



Robert
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Group

Water Sensitive Urban Design Report High Street, Penrith

Issue: G – Development Application

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1.0 Introduction

Robert Bird Group (RBG) has been engaged by Toga Development & Construction (TOGA) to provide civil engineering services in relation to the High Street, Penrith Development (Project).

This report provides reference information, standards and inputs, and description of the proposed works as it pertains to the Water Sensitive Urban Design (WSUD). This report is meant to be a subset of the Stormwater Management Report and accompanies the stormwater quality assessment that was undertaken using the MUSIC software in the post-development scenario.

1.1 Project Description

The site is located to the south of High Street and east of Mulgoa Road. Additionally, the site is bordered by Union Road to the south, John Tipping Grove to the west and Union Lane to the east.

The development is to involve a new roadway connection, public domain works, landscaping, commercial and multi storey residential apartments.



Figure 1- Site Location and Area

1.2 Standards and Reference Information

The standards and reference information applicable to the design include:

- Penrith Development Control Plan, Published 2014
- Penrith City Council Stormwater Drainage Guidelines for Building Developments – Adopted 28th November 2016
- Penrith City Council WSUD Technical Guidelines, Version 3 – June 2015
- Penrith City Council WSUD Technical Guidelines, Addendum 1 – Deemed to Comply Toolkit for Residential, Industrial & Commercial Developments, Version 1, June 2015

- Draft Nepean River PMF Flood Levels, Worley Parsons RMA March 2017 (preliminary only and not yet adopted as of 9th August 2017)
- Australian Rainfall and Runoff (1987) (AR&R)
- AS3500 National Plumbing and Drainage Code
- SJB Architectural Drawings, Rev 2 - Dated 01.02.2018
- Site survey information – Received 8/12/2017 – “V17-0430 – Toga - Penrith Locate”
- Managing Urban Stormwater Runoff: Soils and Construction, 4th Edition (“Blue Book”)
- Cardno Flood Impact Assessment (21st September 2017)
- NSW MUSIC Modelling Guidelines (11th August 2015, BMT WBM Pty Ltd)

1.3 Limitations

A number of limitations apply to the designs, listed as follows:

- This report has been prepared for TOGA for the Project only
- This report shall not be used for any purposes other than that outlined above
- The report has been based on the information available and understanding of the proposed works by RBG
- This report is based on the documentation listed in Section 1.2 of this report

1.4 Design Package Documentation

This design package consists of the following RBG documentation:

- RBG Drawings as listed in Appendix A;
- This Water Sensitive Urban Design Report.



2.0 Stormwater Quality Improvements

To ensure that the development improves the quality of stormwater leaving the site, Robert Bird Group have reviewed the site, consulted with Penrith City Council (PCC), formulated a WSUD concept, modelled the treatment Train performance and have summarised the results below as well as producing a Water Quality Plan and Details for clarity of design.

2.1 Design Objectives

To improve stormwater quality for the region, PCC requires that all developments must meet quantified pollutant reduction targets.

The pollution load targets for the project reflect the reductions noted in the *Penrith City Council WSUD Technical Guidelines, Section 7 Checklist item No. 3.* and the locality DCP, *Section 5B*. These targets are noted in Table 1 below:

Table 1 - Penrith City Council Stormwater Quality Targets

Pollutant	Reduction Target
Gross Pollutant (GP)	90% reduction of average annual loads
Total Suspended Solids (TSS)	85% reduction of average annual loads
Total Phosphorus (TP)	60% reduction of average annual loads
Total Nitrogen (TN)	45% reduction of average annual loads

2.2 Rainfall Data

The PCC WSUD Guidelines recommend the rainfall data for MUSIC Modelling and is shown in Table 2.

Table 2 – Recommended Rainfall Data for MUSIC Modelling

Purpose	Time Step Required	Rainfall Station	Modelling Period
Water Quality	6 minutes	67113 Penrith Lakes AWS	1999 to 2008
Water Quantity (including rainwater tanks, stormwater storages)	Daily	67113 Penrith Lakes AWS	1999 to 2008

This data has been implemented in the MUSIC model. The following screenshots show an example with rainfall data with a 6 minute time step. The rest of the data can be seen within the MUSIC model.

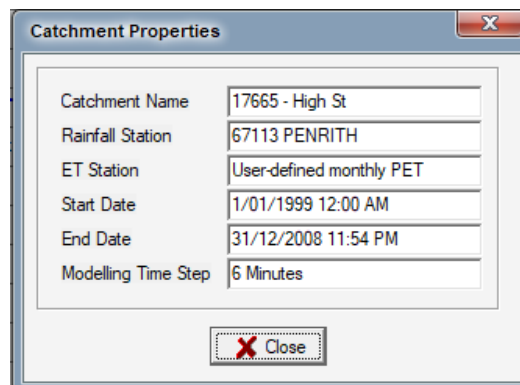


Figure 2 - Catchment Properties and Rainfall data

2.3 Evapotranspiration Data

The evapotranspiration is the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces as well as transpiration from plants. The PCC WSUD Guidelines recommend the evapotranspiration data for MUSIC Modelling and is shown in Table 3.

Table 2 – Monthly Evapotranspiration for Penrith

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	159	122	115	77	50	39	41	57	81	122	142	152

This has been input into the MUSIC models site specific Meteorological Template as shown in Figure 3.

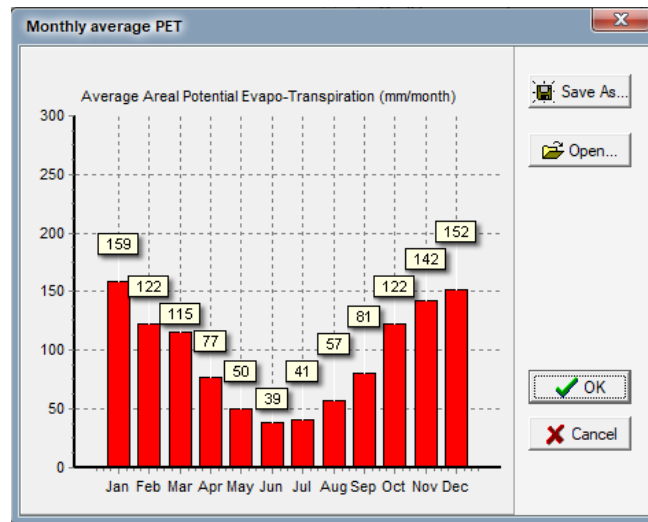


Figure 3 – Evapotranspiration Data

2.4 Data Summary

The statistical summary from the MUSIC model is shown below.

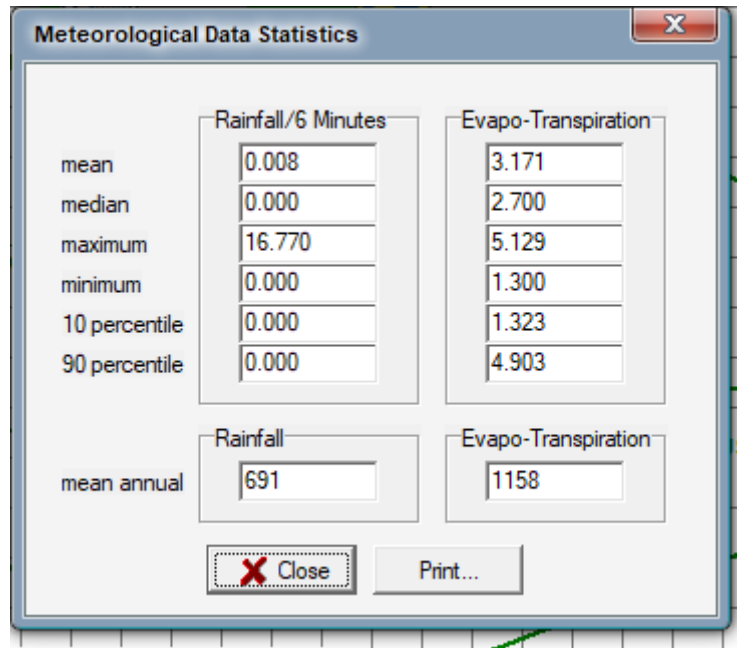


Figure 4 - Data Summary

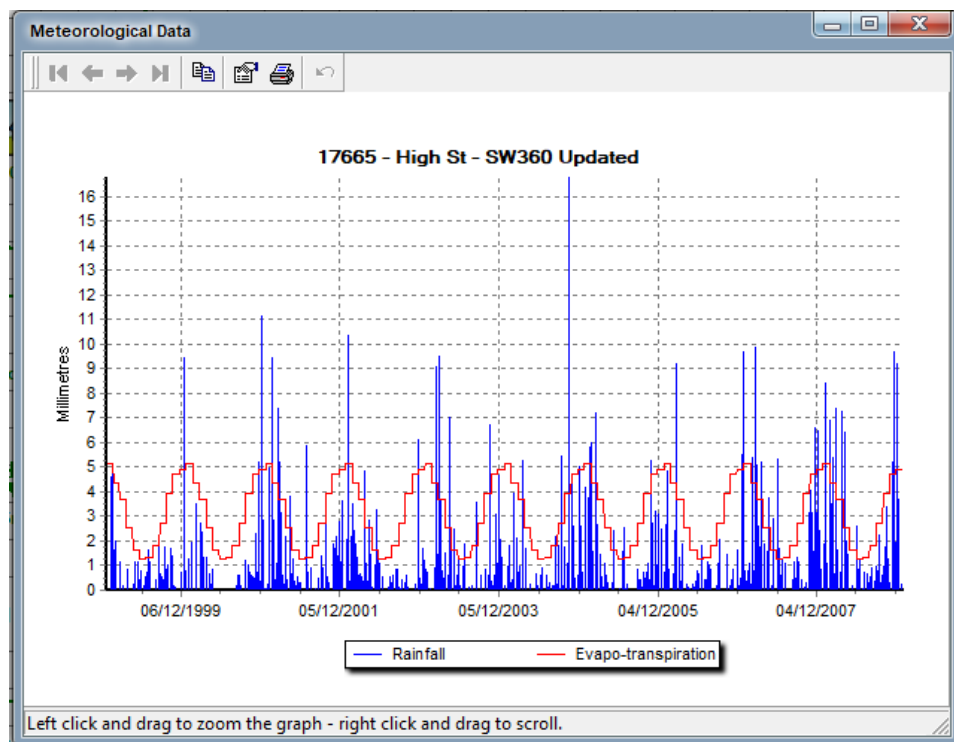


Figure 5 - Data Summary Graph

2.5 Rainfall-Runoff Parameters

Default rainfall-runoff parameters are given in the Penrith WSUD Guidelines and are listed in Table 3.

Table 3 – Rainfall-Runoff Parameters

Impervious Area Parameters	
Rainfall Threshold	1.4mm
Pervious Area Parameters	
Soil Storage Capacity	105mm
Initial Storage (% of capacity)	30
Field Capacity	70mm
Infiltration Capacity Coefficient – a	150
Infiltration Capacity Exponent – b	3.5
Groundwater Properties	
Initial Depth	10mm
Daily Recharge Rate	25%
Daily Baseflow	10%
Daily Deep Seepage Rate	0%

We have implemented the above parameters in the source nodes as shown in Figure 6.

