plan (Sheet 4 of 4)
2521E-01-271	Roadworks Signage & Linemarking Layout Plan (Sheet 1 of 2)
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2521E-01-281	Roadworks Driveway Layout & Setout Table (Sheet 1 of 1) B

DRAWING INDEX

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2521E-01-302	Stormwater Drainage Layout Plan (Sheet 2 of 2)
2521E-01-321	Stormwater Drainage Catchment Layout Plan (Sheet 1 of 1)
2521E-01-331	Stormwater Drainage Longitudinal Sections (Sheet 1 of 4)
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2521E-01-343	Stormwater Drainage Calculation Sheets - Major Q100 (Sheet 1 of 2)
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SEWER AND WATER UU PACKAGE DRAWING INDEX

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2521E-01-401	Sewer Layout Plan (Sheet 1 of 3)
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2521E-01-403	Sewer Layout Plan (Sheet 3 of 3)
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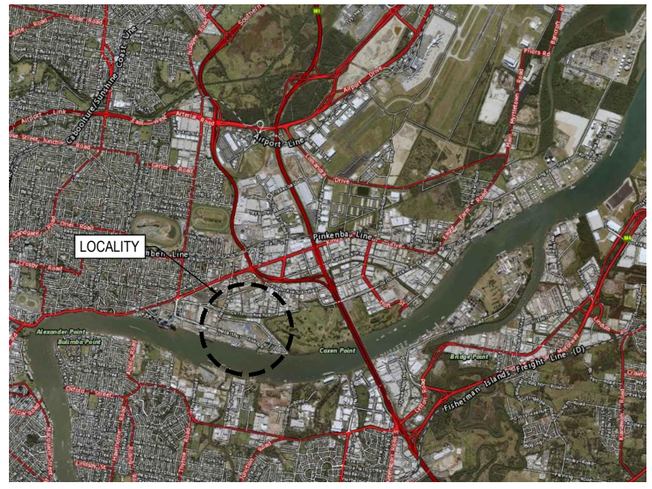
2521E-01-500	Water Cover Sheet, Notes and Details (Sheet 1 of 1)
2521E-01-501	Water Demolition Layout Plan (Sheet 1 of 1)
2521E-01-502	Water Layout Plan (Sheet 1 of 2)
2521E-01-503	Water Layout Plan (Sheet 2 of 2)
2521E-01-504	Water Connection Details (Sheet 1 of 1)



LOCALITY PLAN

Principal

Economic Development Queensland

1 William Street

Brisbane, 4000

REVISION		DATE	DES/DFT	WVR	APP'D
B	Additional Drawing Included In Drawing Index	15/09/21	AY/KM	0025	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....

Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

All setting out should be carried out in accordance with GAA/Council's standard drawings or as nominated on hard copy plans provided by SMEC. Any digital information supplied by this office is for information only. Any discrepancies should be discussed with the superintendent.

Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1
N.T.S.

N

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Member of the Surbana Jurong Group
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SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com

Adelaide	+61 8 8225 9800	Geelong	+61 3 5228 3100
Brisbane	+61 7 3831 8988	Melbourne	+61 3 9869 0800
Campbelltown	+61 2 4640 8222	Perth	+61 8 9323 5900
Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Civil Works
Cover Sheet, Drawing Index & Locality Plan
Drawing No. 2521E-01-000 **Rev B**
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction

FOR CONTINUATION REFER SHEET 2

NOTES:
1. REFER LANDSCAPING DRAWINGS FOR DETAILS OF VERGE TREATMENT.
2. FENCING TO BE STRONG ENOUGH TO SUPPORT BANNERS.
3. INSTALL TACTILES TO BCC STANDARDS.

PACKAGE 2

CEDAR ROAD

MACARTHUR AVENUE (SOUTH)

BARCHAM ROAD

FUTURE LOOP ROAD 1

FUTURE LOOP ROAD 2

LIMIT OF WORKS

SWALE DRAIN 01
100mm THICK UNREINFORCED CONCRETE SPOON DRAIN.
1.0m WIDE 0.15m DEEP.
4m LANDSCAPE BUFFER

20m ROAD RESERVE
1.80m FOOTPATH
16.00m ROAD WIDTH
3.00m LANE WIDTH
2.25m PARKING BAY

2m BICYCLE PATH
3m FOOTPATH
30m ROAD RESERVE
7.00m ROAD WIDTH
3.50m LANE WIDTH

TIE NEATLY INTO EXISTING KERB

TIE NEATLY INTO EXISTING FOOTPATH

INSTALL TEMPORARY LANE SEPARATION BOLLARDS OR APPROVED EQUIVALENT AT 1m CENTRES.

REFER LANDSCAPING DRAWINGS FOR RAMP DETAILS.

TIE RAMP NEATLY INTO EXISTING CONCRETE

TIE NEATLY INTO EXISTING CARPARK ASHPALT

INSTALL APPROX 11m CAR PARK BARRIER TO PROTECT EXISTING ELECTRICAL BUILDING

TIE NEW KERB NEATLY INTO EXISTING

CONCRETE INFILL TRAFFIC ISLAND DETAIL ON SHEET 211 FOR FURTHER DETAIL

TIE NEW KERB NEATLY INTO EXISTING

FINAL RESURFACING AREA OF ROUNDABOUT TO BE FINALISED PRIOR TO WORKS COMMENCING. TO BE DETERMINED BY SUPERINTENDENT

EXISTING FOOTPATH TO BE REMOVED AND NEW WIDER 2.2M FOOTPATH INSTALLED FOR IMPROVED CONNECTIVITY. FINAL DETAILS TO BE FINALISED PRIOR TO CONSTRUCTION.

FOR CONTINUATION REFER ABOVE INSET

INSET

NOTES
1. For roadwork notes and details refer drg no. 2521E-01-200.

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site.
No guarantee is given that all existing services are shown.
Locate all underground services before commencement of works
DIAL 1100 BEFORE YOU DIG
www.1100.com.au

KEYPLAN

SWALE DRAIN 01

PT	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIR AI	A.LENGTH	DEFL.ANG I.E
IP 1	0.000	8035.371	4520.686	3.300	16°07'56.08"			
	20.000	8040.928	4539.898	3.380	16°07'56.08"			
	40.000	8046.485	4559.110	3.460	16°07'56.08"			
TC	44.040	8047.608	4562.991	3.476	16°07'56.08"			
IP 2	44.368	8047.699	4563.306	3.477		R = 50.000	0.655	0°45'03.93"
CT	44.695	8047.794	4563.620	3.479	16°53'00.00"			
	60.000	8052.239	4578.265	3.540	16°53'00.00"			
	80.000	8058.047	4597.403	3.620	16°53'00.00"			
IP 3	81.409	8058.456	4598.751	3.626	16°53'00.00"			

BOUNDARIES
EXISTING / PROPOSED / FUTURE
STAGE BOUNDARY
ROAD RESERVE

ROADWORKS
EXISTING / PROPOSED / FUTURE
CHAINAGE (PROPOSED CH270.00)
CONTROL LINE
1.8m HIGH BLACK CHAIN WIRE FENCE (2 GATES PER LOT)
KERB
TREE TO BE RETAINED
RETAINING WALL
BOLLARD
STREET NAME SIGN
TRAFFIC SIGN
STREET LIGHTING
TACTILE INDICATOR CONCRETE TILES (REFER BCC STD DRGS FOR LOCATION AND CONSTRUCTION DETAILS)
FOOTPATH
BICYCLE FOOTPATH
ROAD PAVING INCL PARKING BAYS
FOOTPATH - PT1 REFER LANDSCAPE ARCHITECT PLANS
FOOTPATH - PT2 REFER LANDSCAPE ARCHITECT PLANS
LANDSCAPE BUFFER (4m WIDE)
BIOPOD (REFER DRAWING No. 223 AND 224 FOR SETOUT DETAILS)
ASPHALT MILLING AND RESURFACE ONLY (EXISTING ROUNDABOUTS)

EARTHWORKS
EXISTING / PROPOSED / FUTURE
MAJOR SURFACE CONTOURS (-25.0-)
MINOR SURFACE CONTOURS

SERVICES
EXISTING / PROPOSED / FUTURE
ELECTRICAL PIT
ELECTRICITY U/G (E / Fut E)
ELECTRICITY O/H (O/H / Fut O/H E)
GAS (G / Fut G)
OPTIC FIBRE (O / Fut O)
TELECOMMUNICATION (T / Fut T)
SEWER & MAINTENANCE STRUCTURES (S / Fut S)
STORMWATER DRAIN (D / Fut D)
UNREINFORCED CONCRETE SPOON DRAIN
WATER (W / Fut W)
RECYCLED WATER (RW / Fut RW)

G	Re-Issue for Construction	25/11/21	AC/KM	0041	GP
F	Re issue for Construction	8/11/21	AY/EG	0036	GP
E	Re issue for Construction	13/10/21	AC/EG	0034	GP
D	Re issue for construction	24/09/21	AY/AY	0030	GP
C	Re issue for construction	25/08/21	AY/AY	0023	GP
B	Cedar Road Swale Drainage Updated	7/07/21	AC/KM	0011	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP
REVISION		DATE	DES/DFT	WVR	APP'D

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
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Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Roadworks
Roadworks Layout Plan
Drawing No. 2521E-01-211 **Rev G**
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction

NOTES:
1. REFER LANDSCAPING DRAWINGS FOR DETAILS OF VERGE TREATMENT.
2. FENCING TO BE STRONG ENOUGH TO SUPPORT BANNERS.
3. INSTALL TACTILES TO BCC STANDARDS.

MACARTHUR AVENUE (NORTH)

BARCHAM ROAD

CEDAR ROAD

PACKAGE 2

FINAL RESURFACING AREA OF ROUNDABOUT TO BE FINALISED PRIOR TO WORKS COMMENCING. TO BE DETERMINED BY SUPERINTENDENT

REFER TO CONCRETE INFILL TRAFFIC ISLAND DETAIL ON SHEET 211 FOR FURTHER DETAIL

TYPE B2 DRIVEWAYCROSSOVER 6.0m WIDE THROAT. REFER BCC STD DRG BSD-2021 REFER DRG 281 FOR SETOUT.

ACCESS GATE LOCATION. REFER BSD-7032 DOUBLE GATE MODIFIED FOR 1.8m HIGH 6.0m WIDTH.

4m LANDSCAPE BUFFER

CH 240
CH 220
CT 212.195
TC 205.312
CH 200
CH 180
CH 160
CH 140
CH 120
CH 81.409
CH 80.000
CH 100
CH 60.000
CH 80
CH 60
CH 40.000
TP 44.695
TP 44.040

20m ROAD RESERVE
1.80m FOOTPATH
6.00m ROAD WIDTH
3.00m LANE WIDTH
2.25m PARKING BAY

INVERT CHANNEL
RCC TYPE 'E'

NOTES
1. For roadwork notes and details refer drg no. 2521E-01-200.

WARNING
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DIAL 1100 BEFORE YOU DIG
www.1100.com.au

KEYPLAN

BOUNDARIES
EXISTING PROPOSED FUTURE
- STAGE BOUNDARY
- ROAD RESERVE

ROADWORKS
EXISTING PROPOSED FUTURE
- CHAINAGE (CH270.00)
- CONTROL LINE
- 1.8m HIGH BLACK CHAIN WIRE FENCE (2 GATES PER LOT) REFER BCC STD DRG BSD-7003
- KERB
- TREE TO BE RETAINED
- BOLLARD
- STREET NAME SIGN
- TRAFFIC SIGN
- STREET LIGHTING
- TACTILE INDICATOR CONCRETE TILES (REFER BCC STD DRGS FOR LOCATION AND CONSTRUCTION DETAILS)
- FOOTPATH
- BICYCLE FOOTPATH
- ROAD PAVING INCL PARKING BAYS
- FOOTPATH - PT1 REFER LANDSCAPE ARCHITECT PLANS
- FOOTPATH - PT2 REFER LANDSCAPE ARCHITECT PLANS
- LANDSCAPE BUFFER (4m WIDE)
- DRIVEWAYS
- BIOPOD (REFER DRAWING No. 223 AND 224 FOR SETOUT DETAILS)
- ASPHALT MILLING AND RESURFACE ONLY (EXISTING ROUNDABOUTS)

EARTHWORKS
EXISTING PROPOSED FUTURE
- MAJOR SURFACE CONTOURS
- MINOR SURFACE CONTOURS

SERVICES
EXISTING PROPOSED FUTURE
- ELECTRICAL PIT
- ELECTRICITY U/G
- ELECTRICITY O/H
- GAS
- OPTIC FIBRE
- TELECOMMUNICATION
- SEWER & MAINTENANCE STRUCTURES
- STORMWATER DRAIN
- UNREINFORCED CONCRETE SPOON DRAIN
- WATER
- RECYCLED WATER

D	Driveway Replaced Parking Bay	15/09/21	AY/KM	0025	GP
C	Re issue for construction	25/08/21	AY/AY	0023	GP
B	Re Issue for Construction	20/08/21	AY/EG	0019	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP
REVISION		DATE	DES/DFT	WVR	APP'D

Gustavo Pereira
RPEQ# 17514

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Economic Development Queensland
1 William Street
Brisbane, 4000

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p +61 7 5578 0200 | **f** +61 7 3029 6650 | www.smec.com

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Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Roadworks
Roadworks Layout Plan

Drawing No. 2521E-01-212 **Rev D**
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction

BOUNDARIES

EXISTING	PROPOSED	FUTURE	
			STAGE BOUNDARY
			ROAD RESERVE

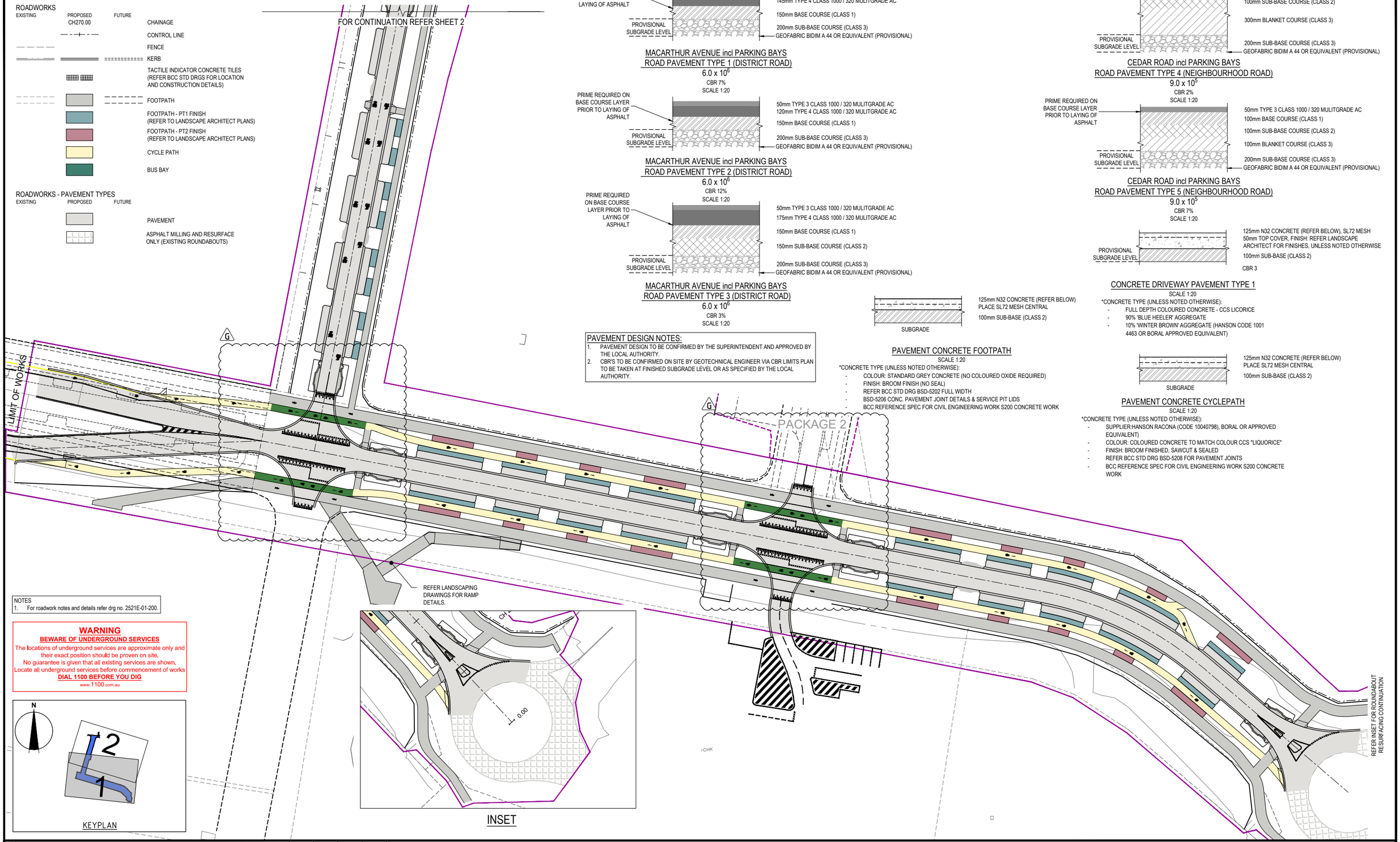
ROADWORKS

EXISTING	PROPOSED	FUTURE	
	CH270.00		CHAINAGE
			CONTROL LINE
			FENCE
			KERB
			TACTILE INDICATOR CONCRETE TILES (REFER BCC STD DRGS FOR LOCATION AND CONSTRUCTION DETAILS)
			FOOTPATH
			FOOTPATH - PT1 FINISH (REFER TO LANDSCAPE ARCHITECT PLANS)
			FOOTPATH - PT2 FINISH (REFER TO LANDSCAPE ARCHITECT PLANS)
			CYCLE PATH
			BUS BAY

ROADWORKS - PAVEMENT TYPES

EXISTING	PROPOSED	FUTURE	
			PAVEMENT
			ASPHALT MILLING AND RESURFACE ONLY (EXISTING ROUNDABOUTS)

FOR CONTINUATION REFER SHEET 2



INSET

KEYPLAN

NOTES
1. For roadwork notes and details refer drg no. 2521E-01-200.

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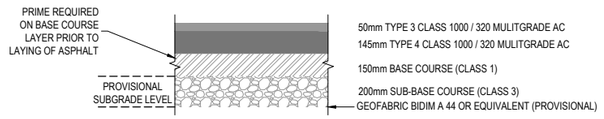


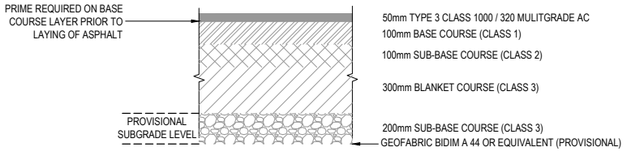
MACARTHUR AVENUE incl PARKING BAYS
ROAD PAVEMENT TYPE 1 (DISTRICT ROAD)
6.0×10^6
CBR 7%
SCALE 1:20

MACARTHUR AVENUE incl PARKING BAYS
ROAD PAVEMENT TYPE 2 (DISTRICT ROAD)
6.0×10^6
CBR 12%
SCALE 1:20

MACARTHUR AVENUE incl PARKING BAYS
ROAD PAVEMENT TYPE 3 (DISTRICT ROAD)
6.0×10^6
CBR 3%
SCALE 1:20

PAVEMENT DESIGN NOTES:
1. PAVEMENT DESIGN TO BE CONFIRMED BY THE SUPERINTENDENT AND APPROVED BY THE LOCAL AUTHORITY.
2. CBR'S TO BE CONFIRMED ON SITE BY GEOTECHNICAL ENGINEER VIA CBR LIMITS PLAN TO BE TAKEN AT FINISHED SUBGRADE LEVEL OR AS SPECIFIED BY THE LOCAL AUTHORITY.

PAVEMENT CONCRETE FOOTPATH
SCALE 1:20
*CONCRETE TYPE (UNLESS NOTED OTHERWISE):
- COLOUR: STANDARD GREY CONCRETE (NO COLOURED OXIDE REQUIRED)
- FINISH: BROOM FINISH (NO SEAL)
- REFER BCC STD DRG BSD-5202 FULL WIDTH
- BSD-5206 CONC. PAVEMENT JOINT DETAILS & SERVICE PIT LIDS
- BCC REFERENCE SPEC FOR CIVIL ENGINEERING WORK S200 CONCRETE WORK



CEDAR ROAD incl PARKING BAYS
ROAD PAVEMENT TYPE 4 (NEIGHBOURHOOD ROAD)
9.0×10^5
CBR 2%
SCALE 1:20

CEDAR ROAD incl PARKING BAYS
ROAD PAVEMENT TYPE 5 (NEIGHBOURHOOD ROAD)
9.0×10^5
CBR 7%
SCALE 1:20

CONCRETE DRIVEWAY PAVEMENT TYPE 1
SCALE 1:20
*CONCRETE TYPE (UNLESS NOTED OTHERWISE):
- FULL DEPTH COLOURED CONCRETE - CCS LICORICE
- 90% 'BLUE HEELER' AGGREGATE
- 10% 'WINTER BROWN' AGGREGATE (HANSON CODE 1001 4463 OR BORAL APPROVED EQUIVALENT)

PAVEMENT CONCRETE CYCLEPATH
SCALE 1:20
*CONCRETE TYPE (UNLESS NOTED OTHERWISE):
- SUPPLIER:HANSON RACONA (CODE 10040798), BORAL OR APPROVED EQUIVALENT)
- COLOUR: COLOURED CONCRETE TO MATCH COLOUR CCS "LIQUORICE"
- FINISH: BROOM FINISHED, SAWCUT & SEALED
- REFER BCC STD DRG BSD-5208 FOR PAVEMENT JOINTS
- BCC REFERENCE SPEC FOR CIVIL ENGINEERING WORK S200 CONCRETE WORK

REVISION	DATE	DES/DFT	WVR	APP'D
G Re-Issue for Construction	25/11/21	AC/KM	0041	GP
F Re issue for Construction	8/11/21	AY/EG	0036	GP
E Re issue for Construction	13/10/21	AC/EG	0034	GP
D Concrete Pavement Colour Amended	11/10/21	GP/KM	0033	GP
C BCC Comments Addressed	15/09/21	AY/KM	0025	GP
B Re issue for construction	25/08/21	AY/AY	0023	GP
A Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
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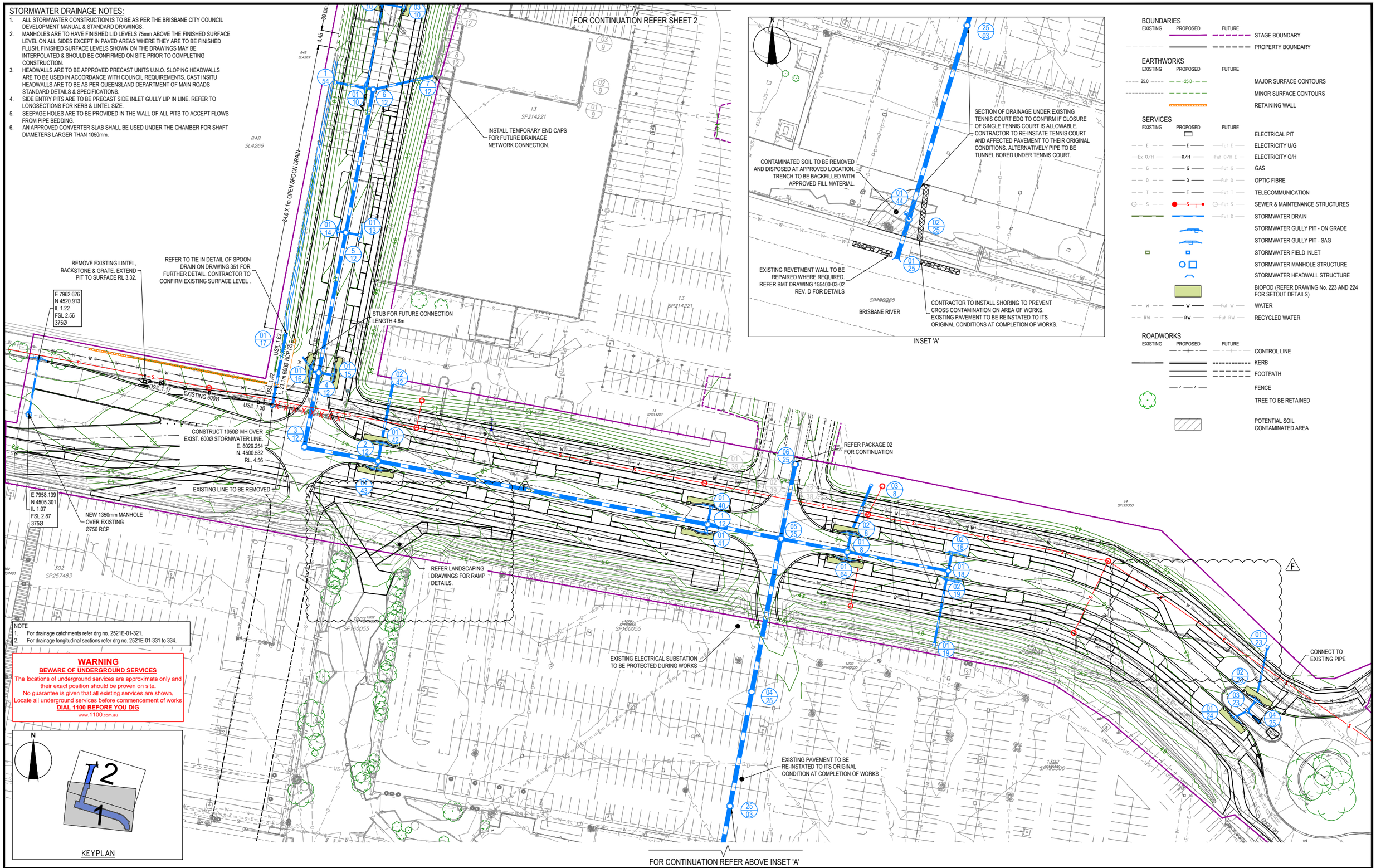
Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Roadworks
Roadworks Centreline Setout Plan & Pavement Plan
Drawing No. 2521E-01-221 **Rev G**
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER CONSTRUCTION IS TO BE AS PER THE BRISBANE CITY COUNCIL DEVELOPMENT MANUAL & STANDARD DRAWINGS.
2. MANHOLES ARE TO HAVE FINISHED LID LEVELS 75mm ABOVE THE FINISHED SURFACE LEVEL ON ALL SIDES EXCEPT IN PAVED AREAS WHERE THEY ARE TO BE FINISHED FLUSH. FINISHED SURFACE LEVELS SHOWN ON THE DRAWINGS MAY BE INTERPOLATED & SHOULD BE CONFIRMED ON SITE PRIOR TO COMPLETING CONSTRUCTION.
3. HEADWALLS ARE TO BE APPROVED PRECAST UNITS U.N.O. SLOPING HEADWALLS ARE TO BE USED IN ACCORDANCE WITH COUNCIL REQUIREMENTS. CAST INSITU HEADWALLS ARE TO BE AS PER QUEENSLAND DEPARTMENT OF MAIN ROADS STANDARD DETAILS & SPECIFICATIONS.
4. SIDE ENTRY PITS ARE TO BE PRECAST SIDE INLET GULLY LIP IN LINE. REFER TO LONGSECTIONS FOR KERB & LINTEL SIZE.
5. SEEPAGE HOLES ARE TO BE PROVIDED IN THE WALL OF ALL PITS TO ACCEPT FLOWS FROM PIPE BEDDING.
6. AN APPROVED CONVERTER SLAB SHALL BE USED UNDER THE CHAMBER FOR SHAFT DIAMETERS LARGER THAN 1050mm.