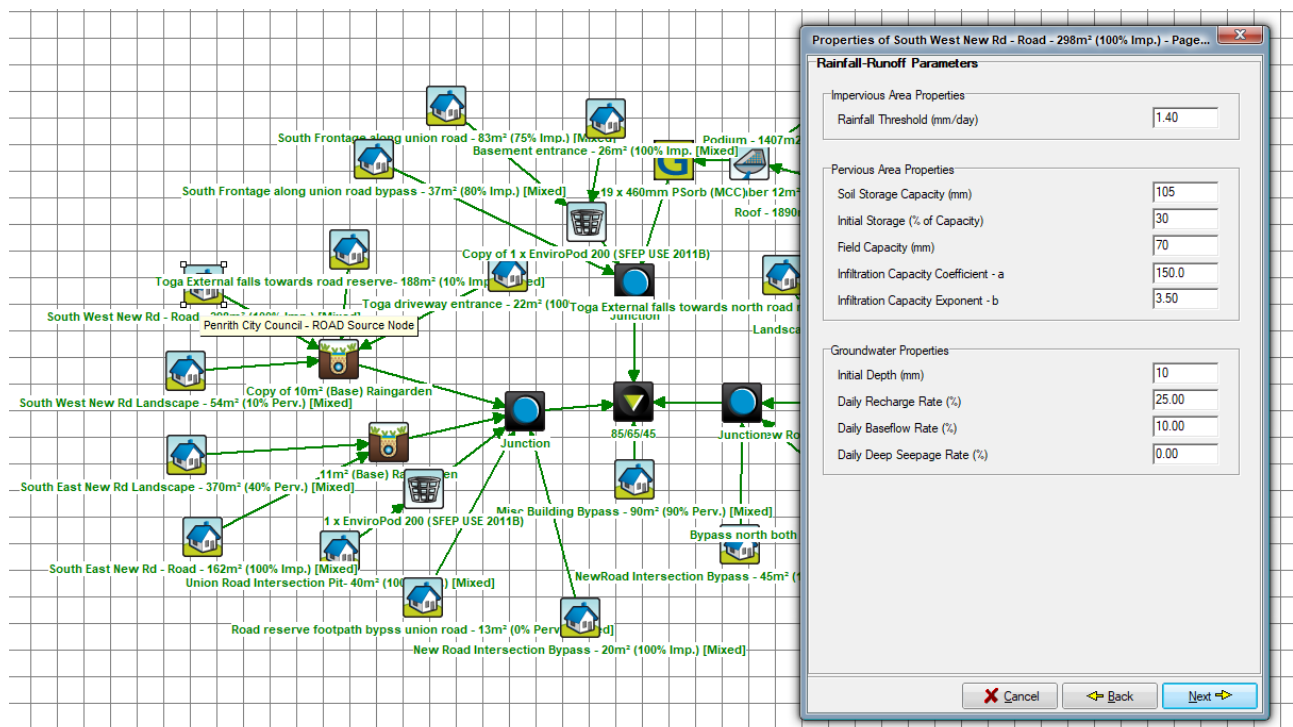


Figure 6 - Rainfall-Runoff Parameters in Model

2.6 Pollutant Generation Parameters

The recommended pollutant parameters given by PCC.



Table 4 - Stormwater Quality Parameters for MUSIC Source Nodes

Land-use Category		Log10 TSS (mg/L)		Log10 TP (mg/L)		Log10 TN(mg/L)	
		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
General Urban, Residential, Industrial, or Commercial	Mean	2.15	1.2	-0.6	-0.85	0.3	0.11
	Std Dev	0.32	0.17	0.25	0.19	0.19	0.12
Road Areas	Mean	2.43	NA	-0.3	NA	0.34	NA
	Std Dev	0.32		0.25		0.19	
Roof Areas	Mean	1.3	NA	-0.89	NA	0.3	NA
	Std Dev	0.32		0.25		0.19	

As can be seen in Appendix B (MUSIC Link report) the above parameters have been correctly input. This is also demonstrated in Figure 7 - General Urban Landscape Pollutant Generation Parameters.

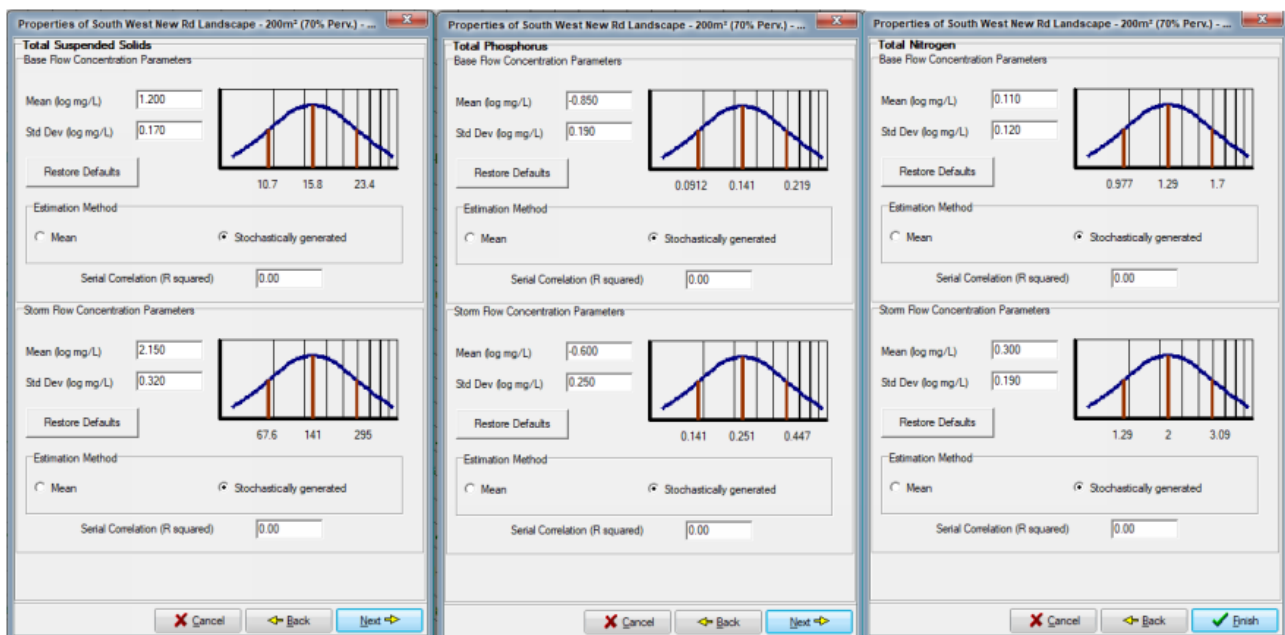


Figure 7 - General Urban Landscape Pollutant Generation Parameters

2.7 Treatment Nodes

Stormwater treatment parameters in the Penrith Council WSUD Guide provides a list of measures that can be taken to improved water discharges. The following devices are recommended in the treatment train:

- Bioretention Rain Gardens
 - Three Bioretention Raingardens are proposed for the development.

These systems are commonly used in many water sensitive localities throughout Australia. The systems consist of vegetated soil media filters, which treat stormwater by allowing it to pond on the vegetated surface, then slowly infiltrating through the soil media. Treated water is captured at the base of the system and discharged via outlet pipes. Details have been developed for this application and are attached in the appendix of this report in sheet C6-30.

- Proprietary Device

- A proprietary water quality treatment system has been utilised to treat all catchment discharge from the building podium and roof within an On Site Detention Tank.

The Ocean Protect (Previously know as Stormwater 360) StormFilter Cartridges system has been proposed and can be installed in the detention tank. The system is effective at removing TSS, TP, and TN to reach the reduction targets.

- Pit filter baskets

- In-pit proprietary devices such as Stormwater360 Enviropod have been proposed in three street drainage pits and are a maintainable inlet pit insert which is effective at removing litter, debris, and other pollutants generated from urban runoff.

In the Pre-Development Application meeting on 13.03.18 it was noted that Pit Baskets were not supported by the City, however the site constraints made it very difficult to treat all flows and thus small bypass flows at the intersections with Union Road and High Street were limiting the ability to reach the reduction targets. The inclusion of the pit baskets has provided the opportunity to treat part of these bypass flows, improving the system.

Table 5 shows the relevant treatment node parameters that have been taken from the WSUD Guidelines. Figures 8 and 9 give some examples of the treatment nodes. It should be noted that Stormwater360 were contacted and 19 x 460mm StormFilter cartridges have been utilised in the MUSIC model and are shown on within the OSD Tank on drawing C6-26.

Table 5 - Stormwater Treatment Parameters

Stormwater treatment measures	Selected key parameter values and design guidance
Bioretention systems (basins & swales)  Bioretention	High flow bypass = generally 3-month ARI flow (to be calculated by consultant). Extended detention depth = 0.1-0.3 m (for basins) Saturated hydraulic conductivity = 125 mm/hr (maximum) Filter depth = 0.5-0.8 m TN content of filter media = 800mg/kg Orthophosphate content of filter media = 40mg/kg Exfiltration rate = 0 mm/hr Note that a submerged (saturated) zone requires a specially designed outlet pit configuration.
Gross pollutant traps  GPT	High flow bypass for the device = 3-month ARI peak flow. Gross pollutant removal should be obtained for the specific GPT type proposed from the supplier – preferably independently verified. - TSS removal = 0 (unless a CDS-type system, when TSS removal can be up to 70% for inflow concentrations greater than 75 mg/L). - TP removal = 0 (unless a CDS-type system, when TP removal can be up to 30% for inflow concentrations greater than 0.5 mg/L). - TN removal = 0.

Figure 8 - Raingarden Parameters

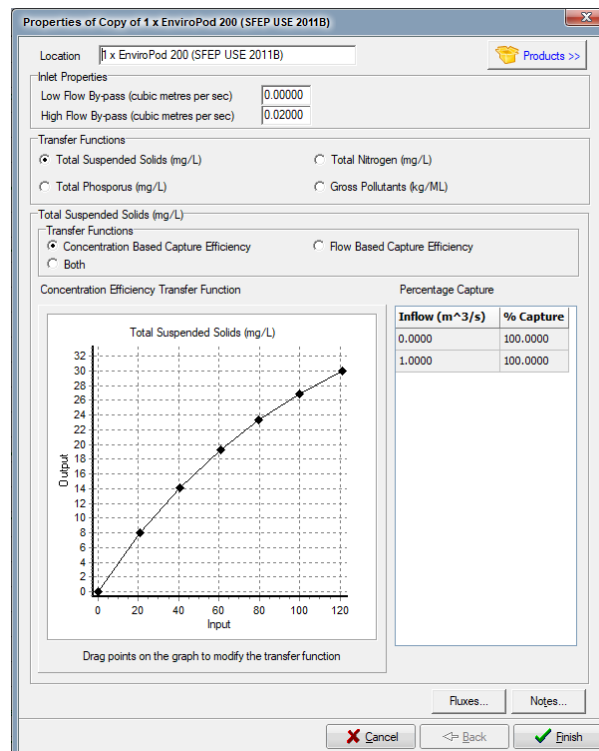


Figure 9 - GPT TSS Details

2.8 Erosion and Sediment Control

To maintain the water quality during the construction stage, erosion and sediment control measures will be installed. Soil management measures shall follow the Landcom guidelines – Managing Urban Stormwater Runoff: Soils and Construction (“Blue Book”) and the PCC WSUD Technical Guidelines.

The measures proposed for this development include:

- Sediment fences around stockpiles and construction zones where soils are exposed;

- Catch drains/bunds to collect construction site runoff and convey flows to the settling basin; and.
- Sediment protection devices on existing and proposed inlet pits i.e. filter socks.
- Truck Wash/Shaker Grid at all site access/egress points.

2.9 Water Quality Treatment Train Performance

A design has been completed for the current project characteristics and arrangement and this has resulted in the proposal for the following treatment systems:

1. 12 x 690mm StormFilter Cartridges installed in the OSD Tank.
2. 3 Bioretention Raingardens located prior to the Union Road and High Street intersections.
3. 3 Enviropods are to be placed in pits immediately adjacent to the intersections.

The treatment train with reduction results is illustrated in Figure 3.

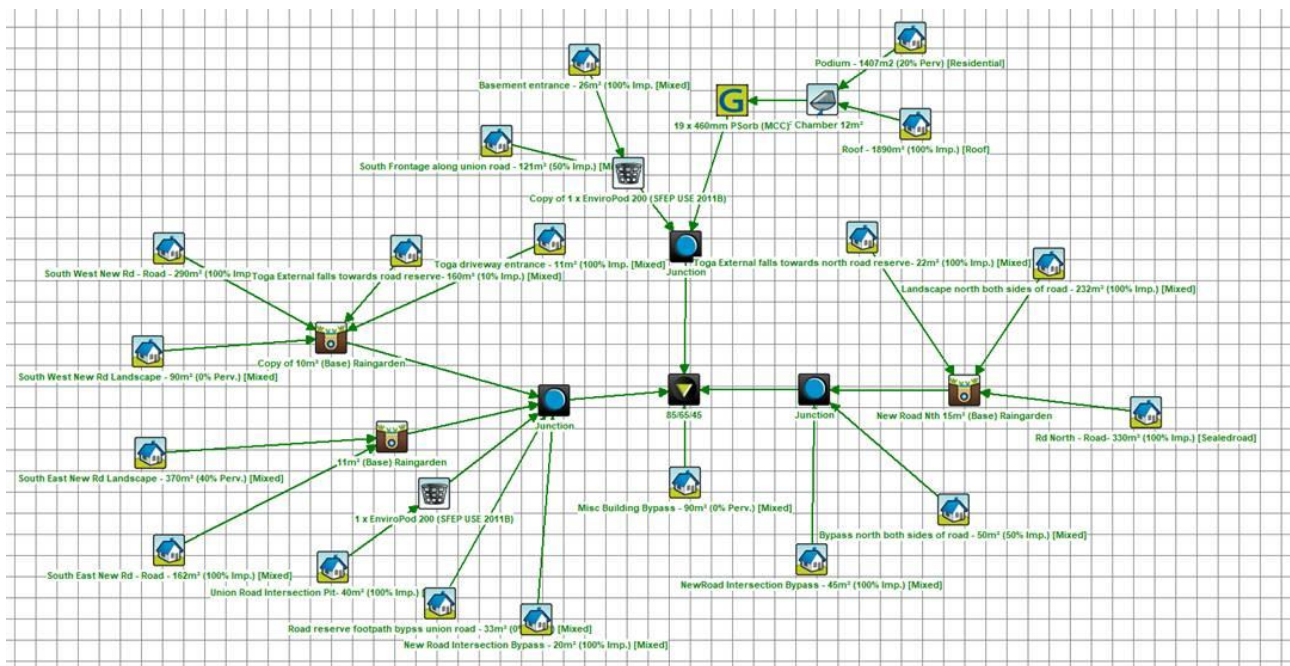


Figure 3 – MUSIC Treatment Train Model Schematic

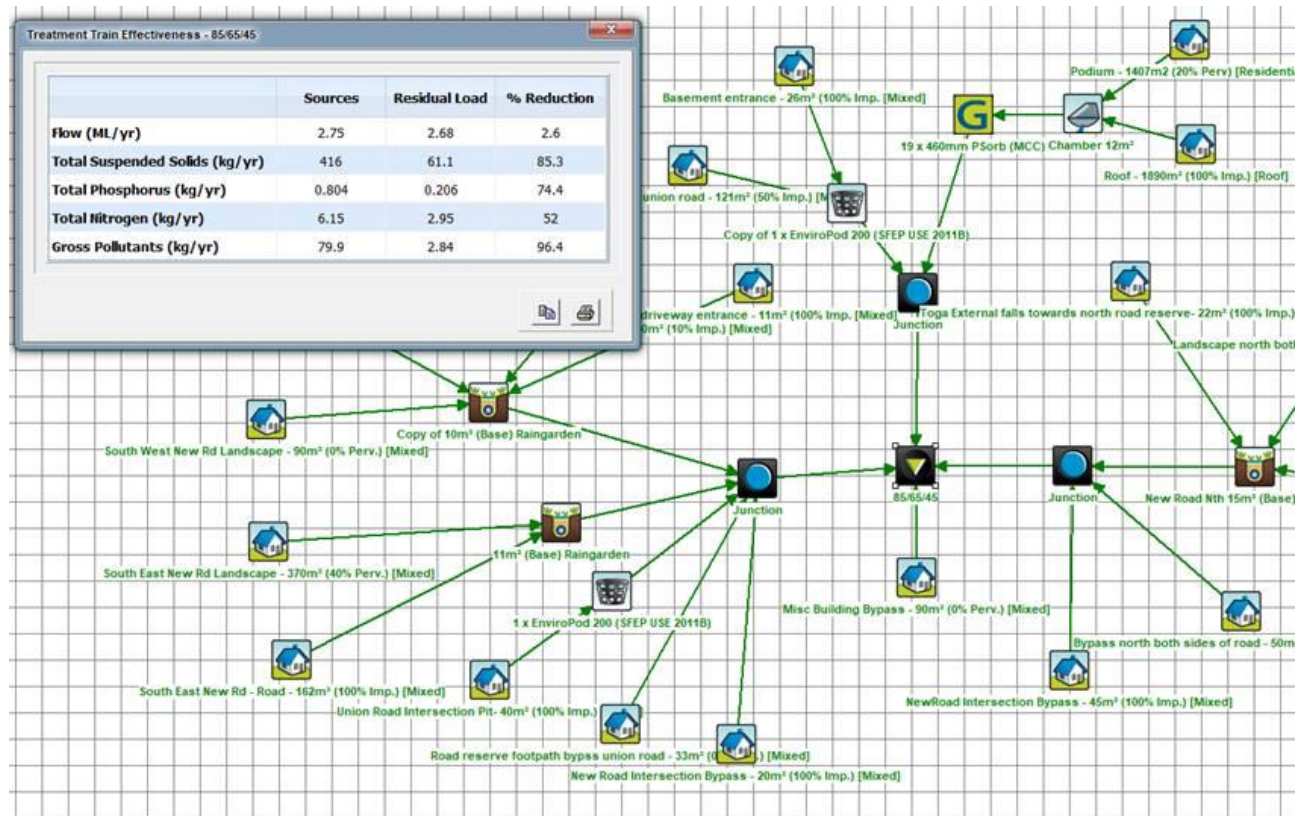


Figure 4 – MUSIC Treatment Train Effectiveness Results

A comparison of the objectives against the design is shown in Table 6.

Table 1 - Stormwater Quality Performance

Pollutant	Objective Target	Design Reduction
Gross Pollutant (GP)	90%	96.4%
Total Suspended Solids (TSS)	85%	85.3%
Total Phosphorus (TP)	65%	74.4%
Total Nitrogen (TN)	45%	52.0%

2.10 Water Conservation and BASIX

A full BASIX assessment has been undertaken by EMF Griffiths and a report has been prepared as part of this development application.

The investigation has shown that BASIX compliance can be achieved through general measures, planting of indigenous or low water use species of vegetation and installation of a 20m³ Rainwater Harvesting tank.

Please refer to the EMF Griffiths report for further BASIX details.

3.0 Conclusion

This Stormwater Management Report outlines the concept design principles that are intended for the management of stormwater runoff associated with the proposed development.

During the concept planning for the Development Application due consideration has been given to the relevant Council requirements, best practice principles, and guidelines.

Flooding and Overland Flow, general Stormwater Drainage, On Site Detention, existing network Pipe Capacities and Water Quality have all been assessed and summarised.

Appendix A

WSUD Checklist



7. CHECKLISTS

7.1. Development Application Checklist (lodged with DA)

 Water Sensitive Urban Design Development Application Checklist			
Site/ Project Name	634-652 High Street 87-91 Union Road Penrith		
Lot and DP Number:	DP 55302	DA Number:	
Information Required with DA Submission:		Y	N
1	Has a Water Sensitive Urban Design Strategy been submitted as part of the development application?	✓	
2	Is a BASIX Certificate required? If so, Yes - Attach certificate with DA	✓	
3	Has the digital version of MUSIC and report on the MUSIC model using data prescribed outlined in Council's Technical Guideline been attached? Have stormwater quality retention criteria (TSS 85%, TP 60%, and TN 45%) and water quantity / drainage requirements been met and documented in the WSUD Strategy? If relevant, have the Water Conservation, Quantity and quantity targets been achieved?	✓	
4	Does WSUD Strategy contain the following information? - Review of the WSUD principles and ensure that these are considered throughout development of the WSUD strategy. - Confirmation of the WSUD objectives that are relevant to the development application. - Confirmation of the WSUD targets for potable water conservation, stormwater quality management and stormwater quantity management that are relevant to the development application. - Complete a site analysis to evaluate the site characteristics that potentially will impact on the feasibility of WSUD for the site. WSUD measures that would be appropriate for the development considering the development scale, site characteristics, stormwater quality management function and stormwater quantity management function. - A preliminary WSUD strategy that positions the selected WSUD measures in appropriate locations and arranges the measures in an appropriate series. Numerical modelling utilising MUSIC software to evaluate appropriate sizes of the WSUD measures. Concept designs of the WSUD measures. WSUD strategy report that summarises the methodology and WSUD outcomes, and provide this with the development application for the site.	✓	
5	Have the conceptual plans of the proposed stormwater treatment measures been included on the plans? (Detailed engineering plans will be required for the construction certificate)	✓	

6	Has a Draft Operation and Maintenance Plan which includes details on the following been provided? • Site description (area, imperviousness, land use, annual rainfall, topography etc) • Site access description • Likely pollutant types, sources and estimated loads • Locations, types and descriptions of measures proposed • Operation and maintenance responsibility (council, developer or owner) • Inspection methods • Maintenance methods (frequency, equipment and personnel requirements including Work Health and Safety requirements) • Landscape and weed control requirements • Operation and maintenance costs • Waste management and disposal options, and • Reporting.		
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Appendix B

MUSIC-link Report



MUSIC-link Report

Project Details		Company Details	
Project:	Toga Development - High Street Penrith	Company:	Toga (Developer) Robert Bird Group (Engineer)
Report Export Date:	2/03/2020	Contact:	Chris Waite
Catchment Name:	17665 - High St - DA Submission-13.02.20	Address:	634-652 HIGH STREET & 87-91 UNION ROAD
Catchment Area:	0.55ha	Phone:	0437 008 160
Impervious Area*:	85.58%	Email:	chris.waite@robertbird.com.au
Rainfall Station:	67113 PENRITH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	691mm		
Evapotranspiration:	1158mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	Penrith		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: 85/65/45	Reduction	Node Type	Number	Node Type	Number
Flow	2.52%	Sedimentation Basin Node	1	Urban Source Node	20
TSS	85.8%	Bio Retention Node	3		
TP	75%	Generic Node	1		
TN	53%	GPT Node	2		
GP	96%				

Comments

The only non-conformance is the "Notional Detention Time". The Min and Max for this area are those for an OSD tank. The parameters that we have given are for our filtration system and how long the stormwater is retained within the cartridges whilst it is being treated. If we set the time for 8-12 hours it would not be accurate.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	11m (Base) Raingarden	Hi-flow bypass rate (cum/sec)	None	99	0.004
Bio	11m (Base) Raingarden	PET Scaling Factor	2.1	2.1	2.1
Bio	Copy of 10m (Base) Raingarden	Hi-flow bypass rate (cum/sec)	None	99	0.004
Bio	Copy of 10m (Base) Raingarden	PET Scaling Factor	2.1	2.1	2.1
Bio	New Road Nth 15m (Base) Raingarden	Hi-flow bypass rate (cum/sec)	None	99	0.008
Bio	New Road Nth 15m (Base) Raingarden	PET Scaling Factor	2.1	2.1	2.1
GPT	1 x EnviroPod 200 (SFEP USE 2011B)	Hi-flow bypass rate (cum/sec)	None	99	0.04
GPT	Copy of 1 x EnviroPod 200 (SFEP USE 2011B)	Hi-flow bypass rate (cum/sec)	None	99	0.04
Receiving	85/65/45	% Load Reduction	None	None	2.52
Receiving	85/65/45	GP % Load Reduction	90	None	96
Receiving	85/65/45	TN % Load Reduction	45	None	53
Receiving	85/65/45	TP % Load Reduction	60	None	75
Receiving	85/65/45	TSS % Load Reduction	85	None	85.8
Sedimentation	SF Chamber 12m	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Basement entrance - 26m (100% Imp.)	Area Impervious (ha)	None	None	0.003
Urban	Basement entrance - 26m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Basement entrance - 26m (100% Imp.)	Total Area (ha)	None	None	0.003
Urban	Bypass north both sides of road - 50m (50% Imp.)	Area Impervious (ha)	None	None	0.002
Urban	Bypass north both sides of road - 50m (50% Imp.)	Area Pervious (ha)	None	None	0.002
Urban	Bypass north both sides of road - 50m (50% Imp.)	Total Area (ha)	None	None	0.005
Urban	Landscape north both sides of road - 232m (100% Imp.)	Area Impervious (ha)	None	None	0.011
Urban	Landscape north both sides of road - 232m (100% Imp.)	Area Pervious (ha)	None	None	0.011
Urban	Landscape north both sides of road - 232m (100% Imp.)	Total Area (ha)	None	None	0.023
Urban	Misc Building Bypass - 90m (90% Perv.)	Area Impervious (ha)	None	None	0.000
Urban	Misc Building Bypass - 90m (90% Perv.)	Area Pervious (ha)	None	None	0.008
Urban	Misc Building Bypass - 90m (90% Perv.)	Total Area (ha)	None	None	0.009
Urban	New Road Intersection Bypass - 20m (100% Imp.)	Area Impervious (ha)	None	None	0.002
Urban	New Road Intersection Bypass - 20m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	New Road Intersection Bypass - 20m (100% Imp.)	Total Area (ha)	None	None	0.002
Urban	New Road Intersection Bypass - 45m (100% Imp.)	Area Impervious (ha)	None	None	0.004
Urban	New Road Intersection Bypass - 45m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	New Road Intersection Bypass - 45m (100% Imp.)	Total Area (ha)	None	None	0.004
Urban	Podium - 1407m2 (20% Perv)	Area Impervious (ha)	None	None	0.112
Urban	Podium - 1407m2 (20% Perv)	Area Pervious (ha)	None	None	0.028
Urban	Podium - 1407m2 (20% Perv)	Total Area (ha)	None	None	0.141
Urban	Rd North - Road- 455m (100% Imp.)	Area Impervious (ha)	None	None	0.046
Urban	Rd North - Road- 455m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Rd North - Road- 455m (100% Imp.)	Total Area (ha)	None	None	0.046
Urban	Road reserve footpath bypass union road - 13m (0% Perv.)	Area Impervious (ha)	None	None	0.001
Urban	Road reserve footpath bypass union road - 13m (0% Perv.)	Area Pervious (ha)	None	None	0