NOTE
1. For drainage catchments refer drg no. 2521E-01-321.
2. For drainage longitudinal sections refer drg no. 2521E-01-331 to 334.

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site.
No guarantee is given that all existing services are shown.
Locate all underground services before commencement of works
DIAL 1100 BEFORE YOU DIG
www.1100.com.au

KEYPLAN

BOUNDARIES
EXISTING / PROPOSED / FUTURE
- STAGE BOUNDARY
- PROPERTY BOUNDARY

EARTHWORKS
EXISTING / PROPOSED / FUTURE
- MAJOR SURFACE CONTOURS (25.0)
- MINOR SURFACE CONTOURS
- RETAINING WALL

SERVICES
EXISTING / PROPOSED / FUTURE
- ELECTRICAL PIT
- ELECTRICITY U/G (E / Fut E)
- ELECTRICITY O/H (Ex O/H / O/H / Fut O/H E)
- GAS (G / Fut G)
- OPTIC FIBRE (O / Fut O)
- TELECOMMUNICATION (T / Fut T)
- SEWER & MAINTENANCE STRUCTURES (S / Fut S)
- STORMWATER DRAIN (Fut D)
- STORMWATER GULLY PIT - ON GRADE
- STORMWATER GULLY PIT - SAG
- STORMWATER FIELD INLET
- STORMWATER MANHOLE STRUCTURE
- STORMWATER HEADWALL STRUCTURE
- BIOPOD (REFER DRAWING No. 223 AND 224 FOR SETOUT DETAILS)
- WATER (W / Fut W)
- RECYCLED WATER (RW / Fut RW)

ROADWORKS
EXISTING / PROPOSED / FUTURE
- CONTROL LINE
- KERB
- FOOTPATH
- FENCE
- TREE TO BE RETAINED
- POTENTIAL SOIL CONTAMINATED AREA

REVISION		DATE	DES/DFT	WVR	APP'D
F	Re issue for Construction	8/11/21	AY/EG	0036	GP
E	Re issue for Construction	13/10/21	AC/EG	0034	GP
D	Re issue for construction	25/08/21	AY/AY	0023	GP
C	Re-issue for Construction	4/08/21	EW/EG	0014	GP
B	Cedar Road Swale Drainage Updated	7/07/21	AC/KM	0011	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
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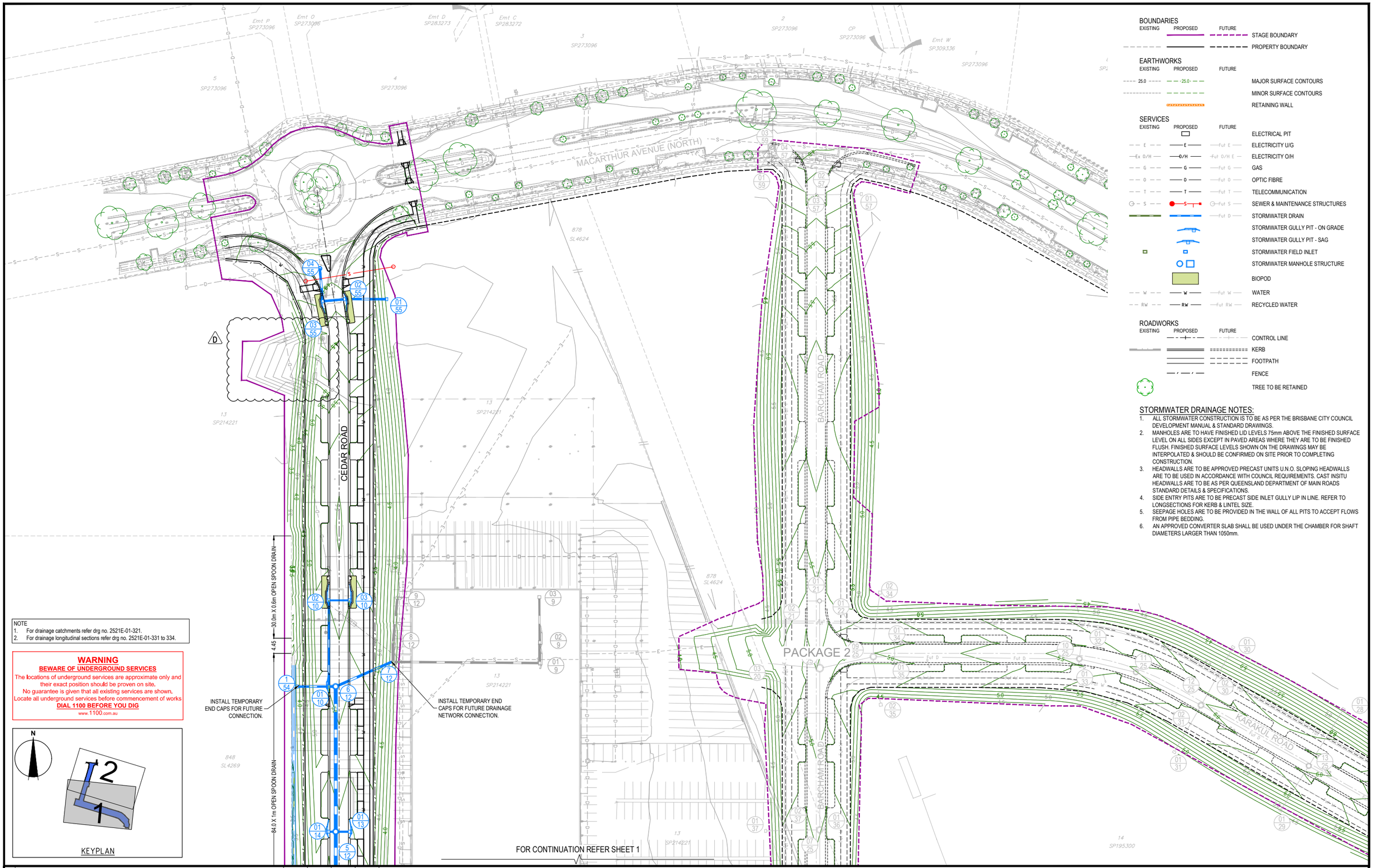
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Layout Plan

Drawing No. 2521E-01-301 **Rev** F
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction



BOUNDARIES

EXISTING	PROPOSED	FUTURE	
			STAGE BOUNDARY
			PROPERTY BOUNDARY

EARTHWORKS

EXISTING	PROPOSED	FUTURE	
25.0	25.0		MAJOR SURFACE CONTOURS
			MINOR SURFACE CONTOURS
			RETAINING WALL

SERVICES

EXISTING	PROPOSED	FUTURE	
			ELECTRICAL PIT
E	E	Fut E	ELECTRICITY U/G
Ex O/H	O/H	Fut O/H E	ELECTRICITY O/H
G	G	Fut G	GAS
O	O	Fut O	OPTIC FIBRE
T	T	Fut T	TELECOMMUNICATION
S	S	Fut S	SEWER & MAINTENANCE STRUCTURES
		Fut D	STORMWATER DRAIN
			STORMWATER GULLY PIT - ON GRADE
			STORMWATER GULLY PIT - SAG
			STORMWATER FIELD INLET
			STORMWATER MANHOLE STRUCTURE
			BIOPOD
W	W	Fut W	WATER
RW	RW	Fut RW	RECYCLED WATER

ROADWORKS

EXISTING	PROPOSED	FUTURE	
			CONTROL LINE
			KERB
			FOOTPATH
			FENCE
			TREE TO BE RETAINED

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NOTE
1. For drainage catchments refer drg no. 2521E-01-321.
2. For drainage longitudinal sections refer drg no. 2521E-01-331 to 334.

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KEYPLAN

REVISION		DATE	DES/DFT	WVR	APP'D
D	Driveway Replaced Parking Bay	N.I.	AY/KM	0025	GP
C	Re issue for construction	25/08/21	AY/AY	0023	GP
B	Drainage Updated	14/07/21	AC/KM	0011	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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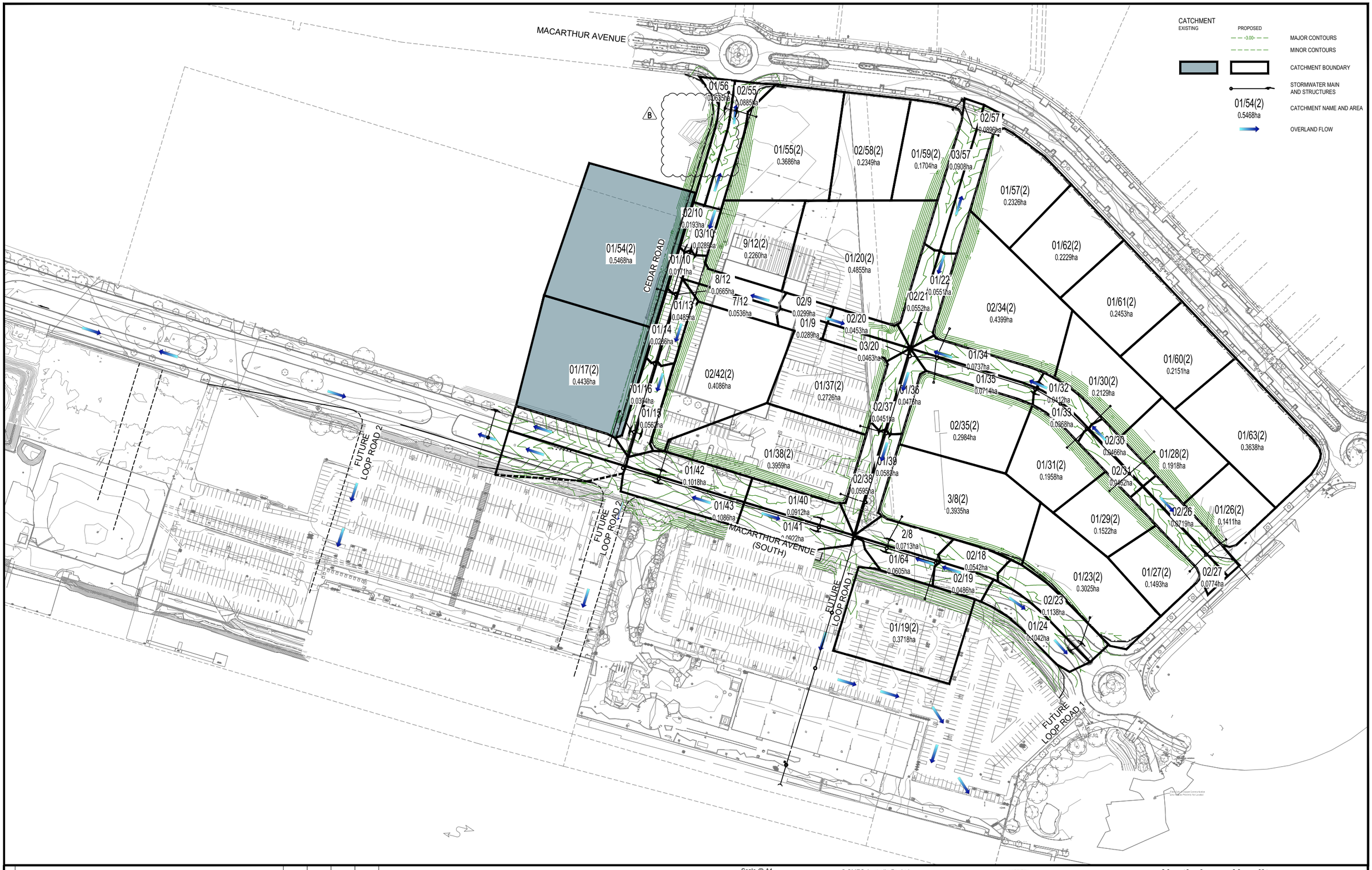
Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Layout Plan
Drawing No. 2521E-01-302 **Rev D**
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction



B	Driveway Replaced Parking Bay	N.I.	AY/KM	0025	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP
REVISION		DATE	DES/DFT	WVR	APP'D

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Checked D. Rapson
Authorised G. Pereira
Date May-2021

Scale @ A1
1:1000
0 10 20 40
Scale 1:1000
N

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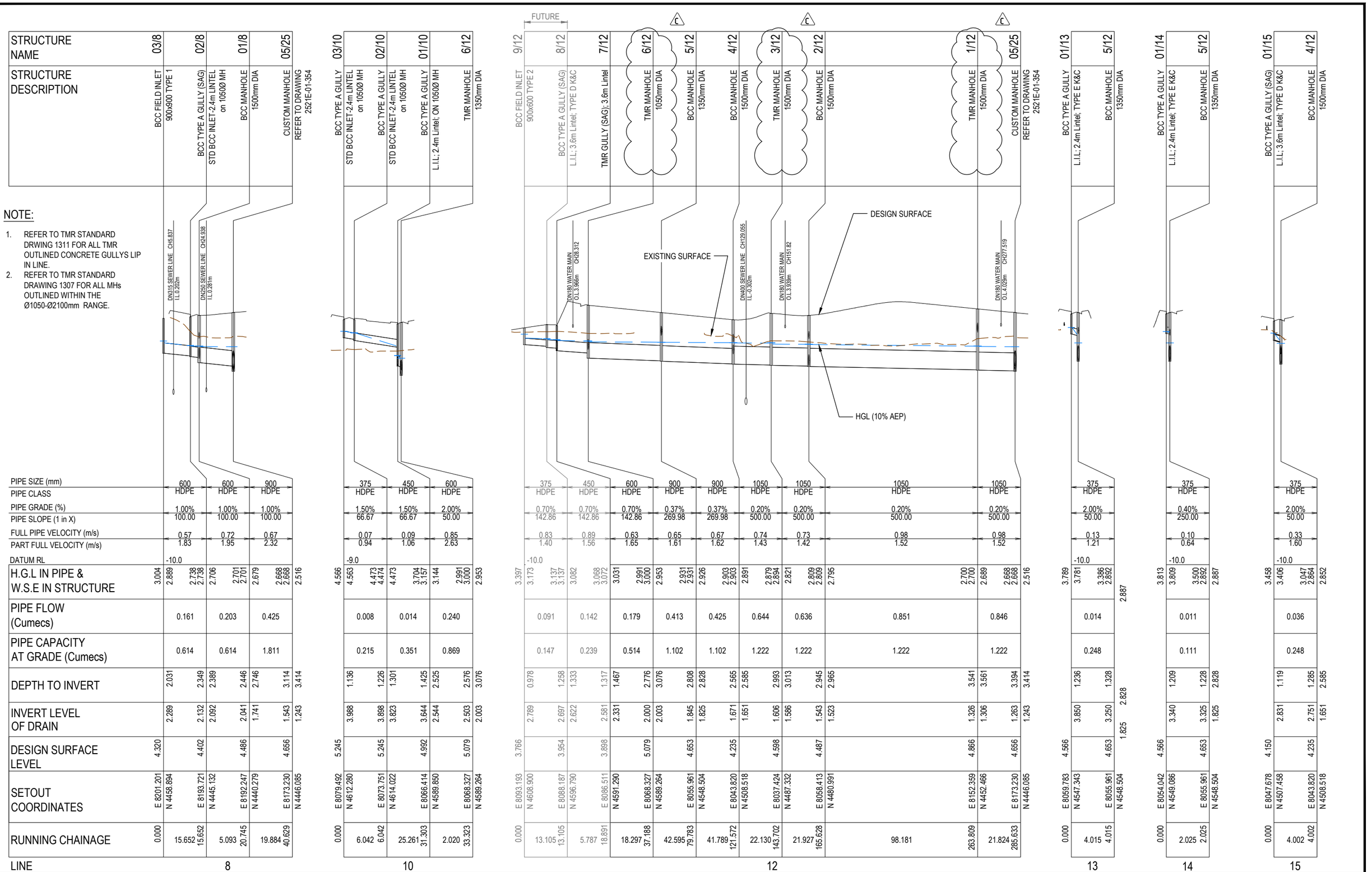
Northshore, Hamilton

Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Catchment Layout Plan

Drawing No. 2521E-01-321 **Rev B**
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction



STRUCTURE NAME	03/8	02/8	01/8	05/25	03/10	02/10	01/10	6/12	9/12	8/12	7/12	6/12	5/12	4/12	3/12	2/12	1/12	05/25	01/13	5/12	01/14	5/12	01/15	4/12
STRUCTURE DESCRIPTION	BCC FIELD INLET 900x900 TYPE 1	BCC TYPE A GULLY (SAG) STD BCC INLET-2.4m LINTEL on 1050Ø MH	BCC MANHOLE 1500mm DIA	CUSTOM MANHOLE REFER TO DRAWING 2521E-01-354	BCC TYPE A GULLY STD BCC INLET-2.4m LINTEL on 1050Ø MH	BCC TYPE A GULLY STD BCC INLET-2.4m LINTEL on 1050Ø MH	BCC TYPE A GULLY L.I.L.; 2.4m Lintel; ON 1050Ø MH	TMR MANHOLE 1350mm DIA	BCC FIELD INLET 900x600 TYPE 2	BCC TYPE A GULLY (SAG) L.I.L.; 3.6m Lintel; TYPE D K&C	TMR GULLY (SAG); 3.6m Lintel	TMR MANHOLE 1050mm DIA	BCC MANHOLE 1350mm DIA	BCC MANHOLE 1500mm DIA	TMR MANHOLE 1500mm DIA	BCC MANHOLE 1500mm DIA	TMR MANHOLE 1500mm DIA	CUSTOM MANHOLE REFER TO DRAWING 2521E-01-354	BCC TYPE A GULLY L.I.L.; 2.4m Lintel; TYPE E K&C	BCC MANHOLE 1350mm DIA	BCC TYPE A GULLY L.I.L.; 2.4m Lintel; TYPE E K&C	BCC MANHOLE 1350mm DIA	BCC TYPE A GULLY (SAG) L.I.L.; 3.6m Lintel; TYPE D K&C	BCC MANHOLE 1500mm DIA
PIPE SIZE (mm)	600	600	900		375	450	600		375	450	600	900	900	1050	1050	1050	1050		375		375		375	
PIPE CLASS	HDPE	HDPE	HDPE		HDPE	HDPE	HDPE		HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE		HDPE		HDPE		HDPE	
PIPE GRADE (%)	1.00%	1.00%	1.00%		1.50%	1.50%	2.00%		0.70%	0.70%	0.70%	0.37%	0.37%	0.20%	0.20%	0.20%	0.20%		2.00%		0.40%		2.00%	
PIPE SLOPE (1 in X)	100.00	100.00	100.00		66.67	66.67	50.00		142.86	142.86	142.86	269.98	269.98	500.00	500.00	500.00	500.00		50.00		250.00		50.00	
FULL PIPE VELOCITY (m/s)	0.57	0.72	0.67		0.07	0.09	0.85		0.83	0.89	0.63	0.65	0.67	0.74	0.73	0.98	0.98		0.13		0.10		0.33	
PART FULL VELOCITY (m/s)	1.83	1.95	2.32		0.94	1.06	2.63		1.40	1.56	1.65	1.61	1.62	1.43	1.42	1.52	1.52		1.21		0.64		1.60	
DATUM RL	-10.0				-9.0				-10.0										-10.0		-10.0		-10.0	
H.G.L IN PIPE & W.S.E IN STRUCTURE	3.004 2.889 2.738 2.738	2.706 2.701 2.701	2.679 2.668 2.668	2.516	4.566 4.563 4.473 4.474	4.473 3.704 3.157	3.144 2.991 3.000	2.953	3.397 3.173 3.137 3.137	3.082 3.068 3.072	3.031 2.991 3.000	2.953 2.931 2.931	2.926 2.903 2.903	2.891 2.879 2.894	2.821 2.809 2.809	2.795 2.700 2.700	2.689 2.668 2.668	2.516	3.789 3.781 3.386 2.892	2.887	3.813 3.809 3.500 2.892	2.887	3.458 3.406 3.047 2.864	2.852
PIPE FLOW (Cumecs)	0.161	0.203	0.425		0.008	0.014	0.240		0.091	0.142	0.179	0.413	0.425	0.644	0.636	0.851	0.846		0.014		0.011		0.036	
PIPE CAPACITY AT GRADE (Cumecs)	0.614	0.614	1.811		0.215	0.351	0.869		0.147	0.239	0.514	1.102	1.102	1.222	1.222	1.222	1.222		0.248		0.111		0.248	
DEPTH TO INVERT	2.031	2.389	2.746	3.414	1.136	1.301	2.525	3.076	0.978	1.333	1.467	3.076	2.828	2.585	3.013	2.965	3.541	3.414	1.236	2.828	1.209	2.828	1.119	2.585
INVERT LEVEL OF DRAIN	2.289 2.132	2.092 2.041	1.741 1.543	1.243	3.988 3.898	3.823 3.644	2.544 2.503	2.003	2.789 2.697	2.622 2.581	2.331 2.000	2.003 1.845	1.825 1.671	1.651 1.606	1.586 1.543	1.523 1.326	1.306 1.263	1.243	3.850 3.250	1.825	3.340 3.325	1.825	2.831 2.751	1.651
DESIGN SURFACE LEVEL	4.320 4.402	4.486 4.656			5.245 5.245	4.992 5.079			3.766 3.954	3.898 5.079	4.653 4.235	4.598 4.487	4.866 4.656						4.566 4.653		4.566 4.653		4.150 4.235	
SETOUT COORDINATES	E 8201.201 N 4458.894	E 8193.721 N 4445.132	E 8192.247 N 4440.279	E 8173.230 N 4446.085	E 8079.492 N 4612.280	E 8073.751 N 4614.022	E 8066.414 N 4589.850	E 8068.327 N 4589.264	E 8093.193 N 4608.900	E 8088.187 N 4596.790	E 8086.511 N 4591.290	E 8068.327 N 4589.264	E 8055.961 N 4548.504	E 8043.820 N 4508.518	E 8037.424 N 4487.332	E 8058.413 N 4480.991	E 8152.359 N 4452.466	E 8173.230 N 4446.085	E 8059.783 N 4547.343	E 8055.961 N 4548.504	E 8054.042 N 4549.086	E 8055.961 N 4548.504	E 8047.678 N 4507.458	E 8043.820 N 4508.518
RUNNING CHAINAGE	0.000 15.652 15.652	5.093 20.745	19.884 40.629		0.000 6.042 6.042	25.261 31.303	2.020 33.323		0.000 13.105 13.105	5.787 18.891	18.297 37.188	42.595 79.783	41.789 121.572	22.130 143.702	21.927 165.628	98.181 263.809	21.824 285.633		0.000 4.015 4.015		0.000 2.025 2.025		0.000 4.002 4.002	
LINE	8				10				12										13		14		15	

NOTE:

1. REFER TO TMR STANDARD DRWING 1311 FOR ALL TMR OUTLINED CONCRETE GULLYS LIP IN LINE.
2. REFER TO TMR STANDARD DRAWING 1307 FOR ALL MHs OUTLINED WITHIN THE Ø1050-Ø2100mm RANGE.

REVISION		DATE	DES/DFT	WVR	APP'D
C	Re-issue for Construction	23/08/21	AY/AY	0020	GP
B	Re Issue for Construction	4/08/21	EW/EG	0014	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

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1:1000
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0 1 2 4
Scale H1:1000, V1:100

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Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Longitudinal Sections

Drawing No. 2521E-01-331 **Rev** C
Dev. App. No.
Sheet No. 1 of 4

Issue for Construction

STRUCTURE NAME	01/16		4/12	02/18		01/18	01/8	01/19		02/19	01/18	01/23		02/23	03/23	04/23	01/24		03/23
STRUCTURE DESCRIPTION	TMR GULLY (SAG) L.I.L; 3.6m Lintel		BCC MANHOLE 1500mm DIA	BCC TYPE A GULLY STD BCC INLET-2.4m LINTEL on 1050Ø MH		BCC MANHOLE 1200mm DIA	BCC MANHOLE 1500mm DIA	BCC FIELD INLET 900x600 TYPE 2		BCC TYPE A GULLY STD BCC INLET-2.4m LINTEL on 1050Ø MH	BCC MANHOLE 1200mm DIA	BCC FIELD INLET 900x600 TYPE 2		BCC TYPE A GULLY (SAG) L.I.L; 2.4m Lintel; TYPE D K&C	BCC MANHOLE 1050mm DIA	PIPE CONNECTION - NO MANHOLE	BCC TYPE A GULLY (SAG) L.I.L; 2.4m Lintel; TYPE D K&C		BCC MANHOLE 1050mm DIA
PIPE SIZE (mm)	525			375	675			525	600			375		375	375	450	375		
PIPE CLASS	HDPE			HDPE	HDPE			HDPE	HDPE			RCP		RCP	RCP	RCP	RCP		
PIPE GRADE (%)	2.00%			0.50%	0.50%			0.50%	0.50%			0.60%		0.60%	0.60%	0.60%	0.40%		
PIPE SLOPE (1 in X)	50.00			200.00	200.00			200.00	200.00			166.67		166.67	166.67	166.67	250.00		
FULL PIPE VELOCITY (m/s)	0.94			0.00	0.41			0.69	0.57			1.09		1.56	1.39		0.45		
PART FULL VELOCITY (m/s)	2.53			0.00	1.38			1.40	1.42			1.39		1.56	1.58		0.98		
DATUM RL	-10.0			-10.0				-9.0				-9.0					-10.0		
H.G.L IN PIPE & W.S.E IN STRUCTURE	2.912	2.907	2.903 2.903 2.891	3.242	3.242	3.217 2.814	2.792	2.679 2.680 2.646	3.073	2.901	2.821 2.821	2.819	2.817 2.824	2.792	3.875	3.650	3.574 3.574	3.396	3.359 3.403	3.168	3.100 3.100 3.100	3.450	3.362	3.359 3.403	3.168
PIPE FLOW (Cumecs)		0.204			0.000		0.147			0.150	0.161					0.120	0.172	0.221			0.050				
PIPE CAPACITY AT GRADE (Cumecs)		0.608			0.125		0.595			0.304	0.434					0.136	0.136	0.221			0.111				
DEPTH TO INVERT	1.858	1.985	2.585	1.475	1.509		2.609	2.521	2.746	0.918	2.440	2.515	2.534	2.609		1.314	1.196	1.216	1.361	1.436	1.450 1.450		1.274	1.361	1.436
INVERT LEVEL OF DRAIN	2.291	2.251	1.651	3.242	3.217		2.117	1.966	1.741	2.376	2.276	2.201	2.192	2.117		2.932	2.836	2.816	2.793	2.718	2.685 2.685		2.808	2.793	2.718
DESIGN SURFACE LEVEL	4.148	4.235		4.641	4.725		4.486	3.294	4.641		4.725				4.246		4.069		4.153		4.135	4.081		4.153	
SETOUT COORDINATES	E 8041.890	N 4509.047	E 8043.820 N 4508.518	E 8222.467	N 4436.404	E 8221.000	N 4431.572	E 8192.247 N 4440.279	E 8214.670	N 4410.586	E 8220.433	N 4429.706	E 8221.000 N 4431.572		E 8311.624	N 4399.582	E 8303.276	N 4387.302	E 8303.740	N 4381.711	E 8307.421 N 4377.752	E 8300.280	N 4380.254	E 8303.740	N 4381.711
RUNNING CHAINAGE	0.000	1.998	1.998	0.000	5.070	5.070	30.042	35.112	0.000	19.950	19.950	1.970	21.920		-13.293	16.118	2.825	3.836	6.661	5.406	12.067	0.000	3.779	3.779	
LINE	16			18				19				23										24			

HGL (10% AEP)

DESIGN SURFACE

EXISTING SURFACE

DN315 SEWER LINE CH7.568 I.L.0.861m

DN315 WATER MAIN O.L.4.26m CH11.32

NOTE:

1. REFER TO TMR STANDARD DRWING 1311 FOR ALL TMR OUTLINED CONCRETE GULLYS LIP IN LINE.
2. REFER TO TMR STANDARD DRAWING 1307 FOR ALL MHs OUTLINED WITHIN THE Ø1050-Ø2100mm RANGE.

REVISION		DATE	DES/DFT	WVR	APP'D
C	Re-issue for Construction	4/08/21	EW/EG	0014	GP
B	Cedar Road Swale Drainage Updated	7/07/21	AC/KM	0011	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1
H 1:1000 V 1:100
0 10 20 40
0 1 2 4
Scale H1:1000, V1:100

SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com

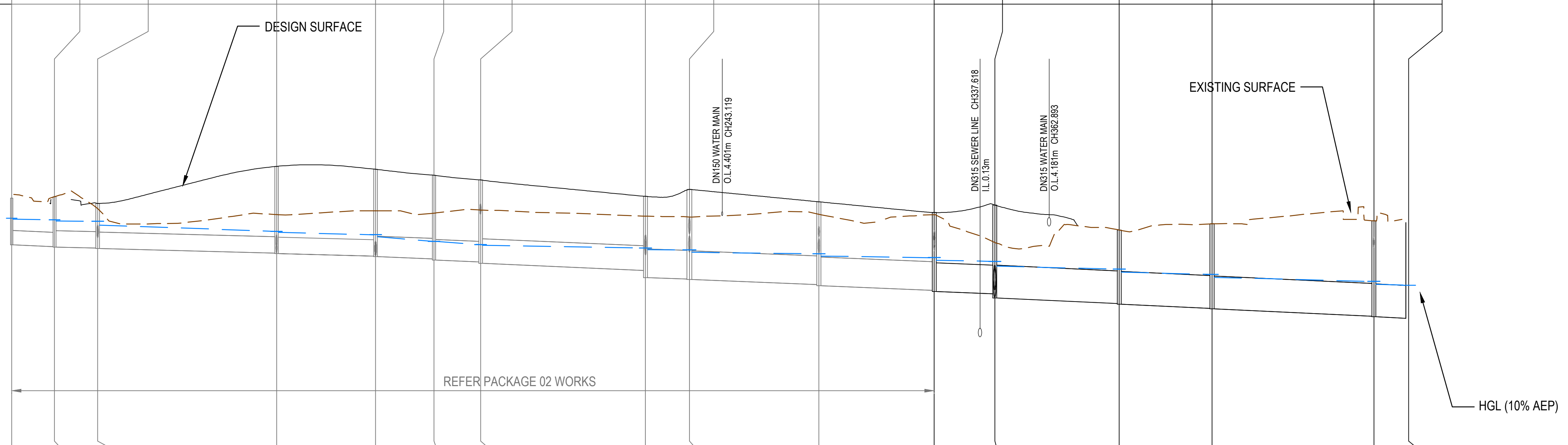
Adelaide	+61 8 8225 9800	Geelong	+61 3 5228 3100
Brisbane	+61 7 3831 8988	Melbourne	+61 3 9869 0800
Campbelltown	+61 2 4640 8222	Perth	+61 8 9323 5900
Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Longitudinal Sections
Drawing No. 2521E-01-332 **Rev C**
Dev. App. No.
Sheet No. 2 of 4

Issue for Construction

NOTE:

1. REFER TO TMR STANDARD DRWING 1311 FOR ALL TMR OUTLINED CONCRETE GULLYS LIP IN LINE.
2. REFER TO TMR STANDARD DRAWING 1307 FOR ALL MHs OUTLINED WITHIN THE Ø1050-Ø2100mm RANGE.



DATUM RL -10.0

STRUCTURE NAME	STRUCTURE DESCRIPTION	W.S.E IN STRUCTURE	DESIGN SURFACE LEVEL	SETOUT COORDINATES	RUNNING CHAINAGE
X/25	EXISTING STRUCTURE	4.160	4.900	E 8405.545 N 4421.896	0.000
15/25	BCC MANHOLE 1050mm DIA	4.100	4.948	E 8395.384 N 4433.869	15.703
14/25	BCC MANHOLE 1350mm DIA	4.050	4.704	E 8379.769 N 4436.351	31.514
13/25	TMR MANHOLE 1200mm DIA	3.680	6.062	E 8334.766 N 4484.025	97.074
12/25	TMR MANHOLE 1200mm DIA	3.560	5.956	E 8309.678 N 4510.246	133.364
11/25	TMR MANHOLE 1200mm DIA	3.320	5.740	E 8294.230 N 4525.031	154.747
10/25	TMR MANHOLE 1350mm DIA	3.200	5.565	E 8279.466 N 4533.627	171.831
09/25	BCC MANHOLE 1500mm DIA	3.070	4.965	E 8221.828 N 4551.819	232.272
08/25	TMR MANHOLE 1800 mm DIA	3.000	5.220	E 8205.765 N 4553.147	248.390
07/25	TMR MANHOLE 1500mm DIA	2.860	4.764	E 8191.993 N 4507.736	295.844
06/25	BCC MANHOLE 1500mm DIA	2.720	4.372	E 8179.730 N 4467.302	338.097
05/25	CUSTOM MANHOLE REFER TO DRAWING 2521E-01-354	2.580	4.647	E 8173.230 N 4446.085	360.287
04/25	BCC MANHOLE 1500mm DIA	2.300	3.731	E 8160.090 N 4402.392	405.912
03/25	TMR MANHOLE 1500mm DIA	2.110	3.958	E 8150.289 N 4369.818	439.929
02/25	TMR MANHOLE 1500mm DIA	1.850	4.068	E 8133.220 N 4313.037	499.220
01/25	HEADWALL	1.710 / 1.710	4.000	E 8129.552 N 4300.842	511.955

PIPE	PIPE SIZE (mm)	PIPE CLASS	PIPE GRADE (%)	PIPE SLOPE (1 in X)	FULL PIPE VELOCITY (m/s)	PART FULL VELOCITY (m/s)	H.G.L IN PIPE (start / end)	PIPE FLOW (Cumecs)	PIPE CAPACITY AT GRADE (Cumecs)	DEPTH TO INVERT (start / end)	INVERT LEVEL OF DRAIN (start / end)	LENGTH
X/25 – 15/25	525	HDPE	0.45%	220.34			4.131 / 4.098	0.251		1.709 / 1.828	3.191 / 3.120	15.703
15/25 – 14/25	600	HDPE	0.20%	500.01			4.063 / 4.046	0.248		1.845 / 1.633	3.103 / 3.072	15.811
14/25 – 13/25	600	HDPE	0.25%	400.00			3.909 / 3.685	0.422		1.653 / 3.175	3.052 / 2.888	65.560
13/25 – 12/25	600	HDPE	0.25%	400.00			3.643 / 3.556	0.573		3.195 / 3.179	2.868 / 2.777	36.290
12/25 – 11/25	750	HDPE	0.37%	267.70			3.488 / 3.316	0.782		3.199 / 3.063	2.757 / 2.677	21.383
11/25 – 10/25	750	HDPE	0.40%	251.26			3.316 / 3.198	0.785		3.105 / 2.998	2.635 / 2.567	17.084
10/25 – 09/25	900	HDPE	0.43%	233.14			3.176 / 3.072	0.824		3.053 / 2.713	2.512 / 2.253	60.441
09/25 – 08/25	1050	HDPE	0.30%	333.33			3.015 / 2.999	1.151		2.978 / 3.280	1.988 / 1.940	16.118
08/25 – 07/25	1050	HDPE	0.40%	250.00			2.915 / 2.861	1.208		3.300 / 3.034	1.920 / 1.730	47.454
07/25 – 06/25	1050	HDPE	0.40%	250.00			2.777 / 2.717	1.311		3.074 / 2.851	1.690 / 1.521	42.253
06/25 – 05/25	1050	HDPE	0.40%	250.00			2.623 / 2.582	1.483		2.891 / 3.255	1.481 / 1.393	22.190
05/25 – 04/25	1200	HDPE	0.45%	222.22			2.411 / 2.297	2.303		3.405 / 2.694	1.243 / 1.037	45.625
04/25 – 03/25	1200	HDPE	0.45%	222.22			2.191 / 2.106	2.302		2.714 / 3.094	1.017 / 0.864	34.017
03/25 – 02/25	1200	HDPE	0.45%	222.22			1.998 / 1.848	2.302		3.114 / 3.491	0.844 / 0.577	59.290
02/25 – 01/25	1200	HDPE	0.45%	222.22			1.742 / 1.710	2.303		3.511 / 3.500	0.557 / 0.500	12.735
01/25 (outlet)							1.710			3.500	0.500	

LINE 25

REVISION		DATE	DES/DFT	WVR	APP'D
E	Re-issue for Construction	23/08/21	AY/AY	0020	GP
D	Re-issue for Construction	12/08/21	AY/EG	0017	GP
C	Re-issue for Construction	4/08/21	EW/EG	0014	GP
B	Drainage Updated	7/07/21	AC/KM	0011	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

....

Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader: G. Pereira
Designed: D. Rapson
Drawn: K. McCoy
Checked: D. Rapson
Authorised: G. Pereira
Date: May-2021

Scale @ A1
H 1:1000 V 1:100
Scale H1:1000, V1:100

SMEC
Member of the Surbana Jurong Group
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SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com
Adelaide +61 8 8225 9800 Geelong +61 3 5228 3100
Brisbane +61 7 3831 8988 Melbourne +61 3 9869 0800
Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Longitudinal Sections
Drawing No. 2521E-01-333 **Rev E**
Dev. App. No.
Sheet No. 3 of 4

Issue for Construction

DESIGN ARI	STRUCTURE No.	DRAIN SECTION	Tc SUB-CATCHMENT TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/h)	A SUB-CATCHMENT AREA (ha)	CA EQUIVALENT AREA (ha)	Qc SUB-CATCHMENT DISCHARGE (L/s)	Qa FLOW IN K&C (INC. BYPASS) (L/s)	HALF ROAD CAPACITY (L/s)	FLOW WIDTH (m)	FLOW DEPTH (m)	FLOW DxV (m^2/s)	ROAD GRADE AT INLET (%)	ROAD XFALL AT INLET (%)	INLET TYPE	INLET CURVE	Qg FLOW INTO INLET (L/s)	Qb BYPASS FLOW (L/s)	BYPASS STRUCTURE No.	Tc CRITICAL TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/hr)	CA TOTAL (C x A) (ha)	Qrat PEAK FLOW (L/s)	Q PIPE FLOW (L/s)
LOCATION			SUB-CATCHMENT RUNOFF					INLET DESIGN												DRAIN DESIGN				
10	03/8	03/8 to 02/8	5	215	0.318	0.273	163	163	15		0.228				SF1		163	0		5	215	0.273	163	163
10	02/8	02/8 to 01/8	5	215	0.066	0.057	34	60	193		0.028		0.23		SAL3D		60	0		5.14	213	0.33	195	221
10	01/8	01/8 to 11/12													MH1500					5.62	207	0.719	413	457
10	05/25														MH1500E600									
10	03/9	03/9 to 02/9	0	0	0	0	0	0			0				SF2		0	0		5	215	0	0	0
10	02/9	02/9 to 01/9	5	215	0.028	0.024	14	14							AL3E		0	14	8/12	5	215	0.024	14	0
10	01/9	01/9 to 04/11	5	215	0.027	0.023	14	14							AL3E		0	14	7/12	5.05	214	0.047	28	0
10	7/12		5	215	0.049	0.043	26	40	193		0.001			-24.97	SAL3D	SAG	40	0	01/13					
10	03/10	03/10 to 02/10	5	215	0.027	0.023	14	14	179	1.075	0.055	0.035	1	3.33	AL3E	1G,3.3X	0	14	8/12	5	215	0.023	14	0
10	02/10	02/10 to 01/10	5	215	0.018	0.016	9	9	179	0.89	0.049	0.028	1	3.33	AL3E	1G,3.3X	0	9	01/10	5.05	214	0.039	23	0
10	01/10	01/10 to 03/11	5	215	0.016	0.014	8	17	179	1.191	0.059	0.039	1	3.33	AL2E	1G,3.3X	0	17	01/14	5.08	214	0.426	253	222
10	6/12														MH1350									
10	9/12	07/12 to 06/12	5	215	0.181	0.155	93	93			0.176				SF2		93	0		5	215	0.155	93	93
10	8/12	06/12 to 05/12	5	215	0.061	0.053	32	60	193		0.028			-25.02	SAL3D	SAG	60	0	7/12	5.16	213	0.208	123	151
10	7/12	05/12 to 04/12	5	215	0.049	0.043	26	40	193		0.001			-24.97	SAL3D	SAG	40	0	01/13	5.22	212	0.297	175	189
10	6/12	04/12 to 03/12													MH1350					5.4	209	0.727	423	406
10	5/12	03/12 to 02/12													MH1350					5.84	204	0.789	447	393
10	4/12	02/12 to 01/12													MH1500					6.16	200	1.171	652	652
10	3/12	A													MH1500					6.41	198	1.171	644	644
10	2/12	A													MH1500					6.58	196	1.626	886	861
10	1/12	A													MH1500					7.71	185	1.781	917	804
10	05/25														MH1500E600									
10	01/13	01/13 to 02/11	5	215	0.045	0.039	23	23	179	1.345	0.064	0.045	1	3.33	AL2E	1G,3.3X	0	23	01/15	5	215	0.039	23	0
10	5/12														MH1350									
10	01/14	01/14 to 02/11	5	215	0.026	0.023	14	31	179	1.522	0.07	0.053	1	3.33	AL2E	1G,3.3X	0	31	01/16	5	215	0.023	14	0
10	5/12														MH1350									
10	01/15	01/15 to 01/11	5	215	0.052	0.045	27	50	38		0		1	3.33	SAL3D	SAG	38	12	01/16	5	215	0.045	27	38
10	4/12														MH1500									
10	01/16	01/16 to 01/11	5	215	0.036	0.032	19	62	39		0.03		1	3.33	SAL3D		62	0		5.12	213	0.336	199	242
10	4/12														MH1500									
10	01/17	01/17 to 01/16	5	215	0.355	0.304	182	182			0.386				SF2		182	0		5	215	0.304	182	182
10	01/16		5	215	0.036	0.032	19	62	39		0.03		1	3.33	SAL3D		62	0						
10	02/18	02/18 to 01/18	5	215	0.05	0.044	26	26	266	1.414	0.066	0.048	1		AL3E		0	26	02/8	5	215	0.044	26	0
10	01/18	01/18 to 12/12													MH1200					5.26	211	0.338	198	149
10	01/8														MH1500									
10	01/19	01/19 to 02/19	5	215	0.297	0.255	152	152	2		0.273				SF2		152	0		5	215	0.255	152	152
10	02/19	02/19 to 01/18	5	215	0.045	0.039	23	23	267	1.348	0.064	0.045	1		AL3E		0	23	01/64	5.24	212	0.294	173	150
10	01/18														MH1200									
10	01/20	01/20 to 02/20	5	215	0.388	0.333	199	199	3		0.464				SF2		199	0		5	215	0.333	199	199
10	02/21		5	215	0.051	0.044	26	40	175	1.695	0.076	0.06	0.96	3.33	AL2E	1G,3.3X	0	40	LOST					
10	04/21	04/21 to 03/21	5	215	0.026	0.022	13	13	153	1.129	0.056	0.032	0.77	3.14	AL2E	1G,3.3X	0	13	01/22	5	215	0.022	13	0
10	03/21	03/21 to 02/21	5	215	0.026	0.022	13	13	152	1.127	0.056	0.032	0.77	3.14	AL2E	1G,3.3X	0	13	02/21	5.05	214	0.045	27	0
10	02/21	02/21 to 01/21	5	215	0.051	0.044	26	40	175	1.695	0.076	0.06	0.96	3.33	AL2E	1G,3.3X	0	40	LOST	5.16	213	0.42	248	195
10	01/21	01/21 to 03/25													MH1050					5.19	212	0.464	274	194
10	08/25														MH									
10	01/22	01/22 to 01/21	5	215	0.051	0.044	26	40	175	1.693	0.076	0.06	0.96	3.33	AL2E	1G,3.3X	0	40	01/34	5	215	0.044	26	0
10	01/21														MH1050									
10	01/23	01/23 to 02/23	5	215	0.238	0.204	122	122	2		0.215				SF2		122	0		5	215	0.204	122	122
10	02/23	02/23 to 03/23	5	215	0.105	0.091	55	55	20		0		1.73		SAL2D	SAG	20	35	01/24	5.17	213	0.296	175	140
10	03/23	03/23 to 04/23													MH1050					5.22	212	0.379	223	159
10	04/23														PC									
10	01/24	01/24 to 03/23	5	215	0.096	0.084	50	84	20		0		1.73		SAL2D	SAG	20	64	1/Dummy	5	215	0.084	50	20
10	03/23														MH1050									
10	15/25	15/25 to 14/25													MH1050					5	215	0	0	0
10	14/25	14/25 to 13/25													MH1350					5.22	212	0.319	188	188
10	13/25	13/25 to 12/25													MH1200					5.89	203	0.557	315	315
10	12/25	12/25 to 11/25													MH1350					6.25	199	0.919	509	465
10	11/25	11/25 to 10/25													MH1200					6.46	197	0.919	504	459
10	10/25	10/25 to 09/25													MH1350					6.63	196	0.982	534	452
10	09/25	09/25 to 08/25													MH1500					7.1	191	1.619	859	817
10	08/25	08/25 to 07/25													MH					6.68	195	2.048	1110	989
10	07/25	07/25 to 06/25													MH1500					7.07	191	2.317	1232	1066
10	06/25	06/25 to 05/25													MH1500					7.37	188	2.643	1382	1282
10	05/25	05/25 to 04/25													MH1500E600					7.8	185	5.182	2658	2488
10	04/25	04/25 to 03/25													MH1500					8.01	183	5.161	2622	2453
10	03/25	03/25 to 02/25													MH1500					8.08	182	5.12	2592	2422
10	02/25	02/25 to 01/25													MH1500					8.93	175	5.241	2554	2385
10	01/25														HW									
10	01/26	01/26 to 02/26	5	215	0.113	0.097	58	58	29		-0.578			25	EB2		58	0		5	215	0.097	58	58
10	02/26	02/26 to 09/25	5	215	0.066	0.058	34	34	166		0.021		1.56	3.65	SAL2D	SAG	34	0	LOST	5.17	213	0.155	91	91
10	14/25														MH1350									
10	01/27	01/27 to 02/27	5	215	0.119	0.102	61	61	6		0.118				SF1		61	0		5	215	0.102	61	61
10	02/27	02/27 to 09/25	5	215	0.071	0.062	37	37	166		0.025		1.56	3.65	SAL2D	SAG	37	0	LOST	5.13	213	0.165	97	97
10	14/25														MH1350									
10	01/28	01/28 to 08/25	5	215	0.153	0.132	79	79			0.139			25	SF1		79	0		5	215	0.132	79	79
10	13/25														MH1200									
10	01/29	01/29 to 08/25	5	215	0.122	0.104	62	62	310		0.119				SF1		62	0		5	215	0.104	62	62
10	13/25														MH1200									
10	01/30	01/30 to 02/30	5	215	0.17	0.146	87	87			0.15				SF1		87	0		5	215	0.146	87	87
10	02/30	02/30 to 07/25	5	215	0.043	0.037	22	22	405	2.1	0.051	0.03	1	3.33	AL2E	1G,3.3X	0	22	01/32	5.17	213	0.184	108	86
10	12/25														MH1350									
10	01/31	01/31 to 02/31	5	215	0.157	0.134	80	80	7		0.142				SF1		80	0		5	215	0.134	80	80
10	02/31	02/31 to 07/25	5	215	0.042	0.037	22	22	405	2.09	0.051	0.03	1	3.33	AL2E	1G,3.3X	0	22	01/33	5.15	213	0.171	101	79
10	12/25														MH1350									
10	01/32	01/32 to 05/25	5	215	0.038	0.033	20	42	416	2.829	0.062	0.041	0.96	3.34	AL2E	1G,3.3X	0	42	LOST	5	215	0.033	20	0
10	10/25														MH1350									
10	01/33	01/33 to 05/25	5	215	0.034	0.03	18	40	403	2.678	0.06	0.041	1.04	3.34	AL2E	1G,3.3X	0	40	LOST	5	215	0.03	18	0
10	10/25														MH1350									
10	02/34	02/34 to 01/34	5	215	0.352	0.302	180	180			0.38			0.63	SF2		180	0		5	215	0.302	180	180
10	01/34	01/34 to 04/25	5	215	0.068	0.059	35	75	166		0.07		0.74	3.4	SAL2D	SAG	75	0	LOST	5.17	213	0.361	213	253
10	09/25														MH1500									
10	02/35	02/35 to 01/35	5	215	0.239	0.205	122	122			0.216			21.91	SF2		122	0		5	215	0.205	122	122
10	01/35	01/35 to 04/25	5	215	0.066	0.057	34	34	166		0.02		0.74	3.4	SAL2D	SAG	34	0	01/36	5.15	213	0.262	155	155
10	09/25														MH1500									
10	01/36	01/36 to 02/25	5	215	0.044	0.038	23	23	175	1.348	0.064	0.044	0.96	3.33	AL2E	1G,3.3X	0	23	01/39	5	215	0.038	23	0
10	07/25														MH1500									
10	01/37	01/37 to 02/37	5	215	0.218	0.187	112	112			0.176				SF1		112	0		5	215	0.187	112	112
10	02/37	02/37 to 02/25	5	215	0.042	0.036	22	22	175	1.318	0.063	0.043	0.96	3.33	AL2E	1G,3.3X	0	22	02/38	5.12	213	0.223	132	111
10	07/25														MH1500									
10	01/38	01/38 to 02/38	5	215	0.314	0.269	161	161			0.225			6.01	SF1		161	0		5	215	0.269	161	161
10	02/38	02/38 to 01/25	5	215	0.055	0.048	29	94	166		0.081		0.38	3.45	SAL2D	SAG	94	0	LOST	5.13	213	0.317	188	253