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Road reserve footpath bypass union road - 13m (0% Perv.)	Total Area (ha)	None	None	0.001
Urban	Roof - 1890m (100% Imp.)	Area Impervious (ha)	None	None	0.189
Urban	Roof - 1890m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Roof - 1890m (100% Imp.)	Total Area (ha)	None	None	0.189
Urban	South East New Rd - Road - 162m (100% Imp.)	Area Impervious (ha)	None	None	0.016
Urban	South East New Rd - Road - 162m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	South East New Rd - Road - 162m (100% Imp.)	Total Area (ha)	None	None	0.016
Urban	South East New Rd Landscape - 370m (40% Perv.)	Area Impervious (ha)	None	None	0.022
Urban	South East New Rd Landscape - 370m (40% Perv.)	Area Pervious (ha)	None	None	0.014
Urban	South East New Rd Landscape - 370m (40% Perv.)	Total Area (ha)	None	None	0.037
Urban	South Frontage along union road - 83m (75% Imp.)	Area Impervious (ha)	None	None	0.00598
Urban	South Frontage along union road - 83m (75% Imp.)	Area Pervious (ha)	None	None	0.00202
Urban	South Frontage along union road - 83m (75% Imp.)	Total Area (ha)	None	None	0.008
Urban	South Frontage along union road bypass - 37m (80% Imp.)	Area Impervious (ha)	None	None	0.003
Urban	South Frontage along union road bypass - 37m (80% Imp.)	Area Pervious (ha)	None	None	0.000
Urban	South Frontage along union road bypass - 37m (80% Imp.)	Total Area (ha)	None	None	0.004
Urban	South West New Rd - Road - 298m (100% Imp.)	Area Impervious (ha)	None	None	0.03
Urban	South West New Rd - Road - 298m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	South West New Rd - Road - 298m (100% Imp.)	Total Area (ha)	None	None	0.03
Urban	South West New Rd Landscape - 54m (10% Perv.)	Area Impervious (ha)	None	None	0.004
Urban	South West New Rd Landscape - 54m (10% Perv.)	Area Pervious (ha)	None	None	0.000
Urban	South West New Rd Landscape - 54m (10% Perv.)	Total Area (ha)	None	None	0.005
Urban	Toga driveway entrance - 22m (100% Imp.)	Area Impervious (ha)	None	None	0.002
Urban	Toga driveway entrance - 22m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Toga driveway entrance - 22m (100% Imp.)	Total Area (ha)	None	None	0.002
Urban	Toga External falls towards north road reserve- 22m (100% Imp.)	Area Impervious (ha)	None	None	0.001
Urban	Toga External falls towards north road reserve- 22m (100% Imp.)	Area Pervious (ha)	None	None	3.014
Urban	Toga External falls towards north road reserve- 22m (100% Imp.)	Total Area (ha)	None	None	0.002
Urban	Toga External falls towards road reserve- 188m (10% Imp.)	Area Impervious (ha)	None	None	0.008
Urban	Toga External falls towards road reserve- 188m (10% Imp.)	Area Pervious (ha)	None	None	0.010
Urban	Toga External falls towards road reserve- 188m (10% Imp.)	Total Area (ha)	None	None	0.019
Urban	Union Road Intersection Pit- 40m (100% Imp.)	Area Impervious (ha)	None	None	0.004
Urban	Union Road Intersection Pit- 40m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Union Road Intersection Pit- 40m (100% Imp.)	Total Area (ha)	None	None	0.004

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber 12m	Notional Detention Time (hrs)	8	12	0.154

Only certain parameters are reported when they pass validation

Appendix C

Technical Drawings



634-652 HIGH STREET & 87-91 UNION ROAD

PENRITH

CIVIL ENGINEERING DRAWING SET

ISSUED FOR DEVELOPMENT APPLICATION

Sheet List Table	
Sheet Number	Sheet Title
C0-00	COVER SHEET, LOCALITY PLAN AND SHEET LIST
C0-02	SURVEY REFERENCE PLAN
C1-01	EROSION AND SEDIMENT CONTROL PLAN
C1-10	EROSION AND SEDIMENT CONTROL DETAILS
C2-01	BULK EARTHWORKS PLAN
C3-00	GENERAL ARRANGEMENT PLAN
C3-05	STAGING PLAN – STAGE 1 – CONNECTING TO EXISTING ROUND ABOUT
C3-06	STAGING PLAN – STAGE 2 – CONNECTING TO SIGNALISED INTERSECTION
C3-07	STAGING PLAN – STAGE 3 ULTIMATE ROAD DESIGN
C3-10	CIVIL DETAILS
C3-15	TYPICAL ROAD CROSS SECTIONS – SHEET 1 OF 2
C3-16	TYPICAL ROAD CROSS SECTIONS – SHEET 2 OF 2
C3-20	ROADWAY LONGITUDINAL SECTION ULTIMATE ROAD
C3-40	ROADWAY CROSS SECTIONS – SHEET 1
C4-01	PAVEMENT LAYOUT PLAN
C4-10	PAVEMENT DETAILS
C6-01	STORMWATER MANAGEMENT PLAN
C6-10	STORMWATER DETAILS
C6-20	STORMWATER LONGSECTIONS
C6-22	STORMWATER LONGSECTIONS – ULTIMATE STAGE 3 DESIGN
C6-25	WATER QUALITY PLAN
C6-26	ON SITE DETENTION TANK TYPICAL DETAILS
C6-30	BIORETENTION SYSTEM TYPICAL ARRANGEMENT DETAILS
C6-51	PRE-DEVELOPMENT CATCHMENT PLAN
C6-56	POST-DEVELOPMENT CATCHMENT PLAN



LOCALITY PLAN
SCALE NTS

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
8	ISSUED FOR APPROVAL	RG	CW	05.10.21

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Title
**COVER SHEET, LOCALITY PLAN
AND SHEET LIST**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
18.06.18

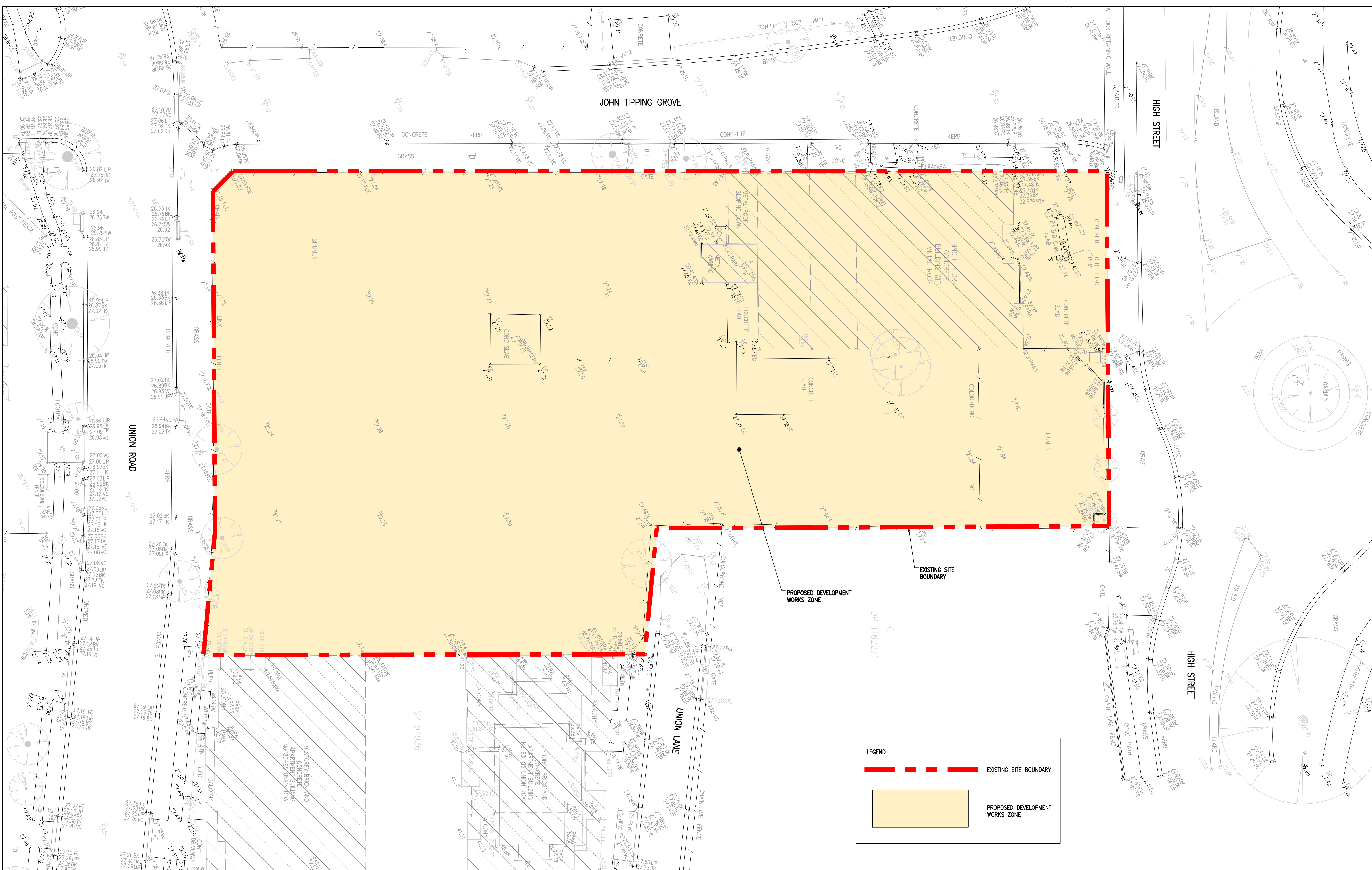
Drawing Number
C0-00

Drawn
S.MANANDHAR
Designer
—

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

Revision
8

FOR APPROVAL NOT FOR CONSTRUCTION



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7	ISSUED FOR APPROVAL	RC	CW	05.10.21

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ACN 010 580 246

Client

TOGA

Title
SURVEY REFERENCE PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
13.02.20