STRUCTURE No.	L REACH LENGTH (m)	S PIPE GRADE (%)	PIPE SIZE (mm)	PIPE CLASS	Vf=Q/A FULL PIPE VELOCITY (m/s)	Qcap CAPACITY FLOW (L/s)	Vcap CAPACITY VELOCITY (m/s)	Vt TRAVEL VELOCITY (m/s)	CHART(S) USED	Vf^2/2g VELOCITY HEAD (m)	Ku U/S HEAD LOSS COEFFICIENT	hu U/S HEAD LOSS (m)	Kw W.S.E COEFFICIENT	hw CHANGE IN W.S.E (m)	Sf PIPE FRICTION SLOPE (%)	hf PIPE FRICTION HEAD LOSS (m)	dn NORMAL DEPTH (m)	Vn DEPTH VEL. (m/s)	PIPE U/S I.L (m)	PIPE D/S I.L (m)	PIPE U/S H.G.L (m)	PIPE D/S H.G.L (m)	W.S.E (m)	GRATE LEVEL (m)	STRUCTURE No.
	DRAIN DESIGN								HEAD LOSSES								PART FULL		DESIGN LEVELS						
03/8	15.652	1	600	RCP	0.58	614	2.17	1.84	G1	0.017	7	0.119		0.119	0.97	0.152	0.211	1.84	2.289	2.132	2.889	2.736	3.007	4.32	03/8
02/8	5.093	1	600	RCP	0.78	614	2.17	1.99	T1/T2	0.031	1.41	0.044		0.044	0.35	0.018	0.249	1.99	2.092	2.041	2.692	2.674	2.736	4.402	02/8
01/8	19.884	1	900	RCP	0.72	1811	2.85	2.37	T4/T8	0.026	1.26	0.033	1.32	0.035	0.19	0.038	0.308	2.37	1.741	1.543	2.641	2.604	2.676	4.486	01/8
05/25									T4		0.59	0.145		0.145									2.604	4.656	05/25
03/9	13.288	1	525	RCP	0	430	1.99	2		0	0	0		0	0	0	0	0	2.955	2.822	3.071	3.071	3.071	3.931	03/9
02/9	6.042	1	525	RCP	0	430	1.99	2		0	2	0		0	0	0	0	0	2.802	2.741	3.071	3.071	3.071	5.221	02/9
01/9	43.008	0.5	600	RCP	0	434	1.54	2		0	0	0		0	0	0	0	0	2.666	2.451	3.071	3.071	3.071	5.221	01/9
7/12									T4/T8		1.77	0.04	1.99	0.045									3.077	3.898	7/12
03/10	6.042	1.5	375	RCP	0	215	1.95	2		0	0	0		0	1.5	0.091	0	0	4.188	4.098	4.188	4.098	4.188	5.245	03/10
02/10	25.261	1.5	450	RCP	0	351	2.2	2		0	0	0		0	1.5	0.379	0	0	4.023	3.644	4.023	3.644	4.023	5.245	02/10
01/10	2.02	2	600	RCP	0.79	869	3.07	2.57	T1	0.031	0.2	0.006		0.006	10.1	0.184	0.207	2.57	2.544	2.503	3.144	2.939	3.15	4.992	01/10
6/12									T8/T10		1.75	0.036	2.16	0.045									2.948	5.079	6/12
9/12	13.105	0.7	375	RCP	0.84	147	1.33	1.4	G1	0.036	6.23	0.223		0.223	0.28	0.037	0.216	1.4	2.789	2.697	3.194	3.157	3.417	3.766	9/12
8/12	5.787	0.7	450	RCP	0.95	239	1.5	1.59	T1/T2	0.046	1.5	0.069		0.069	0.28	0.016	0.26	1.59	2.622	2.581	3.088	3.071	3.157	3.954	8/12
7/12	18.297	0.7	600	RCP	0.67	514	1.82	1.68	T4/T8	0.023	1.77	0.04	1.99	0.045	0.5	0.092	0.252	1.68	2.431	2.303	3.031	2.939	3.077	3.898	7/12
6/12	42.595	0.37	900	RCP	0.64	1102	1.73	1.6	T8/T10	0.021	1.75	0.036	2.16	0.045	0.09	0.038	0.378	1.6	2.003	1.845	2.903	2.865	2.948	5.079	6/12
5/12	41.789	0.37	900	RCP	0.62	1102	1.73	1.59	T1	0.019	0.2	0.004		0.004	0.05	0.02	0.371	1.59	1.825	1.671	2.861	2.842	2.865	4.653	5/12
4/12	22.13	0.2	1050	RCP	0.75	1222	1.41	1.43	T2/T4	0.029	0.48	0.014		0.014	0.06	0.013	0.546	1.43	1.651	1.606	2.828	2.815	2.842	4.235	4/12
3/12	21.927	0.2	1050	RCP	0.74	1222	1.41	1.43	T10	0.028	2.09	0.059	2.66	0.075	0.06	0.012	0.542	1.43	1.586	1.543	2.756	2.744	2.831	4.598	3/12
2/12	98.181	0.2	1050	RCP	0.99	1222	1.41	1.53	T2/T4	0.05	0.3	0.015		0.015	0.1	0.098	0.651	1.53	1.523	1.326	2.729	2.631	2.744	4.487	2/12
1/12	21.824	0.2	1050	RCP	0.93	1222	1.41	1.51	T1	0.044	0.2	0.009		0.009	0.09	0.019	0.622	1.51	1.306	1.263	2.623	2.604	2.631	4.866	1/12
05/25									T4		0.59	0.145		0.145									2.604	4.656	05/25
01/13	4.015	2	375	RCP	0	248	2.25	2		0	0	0		0	2	0.08	0	0	3.406	3.325	3.406	3.325	3.406	4.566	01/13
5/12									T1		0.2	0.004		0.004									2.865	4.653	5/12
01/14	2.025	0.4	375	RCP	0	111	1	2		0	0	0		0	0.4	0.008	0	0	3.434	3.425	3.434	3.425	3.434	4.566	01/14
5/12									T1		0.2	0.004		0.004									2.865	4.653	5/12
01/15	4.002	2	375	RCP	0.35	248	2.25	1.63	G2	0.006	9.7	0.06		0.06	8.88	0.226	0.1	1.63	3.031	2.951	3.406	3.051	3.466	4.15	01/15
4/12									T2/T4		0.48	0.014		0.014									2.842	4.235	4/12
01/16	1.998	2	525	RCP	1.12	608	2.81	2.65	T4	0.064	0.89	0.056		0.056	0.32	0.006	0.23	2.65	2.291	2.251	2.848	2.842	2.904	4.148	01/16
4/12									T2/T4		0.48	0.014		0.014									2.842	4.235	4/12
01/17	13.518	1	375	RCP	1.65	175	1.59	1.8	G1	0.122	3.82	0.467		0.467	0.95	0.128	0.321	1.8	2.576	2.441	3.033	2.904	3.5	3.5	01/17
01/16									T4		0.89	0.056		0.056									2.904	4.148	01/16
02/18	5.07	0.5	375	RCP	0	125	1.13	2		0	0	0		0	0.5	0.025	0	0	3.242	3.217	3.242	3.217	3.242	4.641	02/18
01/18	30.042	0.5	675	RCP	0.42	595	1.66	1.38	T10	0.009	2.09	0.018	2.66	0.024	0.39	0.117	0.23	1.38	2.117	1.966	2.792	2.674	2.815	4.725	01/18
01/8									T4/T8		1.26	0.033	1.32	0.035									2.676	4.486	01/8
01/19	19.95	0.5	450	RCP	0.96	202	1.27	1.39	G1	0.047	6.31	0.295		0.295	0.45	0.09	0.292	1.39	2.451	2.351	2.901	2.811	3.197	3.294	01/19
02/19	1.97	0.5	600	RCP	0.53	434	1.54	1.39	T1	0.014	0	0		0	0.06	0.001	0.243	1.39	2.201	2.192	2.811	2.81	2.811	4.641	02/19
01/18									T10		2.09	0.018	2.66	0.024									2.815	4.725	01/18
01/20	14.029	0.5	525	RCP	0.92	304	1.41	1.5	G1	0.043	6.76	0.291		0.291	0.59	0.082	0.31	1.5	2.793	2.723	3.318	3.235	3.609	4.076	01/20
02/21									T1/T2		0.22	0.009		0.009									3.235	5.323	02/21
04/21	6.041	1	375	RCP	0	175	1.59	2		0	2	0		0	1	0.06	0	0	4.674	4.614	4.674	4.614	4.674	5.743	04/21
03/21	43.851	1	450	RCP	0	286	1.8	2		0	0	0		0	1	0.439	0	0	4.539	4.1	4.539	4.1	4.539	5.743	03/21
02/21	4.021	1	525	RCP	0.9	430	1.99	1.94	T1/T2	0.041	0.22	0.009		0.009	0.21	0.008	0.248	1.94	2.683	2.642	3.226	3.218	3.235	5.323	02/21
01/21	19.732	1	600	RCP	0.69	614	2.17	1.93	T10	0.024	2.09	0.05	2.66	0.064	0.55	0.109	0.232	1.93	2.567	2.37	3.167	3.058	3.231	5.41	01/21
08/25									T4/T8		1.32	0.088	1.39	0.093									3.063	5.22	08/25
01/22	2.021	2	375	RCP	0	248	2.25	2		0	0	0		0	2	0.04	0	0	4.108	4.067	4.108	4.067	4.108	5.323	01/22
01/21									T10		2.09	0.05	2.66	0.064									3.231	5.41	01/21
01/23	14.479	0.6	375	RCP	1.1	136	1.23	1.39	G1	0.062	3.68	0.229		0.229	0.48	0.07	0.278	1.39	2.965	2.879	3.696	3.626	3.925	4.246	01/23
02/23	3.521	0.6	375	RCP	1.27	136	1.23	1.4	T1	0.082	0.71	0.059		0.059	0.64	0.022	0.319	1.4	2.859	2.837	3.567	3.545	3.626	4.116	02/23
03/23	12.991	0.6	450	RCP	1	221	1.39	1.51	T10	0.051	2.06	0.105	2.54	0.129	0.31	0.04	0.283	1.51	2.762	2.684	3.44	3.4	3.57	4.252	03/23
04/23																							3.4	4.134	04/23
01/24	3.521	0.4	375	RCP	0.18	111	1	0.76	G2	0.002	7.62	0.013		0.013	0.01	0	0.108	0.76	2.852	2.837	3.545	3.545	3.558	4.116	01/24
03/23									T10		2.06	0.105	2.54	0.129									3.57	4.252	03/23
15/25	23.512	0.4	525	RCP	0	272	1.26	2		0	0	0		0	0	0	0	0	3.573	3.479	4.086	4.086	4.086	4.906	15/25
14/25	65.56	0.5	600	RCP	0.66	434	1.54	1.48	T10	0.023	2.09	0.047	2.65	0.06	0.48	0.317	0.276	1.48	3.439	3.112	4.039	3.723	4.099	4.753	14/25
13/25	36.29	0.5	600	RCP	1.11	434	1.54	1.67	T2/T4	0.063	0.49	0.031		0.031	0.44	0.159	0.379	1.67	3.092	2.91	3.692	3.533	3.723	6.06	13/25
12/25	21.383	0.4	750	RCP	1.05	704	1.59	1.7	T2/T4	0.056	0.41	0.023		0.023	0.52	0.111	0.445	1.7	2.76	2.675	3.51	3.398	3.533	5.956	12/25
11/25	17.084	0.4	750	RCP	1.04	704	1.59	1.7	T1/T2	0.055	0.24	0.013		0.013	0.56	0.094	0.441	1.7	2.635	2.566	3.385	3.289	3.398	5.74	11/25
10/25	60.441	0.4	750	RCP	1.02	704	1.59	1.69	T1/T2	0.053	0.24	0.013		0.013	0.22	0.131	0.437	1.69	2.526	2.285	3.276	3.145	3.289	5.566	10/25
09/25	16.118	0.4	900	RCP	1.28	1145	1.8	1.96	T4/T8	0.084	0.65	0.054	0.65	0.055	0.2	0.033	0.562	1.96	2.135	2.07	3.091	3.058	3.146	4.967	09/25
08/25	47.454	0.4	1050	RCP	1.14	1728	2	2.06	T4/T8	0.067	1.32	0.088	1.39	0.093	0.44	0.207	0.569	2.06	1.92	1.73	2.97	2.763	3.063	5.22	08/25
07/25	42.253	0.4	1050	RCP	1.23	1728	2	2.1	T1/T2	0.077	0.23	0.018		0.018	0.15	0.064	0.597	2.1	1.69	1.521	2.745	2.681	2.763	4.764	07/25
06/25	22.19	0.4	1050	RCP	1.48	1728	2	2.18	T1/T2	0.112	0.25	0.028		0.028	0.22	0.049	0.674	2.18	1.481	1.393	2.653	2.604	2.681	4.374	06/25
05/25	45.625	0.45	1200	RCP	2.2	2616	2.31	2.63	T4	0.247	0.59	0.145		0.145	0.41	0.186	0.935	2.63	1.243	1.037	2.459	2.273	2.604	4.656	05/25
04/25	34.017	0.45	1200	RCP	2.17	2616	2.31	2.63	T1	0.24	0.2	0.048		0.048	0.4	0.135	0.923	2.63	1.017	0.864	2.225	2.091	2.273	3.731	04/25
03/25	50	0.45	1200	RCP	2.14	2616	2.31	2.63	T1	0.234	0.2	0.047		0.047	0.4	0.2	0.912	2.63	0.844	0.619	2.044	1.844	2.091	3.958	03/25
02/25	22.025	0.45	1200	RCP	2.11	2616	2.31	2.62	T1	0.227	0.2	0.045		0.045	2.03	0.28	0.9	2.62	0.599	0.5	1.799	1.352	1.844	4.12	02/25
01/25																							1.352	4	01/25
01/26	11.176	0.5	450	RCP	0.36	202	1.27	1.09	G1	0.007	7	0.047		0.047	0.04	0.005	0.165	1.09	3.554	3.498	4.124	4.12	4.171	4.408	01/26
02/26	3.761	0.5	450	RCP	0.57	202	1.27	1.24	T1/T2	0.017	1.74	0.029		0.029	0.1	0.004	0.212	1.24	3.478	3.459	4.09	4.086	4.12	4.652	02/26
14/25									T10		2.09	0.047	2.65	0.06									4.099	4.753	14/25
01/27	11.298	1	450	RCP	0.38	285	1.79	1.43	G1	0.008	7	0.053		0.053	0.05	0.005	0.142	1.43	3.615	3.502	4.127	4.122	4.18	4.5	01/27
02/27	2.281	1	450	RCP	0.61	285	1.79	1.62	T1/T2	0.019	1.72	0.033		0.033	0.12	0.003	0.181	1.62	3.482	3.459	4.089	4.086	4.122	4.652	02/27
14/25									T10		2.09	0.047	2.65	0.06									4.099	4.753	14/25
01/28	19.532	1	450	RCP	0.49	285	1.79	1.53	G1	0.012	7	0.087		0.087	0.17	0.034	0.161	1.53	3.307	3.112	3.757	3.723	3.844	4.188	01/28
13/25									T2/T4		0.49	0.031		0.031									3.723	6.06	13/25
01/29	15.432	1	375	RCP	0.56	175	1.59	1.45	G1	0.016	6.73	0.109		0.109	0.13	0.02	0.155	1.45	3.266	3.112	3.742	3.723	3.852	4.5	01/29
13/25									T2/T4		0.49	0.031		0.031									3.723	6.06	13/25
01/30	15.455	1	525	RCP	0.4	430	1.99	1.56	G1	0.008	7	0.058		0.058	0.04	0.006	0.16	1.56	2.995	2.84	3.543	3.536	3.601	4.162	01/30
02/30	4.019	1	525	RCP	0.4	430	1.99	1.55	T1/T2	0.008	0.2	0.002		0.002	0.04	0.002	0.159	1.55	2.82	2.78	3.535	3.533	3.536	5.869	02/30
12/25									T2/T4		0.41	0.023		0.023									3.533	5.956	12/25
01/31	13.814	1	525	RCP	0.37	430	1.99	1.52	G1	0.007	7	0.049		0.049	0.03	0.005	0.154	1.52	2.959	2.82	3.54	3.535	3.589	4.5	01/31
02/31	2.023	1	525	RCP	0.37	430	1.99	1.52	T1	0.007	0.2	0.001		0.001	0.03	0.001	0.153	1.52	2.8	2.78	3.534	3.533	3.535	5.869	02/31
12/25									T2/T4		0.41	0.023		0.023									3.533	5.956	12/25
01/32	4.041	1	375	RCP	0	175	1.59	2		0	0	0		0	1	0.04	0	0	4.367	4.326	4.367	4.326	4.367	5.48	01/32
10/25									T1/T2		0.24	0.013		0.013									3.289	5.566	10/25
01/33	2.024	1	375	RCP	0	175	1.59	2		0	0	0		0	1	0.02	0	0	4.347	4.326	4.347	4.326	4.347	5.479	01/33
10/25									T1/T2		0.24	0.013		0.013									3.289	5.566	10/25
02/34	14.743	0.5	600	RCP	0.64	434	1.54	1.46	G1	0.021	7	0.145		0.145	0.23	0.034	0.269	1.46	3.049	2.975	3.649	3.616	3.794	4.167	02/34
01/34	4.167	0.5	600	RCP	0.89	434	1.54	1.59	T1/T2	0.041	1.47	0.06		0.06	7.06	0.203	0.329	1.59	2.955	2.935	3.555	3.261	3.616	4.878	01/34
09/25									T4/T8		0.65	0.054	0.65	0.055									3.146	4.967	09/25
02/35	12.256	0.5	525	RCP	0.56	304	1.41	1.33	G1	0.016	7	0.114		0.114	0.57	0.07	0.232	1.33	3.046	2.985	3.571	3.501	3.685	4.305	02/35
01/35	2.024	0.5	525	RCP	0.72	304	1.41	1.41	T1/T2	0.026	1.2	0.031		0.031	13.42	0.194	0.265	1.41	2.945	2.935	3.47	3.198	3.501	4.878	01/35
09/25									T4/T8		0.65	0.054	0.65	0.055									3.146	4.967	09/25
01/36	2.006	1	375	RCP	0	175	1.59	2		0	0	0		0	1	0.02	0	0	3.51	3.49	3.51	3.49	3.51	4.677	01/36
07/25									T1/T2		0.23	0.018		0.018									2.763	4.764	07/25
01/37	11.848	1	525	RCP	0.52	430	1.99	1.67	G1	0.014	7	0.095		0.095	1.15	0.136	0.182	1.67	3.069	2.951	3.594	3.458	3.689	4.145	01/37
02/37	4.034	1	525	RCP	0.51	430	1.99	1.66	T1/T2	0.013	0.2	0.003		0.003	9.51	0.256	0.182	1.66	2.931	2.89	3.456	3.072	3.458	4.677	02/37
07/25									T1/T2		0.23	0.018		0.018									2.763	4.764	07/25
01/38	11.281	0.5	450	RCP	1.01	202	1.27	1.41	G1	0.052	5.57	0.29		0.29	0.32	0.036	0.304	1.41	3.333	3.276	3.865	3.829	4.155	4.278	01/38
02/38	4.044	0.5	525	RCP	1.17	304	1.41	1.57	T1/T2	0.07	1.47	0.102		0.102	5.07	0.127	0.366	1.57	3.201	3.181	3.726	3.522	3.829	4.287	02/38

		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP
REVISION					

Gustavo Pereira
RPEQ# 17514

....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

All setting out should be carried out in accordance with GAA/Council's standard drawings or as nominated on hard copy plans provided by SMEC. Any digital information supplied by this office is for information only. Any discrepancies should be discussed with the superintendent.

Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1

SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com
Adelaide +61 8 8225 9800 Geelong +61 3 5228 3100
Brisbane +61 7 3831 8988 Melbourne +61 3 9869 0800
Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Calculation Sheets - Minor Q10
Drawing No. 2521E-01-341 **Rev A**
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction

LOCATION			SUB-CATCHMENT RUNOFF					INLET DESIGN											DRAIN DESIGN																HEAD LOSSES							PART FULL		DESIGN LEVELS							
			Tc	I	A	CA	Qc	Qa								Qg	Qb		Tc	I	CA	Qrat	Q	L	S			Vf=Q/A	Qcap	Vcap	Vt																				
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	HALF ROAD CAPACITY	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	INLET CURVE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL(C x A)	PEAK FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	PIPE CLASS	FULL PIPE VELOCITY	CAPACITY FLOW	CAPACITY VELOCITY	TRAVEL VELOCITY	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	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	STRUCTURE No.
			min	mm/h	ha	ha	L/s	L/s	L/s	m	m	m^2/s	%	%			L/s	L/s		min	mm/hr	ha	L/s	L/s	m	%	mm		m/s	L/s	m/s	m/s		m		m		m			m	m/s	m	m	m	m	m	m	
10	06/25														MH1500																	T1/T2		0.25	0.028		0.028									2.681	4.374	06/25
10	01/39	01/39 to 02/39	5	215	0.054	0.047	28	51	193		0.016		0.38	3.51	SAL3D	SAG	51	0	02/8	5	215	0.047	28	51	2.001	2	375	RCP	0.46	248	2.25	1.76	G2	0.011	9.7	0.104		0.104	14.99	0.152	0.115	1.76	3.014	2.974	3.389	3.089	3.493	4.287	01/39
10	02/39														MH1500																															3.089	4.374	02/39
10	01/40	01/40 to 10/12	5	215	0.084	0.073	44	44	267	1.746	0.077	0.063	1		AL3E		0	44	02/38	5	215	0.073	44	0	5.021	2	450	RCP	0	403	2.54	2		0	0	0		0	2	0.1	0	0	3.607	3.506	3.607	3.506	3.607	4.78	01/40
10	1/12														MH1500																	T1		0.2	0.009		0.009									2.631	4.866	1/12
10	01/41	01/41 to 10/12	5	215	0.085	0.074	44	44	267	1.754	0.078	0.064	1		AL3E		0	44	01/64	5	215	0.074	44	0	2.021	2	450	RCP	0	403	2.54	2		0	0	0		0	2	0.04	0	0	3.647	3.606	3.647	3.606	3.647	4.78	01/41
10	1/12														MH1500																	T1		0.2	0.009		0.009									2.631	4.866	1/12
10	02/42	02/42 to 01/42	5	215	0.33	0.283	169	169	7		0.334				SF2		169	0		5	215	0.283	169	169	18.264	1	600	RCP	0.6	614	2.17	1.85	G1	0.018	5.65	0.103		0.103	0.08	0.014	0.215	1.85	1.795	1.613	2.777	2.763	2.879	3.515	02/42
10	01/42	01/42 to 09/12	5	215	0.094	0.082	49	49	190		0.026		0.65	3.69	SAL3E		49	0		5.16	213	0.365	215	215	5.022	1	675	RCP	0.6	841	2.35	1.97	T1/T2	0.018	0.84	0.015		0.015	0.07	0.003	0.233	1.97	1.593	1.543	2.747	2.744	2.763	4.398	01/42
10	2/12														MH1500																	T2/T4		0.3	0.015		0.015									2.744	4.487	2/12
10	01/43	01/43 to 09/12	5	215	0.1	0.087	52	52	27		0		0.65		SAL3E	SAG	27	25	1/Dummy	5	215	0.087	52	27	2.017	2	450	RCP	0.17	403	2.54	1.44	G2	0.001	9.7	0.014		0.014	20.4	0.307	0.079	1.44	3.163	3.123	3.613	3.201	3.627	4.398	01/43
10	2/12														MH1500																	T2/T4		0.3	0.015		0.015									2.744	4.487	2/12
10	01/54	01/54 to 01/10	5	215	0.437	0.375	224	224			0.5			28.57	SF2		224	0		5	215	0.375	224	224	9.343	1	525	RCP	1.03	430	1.99	2.01	G1	0.055	6.31	0.345		0.345	0.34	0.032	0.269	2.01	2.657	2.564	3.182	3.15	3.527	3.61	01/54
10	01/10		5	215	0.016	0.014	8	17	179	1.191	0.059	0.039	1	3.33	AL2E	1G,3.3X	0	17	01/14													T1		0.2	0.006		0.006									3.15	4.992	01/10
10	01/55	01/55 to 02/55	5	215	0.295	0.253	151	151	76		-0.134				EB2		151	0		5	215	0.253	151	151	12.413	0.5	525	RCP	0.7	304	1.41	1.4	G1	0.025	4.31	0.107		0.107	0.12	0.015	0.261	1.4	1.15	1.088	2.216	2.201	2.323	3.42	01/55
10	02/55	02/55 to 03/55	0	0	0	0	0	0					2.91	3.33	AL2E	2G,3.3X	0	0	LOST	5.15	213	0.253	150	150	6.388	0.5	525	RCP	0.69	304	1.41	1.4	T1/T2	0.024	0.22	0.005		0.005	0.12	0.008	0.26	1.4	1.068	1.036	2.195	2.188	2.201	4.04	02/55
10	03/55	03/55 to 04/55	5	215	0.081	0.071	42	42	2028	6.134	0.06	0.059		3	AL2E		42	0		5.22	212	0.324	191	191	7.314	0.5	525	RCP	0.88	304	1.41	1.48	T8/T10	0.04	1.85	0.073	2.2	0.087	0.2	0.014	0.301	1.48	1.016	0.979	2.114	2.1	2.201	4.033	03/55
10	04/55														PC																															2.1	3.892	04/55
10	01/57	01/57 to 02/57	5	215	0.186	0.16	95	95	48		-0.246				EB2		95	0		5	215	0.16	95	95	10.441	2	375	RCP	0.86	248	2.25	2.1	G1	0.038	6.36	0.242		0.242	2.12	0.22	0.161	2.1	3.218	3.009	3.593	3.372	3.835	4.3	01/57
10	02/57	02/57 to 03/57	5	215	0.057	0.05	30	30	342	1.129	0.057	0.07	3.74	3.33	AL2E	4G,3.3X	0	30	LOST	5.08	214	0.209	124	95	5.797	2	375	RCP	0.86	248	2.25	2.09	T1/T2	0.037	0.2	0.008		0.008	5.7	0.144	0.161	2.09	2.989	2.873	3.364	3.034	3.372	4.373	02/57
10	03/57	03/57 to 04/57	5	215	0.058	0.051	30	30	342	1.139	0.057	0.071	3.74	3.33	AL2E	4G,3.3X	0	30	LOST	5.13	213	0.26	154	94	17.166	2	375	RCP	0.85	248	2.25	2.09	T10	0.037	2.09	0.077	2.66	0.098	3.25	0.372	0.16	2.09	2.373	2.03	2.748	2.19	2.847	4.373	03/57
10	04/57														MH1050																															2.19	3.9	04/57
10	02/58	02/58 to 01/58	5	215	0.191	0.163	98	98							SF1		98	0		5	215	0.163	98	98	16.468	0.25	525	RCP	0.45	215	0.99	0.97	G1	0.01	4	0.041		0.041	0.05	0.008	0.248	0.97	1.7	1.659	2.908	2.9	2.95	3.643	02/58
10	01/58														MH1050																															2.9	3.422	01/58
10	01/59	01/59 to 02/59	5	215	0.136	0.117	70	70	35		0.145				EB2		70	0		5	215	0.117	70	70	7.961	1	375	RCP	0.63	175	1.59	1.5	G1	0.02	7	0.143		0.143	3.64	0.196	0.165	1.5	2.11	2.03	2.485	2.195	2.627	4	01/59
10	02/59														MH1050																															2.195	4	02/59
10	01/60	01/60 to 02/60	5	215	0.172	0.148	88	88	44						EB2		88	0		5	215	0.148	88	88	19.969	0.4	375	RCP	0.8	111	1	1.11	G1	0.032	3.27	0.106		0.106	0.25	0.05	0.252	1.11	2.17	2.09	3.15	3.1	3.257	4	01/60
10	02/60														MH1050																															3.1	3.18	02/60
10	01/61	01/61 to 02/61	5	215	0.196	0.168	100	100	50						EB2		100	0		5	215	0.168	100	100	19.837	0.4	375	RCP	0.91	111	1	1.14	G1	0.042	3.24	0.137		0.137	0.33	0.065	0.28	1.14	1.904	1.825	2.865	2.8	3.002	4.25	01/61
10	02/61														MH1050																															2.8	3.35	02/61
10	01/62	01/62 to 02/62	5	215	0.178	0.153	91	91	46						EB2		91	0		5	215	0.153	91	91	19.682	0.4	375	RCP	0.83	111	1	1.12	G1	0.035	3.58	0.125		0.125	0.27	0.053	0.259	1.12	2.189	2.11	3.053	3	3.178	5	01/62
10	02/62														MH1050																															3	3.5	02/62
10	01/63	01/63 to 02/63	5	215	0.291	0.25	149	149	75						EB2		149	0		5	215	0.25	149	149	17.211	0.2	750	RCP	0.34	498	1.13	0.98	G1	0.006	5.48	0.032		0.032	0.02	0.003	0.281	0.98	0.75	0.716	2.103	2.1	2.135	3.986	01/63
10	02/63														MH1050																															2.1	3	02/63
10	01/64	01/64 to 12/12	5	215	0.056	0.049	29	96	193		0.066		0.23		SAL3D	SAG	96	0	LOST	5	215	0.049	29	96	1.928	2	375	RCP	0.87	248	2.25	2.28	G2	0.039	7.95	0.309		0.309	13.03	0.064	0.162	2.1	3.18	3.141	3.555	3.304	3.864	4.402	01/64
10	01/8														MH1500																	T4/T8		1.26	0.033	1.32	0.035									2.676	4.486	01/8

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1

SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | **f** +61 7 3029 6650 | www.smec.com
Adelaide +61 8 8225 9800 Geelong +61 3 5228 3100
Brisbane +61 7 3831 8988 Melbourne +61 3 9869 0800
Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Calculation Sheets - Minor Q10

Drawing No. 2521E-01-342 **Rev A**
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction

LOCATION			SUB-CATCHMENT RUNOFF					INLET DESIGN											
			Tc	I	A	CA	Qc	Qa									Qg	Qb	
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	HALF ROAD CAPACITY	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD XFALL AT INLET	INLET TYPE	INLET CURVE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.
			min	mm/h	ha	ha	L/s	L/s	L/s	m	m	m^2/s	%	%			L/s	L/s	
100	03/8	03/8 to 02/8	5	324	0.318	0.273	246	246	15		0.314				SF1		246	0	
100	02/8	02/8 to 01/8	5	324	0.066	0.057	51	91	193		0.06		0.23		SAL3D		91	0	
100	01/8	01/8 to 11/12													MH1500				
100	05/25														MH1500E600				
100	03/9	03/9 to 02/9	0	0	0	0	0	0			0				SF2		0	0	
100	02/9	02/9 to 01/9	5	324	0.028	0.024	22	22							AL3E		0	22	8/12
100	01/9	01/9 to 04/11	5	324	0.027	0.023	21	21							AL3E		0	21	7/12
100	7/12		5	324	0.049	0.043	39	60	193		0.027			-24.97	SAL3D	SAG	60	0	01/13
100	03/10	03/10 to 02/10	5	324	0.027	0.023	21	21	179	1.286	0.062	0.043	1	3.33	AL3E	1G,3.3X	0	21	8/12
100	02/10	02/10 to 01/10	5	324	0.018	0.016	14	14	179	1.078	0.055	0.035	1	3.33	AL3E	1G,3.3X	0	14	01/10
100	01/10	01/10 to 03/11	5	324	0.016	0.014	12	26	179	1.419	0.067	0.048	1	3.33	AL2E	1G,3.3X	0	26	01/14
100	6/12														MH1350				
100	9/12	07/12 to 06/12	5	324	0.181	0.155	140	140			0.241				SF2		140	0	
100	8/12	06/12 to 05/12	5	324	0.061	0.053	48	91	193		0.06			-25.02	SAL3D	SAG	91	0	7/12
100	7/12	05/12 to 04/12	5	324	0.049	0.043	39	60	193		0.027			-24.97	SAL3D	SAG	60	0	01/13
100	6/12	04/12 to 03/12													MH1350				
100	5/12	03/12 to 02/12													MH1350				
100	4/12	02/12 to 01/12													MH1500				
100	3/12	A													MH1500				
100	2/12	A													MH1500				
100	1/12	A													MH1500				
100	05/25														MH1500E600				
100	01/13	01/13 to 02/11	5	324	0.045	0.039	35	35	179	1.595	0.073	0.056	1	3.33	AL2E	1G,3.3X	0	35	01/15
100	5/12														MH1350				
100	01/14	01/14 to 02/11	5	324	0.026	0.023	21	47	179	1.798	0.079	0.066	1	3.33	AL2E	1G,3.3X	0	47	01/16
100	5/12														MH1350				
100	01/15	01/15 to 01/11	5	324	0.052	0.045	41	76	38		0		1	3.33	SAL3D	SAG	38	37	01/16
100	4/12														MH1500				
100	01/16	01/16 to 01/11	5	324	0.036	0.032	28	113	39		0.076		1	3.33	SAL3D		113	0	
100	4/12														MH1500				
100	01/17	01/17 to 01/16	5	324	0.355	0.304	274	274			0.5				SF2		274	0	
100	01/16		5	324	0.036	0.032	28	113	39		0.076		1	3.33	SAL3D		113	0	
100	02/18	02/18 to 01/18	5	324	0.05	0.044	39	39	266	1.674	0.075	0.06	1		AL3E		0	39	02/8
100	01/18	01/18 to 12/12													MH1200				
100	01/8														MH1500				
100	01/19	01/19 to 02/19	5	324	0.297	0.255	230	230	2		0.5				SF2		230	0	
100	02/19	02/19 to 01/18	5	324	0.045	0.039	35	35	267	1.598	0.073	0.056	1		AL3E		0	35	01/64
100	01/18														MH1200				
100	01/20	01/20 to 02/20	5	324	0.388	0.333	300	300	3		0.5				SF2		300	0	
100	02/21		5	324	0.051	0.044	40	60	175	1.997	0.086	0.075	0.96	3.33	AL2E	1G,3.3X	0	60	LOST
100	04/21	04/21 to 03/21	5	324	0.026	0.022	20	20	153	1.35	0.063	0.04	0.77	3.14	AL2E	1G,3.3X	0	20	01/22
100	03/21	03/21 to 02/21	5	324	0.026	0.022	20	20	152	1.349	0.063	0.04	0.77	3.14	AL2E	1G,3.3X	0	20	02/21
100	02/21	02/21 to 01/21	5	324	0.051	0.044	40	60	175	1.997	0.086	0.075	0.96	3.33	AL2E	1G,3.3X	0	60	LOST
100	01/21	01/21 to 03/25													MH1050				
100	08/25														MH				
100	01/22	01/22 to 01/21	5	324	0.051	0.044	40	60	175	1.995	0.086	0.075	0.96	3.33	AL2E	1G,3.3X	0	60	01/34
100	01/21														MH1050				
100	01/23	01/23 to 02/23	5	324	0.238	0.204	184	184	2		0.395				SF2		184	0	
100	02/23	02/23 to 03/23	5	324	0.105	0.091	82	82	20		0		1.73		SAL2D	SAG	20	62	01/24
100	03/23	03/23 to 04/23													MH1050				
100	04/23														PC				
100	01/24	01/24 to 03/23	5	324	0.096	0.084	75	137	20		0		1.73		SAL2D	SAG	20	117	1/Dummy
100	03/23														MH1050				
100	15/25	15/25 to 14/25													MH1050				
100	14/25	14/25 to 13/25													MH1350				
100	13/25	13/25 to 12/25													MH1200				
100	12/25	12/25 to 11/25													MH1350				
100	11/25	11/25 to 10/25													MH1200				
100	10/25	10/25 to 09/25													MH1350				
100	09/25	09/25 to 08/25													MH1500				
100	08/25	08/25 to 07/25													MH				
100	07/25	07/25 to 06/25													MH1500				
100	06/25	06/25 to 05/25													MH1500				
100	05/25	05/25 to 04/25													MH1500E600				
100	04/25	04/25 to 03/25													MH1500				
100	03/25	03/25 to 02/25													MH1500				
100	02/25	02/25 to 01/25													MH1500				
100	01/25														HW				
100	01/26	01/26 to 02/26	5	324	0.113	0.097	87	87	44		-0.578			25	EB2		87	0	
100	02/26	02/26 to 09/25	5	324	0.066	0.058	52	52	166		0.047		1.56	3.65	SAL2D	SAG	52	0	LOST
100	14/25														MH1350				
100	01/27	01/27 to 02/27	5	324	0.119	0.102	92	92	6		0.156				SF1		92	0	
100	02/27	02/27 to 09/25	5	324	0.071	0.062	56	56	166		0.051		1.56	3.65	SAL2D	SAG	56	0	LOST
100	14/25														MH1350				
100	01/28	01/28 to 08/25	5	324	0.153	0.132	118	118			0.184			25	SF1		118	0	
100	13/25														MH1200				
100	01/29	01/29 to 08/25	5	324	0.122	0.104	94	94	310		0.158				SF1		94	0	
100	13/25														MH1200				
100	01/30	01/30 to 02/30	5	324	0.17	0.146	131	131			0.198				SF1		131	0	
100	02/30	02/30 to 07/25	5	324	0.043	0.037	34	34	405	2.534	0.058	0.037	1	3.33	AL2E	1G,3.3X	0	34	01/32
100	12/25														MH1350				
100	01/31	01/31 to 02/31	5	324	0.157	0.134	121	121	7		0.186				SF1		121	0	
100	02/31	02/31 to 07/25	5	324	0.042	0.037	33	33	405	2.523	0.057	0.037	1	3.33	AL2E	1G,3.3X	0	33	01/33
100	12/25														MH1350				
100	01/32	01/32 to 05/25	5	324	0.038	0.033	30	63	416	3.363	0.069	0.051	0.96	3.34	AL2E	1G,3.3X	0	63	LOST
100	10/25														MH1350				
100	01/33	01/33 to 05/25	5	324	0.034	0.03	27	60	403	3.183	0.067	0.051	1.04	3.34	AL2E	1G,3.3X	0	60	LOST
100	10/25														MH1350				
100	02/34	02/34 to 01/34	5	324	0.352	0.302	272	272			0.5			0.63	SF2		272	0	
100	01/34	01/34 to 04/25	5	324	0.068	0.059	53	113	166		0.09		0.74	3.4	SAL2D	SAG	113	0	LOST
100	09/25														MH1500				
100	02/35	02/35 to 01/35	5	324	0.239	0.205	184	184			0.397			21.91	SF2		184	0	
100	01/35	01/35 to 04/25	5	324	0.066	0.057	52	52	166		0.046		0.74	3.4	SAL2D	SAG	52	0	01/36
100	09/25														MH1500				
100	01/36	01/36 to 02/25	5	324	0.044	0.038	34	34	175	1.598	0.072	0.055	0.96	3.33	AL2E	1G,3.3X	0	34	01/39
100	07/25														MH1500				
100	01/37	01/37 to 02/37	5	324	0.218	0.187	168	168			0.232				SF1		168	0	
100	02/37	02/37 to 02/25	5	324	0.042	0.036	33	33	175	1.563	0.071	0.054	0.96	3.33	AL2E	1G,3.3X	0	33	02/38
100	07/25														MH1500				

	DRAIN DESIGN												
	Tc	I	CA	Qrat	Q	L	S			Vf=Q/A	Qcap	Vcap	Vt
STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PEAK FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	PIPE CLASS	FULL PIPE VELOCITY	CAPACITY FLOW	CAPACITY VELOCITY	TRAVEL VELOCITY
	min	mm/hr	ha	L/s	L/s	m	%	mm		m/s	L/s	m/s	m/s
03/8	5	324	0.273	246	246	15.652	1	600	RCP	0.87	614	2.17	2.05
02/8	5.13	321	0.33	295	334	5.093	1	600	RCP	1.18	614	2.17	2.22
01/8	5.58	313	0.719	624	691	19.884	1	900	RCP	1.09	1811	2.85	2.65
05/25													
03/9	5	324	0	0	0	13.288	1	525	RCP	0	430	1.99	2
02/9	5	324	0.024	22	0	6.042	1	525	RCP	0	430	1.99	2
01/9	5.05	323	0.047	42	0	43.008	0.5	600	RCP	0	434	1.54	2
7/12													
03/10	5	324	0.023	21	0	6.042	1.5	375	RCP	0	215	1.95	2
02/10	5.05	323	0.039	35	0	25.261	1.5	450	RCP	0	351	2.2	2
01/10	5.07	323	0.426	382	335	2.02	2	600	RCP	1.18	869	3.07	2.87
6/12													
9/12	5	324	0.155	140	140	13.105	0.7	375	RCP	1.26	147	1.33	1.51
8/12	5.14	321	0.208	186	228	5.787	0.7	450	RCP	1.44	239	1.5	1.71
7/12	5.2	320	0.297	264	285	18.297	0.7	600	RCP	1.01	514	1.82	1.86
6/12	5.36	317	0.727	639	613	42.595	0.37	900	RCP	0.96	1102	1.73	1.78
5/12	5.76	309	0.789	678	596	41.789	0.37	900	RCP	0.94	1102	1.73	1.77
4/12	6.02	305	1.169	989	989	22.13	0.2	1050	RCP	1.14	1222	1.41	1.57
3/12	6.25	301	1.169	977	977	21.927	0.2	1050	RCP	1.13	1222	1.41	1.57
2/12	6.43	298	1.625	1346	1295	98.181	0.2	1050	RCP	1.5	1222	1.41	1.59
1/12	7.45	284	1.775	1398	1214	21.824	0.2	1050	RCP	1.4	1222	1.41	1.61
05/25													
01/13	5	324	0.039	35	0	4.015	2	375	RCP	0	248	2.25	2
5/12													
01/14	5	324	0.023	21	0	2.025	0.4	375	RCP	0	111	1	2
5/12													
01/15	5	324	0.045	41	38	4.002	2	375	RCP	0.35	248	2.25	1.63
4/12													
01/16	5.09	322	0.336	301	385	1.998	2	525	RCP	1.78	608	2.81	2.97
4/12													
01/17	5	324	0.304	274	274	13.518	1	375	RCP	2.48	175	1.59	2.48
01/16													
02/18	5	324	0.044	39	0	5.07	0.5	375	RCP	0	125	1.13	2
01/18	5.25	319	0.338	299	225	30.042	0.5	675	RCP	0.63	595	1.66	1.55
01/8													
01/19	5	324	0.255	230	230	19.95	0.5	450	RCP	1.44	202	1.27	1.44
02/19	5.23	319	0.294	261	226	1.97	0.5	600	RCP	0.8	434	1.54	1.55
01/18													
01/20	5	324	0.333	300	300	14.029	0.5	525	RCP	1.38	304	1.41	1.6
02/21													
04/21	5	324	0.022	20	0	6.041	1	375	RCP	0	175	1.59	2
03/21	5.05	323	0.045	40	0	43.851	1	450	RCP	0	286	1.8	2
02/21	5.15	321	0.42	374	294	4.021	1	525	RCP	1.36	430	1.99	2.14
01/21	5.18	320	0.464	413	293	19.732	1	600	RCP	1.04	614	2.17	2.15
08/25													
01/22	5	324	0.044	40	0	2.021	2	375	RCP	0	248	2.25	2
01/21													
01/23	5	324	0.204	184	184	14.479	0.6	375	RCP	1.66	136	1.23	1.66
02/23	5.15	321	0.296	264	201	3.521	0.6	375	RCP	1.82	136	1.23	1.82
03/23	5.18	320	0.379	338	220	12.991	0.6	450	RCP	1.38	221	1.39	1.58
04/23													
01/24	5	324	0.084	75	20	3.521	0.4	375	RCP	0.18	111	1	0.76
03/23													
15/25	5	324	0	0	0	23.512	0.4	525	RCP	0	272	1.26	2
14/25	5.2	320	0.319	284	284	65.56	0.5	600	RCP	1	434	1.54	1.64
13/25	5.81	308	0.557	477	477	36.29	0.5	600	RCP	1.69	434	1.54	1.69
12/25	6.16	302	0.918	771	704	21.383	0.4	750	RCP	1.59	704	1.59	1.82
11/25	6.36	299	0.918	763	696	17.084	0.4	750	RCP	1.58	704	1.59	1.82
10/25	6.52	297	0.981	809	686	60.441	0.4	750	RCP	1.55	704	1.59	1.82
09/25	6.95	291	1.618	1306	1242	16.118	0.4	900	RCP	1.95	1145	1.8	1.95
08/25	6.59	296	2.05	1684	1501	47.454	0.4	1050	RCP	1.73	1728	2	2.25
07/25	6.95	291	2.319	1873	1623	42.253	0.4	1050	RCP	1.87	1728	2	2.27
06/25	7.23	287	2.645	2107	1955	22.19	0.4	1050	RCP	2.26	1728	2	2.26
05/25	7.6	282	5.177	4052	3783	45.625	0.45	1200	RCP	3.35	2616	2.31	3.35
04/25	7.83	279	5.177	4013	3744	34.017	0.45	1200	RCP	3.31	2616	2.31	3.31
03/25	8	277	5.177	3983	3714	50	0.45	1200	RCP	3.28	2616	2.31	3.28
02/25	8.25	274	5.177	3940	3671	22.025	0.45	1200	RCP	3.25	2616	2.31	3.25
01/25													
01/26	5	324	0.097	87	87	11.176	0.5	450	RCP	0.55	202	1.27	1.22
02/26	5.15	321	0.155	138	138	3.761	0.5	450	RCP	0.87	202	1.27	1.36
14/25													
01/27	5	324	0.102	92	92	11.298	1	450	RCP	0.58	285	1.79	1.6
02/27	5.12	322	0.165	147	147	2.281	1	450	RCP	0.92	285	1.79	1.81
14/25													
01/28	5	324	0.132	118	118	19.532	1	450	RCP	0.74	285	1.79	1.71
13/25													
01/29	5	324	0.104	94	94	15.432	1	375	RCP	0.85	175	1.59	1.62
13/25													
01/30	5	324	0.146	131	131	15.455	1	525	RCP	0.61	430	1.99	1.75
02/30	5.15	321	0.184	164	130	4.019	1	525	RCP	0.6	430	1.99	1.74
12/25													
01/31	5	324	0.134	121	121	13.814	1	525	RCP	0.56	430	1.99	1.71
02/31	5.13	321	0.171	153	120	2.023	1	525	RCP	0.55	430	1.99	1.7
12/25													
01/32	5	324	0.033	30	0	4.041	1	375	RCP	0	175	1.59	2
10/25													
01/33	5	324	0.03	27	0	2.024	1	375	RCP	0	175	1.59	2
10/25													
02/34	5	324	0.302	272	272	14.743	0.5	600	RCP	0.96	434	1.54	1.62
01/34	5.15	321	0.361	322	382	4.167	0.5	600	RCP	1.35	434	1.54	1.73
09/25													
02/35	5	324	0.205	184	184	12.256	0.5	525	RCP	0.85	304	1.41	1.47
01/35	5.14	321	0.262	234	234	2.024	0.5	525	RCP	1.08	304	1.41	1.55
09/25													
01/36	5	324	0.038	34	0	2.006	1	375	RCP	0	175	1.59	2
07/25													
01/37	5	324	0.187	168	168	11.848	1	525	RCP	0.78	430	1.99	1.86
02/37	5.11	322	0.223	199	167	4.034	1	525	RCP	0.77	430	1.99	1.86
07/25													