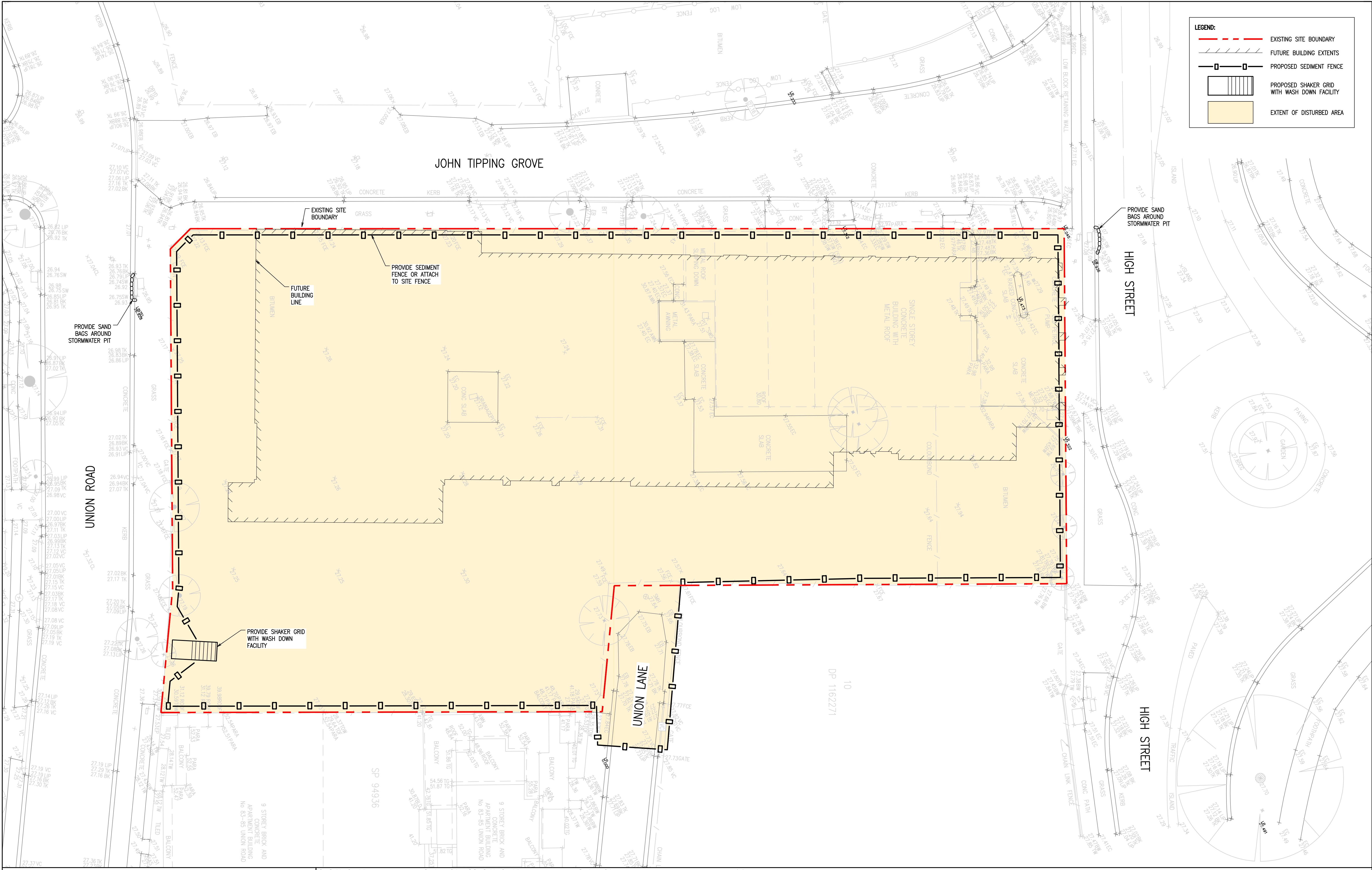
Drawn
S.MANANDHAR
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Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
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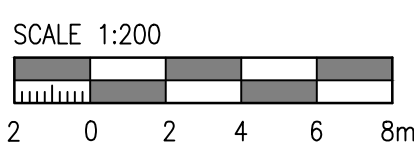
Drawing Number
C0-02

Revision
7



LEGEND:

- EXISTING SITE BOUNDARY
- FUTURE BUILDING EXTENTS
- PROPOSED SEDIMENT FENCE
- PROPOSED SHAKER GRID WITH WASH DOWN FACILITY
- EXTENT OF DISTURBED AREA



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Client

EROSION AND SEDIMENT CONTROL PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
13.02.20

Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C1-01

Revision
7

GENERAL NOTES:

- A1. THIS SOIL AND WATER MANAGEMENT PLAN IS TO BE READ IN CONJUNCTION WITH OTHER ENGINEERING PLANS RELATING TO THIS DEVELOPMENT.
- A2. CONTRACTORS WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE UNDERTAKEN AS INSTRUCTED IN THIS SPECIFICATION AND CONSTRUCTED FOLLOWING THE PENRITH CITY COUNCIL REQUIREMENTS AND TO LANDCOM – MANAGING URBAN STORMWATER: SOIL AND CONSTRUCTION, 4th EDITION, MAR 2004.
- A3. REFER GEOTECHNICAL REPORT FOR EARTHWORKS AND PARAMETERS.
- A10. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE VIA THE APPROVED CONSTRUCTION ENTRY/EXIT ROUTE.
- A11. ALL VEHICLES LEAVING THE SITE SHALL BE CLEANED AND INSPECTED BEFORE LEAVING.
- A12. MAINTAIN ALL STORMWATER PIPES AND PITS CLEAR OF DEBRIS AND SEDIMENT. INSPECT STORMWATER SYSTEM AND CLEAN OUT AFTER EACH STORM EVENT.
- A13. CLEAN OUT ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH STORM EVENT.
- A14. ALL DISTURBED AREAS SHALL BE REVEGETATED AS SOON AS THE RELEVANT WORKS HAVE BEEN COMPLETED.
- A15. KERB INLET SOCKS TO BE PROVIDED ON DOWNSTREAM PITS.

SITE MAINTENANCE NOTES:

- SM1. THE CONTRACTOR WILL INSPECT THE SITE AT LEAST WEEKLY AND AT THE CONCLUSION OF EVERY STORM EVENT TO:
- A) ENSURE THAT DRAINS OPERATE PROPERLY AND TO EFFECT AND NECESSARY REPAIRS.
- B) REMOVED SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS, INCLUDING LANDS CLOSER THAN 5 METRES FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY WATERWAYS AND PAVED AREAS.
- C) REMOVED TRAPPED SEDIMENT WHENEVER THE DESIGN CAPACITY OF THAT STRUCTURES HAS BEEN EXCEEDED.
- D) ENSURE REHABILITATION LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD TO INITIATE UPGRADING OR REPAIR AS NECESSARY.
- E) CONSTRUCT ADDITIONAL EROSION AND OR SEDIMENT CONTROL WORKS AS MIGHT BECOME NECESSARY TO ENSURE THE DESIRED PROTECTION IS GIVEN TO DOWNSLOPE LANDS AND WATERWAYS. MAKE ONGOING CHANGES TO THE PLAN WHERE IT PROVES INADEQUATE IN PRACTICE OR IS SUBJECT TO CHANGES IN CONDITIONS ON THE WORK–SITE OR ELSEWHERE IN THE CATCHMENT.
- F) MAINTAIN EROSION AND SEDIMENT CONTROL STRUCTURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED.
- G) FILL IN AND COMPACT ALL TRENCHES IMMEDIATELY AFTER SERVICES HAVE BEEN LAID.
- SM2. THE CONTRACTOR WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE:
- A) THE VOLUME AND INTENSITY OF ANY RAINFALL EVENTS.
- B) THE CONDITION OF ANY SOIL AND WATER MANAGEMENT WORKS.
- C) THE CONDITION OF VEGETATION AND ANY NEED TO IRRIGATE.
- D) THE NEED FOR DUST PREVENTION STRATEGIES
- THE LOGBOOK WILL BE KEPT ON–SITE AND MADE AVAILABLE TO ANY AUTHORISED PERSON UPON REQUEST. IT WILL BE GIVEN TO THE PROJECT MANAGER AT THE CONCLUSION OF THE WORKS.

SEDIMENT CONTROL NOTES:

- SC1. SEDIMENT FENCES WILL BE INSTALLED AS SHOWN ON THE PLAN AND ELSEWHERE AT THE DISCRETION OF THE SITE CONTRACTOR TO CONTAIN SOIL AS NEAR AS POSSIBLE TO THEIR SOURCE.
- SC2. SEDIMENT FENCES WILL NOT HAVE CATCHMENT AREAS EXCEEDING 900 SQUARE METRES AND HAVE A STORAGE DEPTH OF AT LEAST 0.6 METRES.
- SC3. SEDIMENT FENCES SHOULD LAST FOR UP TO SIX MONTHS BUT REQUIRE REGULAR MAINTENANCE AND WEEKLY CHECKS. IT MUST REMAIN VERTICAL AND KEYED INTO THE SOIL. DAMAGED FENCES MUST BE REPAIRED PROMPTLY.
- SC4. SEDIMENT FENCES NEED TO BE TRENCHED IN AT LEAST 150mm AND BURIED SO THE WATER FLOWS THROUGH AND NOT UNDERNEATH.
- SC5. SEDIMENT REMOVED FROM ANY TRAPPING DEVICES WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS CANNOT OCCUR.
- SC6. STOCKPILES ARE NOT TO BE LOCATED WITHIN 5 METERS OF HAZARD AREAS INCLUDING AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS AND DRIVEWAYS.
- SC7. WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR WATER HAS BEEN TREATED BY AN APPROVED DEVICE.
- SC8. TEMPORARY SEDIMENT TRAPS WILL REMAIN IN PLACE UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.
- SC9. ACCESS TO SITES SHOULD BE STABILIZED TO REDUCE THE LIKELIHOOD OF VEHICLES TRACKING SOIL MATERIALS ONTO PUBLIC ROADS AND ENSURE ALL–WEATHER ENTRY/EXIT.

LAND DISTURBANCE NOTES:

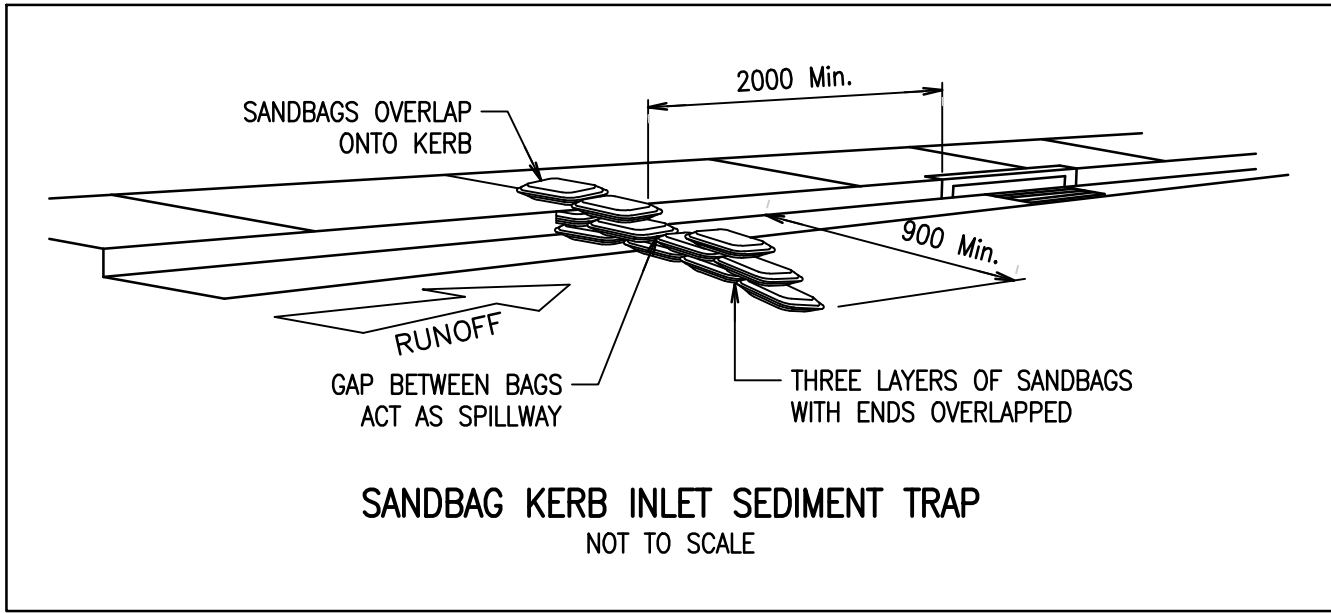
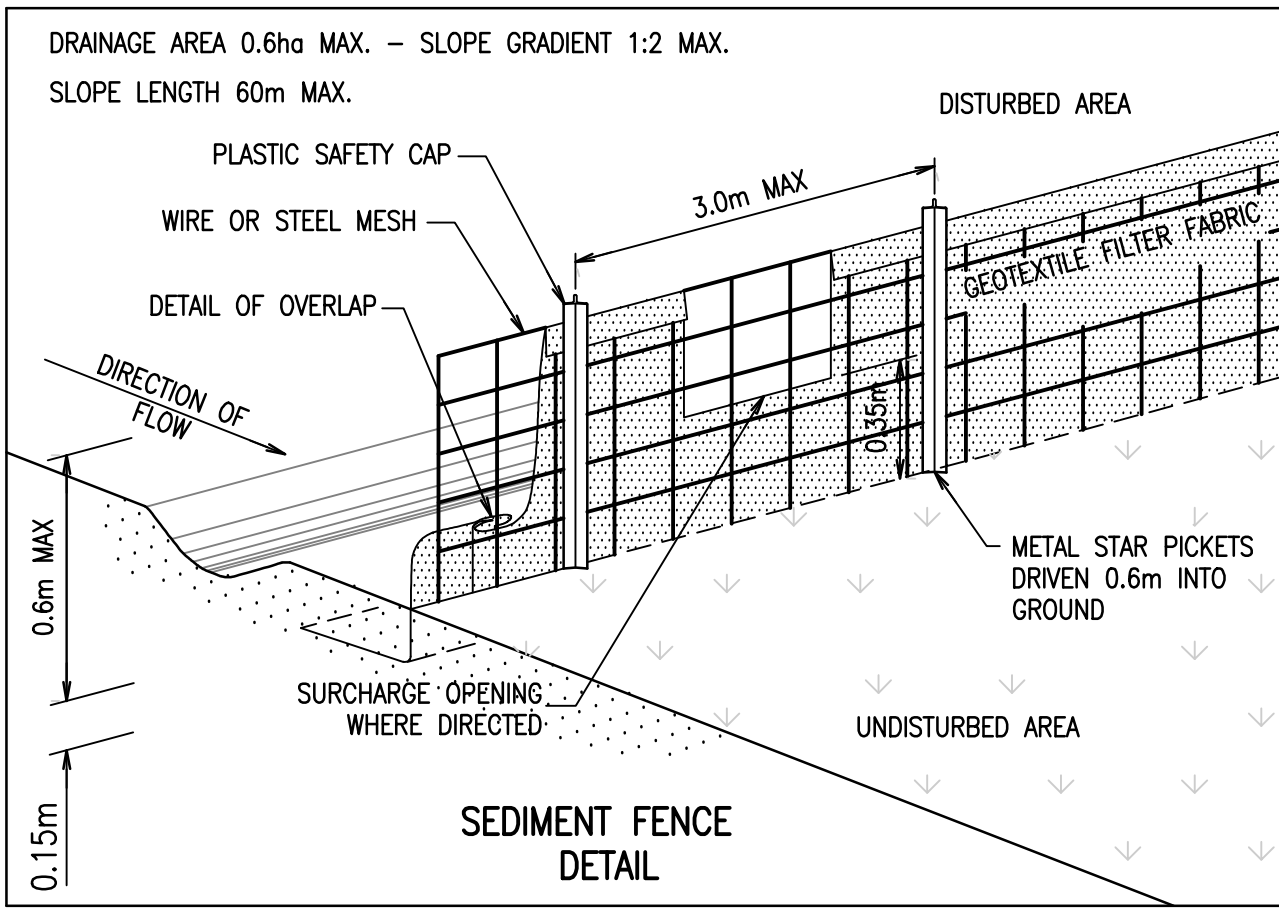
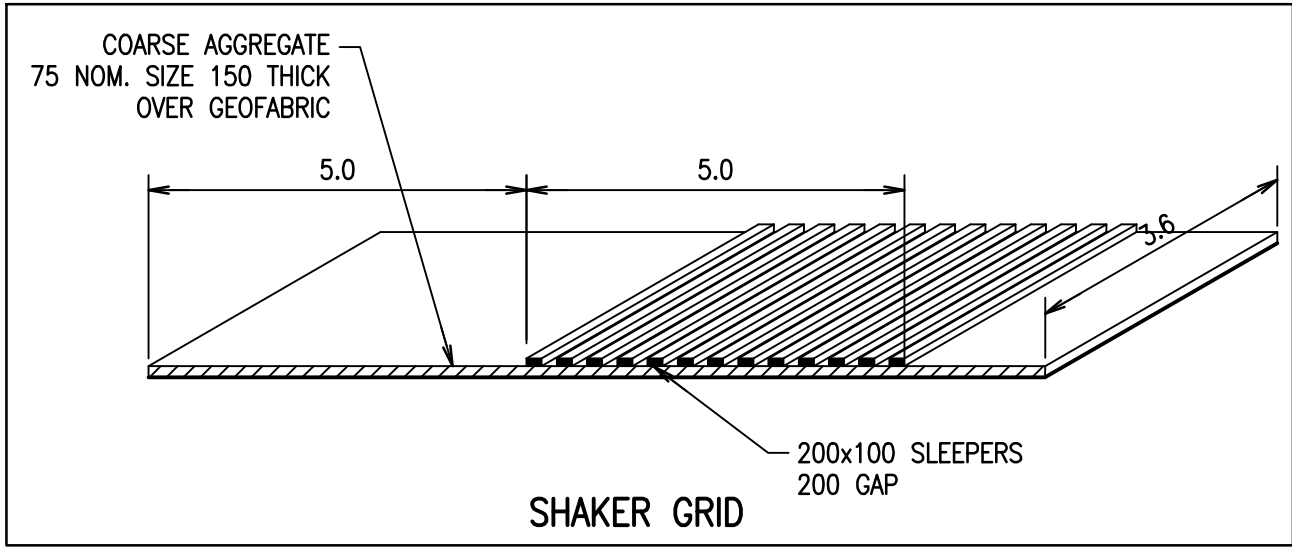
- LD1. ACCESS AREAS ARE TO BE LIMITED TO A MAXIMUM WIDTH OF 10 METERS THE SITE MANAGER WILL DETERMINE AND MARK THE LOCATION OF THESE ZONES ON–SITE. ALL SITE WORKERS WILL CLEARLY RECOGNIZE THOSE BOUNDARIES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH A BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS.
- LD2. ENTRY TO LANDS NOT REQUIRED FOR CONSTRUCTION OR ACCESS IS PROHIBITED EXCEPT FOR ESSENTIAL THINNING OF PLANT GROWTH.
- LD3. WORKS ARE TO PROCEED IN THE FOLLOWING SEQUENCE:
- A) INSTALL ALL BARRIER AND SEDIMENT FENCING WHERE SHOWN ON THE PLAN.
- B) CONSTRUCT THE STABILISED SITE ACCESS.
- C) CONSTRUCT DIVERSION DRAINS AS REQUIRED.
- D) INSTALL MESH AND GRAVEL INLETS FOR ANY ADJACENT KERB INLETS.
- E) INSTALL GEOTEXTILE INLET FILTERS AROUND ANY ON–SITE DROP INLET PITS.
- F) CLEAR SITE AND STRIP AND STOCKPILE TOPSOIL IN LOCATIONS SHOWN ON THE PLAN.
- G) UNDERTAKE ALL ESSENTIAL CONSTRUCTION WORKS ENSURING THAT ROOF AND/OR PAVED AREA STORMWATER SYSTEMS ARE CONNECTED TO PERMANENT DRAINAGE AS SOON AS PRACTICABLE.
- H) GRADE LOT AREAS TO FINAL GRADES AND APPLY PERMANENT STABILISATION (LANDSCAPING) WITHIN 20 DAYS OF COMPLETION OF CONSTRUCTION WORKS.
- I) REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER THE PERMANENT LANDSCAPING HAS BEEN COMPLETED.
- LD4. ENSURE THAT SLOPE LENGTHS DO NOT EXCEED 80 METRES WHERE PRACTICABLE. SLOPE LENGTHS ARE DETERMINED BY SILTATION FENCING AND CATCH DRAIN SPACING.

SOIL EROSION CONTROL NOTES:

- SE1. EARTH BATTERS WILL BE CONSTRUCTED WITH AS LOW A GRADIENT AS PRACTICABLE BUT NO STEEPER, UNLESS OTHERWISE NOTES, THAN THAT RECOMMENDED BY GEOTECHNICAL REPORT.
- SE2. ALL WATERWAYS, DRAINS, SPILLWAYS AND THEIR OUTLETS WILL BE CONSTRUCTED TO BE STABLE IN AT LEAST THE 1:20 YEAR ARI, TIME OF CONCENTRATION STORM EVENT.
- SE3. WATERWAYS AND OTHER AREAS SUBJECT TO CONCENTRATED FLOWS AFTER CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND COVER C–FACTOR OF 0.05 (70% GROUND COVER) WITHIN 10 WORKING DAYS FROM COMPLETION OF FORMATION. FOOT AND VEHICULAR TRAFFIC WILL BE PROHIBITED IN THESE AREAS.
- SE4. STOCKPILES AFTER CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND–COVER C–FACTOR OF 0.1% (60% GROUND–COVER) WITHIN 10 WORKING DAYS FROM COMPLETION OF FORMATION.
- SE5. ALL LANDS, INCLUDING WATERWAYS AND STOCKPILES DURING CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND COVER C–FACTOR OF 0.15 (50% GROUND COVER) WITHIN 20 WORKING DAYS FROM INACTIVITY EVEN THOUGH WORKS MAY CONTINUE LATER.
- SE6. PERMANENT REHABILITATION OF LANDS AFTER CONSTRUCTION WILL ACHIEVE A GROUND–COVER C–FACTOR OF LESS THAN 0.1 AND LESS THAN 0.05 WITHIN 60 DAYS. NEWLY PLANTED LANDS WILL BE WATERED REGULARLY UNTIL AN EFFECTIVE COVER IS ESTABLISHED AND PLANTS ARE GROWING VIGOROUSLY. FOLLOW–UP SEED AND FERTILISER WILL BE APPLIED AS NECESSARY.

WASTE CONTROL NOTES:

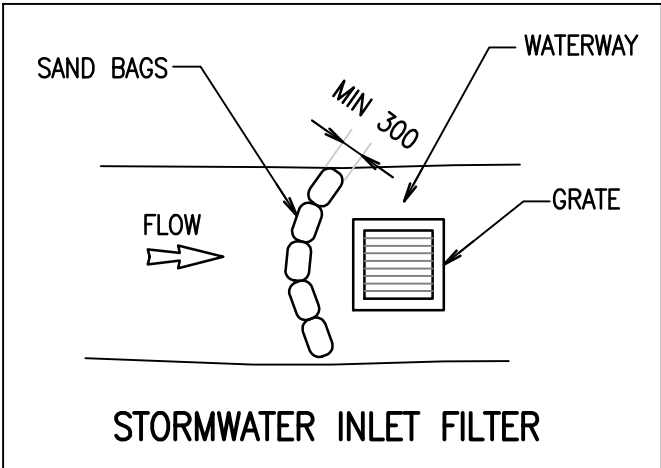
- WC1. ACCEPTABLE BINS WILL BE PROVIDED FOR ANY CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHING, LIGHTWEIGHT WASTE MATERIALS AND LITTER. CLEARANCE SERVICES WILL BE PROVIDED AT LEAST WEEKLY. DISPOSAL OF WASTE WILL BE IN A MANNER APPROVED BY THE SITE CONTRACTOR.
- WC2. ALL POSSIBLE POLLUTANT MATERIALS ARE TO BE STORED WELL CLEAR OF ANY POORLY DRAINED AREAS, FLOW PRONE AREAS, STREAMBANKS, CHANNELS AND STORMWATER DRAINAGE AREAS. STORE SUCH MATERIALS IN A DESIGNATED AREA UNDER COVER WHERE POSSIBLE AND WITHIN CONTAINMENT BUNDS.
- WC3. ALL SITE STAFF AD SUBCONTRACTORS ARE TO BE INFORMED OF THEIR OBLIGATION TO USE WASTE CONTROL FACILITIES PROVIDED.
- WC4. ANY DE–WATERING ACTIVITIES ARE TO BE CLOSELY MONITORED TO ENSURE THAT WATER IS NOT POLLUTED BY SEDIMENT, TOXIC MATERIALS OR PETROLEUM PRODUCTS.
- WC5. PROVIDE DESIGNATED VEHICULAR WASHDOWN AND MAINTENANCE AREAS WHICH ARE TO HAVE CONTAINMENT BUNDS.



INSTALLATION

1. EXCAVATE A TRENCH AT LEAST 150mm DEEP.
2. DRIVE POSTS 500–600mm INTO GROUND AT A MAXIMUM SPACING OF 3.0m CENTRES.
3. PLACE AND FIX SUPPORT MESH (FS2) TO POST.
4. LAY BIDIM GEOTABRIC (SF 2000) AGAINST THE SUPPORT MESH AND FIX BY TIE WIRE, STAPLES OR HOC RINGS.
5. PLACE BIDIM IN TRENCH AND BACKFILL WITH SOIL.
6. SOIL ON BOTH SIDES OF THE FENCE MUST BE COMPACTED TO AVOID SEEPAGE UNDER THE BARRIER.

NOTE:
POSITION OF SEDIMENT FENCE AS DIRECTED BY MANAGING CONTRACTOR. FENCE TO REMAIN IN PLACE UNTIL EXCAVATION IS BELOW FOOTPATH LEVEL. PROVIDE 2mx2m TURFED AREA ON DOWNSTREAM SIDE OF FENCE AT SURCHARGE OPENINGS.



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Client

Title
**EROSION AND SEDIMENT CONTROL
DETAILS**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C1–10

Revision
7



NOTES:

1. TEMPORARY BATTERS FOR BASEMENT AND ROADS NOT ACCOUNTED FOR
2. TOTAL CUT = 11,800m³
3. TOTAL FILL = 50m³
4. BALANCE = 11,750m³ OF CUT
5. TOTAL DEPTH OF BASEMENT EXCAVATION BELOW FFL ASSUMED TO BE 250mm.
6. COMPACTION, SHRINK/SWELL RATIO'S, AND SEPARATION OF TOPSOIL/EXISTING PAVEMENTS NOT INCORPORATED IN ASSESSMENT.