HEAD LOSSES								PART FULL		DESIGN LEVELS						
	Vf²/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn							
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	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	STRUCTURE No.
	m		m		m	%	m	m	m/s	m	m	m	m	m	m	
G1	0.038	4.45	0.171		0.171	0.16	0.025	0.264	2.05	2.289	2.132	3.416	3.391	3.588	4.32	03/8
T1/T2	0.071	1.15	0.082		0.082	0.3	0.015	0.315	2.22	2.092	2.041	3.309	3.294	3.391	4.402	02/8
T4/T8	0	1.2	0	1.26	0	0	0	0.386	2.65	1.741	1.543	3.294	3.294	3.294	4.486	01/8
T4		0.58	0.174		0.174									3.294	4.656	05/25
	0	0	0		0	0	0	0	0	2.955	2.822	3.726	3.726	3.726	3.931	03/9
	0	2	0		0	0	0	0	0	2.802	2.741	3.726	3.726	3.726	5.221	02/9
	0	0	0		0	0	0	0	0	2.666	2.451	3.726	3.726	3.726	5.221	01/9
T4/T8		1.59	0.083	1.7	0.088									3.731	3.898	7/12
	0	0	0		0	1.5	0.091	0	0	4.188	4.098	4.188	4.098	4.188	5.245	03/10
	0	0	0		0	1.5	0.379	0	0	4.023	3.644	4.023	3.644	4.023	5.245	02/10
T1	0.021	0.2	0.004		0.004	0.09	0.002	0.258	2.87	2.544	2.503	3.606	3.604	3.61	4.992	01/10
T8/T10		1.7	0.031	2.05	0.037									3.61	5.079	6/12
G1	0	3.62	0		0	0	0	0.292	1.51	2.789	2.697	3.766	3.766	3.766	3.766	9/12
T1/T2	0.029	1.03	0.03		0.03	0.18	0.01	0.353	1.71	2.622	2.581	3.736	3.726	3.766	3.954	8/12
T4/T8	0.052	1.59	0.083	1.7	0.088	0.22	0.039	0.319	1.86	2.431	2.303	3.643	3.604	3.731	3.898	7/12
T8/T10	0.018	1.7	0.031	2.05	0.037	0.04	0.019	0.48	1.78	2.003	1.845	3.573	3.554	3.61	5.079	6/12
T1	0.045	0.2	0.009		0.009	0.11	0.045	0.471	1.77	1.825	1.671	3.545	3.5	3.554	4.653	5/12
T2/T4	0	0.48	0		0	0	0	0.717	1.57	1.651	1.606	3.5	3.5	3.5	4.235	4/12
T10	0	2.06	0	2.54	0	0	0	0.711	1.57	1.586	1.543	3.5	3.5	3.5	4.598	3/12
T2/T4	0.064	0.29	0.018		0.018	0.13	0.125	0.934	1.59	1.523	1.326	3.482	3.357	3.5	4.487	2/12
T1	0.1	0.2	0.02		0.02	0.2	0.043	0.855	1.61	1.306	1.263	3.337	3.294	3.357	4.866	1/12
T4		0.58	0.174		0.174									3.294	4.656	05/25
	0	0	0		0	0	0	0	0	3.406	3.325	3.554	3.554	3.554	4.566	01/13
T1		0.2	0.009		0.009									3.554	4.653	5/12
	0	0	0		0	0	0	0	0	3.434	3.425	3.554	3.554	3.554	4.566	01/14
T1		0.2	0.009		0.009									3.554	4.653	5/12
G2	0.006	9.7	0.06		0.06	0.05	0.002	0.1	1.63	3.031	2.951	3.502	3.5	3.562	4.15	01/15
T2/T4		0.48	0		0									3.5	4.235	4/12
T4	0	0.78	0		0	0	0	0.303	2.97	2.291	2.251	3.5	3.5	3.5	4.148	01/16
T2/T4		0.48	0		0									3.5	4.235	4/12
G1	0	3.82	0		0	0	0	0.375	2.48	2.576	2.441	3.5	3.5	3.5	3.5	01/17
T4		0.78	0		0									3.5	4.148	01/16
	0	0	0		0	0	0	0	0	3.242	3.217	3.294	3.294	3.294	4.641	02/18
T10	0	2.07	0	2.57	0	0	0	0.288	1.55	2.117	1.966	3.294	3.294	3.294	4.725	01/18
T4/T8		1.2	0	1.26	0									3.294	4.486	01/8
G1	0	5.36	0		0	0	0	0.45	1.44	2.451	2.351	3.294	3.294	3.294	3.294	01/19
T1	0.001	0	0		0	0	0	0.307	1.55	2.201	2.192	3.294	3.294	3.294	4.641	02/19
T10		2.07	0	2.57	0									3.294	4.725	01/18
G1	0	3.87	0		0	0	0	0.424	1.6	2.793	2.723	4.076	4.076	4.076	4.076	01/20
T1/T2		0.22	0.002		0.002									4.076	5.323	02/21
	0	2	0		0	1	0.06	0	0	4.674	4.614	4.674	4.614	4.674	5.743	04/21
	0	0	0		0	1	0.439	0	0	4.539	4.1	4.539	4.1	4.539	5.743	03/21
T1/T2	0.009	0.22	0.002		0.002	0.04	0.002	0.319	2.14	2.683	2.642	4.074	4.072	4.076	5.323	02/21
T10	0.031	1.81	0.057	1.92	0.06	0.13	0.026	0.292	2.15	2.567	2.37	4.016	3.99	4.076	5.41	01/21
T4/T8		1.2	0.183	1.24	0.191									3.998	5.22	08/25
	0	0	0		0	1.75	0.035	0	0	4.108	4.067	4.108	4.072	4.108	5.323	01/22
T10		1.81	0.057	1.92	0.06									4.076	5.41	01/21
G1	0.11	2.86	0.315		0.315	0.86	0.124	0.375	1.66	2.965	2.879	3.931	3.806	4.246	4.246	01/23
T1	0.17	0.52	0.088		0.088	1.32	0.046	0.375	1.82	2.859	2.837	3.718	3.672	3.806	4.116	02/23
T10	0.098	1.99	0.194	2.35	0.23	0.6	0.077	0.368	1.58	2.762	2.684	3.477	3.4	3.707	4.252	03/23
														3.4	4.134	04/23
G2	0.002	6.09	0.01		0.01	0.01	0	0.108	0.76	2.852	2.837	3.672	3.672	3.683	4.116	01/24
T10		1.99	0.194	2.35	0.23									3.707	4.252	03/23
	0	0	0		0	0	0	0	0	3.573	3.479	4.386	4.386	4.386	4.906	15/25
T10	0.041	2.08	0.086	2.61	0.108	0.17	0.112	0.354	1.64	3.439	3.112	4.3	4.188	4.408	4.753	14/25
T2/T4	0.013	0.49	0.006		0.006	0.05	0.02	0.6	1.69	3.092	2.91	4.182	4.162	4.188	6.06	13/25
T2/T4	0	0.41	0		0	0	0	0.615	1.82	2.76	2.675	4.162	4.162	4.162	5.956	12/25
T1/T2	0	0.24	0		0	0	0	0.607	1.82	2.635	2.566	4.162	4.162	4.162	5.74	11/25
T1/T2	0	0.24	0		0	0	0.001	0.598	1.82	2.526	2.285	4.162	4.161	4.162	5.566	10/25
T4/T8	0.168	0.63	0.106		0.106	0.41	0.065	0.9	1.95	2.135	2.07	4.056	3.99	4.162	4.967	09/25
T4/T8	0.153	1.2	0.183	1.24	0.191	0.3	0.143	0.757	2.25	1.92	1.73	3.807	3.664	3.998	5.22	08/25
T1/T2	0.179	0.23	0.041		0.041	0.35	0.149	0.809	2.27	1.69	1.521	3.623	3.474	3.664	4.764	07/25
T1/T2	0.26	0.25	0.066		0.066	0.51	0.114	1.05	2.26	1.481	1.393	3.408	3.294	3.474	4.374	06/25
T4	0.299	0.58	0.174		0.174	0.49	0.224	1.2	3.35	1.243	1.037	3.12	2.895	3.294	4.656	05/25
T1	0.559	0.2	0.112		0.112	0.92	0.313	1.2	3.31	1.017	0.864	2.784	2.47	2.895	3.731	04/25
T1	0.55	0.2	0.11		0.11	0.91	0.453	1.2	3.28	0.844	0.619	2.36	1.907	2.47	3.958	03/25
T1	0.537	0.2	0.107		0.107	1.18	0.163	1.2	3.25	0.599	0.5	1.799	1.539	1.907	4.12	02/25
														1.539	4	01/25
G1	0	5.25	0		0	0	0	0.207	1.22	3.554	3.498	4.408	4.408	4.408	4.408	01/26
T1/T2	0.013	1.43	0.019		0.019	0.08	0.003	0.273	1.36	3.478	3.459	4.389	4.386	4.408	4.652	02/26
T10		2.08	0.086	2.61	0.108									4.408	4.753	14/25
G1	0.008	4.95	0.042		0.042	0.05	0.006	0.176	1.6	3.615	3.502	4.458	4.452	4.5	4.5	01/27
T1/T2	0.044	1.38	0.06		0.06	0.27	0.006	0.229	1.81	3.482	3.459	4.392	4.386	4.452	4.652	02/27
T10		2.08	0.086	2.61	0.108									4.408	4.753	14/25
G1	0	4.99	0		0	0	0	0.202	1.71	3.307	3.112	4.188	4.188	4.188	4.188	01/28
T2/T4		0.49	0.006		0.006									4.188	6.06	13/25
G1	0.037	3.27	0.121		0.121	0.29	0.044	0.195	1.62	3.266	3.112	4.232	4.188	4.353	4.5	01/29
T2/T4		0.49	0.006		0.006									4.188	6.06	13/25
G1	0	4.33	0		0	0	0	0.199	1.75	2.995	2.84	4.162	4.162	4.162	4.162	01/30
T1/T2	0	0.2	0		0	0	0	0.198	1.74	2.82	2.78	4.162	4.162	4.162	5.869	02/30
T2/T4		0.41	0		0									4.162	5.956	12/25
G1	0.016	3.88	0.062		0.062	0.08	0.011	0.19	1.71	2.959	2.82	4.178	4.167	4.239	4.5	01/31
T1	0.016	0.2	0.003		0.003	0.08	0.002	0.189	1.7	2.8	2.78	4.164	4.162	4.167	5.869	02/31
T2/T4		0.41	0		0									4.162	5.956	12/25
	0	0	0		0	1	0.04	0	0	4.367	4.326	4.367	4.326	4.367	5.48	01/32
T1/T2		0.24	0		0									4.162	5.566	10/25
	0	0	0		0	1	0.02	0	0	4.347	4.326	4.347	4.326	4.347	5.479	01/33
T1/T2		0.24	0		0									4.162	5.566	10/25
G1	0	5.4	0		0	0	0	0.344	1.62	3.049	2.975	4.167	4.167	4.167	4.167	02/34
T1/T2	0.004	1.23	0.005		0.005	0.02	0.001	0.436	1.73	2.955	2.935	4.162	4.161	4.167	4.878	01/34
T4/T8		0.63	0.106		0.106									4.162	4.967	09/25
G1	0.018	3.96	0.071		0.071	0.09	0.011	0.295	1.47	3.046	2.985	4.234	4.223	4.305	4.305	02/35
T1/T2	0.06	0.93	0.055		0.055	0.3	0.006	0.345	1.55	2.945	2.935	4.167	4.161	4.223	4.878	01/35
T4/T8		0.63	0.106		0.106									4.162	4.967	09/25
	0	0	0		0	0	0	0	0	3.51	3.49	3.664	3.664	3.664	4.677	01/36
T1/T2		0.23	0.041		0.041									3.664	4.764	07/25
G1	0.031	6.65	0.205		0.205	0.15	0.018	0.228	1.86	3.069	2.951	3.694	3.676	3.898	4.145	01/37
T1/T2	0.03	0.2	0.006		0.006	0.15	0.006	0.227	1.86	2.931	2.89	3.67	3.664	3.676	4.677	02/37
T1/T2		0.23	0.041		0.041									3.664	4.764	07/25

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

All setting out should be carried out in accordance with GAA/Council's standard drawings or as nominated on hard copy plans provided by SMEC. Any digital information supplied by this office is for information only. Any discrepancies should be discussed with the superintendent.

Project Leader: G. Pereira
Designed: D. Rapson
Drawn: K. McCoy
Checked: D. Rapson
Authorised: G. Pereira
Date: May-2021

Scale @ A1

SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com
Adelaide +61 8 8225 9800 Geelong +61 3 5228 3100
Brisbane +61 7 3831 8988 Melbourne +61 3 9869 0800
Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton

Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Calculation Sheets - Major Q100

Drawing No. 2521E-01-343 **Rev A**
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction

LOCATION			SUB-CATCHMENT RUNOFF					INLET DESIGN														DRAIN DESIGN													HEAD LOSSES						PART FULL		DESIGN LEVELS							
			Tc	I	A	CA	Qc	Qa								Qg	Qb		Tc	I	CA	Qrat	Q	L	S			Vf=Q/A	Qcap	Vcap	Vt																		
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	HALF ROAD CAPACITY	FLOW WIDTH	FLOW DEPTH	FLOW DxV	ROAD GRADE AT INLET	ROAD X FALL AT INLET	INLET TYPE	INLET CURVE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PEAK FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	PIPE CLASS	FULL PIPE VELOCITY	CAPACITY FLOW	CAPACITY VELOCITY	TRAVEL VELOCITY	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	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	STRUCTURE No.
			min	mm/h	ha	ha	L/s	L/s	L/s	m	m	m^2/s	%	%			L/s	L/s		min	mm/hr	ha	L/s	L/s	m	%	mm		m/s	L/s	m/s	m/s		m		m		m		m	m	m/s	m	m	m	m	m	m	
100	01/38	01/38 to 02/38	5	324	0.314	0.269	242	242			0.306			6.01	SF1		242	0		5	324	0.269	242	242	11.281	0.5	450	RCP	1.52	202	1.27	1.52	G1	0.06	4.59	0.277		0.277	0.37	0.042	0.45	1.52	3.333	3.276	4.001	3.959	4.278	4.278	01/38
100	02/38	02/38 to 01/25	5	324	0.055	0.048	43	141	166		0.109		0.38	3.45	SAL2D	SAG	141	0	LOST	5.12	322	0.317	283	381	4.044	0.5	525	RCP	1.76	304	1.41	1.76	T1/T2	0.158	1.47	0.233		0.233	3.16	0.068	0.525	1.76	3.201	3.181	3.726	3.599	3.959	4.287	02/38
100	06/25														MH1500																		T1/T2		0.25	0.066		0.066										3.474	4.374	06/25
100	01/39	01/39 to 02/39	5	324	0.054	0.047	42	76	193		0.047		0.38	3.51	SAL3D	SAG	76	0	02/8	5	324	0.047	42	76	2.001	2	375	RCP	0.69	248	2.25	1.98	G2	0.024	9.17	0.224		0.224	13.6	0.097	0.143	1.98	3.014	2.974	3.389	3.117	3.613	4.287	01/39
100	02/39														MH1500																														3.117	4.374	02/39
100	01/40	01/40 to 10/12	5	324	0.084	0.073	66	66	267	2.057	0.088	0.079	1		AL3E		0	66	02/38	5	324	0.073	66	0	5.021	2	450	RCP	0	403	2.54	2		0	0	0		0	2	0.1	0	0	3.607	3.506	3.607	3.506	3.607	4.78	01/40
100	1/12														MH1500																		T1		0.2	0.02		0.02										3.357	4.866	1/12
100	01/41	01/41 to 10/12	5	324	0.085	0.074	67	67	267	2.066	0.088	0.08	1		AL3E		0	67	01/64	5	324	0.074	67	0	2.021	2	450	RCP	0	403	2.54	2		0	0	0		0	2	0.04	0	0	3.647	3.606	3.647	3.606	3.647	4.78	01/41
100	1/12														MH1500																		T1		0.2	0.02		0.02										3.357	4.866	1/12
100	02/42	02/42 to 01/42	5	324	0.33	0.283	255	255	7		0.5				SF2		255	0		5	324	0.283	255	255	18.264	1	600	RCP	0.9	614	2.17	2.07	G1	0	3.31	0		0	0	0	0.269	2.07	1.795	1.613	3.515	3.515	3.515	3.515	02/42
100	01/42	01/42 to 09/12	5	324	0.094	0.082	74	74	190		0.053		0.65	3.69	SAL3E		74	0		5.15	321	0.365	325	325	5.022	1	675	RCP	0.91	841	2.35	2.2	T1/T2	0.02	0.58	0.011		0.011	0.07	0.004	0.291	2.2	1.593	1.543	3.504	3.5	3.515	4.398	01/42
100	2/12														MH1500																		T2/T4		0.29	0.018		0.018										3.5	4.487	2/12
100	01/43	01/43 to 09/12	5	324	0.1	0.087	78	78	27		0		0.65		SAL3E	SAG	27	51	1/Dummy	5	324	0.087	78	27	2.017	2	450	RCP	0.17	403	2.54	1.44	G2	0.001	9.7	0.014		0.014	5.59	0.113	0.079	1.44	3.163	3.123	3.613	3.5	3.627	4.398	01/43
100	2/12														MH1500																		T2/T4		0.29	0.018		0.018										3.5	4.487	2/12
100	01/54	01/54 to 01/10	5	324	0.437	0.375	338	338			0.5			28.57	SF2		338	0		5	324	0.375	338	338	9.343	1	525	RCP	1.56	430	1.99	2.2	G1	0	5.61	0		0	0	0	0.35	2.2	2.657	2.564	3.61	3.61	3.61	3.61	01/54
100	01/10		5	324	0.016	0.014	12	26	179	1.419	0.067	0.048	1	3.33	AL2E	1G,3.3X	0	26	01/14														T1		0.2	0.004		0.004										3.61	4.992	01/10
100	01/55	01/55 to 02/55	5	324	0.295	0.253	228	228	114		-0.134				EB2		228	0		5	324	0.253	228	228	12.413	0.5	525	RCP	1.05	304	1.41	1.54	G1	0.056	3.54	0.2		0.2	0.28	0.035	0.339	1.54	1.15	1.088	2.354	2.32	2.554	3.42	01/55
100	02/55	02/55 to 03/55	0	0	0	0	0	0					2.91	3.33	AL2E	2G,3.3X	0	0	LOST	5.13	321	0.253	226	226	6.388	0.5	525	RCP	1.04	304	1.41	1.54	T1/T2	0.055	0.22	0.012		0.012	0.28	0.018	0.337	1.54	1.068	1.036	2.308	2.29	2.32	4.04	02/55
100	03/55	03/55 to 04/55	5	324	0.081	0.071	64	64	2028	6.138	0.067	0.071		3	AL2E		64	0		5.2	320	0.324	288	288	7.314	0.5	525	RCP	1.33	304	1.41	1.6	T8/T10	0.09	1.74	0.157	2.02	0.182	0.45	0.033	0.407	1.6	1.016	0.979	2.133	2.1	2.315	4.033	03/55
100	04/55														PC																													2.1	3.892	04/55
100	01/57	01/57 to 02/57	5	324	0.186	0.16	144	144	72		-0.246				EB2		144	0		5	324	0.16	144	144	10.441	2	375	RCP	1.3	248	2.25	2.33	G1	0.086	4.65	0.401		0.401	2.03	0.211	0.205	2.33	3.218	3.009	3.593	3.382	3.994	4.3	01/57
100	02/57	02/57 to 03/57	5	324	0.057	0.05	45	45	342	1.348	0.064	0.087	3.74	3.33	AL2E	4G,3.3X	0	45	LOST	5.07	323	0.209	187	143	5.797	2	375	RCP	1.29	248	2.25	2.32	T1/T2	0.085	0.2	0.017		0.017	4.95	0.097	0.204	2.32	2.989	2.873	3.364	3.077	3.382	4.373	02/57
100	03/57	03/57 to 04/57	5	324	0.058	0.051	46	46	342	1.36	0.064	0.088	3.74	3.33	AL2E	4G,3.3X	0	46	LOST	5.12	322	0.26	232	142	17.166	2	375	RCP	1.29	248	2.25	2.32	T10	0.084	2.08	0.175	2.63	0.221	3	0.324	0.203	2.32	2.373	2.03	2.748	2.233	2.97	4.373	03/57
100	04/57														MH1050																													2.233	3.9	04/57
100	02/58	02/58 to 01/58	5	324	0.191	0.163	147	147							SF1		147	0		5	324	0.163	147	147	16.468	0.25	525	RCP	0.68	215	0.99	1.07	G1	0.024	3.77	0.089		0.089	0.12	0.019	0.319	1.07	1.7	1.659	2.919	2.9	3.008	3.643	02/58
100	01/58														MH1050																													2.9	3.422	01/58
100	01/59	01/59 to 02/59	5	324	0.136	0.117	105	105	53		0.145				EB2		105	0		5	324	0.117	105	105	7.961	1	375	RCP	0.95	175	1.59	1.66	G1	0.046	5.96	0.276		0.276	3.08	0.151	0.209	1.66	2.11	2.03	2.485	2.239	2.761	4	01/59
100	02/59														MH1050																													2.239	4	02/59
100	01/60	01/60 to 02/60	5	324	0.172	0.148	133	133	66						EB2		133	0		5	324	0.148	133	133	19.969	0.4	375	RCP	1.2	111	1	1.2	G1	0.074	2.9	0.214		0.214	0.57	0.114	0.375	1.2	2.17	2.09	3.214	3.1	3.428	4	01/60
100	02/60														MH1050																													3.1	3.18	02/60
100	01/61	01/61 to 02/61	5	324	0.196	0.168	151	151	76						EB2		151	0		5	324	0.168	151	151	19.837	0.4	375	RCP	1.37	111	1	1.37	G1	0.096	2.8	0.269		0.269	0.75	0.148	0.375	1.37	1.904	1.825	2.948	2.8	3.216	4.25	01/61
100	02/61														MH1050																													2.8	3.35	02/61
100	01/62	01/62 to 02/62	5	324	0.178	0.153	138	138	69						EB2		138	0		5	324	0.153	138	138	19.682	0.4	375	RCP	1.25	111	1	1.25	G1	0.079	3.06	0.242		0.242	0.62	0.121	0.375	1.25	2.189	2.11	3.121	3	3.363	5	01/62
100	02/62														MH1050																													3	3.5	02/62
100	01/63	01/63 to 02/63	5	324	0.291	0.25	225	225	112						EB2		225	0		5	324	0.25	225	225	17.211	0.2	750	RCP	0.51	498	1.13	1.1	G1	0.013	5.24	0.069		0.069	0.04	0.007	0.353	1.1	0.75	0.716	2.107	2.1	2.176	3.986	01/63
100	02/63														MH1050																													2.1	3	02/63
100	01/64	01/64 to 12/12	5	324	0.056	0.049	44	145	193		0.092		0.23		SAL3D	SAG	145	0	LOST	5	324	0.049	44	145	1.928	2	375	RCP	1.32	248	2.25	3.44	G2	0.088	5.63	0.498		0.498	10.74	0.018	0.206	2.33	3.18	3.141	3.555	3.348	4.052	4.402	01/64
100	01/8														MH1500																		T4/T8		1.2	0	1.26	0										3.294	4.486	01/8

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader
G. Pereira
Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

Scale @ A1

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Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | f +61 7 3029 6650 | www.smec.com
Adelaide +61 8 8225 9800 Geelong +61 3 5228 3100
Brisbane +61 7 3831 8988 Melbourne +61 3 9869 0800
Campbelltown +61 2 4640 8222 Perth +61 8 9323 5900
Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 01
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Calculation Sheets - Major Q100

Drawing No. 2521E-01-344 **Rev A**
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction

Northshore, Hamilton

Package 02

Economic Development Queensland

Civil Works

Cover Sheet, Drawing Index & Locality Plan

DRAWING INDEX

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2521E-02-012	Demolition Layout Plan (Sheet 2 of 3)
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2521E-02-020	Erosion & Sediment Control Notes (Sheet 1 of 1)
2521E-02-021	Erosion & Sediment Control Details (Sheet 1 of 1)
2521E-02-031	Erosion & Sediment Layout Plan (Clearing & Grubbing) (Sheet 1 of 1)
2521E-02-041	Erosion & Sediment Layout Plan (Construction) (Sheet 1 of 1)
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2521E-02-200	Roadworks Notes and Details (Sheet 1 of 1)
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2521E-02-231	Roadworks Centreline Setout Tables & Driveway Setout (Sheet 1 of 1)
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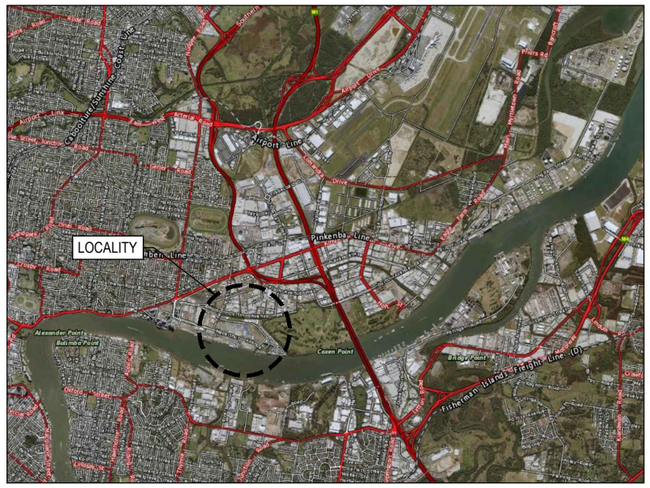
2521E-02-331	Stormwater Drainage Longitudinal Sections (Sheet 1 of 3)
2521E-02-332	Stormwater Drainage Longitudinal Sections (Sheet 2 of 3)
2521E-02-333	Stormwater Drainage Longitudinal Sections (Sheet 3 of 3)



LOCALITY PLAN

Principal

Economic Development Queensland

1 William Street

Brisbane, 4000

REVISION		DATE	DES/DFT	WVR	APP'D
B	Additional Drawing Included In Drawing Index	15/09/21	AY/KM	0026	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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Economic Development Queensland
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Designed D.Rapson
Drawn K.McCoy
Checked D.Rapson
Authorised G.Pereira
Date Dec-2020

Scale @ A1
N.T.S.

N

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Member of the Surbana Jurong Group
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Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
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Northshore, Hamilton
Package 02
Economic Development Queensland
Civil Works
Cover Sheet

Drawing No. 2521E-02-000 **Rev B**
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction

STANDARD NOTES

1. GENERAL
 1.1. NO WORK IS TO COMMENCE ON SITE UNTIL APPROVAL TO PROCEED HAS BEEN GIVEN BY THE SUPERINTENDENT.
 1.2. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND STANDARD DRAWINGS LISTED. THE SUPERINTENDENT WILL ON REQUEST RESOLVE ANY POINT OF CONFLICT. DIMENSIONS ARE NOT TO BE SCALED.
 1.3. WHERE A JUNCTION IS TO BE MADE TO EXISTING CONSTRUCTION THE CONTRACTOR SHALL CONFIRM THE LOCATION AND LEVEL OF THIS CONSTRUCTION PRIOR TO COMMENCING WORK ON ANY CRITICAL SECTION THE SUPERINTENDENT MAY VARY LEVELS AND GRADIENTS OF NEW WORKS TO ACHIEVE A SATISFACTORY CONNECTION.
 1.4. ALL CONSTRUCTION WORK SHALL COMPLY WITH THE QUEENSLAND WORKPLACE HEALTH AND SAFETY ACT (CURRENT VERSION). CONTACT YOUR NEAREST OFFICE OF THE DIVISION OF WORKPLACE HEALTH AND SAFETY FOR INFORMATION. Ph: 1300 362 128
 1.5. THE CONTRACTOR SHALL TAKE ALL REASONABLE AND PRACTICAL MEASURES TO PREVENT OR REDUCE HARM TO THE ENVIRONEMNT AS SET OUT IN THE ENVIRONMENTAL PROTECTION ACT (CURRENT VERSION).

2. SERVICES NOTES
 2.1. LOCATION & PROTECTION
 THE LOCATION OF SERVICES SHOWN ON THESE PLANS HAS BEEN APPROXIMATED FROM KNOWN POSITIONS OF VALVES, INSPECTIONS/ACCESS CHAMBERS, ETC AND INFORMATION SUPPLIED BY SERVICES AUTHORITIES. DETAILS OF SERVICES ARE PROVIDED FOR INFORMATION ONLY AND NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SUPPLIED. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION OF ALL SERVICES WITH THE RELEVANT AUTHORITIES PRIOR TO COMMENCING WORK AND PROVIDING ALL NECESSARY MEASURES TO PROTECT ALL SERVICES DURING THE COURSE OF THE WORK.
 2.2. AUTHORITY SERVICES
 CONFLICTS SERVICE RELOCATIONS ARE SHOWN WHERE KNOWN. THE CONTRACTOR IS TO LOCATE, AND IF NECESSARY LEVEL, ALL SERVICES IN THE AREA OF THE WORKS PRIOR TO CONSTRUCTION. THE SUPERINTENDENT IS TO BE ADVISED IMMEDIATELY OF ANY UNIDENTIFIED CONFLICTS.
 2.3. TELECOMMUNICATION CABLE
 NO WORK IS TO BE CARRIED OUT WITHIN 3.0m OF CABLE IN URBAN AREAS AND 10.0m IN RURAL AREAS, WITHOUT FIRST CONSULTING THE RELEVANT AUTHORITY. THE CONTRACTOR IS TO MANUALLY EXPOSE AND PROTECT THE SERVICE WHEN EXCAVATING, OR WORKING, CLOSER TO TELECOMMUNICATION PLANT THAN THE ABOVE DISTANCES.

3. TRAFFIC CONTROL
 3.1. THE PROVISION FOR TRAFFIC SHALL BE IN ACCORDANCE WITH QUEENSLAND DEPARTMENT OF MAIN ROADS CURRENT MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). THE SAFETY OF VEHICULAR AND PEDESTRIAN TRAFFIC DURING CONSTRUCTION ON OR NEAR ROADS IS THE RESPONSIBILITY OF THE CONTRACTOR.
 3.2. THE CONTRACTOR IS REQUIRED TO PREPARE, SUBMIT AND OBTAIN LOCAL AUTHORITY APPROVAL FOR TRAFFIC MANAGEMENT PLANS DETAILING TRAFFIC MOVEMENTS, DIVERSIONS OR CLOSURES, THEIR STAGING, AND THE SIGNAGE ADOPTED IN EACH STAGE. THIS MAY REQUIRE THE CONTRACTOR TO ENTER INTO DISCUSSIONS AND/OR NEGOTIATIONS WITH LOCAL GOVERNING AUTHORITIES, POLICE, LAND OWNERS AND ASSET OWNERS AFFECTED BY THE WORKS IN ORDER TO OBTAIN APPROVALS. FURTHERMORE, TRAFFIC CLOSURES ARE TO BE AGREED TO BY EDQ.

ENVIRONMENTAL NOTES

1. VEGETATION PROTECTION
 1.1. TREES LOCATED ALONG THE FOOTPATH SHOULD BE, WHERE POSSIBLE, TRANSPLANTED PRIOR TO CONSTRUCTION, OR REPLACED IF DESTROYED.
 1.2. WHEN WORKING WITHIN 4m OF TREES, RUBBER OR HARDWOOD, GIRDLES SHOULD BE CONSTRUCTED WITH 1.8m BATTENS CLOSELY SPACED & ARRANGED VERTICALLY FROM GROUND LEVEL. GIRDLES MUST BE STRAPPED TO TREES PRIOR TO CONSTRUCTIONS & REMAIN UNTIL COMPLETION.
 1.3. WHERE POSSIBLE, TREE ROOTS SHOULD BE TUNNELLED UNDER, RATHER THEN SEVERED. IF ROOTS ARE SEVERED THE DAMAGED AREA SHOULD BE TREATED WITH A SUITABLE FUNGICIDE. CONTACT COUNCIL ARBORIST FOR FURTHER ADVICE.
 1.4. ANY TREES LOPPING REQUIRED SHOULD BE UNDERTAKEN BY COUNCIL'S METROPOLITAN TREE SERVICES.

2. SOIL
 2.1. TOPSOIL & SUBSOIL SHOULD BE STOCKPILED SEPARATELY.
 2.2. CARE SHOULD BE TAKEN TO PREVENT SEDIMENT FROM ENTERING CONTROLS AROUND STOCKPILES.

3. REHABILITATION
 3.1. PREDISTURBANCE SOIL PROFILES & COMPACTION LEVELS ARE TO BE REINSTATED.
 3.2. PREDISTURBANCE VEGETATION PATTERNS SHOULD BE RESTORED. FOR FURTHER INFORMATION CONTACT THE LOCAL COUNCIL.

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

BCC STANDARD DRAWING LIST

2000 SERIES - ROAD CORRIDOR

BSD-2001	KERB PROFILES
BSD-2021	VEHICLE CROSSING (DRIVEWAY) - OTHER THAN SINGLE DWELLING AND REAR ALLOTMENT ACCESS
BSD-2025	VEHICLE CROSSING (DRIVEWAY) - GRADES (4.25m VERGE)
BSD-2041	PAVEMENT DRAINS
BSD-2042	TRENCH RESTORATION - ROAD CROSSING - FLEXIBLE PAVEMENTS
BSD-2101	BUS BAY SLAB (STANDARD CROSSFALL)

3000 SERIES - TRAFFIC MANAGEMENT

BSD-3102	STREET NAME PLATE & BRACKET WITH SIGN CODE G5-2 SETOUT
BSD-3151	PAVEMENT MARKING, LONGITUDINAL LINES
BSD-3152	PAVEMENT MARKING, TRANSVERSE LINES
BSD-3153	PAVEMENT MARKING, TYPICAL MINOR ROAD NON-SIGNALISED INTERSECTION
BSD-3154	RAISED PAVEMENT MARKERS, STANDARD INSTALLATION FOR TRAFFIC LANES
BSD-3155	RAISED PAVEMENT MARKERS, STANDARD INSTALLATION FOR PAINTED TAILS
BSD-3156	RAISED PAVEMENT MARKERS, STANDARD INSTALLATION FOR PAINTED ISLANDS AND MEDIANS
BSD-3157	PAVEMENT MARKINGS, PAVEMENT ARROWS AND GIVE WAY SYMBOL
BSD-3161	PAVEMENT MARKINGS FOR PARALLEL PARKING

5000 SERIES - PEDESTRIAN AND CYCLIST FACILITIES

BSD-5001	TYPE 1 STANDARD BIKEPATH ENTRANCE - LOW VOLUME PATHS
BSD-5003	BIKEPATH FURNITURE DETAILS
BSD-5101	ON-ROAD BIKEWAY PAVEMETN MARKINGS
BSD-5201	CONCRETE FOOTPATH
BSD-5202	CONCRETE FOOTPATH FULL WIDTH
BSD-5203	CONCRETE FOOTPATHS WIDTH REQUIREMENTS
BSD-5204	PROVISION FOR TREE ROOTS UNDER CONCRETE FOOTPATHS/BIKE PATHS
BSD-5206	CONCRETE PAVEMENT JOINT DETAILS & SERVICE PIT LIDS
BSD-5207-1	DECORATIVE SAWCUT CONCRETE FOOTPATH - SHEET 1 OF 4
BSD-5207-2	DECORATIVE SAWCUT CONCRETE FOOTPATH - SHEET 2 OF 4
BSD-5207-3	DECORATIVE SAWCUT CONCRETE FOOTPATH - SHEET 3 OF 4
BSD-5207-4	DECORATIVE SAWCUT CONCRETE FOOTPATH - SHEET 4 OF 4
BSD-5208	BIKEPATH PAVEMENT JOINTS
BSD-5209	ROOT PROTECTION ADJACENT TO CONCRETE BIKEPATHS
BSD-5211	PAVER BANDING AND CONCRETE BANDING
BSD-5231	KERB RAMP
BSD-5232	ISLAND PEDESTRIAN ACCESS
BSD-5233	TYPICAL KERB RAMP AND TRAFFIC SIGNAL PEDESTAL LOCATION

7000 SERIES - FENCES, BARRIERS AND PUBLIC FURNITURE

BSD-7003	FENCE - 1.8m HIGH CHAINWIRE
BSD-7004	FENCE - PEDESTRIAN SAFETY
BSD-7012	FENCE - LOG BARRIER (600mm HIGH)
BSD-7055	ENTRANCE BARRIER - LOCKRAIL WITH TIMBER POSTS

8000 SERIES - STORMWATER DRAINAGE AND WATER QUALITY

BSD-8001	MINIMUM PIPE COVER FOR CONSTRUCTION LOADS - STEEL REINFORCED CONCRETE PIPES
BSD-8002	MINIMUM PIPE COVER FOR CONSTRUCTION LOADS - FIBRE REINFORCED CONCRETE PIPES
BSD-8011	BEDDING METHODS FOR RIGID AND FLEXIBLE DRAINAGE PIPES
BSD-8021	STORMWATER MANHOLE DETAILS 1050 TO 1500 DIAMETER - TO 3.0m DEEP
BSD-8023	MANHOLE ROOF SLAB 1350 TO 1950 DIAMETER
BSD-8024	MANHOLE ROOF SLABS 1980 DIAMETER EXTENDED 600 AND 900
BSD-8025	REINFORCED CONCRETE ROOF SLABS FOR MANHOLE CHAMBERS
BSD-8031	MANHOLE FRAME (ROADWAY AND NON-ROADWAY) 1050 TO 1500 DIAMETER
BSD-8032	RISER DETAILS (ROADWAY)
BSD-8033	MANHOLE COVER (ROADWAY) 1050 TO 1500 DIAMETER
BSD-8034	MANHOLE COVER (NON-ROADWAY) 1050 TO 1500 DIAMETER
BSD-8035	MANHOLE COVER CONCRETE INFILL (PEDESTRIAN TRAFFIC) 1050 TO 1500 DIAMETER
BSD-8051	TYPE 'A' GULLY LIP IN LINE
BSD-8053	TYPE 'A' GULLY GRATE
BSD-8054	TYPE 'A' GULLY GRATE FRAME
BSD-8055	TYPE 'A' GULLY (EXTENDED KERB INLET) PRECAST CONCRETE LINTEL (EXTENDED KERB INLET)
BSD-8091	FIELD INLETS TYPE 1 AND TYPE 2
BSD-8301	ROADSIDE SWALE TYPES AND TYPICAL SECTIONS
BSD-8307	BIORETENTION SWALE - UNDERDRAIN DETAILS
BSD-8331	WSUD BIORETENTION POD (VERGE TYPE) - LAYOUT
BSD-8332	WSUD BIORETENTION POD (VERGE TYPE) - TYPICAL DETAILS

11000 SERIES - ELECTRICAL FACILITIES AND INSTALLATIONS

BSD-11032	TYPICAL REQUIREMENTS FOR SOLAR LED MARKERS: OFF-ROAD SHARED / BICYCLE PATHS

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site.
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Locate all underground services before commencement of works
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www.1100.com.au

A	Issue for Construction	11/06/21	DR/KM	008	GP
REVISION		DATE	DES/DFT	WVR	APP'D

Gustavo Pereira
RPEQ# 17514

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Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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G.Pereira
Designed
D.Rapson
Drawn
K.McCoy
Checked
D.Rapson
Authorised
G.Pereira
Date
Dec-2020

Scale @ A1
N.T.S.

SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
SMEC AUSTRALIA
Level 1, 832 Southport-Nerang Road, Nerang, QLD, 4211
p +61 7 5578 0200 | **f** +61 7 3029 6650 | www.smec.com

Adelaide	+61 8 8225 9800	Geelong	+61 3 5228 3100
Brisbane	+61 7 3831 8988	Melbourne	+61 3 9869 0800
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Northshore, Hamilton
Package 02
Economic Development Queensland
Civil Works
Standard Notes

Drawing No. 2521E-02-001 **Rev A**
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction

BOUNDARIES

EXISTING PROPOSED FUTURE

STAGE BOUNDARY

PROPERTY BOUNDARY

DEMOLITION

DEMOLISH PAVEMENT

DEMOLISH & REMOVAL OF DRIVEWAY

REMOVE / ABANDON

SECURITY FENCE

TELECOMMUNICATION

STORMWATER DRAINAGE

UNSPECIFIED SERVICE

STREET LIGHT

SIGN

TREE TO BE REMOVED

TREE TO BE RETAINED

DEMOLITION - REFER TO RELEVANT APPROVALS

Ex O/H — ELECTRICITY O/H - REFER SEPARATE ELECTRICAL PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

E — ELECTRICITY U/G - REFER SEPARATE ELECTRICAL PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

G — GAS - REFER APA SEPARATE APPROVAL

S — SEWER - REFER SEPARATE SEWER PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

W — WATER - REFER SEPARATE WATER PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

878
SL4674

REMOVE AND RELOCATE GATE

DEMOLISH AND REMOVE EXISTING CAR PARK PAVEMENT

REMOVE AND RELOCATE HYDRANT

REMOVE STREET LIGHTING PILLAR

REMOVE AND RELOCATE STREET LIGHTING PILLAR

FOR CONTINUATION REFER SHEET 2

BARCHAM ROAD

BARCHAM ROAD

KARAKUL ROAD

REMOVE AND RELOCATE STREET LIGHTING PILLAR

14
SP195300

FOR CONTINUATION REFER SHEET 3

NOTE
1. REMOVE AND RELOCATE CAR PARK FENCING IF REQUIRED.

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N

1
2
3

KEYPLAN

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
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1:250
0 2.5 5 10
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N

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© ABN 47 065 475 149

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p +61 7 5578 0200 | **f** +61 7 3029 6650 | www.smec.com

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Northshore, Hamilton

Package 02
Economic Development Queensland
Demolition Works
Demolition Layout Plan

Drawing No. 2521E-02-011 **Rev A**
Dev. App. No.
Sheet No. 1 of 3

Issue for Construction

BOUNDARIES

EXISTING PROPOSED FUTURE

STAGE BOUNDARY

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DEMOLITION

DEMOLISH PAVEMENT

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SEWER - REFER SEPARATE SEWER PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

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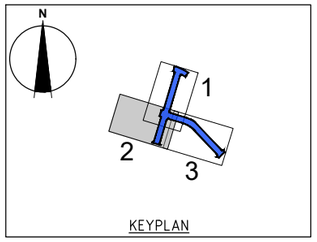

KEYPLAN

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

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© ABN 47 065 475 149

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p +61 7 5578 0200 | **f** +61 7 3029 6650 | www.smec.com

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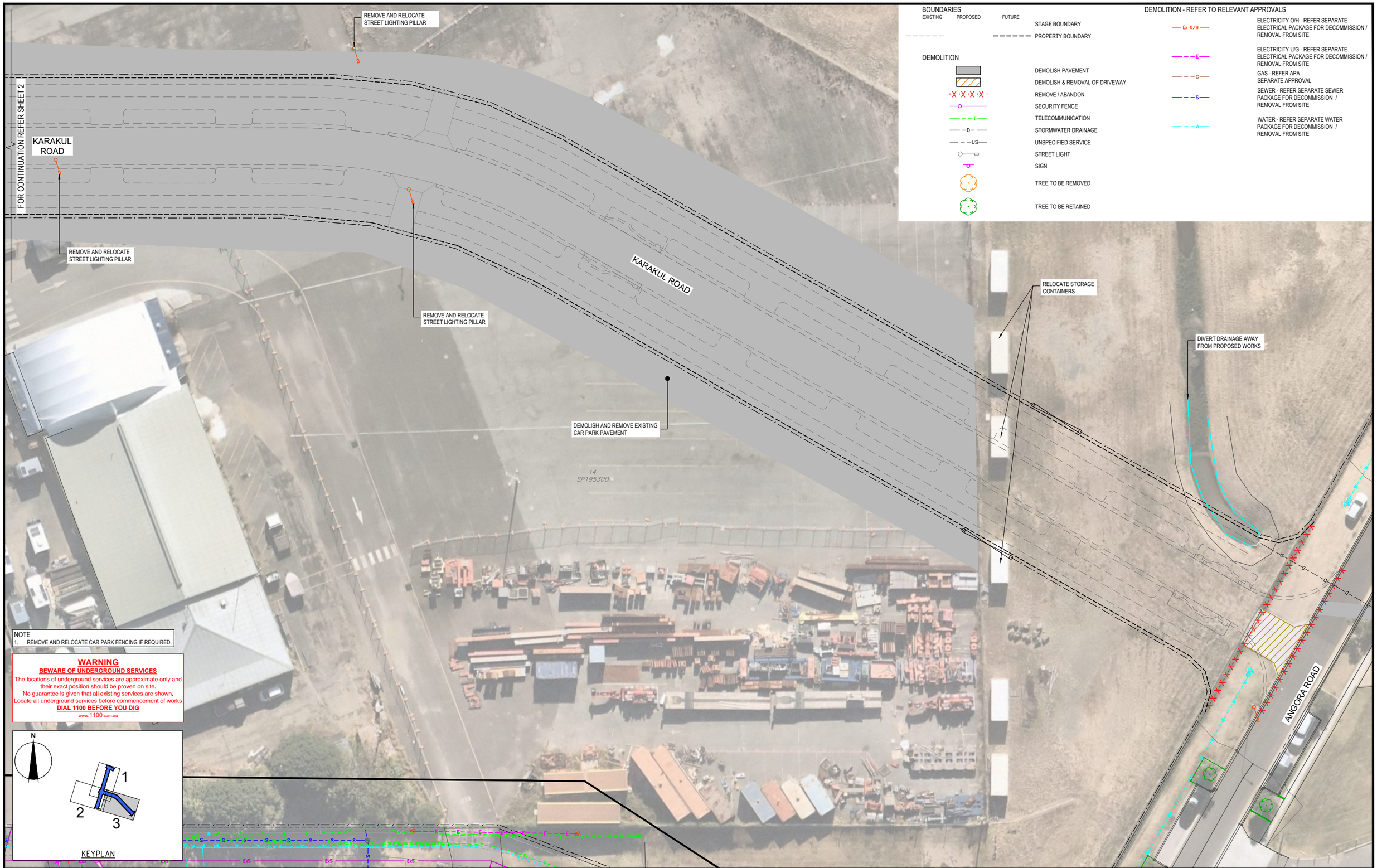
Northshore, Hamilton

Package 02
Economic Development Queensland
Demolition Works
Demolition Layout Plan

Drawing No. 2521E-02-012 **Rev A**
Dev. App. No.
Sheet No. 2 of 3

Issue for Construction



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TREE TO BE RETAINED

DEMOLITION - REFER TO RELEVANT APPROVALS

ELECTRICITY O/H - REFER SEPARATE ELECTRICAL PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

ELECTRICITY U/G - REFER SEPARATE ELECTRICAL PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

GAS - REFER APA SEPARATE APPROVAL

SEWER - REFER SEPARATE SEWER PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

WATER - REFER SEPARATE WATER PACKAGE FOR DECOMMISSION / REMOVAL FROM SITE

NOTE
1. REMOVE AND RELOCATE CAR PARK FENCING IF REQUIRED.

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site.
No guarantee is given that all existing services are shown.
Locate all underground services before commencement of works
DIAL 1100 BEFORE YOU DIG
www.1100.com.au

KEYPLAN

REVISION		DATE	DES/DFT	WVR	APP'D
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....

Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader
G.Pereira
Designed
D.Rapson
Drawn
K.McCoy
Checked
D.Rapson
Authorised
G.Pereira
Date
Dec-2020

Scale @ A1
1:250
0 2.5 5 10
Scale 1:250

N

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Brisbane	+61 7 3831 8988	Melbourne	+61 3 9869 0800
Campbelltown	+61 2 4640 8222	Perth	+61 8 9323 5900
Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton

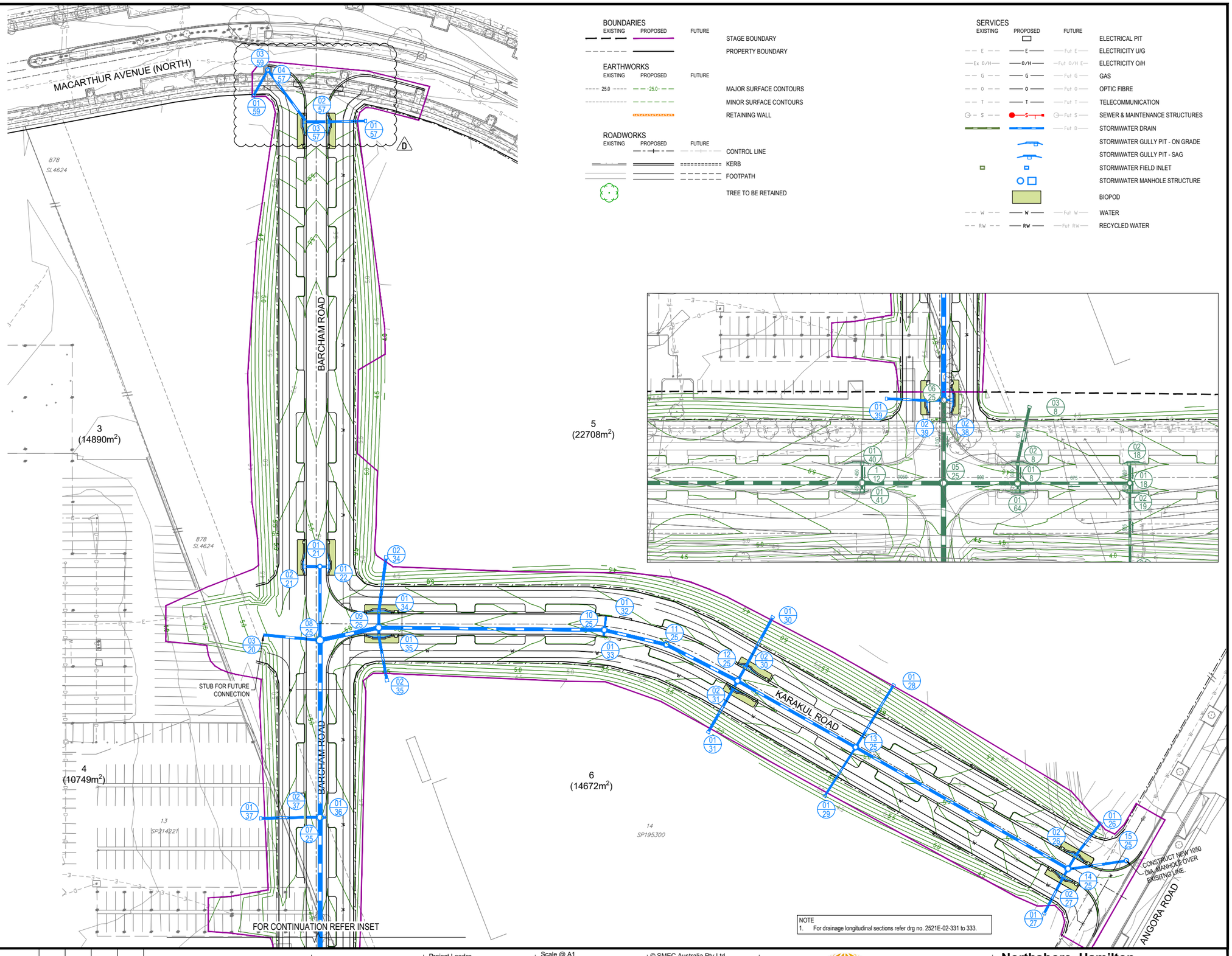
Package 02
Economic Development Queensland
Demolition Works
Demolition Layout Plan

Drawing No. 2521E-02-013 **Rev A**
Dev. App. No.
Sheet No. 3 of 3

Issue for Construction

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER CONSTRUCTION IS TO BE AS PER THE BRISBANE CITY COUNCIL DEVELOPMENT MANUAL & STANDARD DRAWINGS.
2. MANHOLES ARE TO HAVE FINISHED LID LEVELS 75mm ABOVE THE FINISHED SURFACE LEVEL ON ALL SIDES EXCEPT IN PAVED AREAS WHERE THEY ARE TO BE FINISHED FLUSH. FINISHED SURFACE LEVELS SHOWN ON THE DRAWINGS MAY BE INTERPOLATED & SHOULD BE CONFIRMED ON SITE PRIOR TO COMPLETING CONSTRUCTION.
3. HEADWALLS ARE TO BE APPROVED PRECAST UNITS U.N.O. SLOPING HEADWALLS ARE TO BE USED IN ACCORDANCE WITH COUNCIL REQUIREMENTS. CAST INSITU HEADWALLS ARE TO BE AS PER QUEENSLAND DEPARTMENT OF MAIN ROADS STANDARD DETAILS & SPECIFICATIONS.
4. SIDE ENTRY PITS ARE TO BE PRECAST SIDE INLET GULLY LIP IN LINE. REFER TO LONGSECTIONS FOR KERB & LINTEL SIZE.
5. SEEPAGE HOLES ARE TO BE PROVIDED IN THE WALL OF ALL PITS TO ACCEPT FLOWS FROM PIPE BEDDING.
6. AN APPROVED CONVERTER SLAB SHALL BE USED UNDER THE CHAMBER FOR SHAFT DIAMETERS LARGER THAN 1050mm.



BOUNDARIES

EXISTING	PROPOSED	FUTURE	
			STAGE BOUNDARY
			PROPERTY BOUNDARY

EARTHWORKS

EXISTING	PROPOSED	FUTURE	
25.0	-25.0-		MAJOR SURFACE CONTOURS
			MINOR SURFACE CONTOURS
			RETAINING WALL

ROADWORKS

EXISTING	PROPOSED	FUTURE	
			CONTROL LINE
			KERB
			FOOTPATH
			TREE TO BE RETAINED

SERVICES

EXISTING	PROPOSED	FUTURE	
			ELECTRICAL PIT
E	E	Fut E	ELECTRICITY U/G
Ex O/H	O/H	Fut O/H E	ELECTRICITY O/H
G	G	Fut G	GAS
O	O	Fut O	OPTIC FIBRE
T	T	Fut T	TELECOMMUNICATION
S	S	Fut S	SEWER & MAINTENANCE STRUCTURES
		Fut D	STORMWATER DRAIN
			STORMWATER GULLY PIT - ON GRADE
			STORMWATER GULLY PIT - SAG
			STORMWATER FIELD INLET
			STORMWATER MANHOLE STRUCTURE
			BIOPOD
W	W	Fut W	WATER
RW	RW	Fut RW	RECYCLED WATER

NOTE
1. For drainage longitudinal sections refer drg no. 2521E-02-331 to 333.

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Locate all underground services before commencement of works
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REV	DESCRIPTION	DATE	DES/DFT	WVR	APP'D
D	BCC Comments Addressed	N.I.	AY/KM	0026	GP
C	Re-issue for Construction	12/08/21	AY/EG	0016	GP
B	Re-issue for Construction	4/08/21	AY/EG	0015	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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Brisbane, 4000

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Designed D.Rapson
Drawn K.McCoy
Checked D.Rapson
Authorised G.Pereira
Date Dec-2020

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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Canberra	+61 2 6126 1900	Traralgon	+61 3 5173 0100

Northshore, Hamilton
Package 02
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Layout Plan

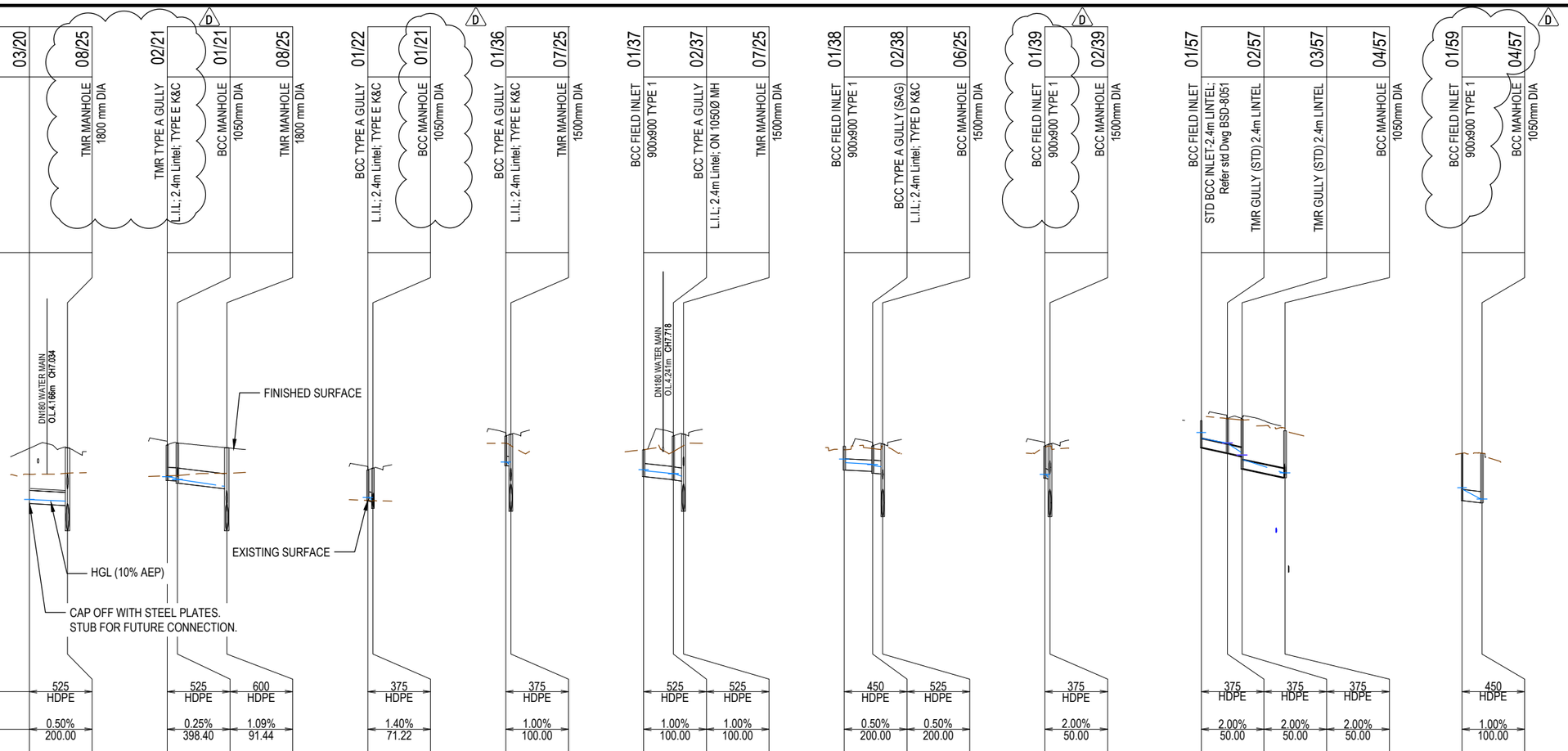
Drawing No. 2521E-02-301 **Rev D**
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction

STRUCTURE NAME	03/20	08/25	02/21	01/21	08/25	01/22	01/21	01/36	07/25	01/37	02/37	07/25	01/38	02/38	06/25	01/39	02/39	01/57	02/57	03/57	04/57	01/59	04/57
STRUCTURE DESCRIPTION		TMR MANHOLE 1800 mm DIA	TMR TYPE A GULLY L.I.L; 2.4m Lintel; TYPE E K&C	BCC MANHOLE 1050mm DIA	TMR MANHOLE 1800 mm DIA	BCC TYPE A GULLY L.I.L; 2.4m Lintel; TYPE E K&C	BCC MANHOLE 1050mm DIA	BCC TYPE A GULLY L.I.L; 2.4m Lintel; TYPE E K&C	TMR MANHOLE 1500mm DIA	BCC FIELD INLET 900x900 TYPE 1	BCC TYPE A GULLY L.I.L; 2.4m Lintel; ON 1050Ø MH	TMR MANHOLE 1500mm DIA	BCC FIELD INLET 900x900 TYPE 1	BCC TYPE A GULLY (SAG) L.I.L; 2.4m Lintel; TYPE D K&C	BCC MANHOLE 1500mm DIA	BCC FIELD INLET 900x900 TYPE 1	BCC MANHOLE 1500mm DIA	BCC FIELD INLET STD BCC INLET-2.4m LINTEL; Refer std Dwg BSD-8051	TMR GULLY (STD) 2.4m LINTEL	TMR GULLY (STD) 2.4m LINTEL	BCC MANHOLE 1050mm DIA	BCC FIELD INLET 900x900 TYPE 1	BCC MANHOLE 1050mm DIA
PIPE SIZE (mm)		525 HDPE		525 HDPE	600 HDPE		375 HDPE		375 HDPE		525 HDPE	525 HDPE		450 HDPE	525 HDPE		375 HDPE		375 HDPE	375 HDPE	375 HDPE		450 HDPE
PIPE CLASS																							
PIPE GRADE (%)		0.50%		0.25%	1.09%		1.40%		1.00%		1.00%	1.00%		0.50%	0.50%		2.00%		2.00%	2.00%	2.00%		1.00%
PIPE SLOPE (1 in X)		200.00		398.40	91.44		71.22		100.00		100.00	100.00		200.00	200.00		50.00		50.00	50.00	50.00		100.00
FULL PIPE VELOCITY (m/s)																			0.85	1.00	1.16		0.43
PART FULL VELOCITY (m/s)																			2.09	2.18	2.26		1.48
DATUM RL		-9.0		-9.0		-8.0		-10.0		-10.0			-10.0			-10.0		-11.0				-10.0	
H.G.L IN PIPE & W.S.E IN STRUCTURE	3.160	3.155		4.068 4.007	3.957 3.960	3.685	3.006	4.243 4.141	3.957	3.654 3.567	3.553	2.853	3.305 3.195	3.190 3.185	3.082	2.853	3.629 3.567	3.550 3.506	3.464	2.683	3.162 3.044	2.683	3.830 3.593	3.412 3.412	3.364 3.049	2.932 2.748	2.221 2.221	2.221	2.626 2.560	2.181 2.181	2.181
PIPE FLOW (Cumecs)		0.041		0.025	0.049		0.025		0.022		0.125	0.145		0.179	0.206		0.027		0.094	0.111	0.128		0.069	
PIPE CAPACITY AT GRADE (Cumecs)																			0.248	0.248	0.248		0.285	
DEPTH TO INVERT	2.204	2.300		1.494	1.507 1.604	1.631	3.300	1.315	1.346 1.604	1.247	1.274	3.074	1.076	1.808 1.828	1.874	3.074	0.945	1.090 1.165	1.191	2.891	1.363	1.400 2.891	1.082	1.387 1.407	1.579 2.079	-2.030	-2.030	1.890	1.970	1.970
INVERT LEVEL OF DRAIN	2.996	2.920		3.913	3.903 3.806	3.590	1.920	4.092	4.064 3.806	3.510	3.490	1.690	3.069	2.951 2.931	2.890	1.690	3.333	3.276 3.201	3.181	1.481	3.013	2.973 1.481	3.018	2.918 2.880	2.730 2.373	2.030	2.030	2.110	2.030	2.030
DESIGN SURFACE LEVEL	5.200		5.220	5.328	5.410 5.220		5.328		5.410 4.764	4.682		4.764	4.145	4.682 4.764		4.372	4.278	4.291 4.372		4.291	4.372	4.300	4.373 4.373	0.000	4.000	4.000	4.000			
SETOUT COORDINATES	E 8191.681 N 4558.929	E 8205.765 N 4553.147		E 8207.664 N 4573.192	E 8211.492 N 4572.030 E 8205.765 N 4553.147		E 8213.406 N 4571.449	E 8211.492 N 4572.030		E 8193.889 N 4507.146	E 8191.993 N 4507.736		E 8176.723 N 4512.103	E 8188.148 N 4508.889	E 8191.993 N 4507.736		E 8165.195 N 4472.135	E 8175.851 N 4468.372	E 8179.730 N 4467.302		E 8181.637 N 4466.776	E 8179.730 N 4467.302	E 8257.845 N 4682.697	E 8248.011 N 4685.469	E 8242.270 N 4687.212	E 8236.734 N 4703.378		E 8231.021 N 4697.843	E 8236.739 N 4703.381	
RUNNING CHAINAGE	0.000	15.224	15.224	0.000	4.021 4.021	19.732	23.753	0.000	2.021 2.021	0.000	2.006 2.006		0.000	11.848 11.848	4.034 15.882		0.000	11.281 11.281	4.044 15.325		0.000	2.001 2.001	-10.196	10.441 0.245	5.797 6.042	17.166 23.208		0.000	7.961 7.961	
LINE		20		21			22		36		37			38			39		57				59	

NOTE:

1. REFER TO TMR STANDARD DRAWING 1311 FOR ALL TMR OUTLINED CONCRETE GULLYS LIP IN LINE.
2. REFER TO TMR STANDARD DRAWING 1307 FOR ALL MHs OUTLINED WITHIN THE Ø1050-Ø2100mm RANGE.



REVISION		DATE	DES/DFT	WVR	APP'D
D	Re-issue for Construction	23/08/21	EW/AY	0021	GP
C	Re-issue for Construction	12/08/21	AY/EG	0016	GP
B	Re-issue for Construction	4/08/21	AY/EG	0015	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

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RPEQ# 17514

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Authorised G.Pereira
Date Dec-2020

Scale @ A1
H 1:1000 V 1:100
0 10 20 40
0 1 2 4
Scale H1:1000, V1:100

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Canberra +61 2 6126 1900 Traralgon +61 3 5173 0100

Northshore, Hamilton
Package 02
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Longitudinal Sections
Drawing No. 2521E-02-331 **Rev** D
Dev. App. No.
Sheet No. 1 of 3

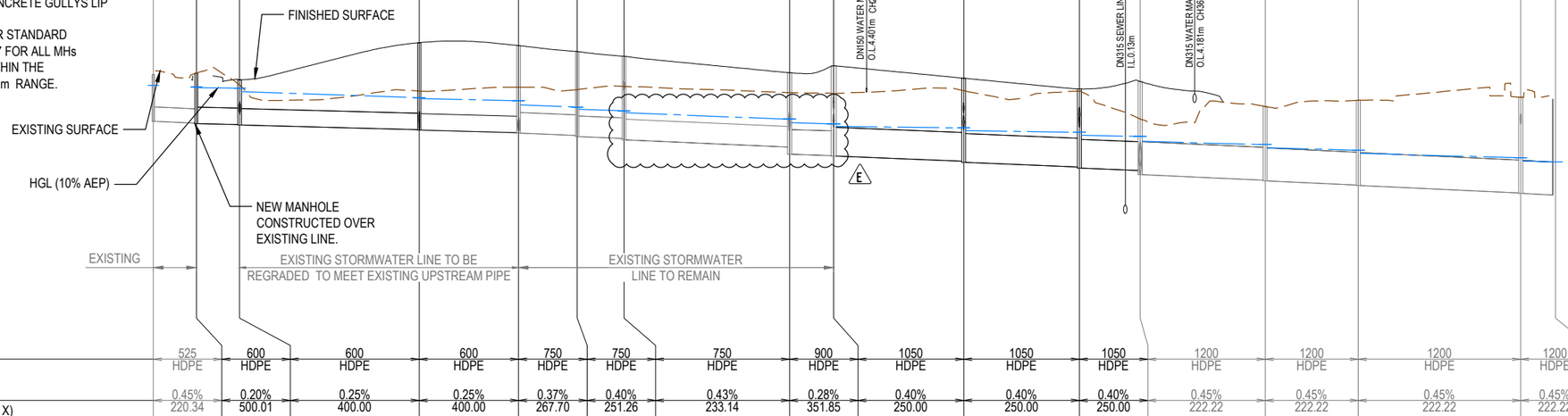
Issue for Construction

STRUCTURE NAME	X/25	15/25	14/25	13/25	12/25	11/25	10/25	09/25	08/25	07/25	06/25	05/25	04/25	03/25	02/25	01/25
STRUCTURE DESCRIPTION	EXISTING STRUCTURE	BCC MANHOLE 1050mm DIA	BCC MANHOLE 1350mm DIA	TMR MANHOLE 1200mm DIA	TMR MANHOLE 1200mm DIA	TMR MANHOLE 1200mm DIA	TMR MANHOLE 1350mm DIA	BCC MANHOLE 1500mm DIA	TMR MANHOLE 1800 mm DIA	TMR MANHOLE 1500mm DIA	BCC MANHOLE 1500mm DIA	CUSTOM MANHOLE REFER TO DRAWING 2521E-01-354	BCC MANHOLE 1500mm DIA	TMR MANHOLE 1500mm DIA	TMR MANHOLE 1500mm DIA	HEADWALL

EXISTING (PACKAGE 1)

NOTE:

1. REFER TO TMR STANDARD DRAWING 1311 FOR ALL TMR OUTLINED CONCRETE GULLYS LIP IN LINE.
2. REFER TO TMR STANDARD DRAWING 1307 FOR ALL MHs OUTLINED WITHIN THE Ø1050-Ø2100mm RANGE.



PIPE SIZE (mm)		525	600	600	600	750	750	750	900	1050	1050	1050	1200	1200	1200	1200
PIPE CLASS		HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE
PIPE GRADE (%)		0.45%	0.20%	0.25%	0.25%	0.37%	0.40%	0.43%	0.28%	0.40%	0.40%	0.40%	0.45%	0.45%	0.45%	0.45%
PIPE SLOPE (1 in X)		220.34	500.01	400.00	400.00	267.70	251.26	233.14	351.85	250.00	250.00	250.00	222.22	222.22	222.22	222.22
FULL PIPE VELOCITY (m/s)																
PART FULL VELOCITY (m/s)																
DATUM RL		-10.0														
H.G.L IN PIPE & W.S.E IN STRUCTURE	4.500	4.440	4.414 4.400	4.269 4.052	4.050 4.017	3.945 3.940	3.788 3.712	3.710 3.633	3.572 3.570	3.503 3.265	3.270 3.142	3.098 3.100	3.006 2.946	2.950 2.853	2.786 2.790	2.663 2.637	2.640 2.458	2.338 2.340	2.225 2.135	2.130 2.019	1.857 1.860	1.744 1.710	1.710 1.710
PIPE FLOW (Cumecs)		0.251	0.247	0.419	0.565	0.768	0.761	0.796	1.160	1.219	1.341	1.544	2.370	2.372	2.373	2.373							
PIPE CAPACITY AT GRADE (Cumecs)									E														
DEPTH TO INVERT		1.709 1.828	1.845 1.633	1.653 3.175	3.195 3.179	3.199 3.063	3.105 2.998	3.053 2.713	2.846 3.146	3.300 3.034	3.074 2.851	2.891 3.255	3.405 2.694	2.714 3.094	3.114 3.491	3.511 3.500	3.500							
INVERT LEVEL OF DRAIN		3.191 3.120	3.103 3.072	3.052 2.888	2.868 2.777	2.757 2.677	2.635 2.567	2.512 2.253	2.120 2.074	1.920 1.730	1.690 1.521	1.481 1.393	1.243 1.037	1.017 0.864	0.844 0.577	0.557 0.500	0.500							
DESIGN SURFACE LEVEL	4.900	4.948	4.704	6.062	5.956	5.740	5.565	4.965	5.220	4.764	4.372	4.647	3.731	3.958	4.068	4.000							
SETOUT COORDINATES	E 8405.545 N 4421.896	E 8395.384 N 4433.869	E 8379.769 N 4436.351	E 8334.766 N 4484.025	E 8309.678 N 4510.246	E 8294.230 N 4525.031	E 8279.466 N 4533.627	E 8221.828 N 4551.819	E 8205.765 N 4553.147	E 8191.993 N 4507.736	E 8179.730 N 4467.302	E 8173.230 N 4446.085	E 8160.090 N 4402.392	E 8150.289 N 4369.818	E 8133.220 N 4313.037	E 8129.552 N 4300.842							
RUNNING CHAINAGE	0.000	15.703 15.703	15.811 31.514	65.560 97.074	36.290 133.364	21.383 154.747	17.084 171.831	60.441 232.272	16.118 248.390	47.454 295.844	42.253 338.097	22.190 360.287	45.625 405.912	34.017 439.929	59.290 499.220	12.735 511.955							

LINE 25

REVISION		DATE	DES/DFT	WVR	APP'D
E	Re-issue for construction	23/08/21	EW/AY	0021	GP
D	Re-issue for Construction	17/08/21	EW/AY	0017	GP
C	Re-issue for Construction	12/08/21	AY/EG	0016	GP
B	Re-issue for Construction	4/08/21	AY/EG	0015	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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Drawn K.McCoy
Checked D.Rapson
Authorised G.Pereira
Date Dec-2020

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H 1:1000 V 1:100
0 10 20 40
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Scale H1:1000, V1:100

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Northshore, Hamilton
Package 02
Economic Development Queensland
Stormwater Drainage
Stormwater Drainage Longitudinal Sections
Drawing No. 2521E-02-332 **Rev** E
Dev. App. No.
Sheet No. 2 of 3

Issue for Construction

Appendix I
BCC FloodWise Report

FloodWise Property Report

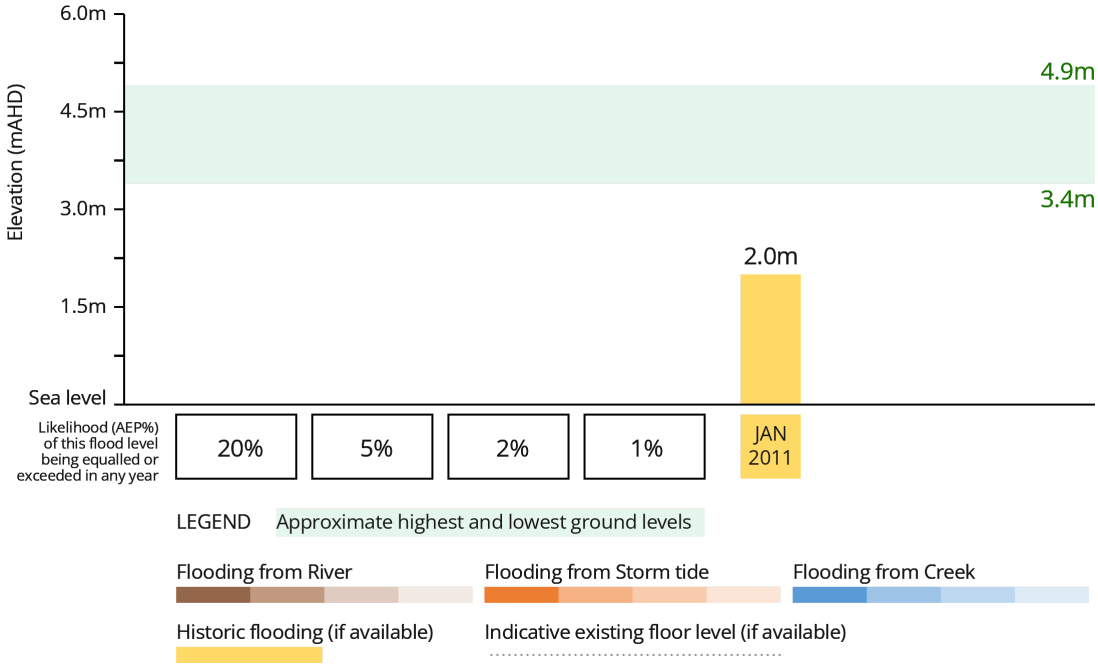
340 MACARTHUR AVE, HAMILTON 4007
Lot 1 on SP337697

Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report **provides technical flood planning information** including estimated flood levels, habitable floor level requirements and more. **This report uses the adopted flood planning information in Brisbane City Plan 2014**, that guides how land in Brisbane is used and developed for the future. Find out more about planning and building. To understand how to be **resilient and prepare for floods**, visit Council's Be Prepared webpage. Find more information about how to read a FloodWise Property Report.

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



Combined 1% AEP for river, creek and storm tide flood extent (if applicable) from the adopted Brisbane City Plan 2014.
Read more about Brisbane City Plan 2014.

Are you resilient and ready for flood?

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

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

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

Technical Summary

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

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

Property Information Summary

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

Property Summary	Level (mAHD) / Comment	Data Quality Code
Minimum ground level	3.4	C
Maximum ground level	4.9	C

Flood Planning and Development Information

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

Flood overlay code

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

Flood planning areas (FPA)		
River	**Creek / waterway**	**Overland flow**
		Applicable

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

Coastal hazard overlay code

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

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

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

Property development flags
Overland flow path - Mapping indicates this property may be located within an overland flow path. Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded and/or when the overland flow path is blocked. It is recommended you consult a Registered Professional Engineer of Queensland (RPEQ) to determine this property's habitable floor level and flooding depth. Please refer to Council's planning scheme for further information.
Large allotment - This property is either a Large Allotment of over 1000 square metres or is located within a Large Allotment. Flood levels may vary significantly across allotments of this size. Further investigations may be warranted in determining the variation in flood levels and the minimum habitable floor level across the site. For more information or advice, please consult a Registered Professional Engineer of Queensland (RPEQ).

Useful Flood Information Definitions

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

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

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

Data quality

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

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

Flood planning area (FPA) - Council has developed five Flood planning areas (FPAs) as part of Brisbane City Plan 2014 Flood overlay mapping for Brisbane River, Creek/waterway flooding and Overland flow to guide future building and development in flood prone areas. Storm tide flooding is mapped separately. The FPAs are designed to recognise the flood hazard for different flooding types. Flood hazard is a combination of frequency of flooding, the flood depth, and the speed at which the water is travelling. **Find more information here**.

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

Minimum habitable floor level (dwelling house) - The minimum level in metres AHD at which habitable areas of development (generally induding bedrooms, living rooms, kitchen, study, family, and rumpus rooms) must be constructed as required by the Brisbane City Plan 2014.

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

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

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

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

Brisbane City Council's Online Flood Tools

Council provides several online flood tools:

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

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

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

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

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

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

Council's Planning Scheme - The Brisbane City Plan 2014 (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Disclaimer

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

Planning to build or renovate?

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

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

Appendix J
Flood Impact Assessment Report

Brisbane
584 Milton Road, Cnr Sylvan Road
Toowong, QLD 4066
PO Box 1492
Toowong BC, QLD 4066
Phone: +61 07 3300 8800
Email: info@adgce.com

Sydney
13 / 20 Berry Street,
North Sydney NSW 4006
Phone: +61 02 8908 5400
Email: info@adgce.com

Melbourne
Suite 309, 838 Collins Street,
Docklands VIC 3008
Phone: +61 03 9269 6300
Email: info@adgce.com

Gold Coast
Suite 201, Level 1, 1 Short Street
Southport, QLD 4215
PO Box 208
Southport, QLD 4215
Phone: +61 07 5552 4700
Email: info@adgce.com

Sunshine Coast
Level 3, 2 Emporio Place
Maroochydore, QLD 4558
PO Box 5014
Maroochydore BC, QLD 4558
Phone: +61 07 5444 0400
Email: info@adgce.com

Toowoomba
Tenancy 8, 158 Margaret Street
Toowoomba QLD 4350, Australia
Phone: +61 07 3300 8800
Email: info@adgce.com

Darwin
Tenancy 3, Lvl 1, 5 Edmunds St,
Darwin NT 0800
GPO Box 2422
Darwin, NT 0801
Phone: +61 08 8944 6300
Email: info@adgce.com

Perth
Level 3, Suite 15, 23 Railway Road,
Subiaco, WA 6008
PO Box 443
Subiaco, WA 6904
Phone: +61 08 9217 0900
Email: info@adgce.com

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