CARPARK DEPTH RANGE		Upper_value	metres	Colour
Lower_value				
-999	to	-3.5	metres	
-3.5	to	-3	metres	
-3	to	-2.5	metres	
-2.5	to	-2	metres	
-2	to	-1.75	metres	
-1.75	to	-1.5	metres	
-1.5	to	-1.25	metres	
-1.25	to	-1	metres	
-1	to	-0.75	metres	
-0.75	to	-0.5	metres	
-0.5	to	-0.25	metres	
-0.25	to	0	metres	
0	to	0.25	metres	
0.25	to	0.5	metres	
0.5	to	1	metres	
1	to	999	metres	

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	RA	CR	06.06.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
4	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	02.03.20
5	ISSUED FOR APPROVAL	RG	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	RA	CR	06.06.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
4	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	02.03.20
5	ISSUED FOR APPROVAL	RG	CW	05.10.21

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ACN 010 580 248



Title
BULK EARTHWORKS PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
18.06.18

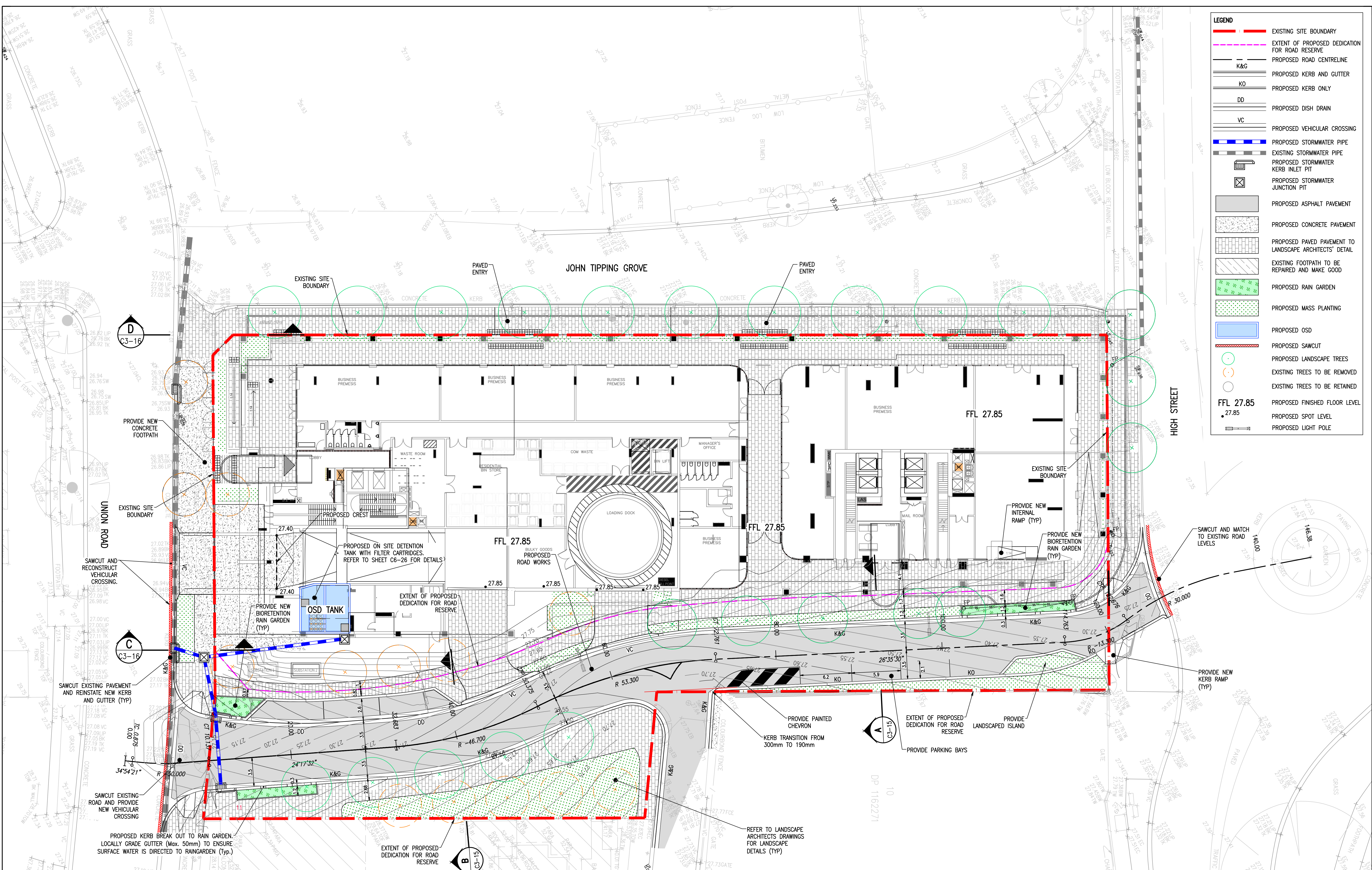
Drawn
R.ATHERTON
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

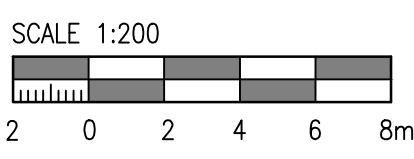
FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C2-01

Revision
5



- LEGEND**
- EXISTING SITE BOUNDARY
 - EXTENT OF PROPOSED DEDICATION FOR ROAD RESERVE
 - PROPOSED ROAD CENTRELINE
 - K&G
 - PROPOSED KERB AND GUTTER
 - KO
 - PROPOSED KERB ONLY
 - DD
 - PROPOSED DISH DRAIN
 - VC
 - PROPOSED VEHICULAR CROSSING
 - PROPOSED STORMWATER PIPE
 - EXISTING STORMWATER PIPE
 - PROPOSED STORMWATER KERB INLET PIT
 - PROPOSED STORMWATER JUNCTION PIT
 - PROPOSED ASPHALT PAVEMENT
 - PROPOSED CONCRETE PAVEMENT
 - PROPOSED PAVED PAVEMENT TO LANDSCAPE ARCHITECTS' DETAIL
 - EXISTING FOOTPATH TO BE REPAIRED AND MAKE GOOD
 - PROPOSED RAIN GARDEN
 - PROPOSED MASS PLANTING
 - PROPOSED OSD
 - PROPOSED SAWCUT
 - PROPOSED LANDSCAPE TREES
 - EXISTING TREES TO BE REMOVED
 - EXISTING TREES TO BE RETAINED
 - FFL 27.85
 - 27.85
 - PROPOSED FINISHED FLOOR LEVEL
 - PROPOSED SPOT LEVEL
 - PROPOSED LIGHT POLE



Rev	Revision Description	By	App	Date
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.05.18
3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
7	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	05.06.18
8	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
9	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
10	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	07.12.18
11	ISSUED FOR APPROVAL	SM	CR	03.01.19

Rev	Revision Description	By	App	Date
12	ISSUED FOR REVIEW	RG	CW	26.03.19
13	RAIN GARDEN REINSTATED	RG	CW	29.03.19
14	ISSUED FOR APPROVAL	RG	CW	24.04.19
15	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
16	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
17	ISSUED FOR APPROVAL	RG	CW	05.10.21

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Client

TOGA

Title
GENERAL ARRANGEMENT PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

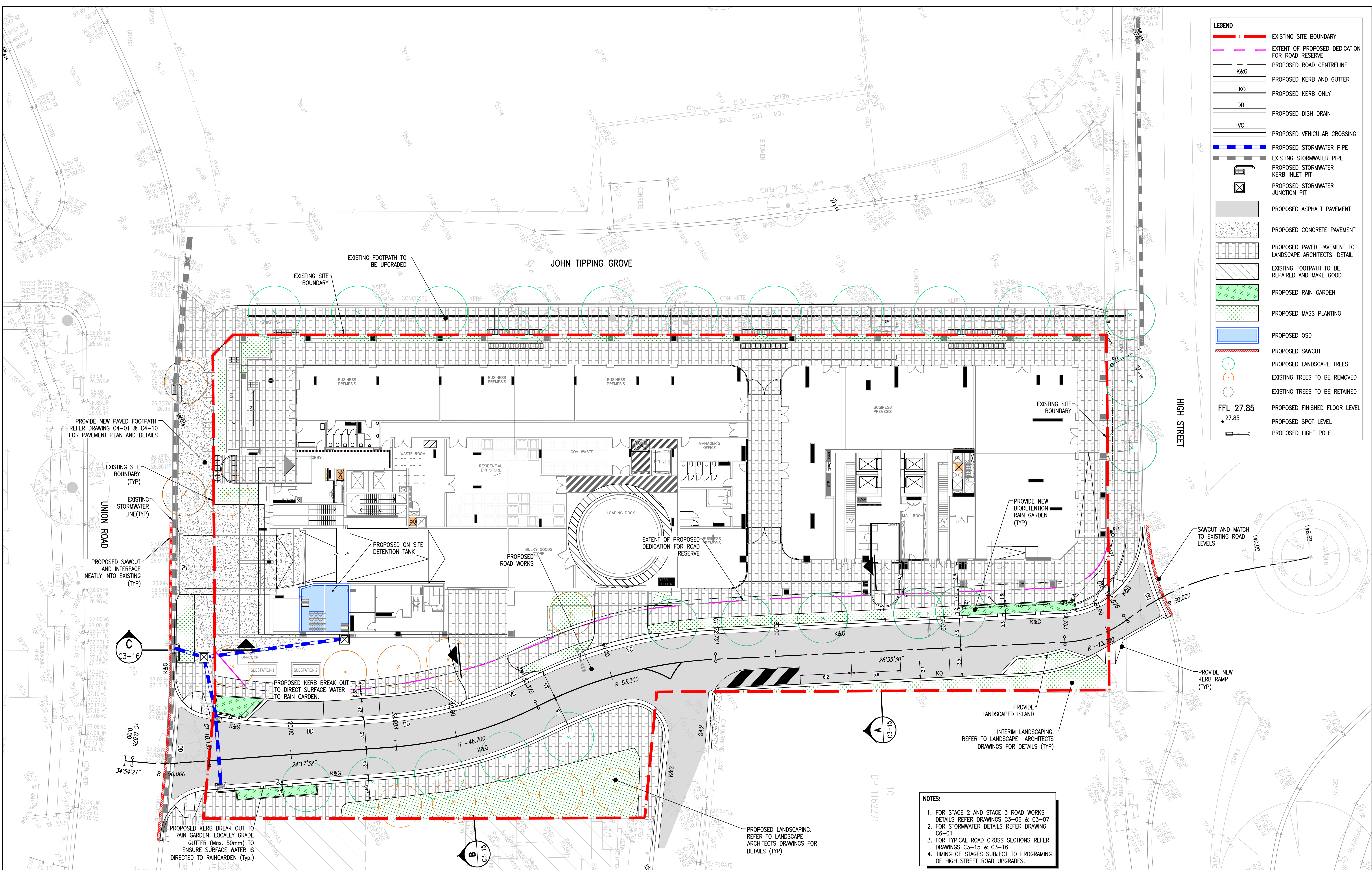
Drawn
M.CLAVEL
Designer
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C3-00

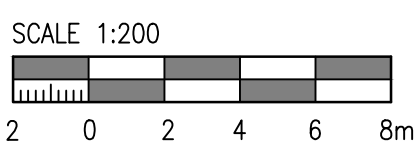
Revision
17



LEGEND

- EXISTING SITE BOUNDARY
- EXTENT OF PROPOSED DEDICATION FOR ROAD RESERVE
- PROPOSED ROAD CENTRELINE
- PROPOSED KERB AND GUTTER
- PROPOSED KERB ONLY
- PROPOSED DISH DRAIN
- PROPOSED VEHICULAR CROSSING
- PROPOSED STORMWATER PIPE
- EXISTING STORMWATER PIPE
- PROPOSED STORMWATER KERB INLET PIT
- PROPOSED STORMWATER JUNCTION PIT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- PROPOSED PAVED PAVEMENT TO LANDSCAPE ARCHITECTS' DETAIL
- EXISTING FOOTPATH TO BE REPAIRED AND MAKE GOOD
- PROPOSED RAIN GARDEN
- PROPOSED MASS PLANTING
- PROPOSED OSD
- PROPOSED SAWCUT
- PROPOSED LANDSCAPE TREES
- EXISTING TREES TO BE REMOVED
- EXISTING TREES TO BE RETAINED
- FFL 27.85
- 27.85
- PROPOSED FINISHED FLOOR LEVEL
- PROPOSED SPOT LEVEL
- PROPOSED LIGHT POLE

- NOTES:**
- FOR STAGE 2 AND STAGE 3 ROAD WORKS DETAILS REFER DRAWINGS C3-06 & C3-07.
 - FOR STORMWATER DETAILS REFER DRAWING C6-01
 - FOR TYPICAL ROAD CROSS SECTIONS REFER DRAWINGS C3-15 & C3-16
 - TIMING OF STAGES SUBJECT TO PROGRAMMING OF HIGH STREET ROAD UPGRADES.



Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
7	ISSUED FOR REVIEW	CW	CW	17.10.18
8	ISSUED FOR REVIEW	RG	CW	26.03.19
9	RAIN GARDEN REINSTATED	RG	CW	29.03.19
10	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19

Rev	Revision Description	By	App	Date
11	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
12	ISSUED FOR APPROVAL	RG	CW	05.10.21

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STAGING PLAN – STAGE 1 – CONNECTING TO EXISTING ROUND ABOUT

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

Drawn
S.MANANDHAR

Design
Z.JONES

Design Checker
C.ROPE

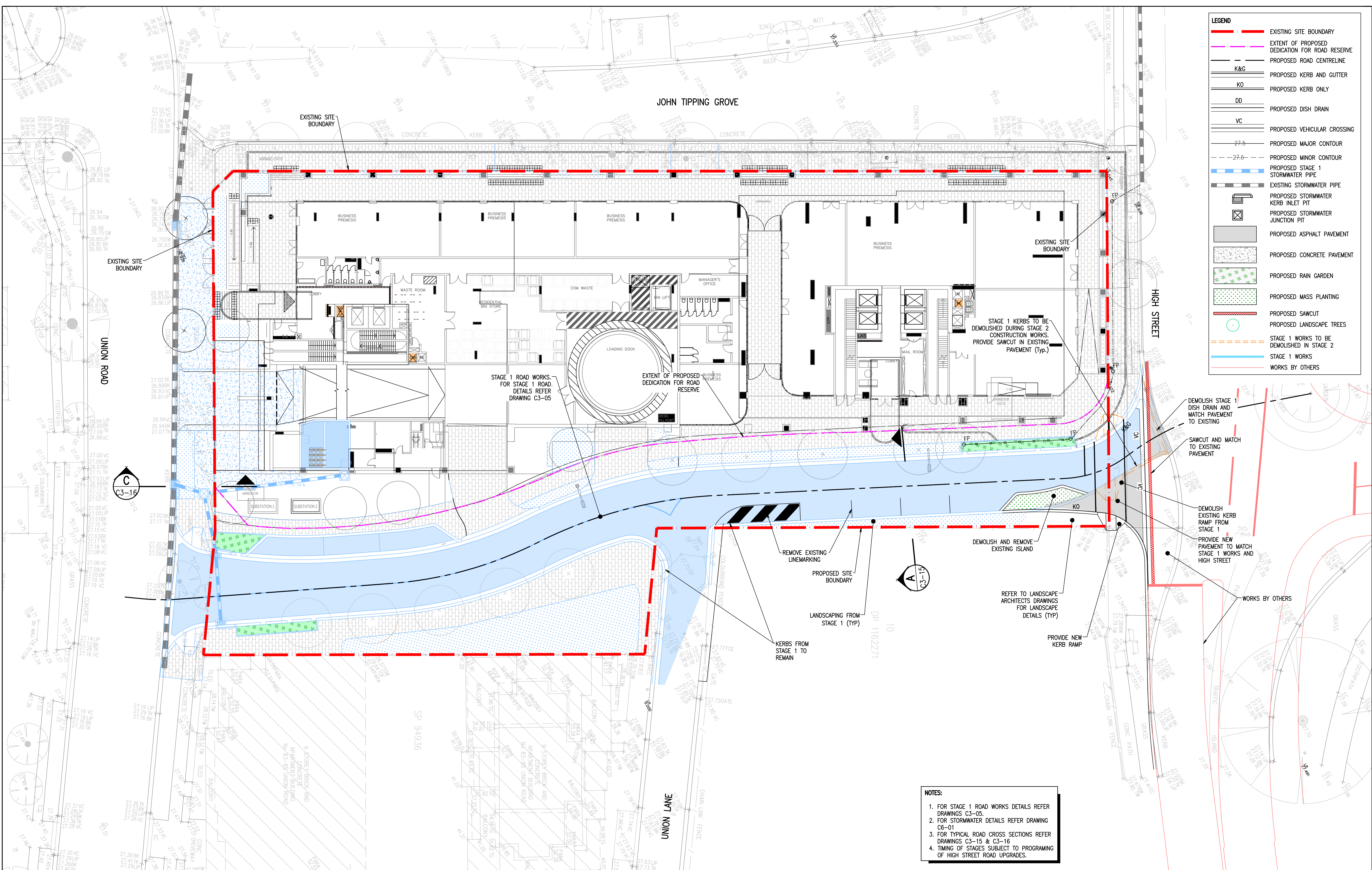
Approved
C.WAITE

Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

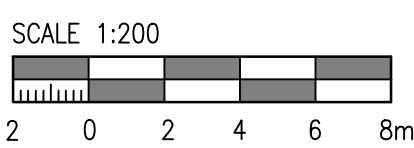
Drawing Number
C3-05

Revision
12



LEGEND	
	EXISTING SITE BOUNDARY
	EXTENT OF PROPOSED DEDICATION FOR ROAD RESERVE
	PROPOSED ROAD CENTRELINE
	PROPOSED KERB AND GUTTER
	PROPOSED KERB ONLY
	PROPOSED DISH DRAIN
	PROPOSED VEHICULAR CROSSING
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	PROPOSED STAGE 1 STORMWATER PIPE
	EXISTING STORMWATER PIPE
	PROPOSED STORMWATER KERB INLET PIT
	PROPOSED STORMWATER JUNCTION PIT
	PROPOSED ASPHALT PAVEMENT
	PROPOSED CONCRETE PAVEMENT
	PROPOSED RAIN GARDEN
	PROPOSED MASS PLANTING
	PROPOSED SAWCUT
	PROPOSED LANDSCAPE TREES
	STAGE 1 WORKS TO BE DEMOLISHED IN STAGE 2
	STAGE 1 WORKS
	WORKS BY OTHERS

- NOTES:
1. FOR STAGE 1 ROAD WORKS DETAILS REFER DRAWINGS C3-05.
 2. FOR STORMWATER DETAILS REFER DRAWING C6-01
 3. FOR TYPICAL ROAD CROSS SECTIONS REFER DRAWINGS C3-15 & C3-16
 4. TIMING OF STAGES SUBJECT TO PROGRAMMING OF HIGH STREET ROAD UPGRADES.



Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
7	ISSUED FOR REVIEW	CW	CR	17.10.18
8	ISSUE FOR REVIEW	CR	CW	26.03.19
9	RAIN GARDEN REINSTATED	CR	CW	29.03.19
10	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19

Rev	Revision Description	By	App	Date
11	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
12	ISSUED FOR APPROVAL	RG	CW	05.10.21

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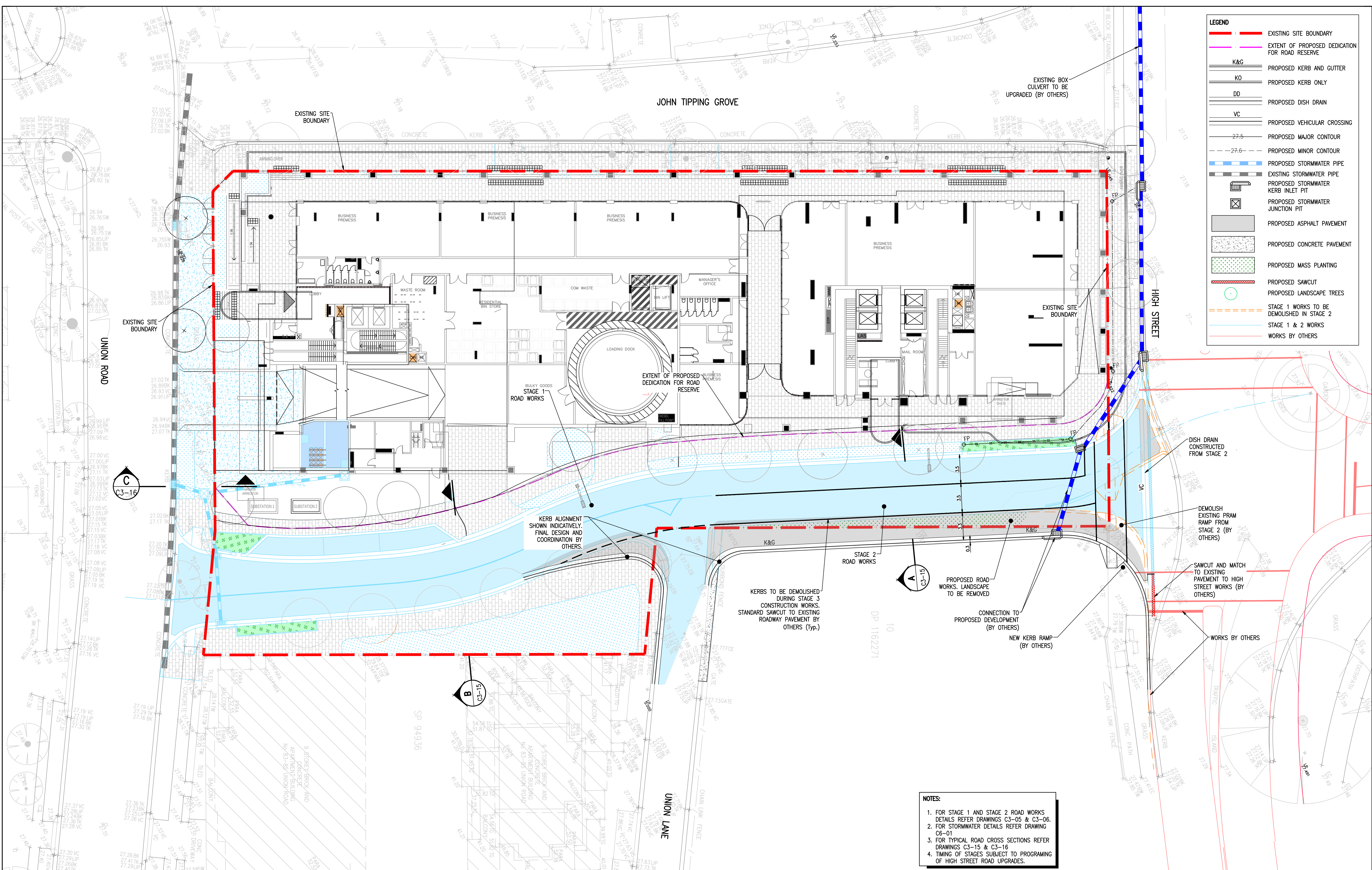


Client

Title
**STAGING PLAN – STAGE 2 –
CONNECTING TO SIGNALISED
INTERSECTION**

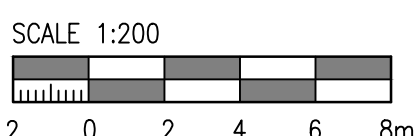
Project
HIGH STREET PENRITH

Scale at A1 AS SHOWN Date 05.10.21	Drawn S.MANANDHAR Designer Z.JONES	Design Checker C.ROPE Approved C.WAITE Job Number 17665C
FOR APPROVAL NOT FOR CONSTRUCTION		Revision 12
Drawing Number C3-06		



- LEGEND**
- EXISTING SITE BOUNDARY
 - EXTENT OF PROPOSED DEDICATION FOR ROAD RESERVE
 - K&G PROPOSED KERB AND GUTTER
 - KO PROPOSED KERB ONLY
 - DD PROPOSED DISH DRAIN
 - VC PROPOSED VEHICULAR CROSSING
 - 27.5 PROPOSED MAJOR CONTOUR
 - 27.6 PROPOSED MINOR CONTOUR
 - PROPOSED STORMWATER PIPE
 - EXISTING STORMWATER PIPE
 - PROPOSED STORMWATER KERB INLET PIT
 - PROPOSED STORMWATER JUNCTION PIT
 - PROPOSED ASPHALT PAVEMENT
 - PROPOSED CONCRETE PAVEMENT
 - PROPOSED MASS PLANTING
 - PROPOSED SAWCUT
 - PROPOSED LANDSCAPE TREES
 - STAGE 1 WORKS TO BE DEMOLISHED IN STAGE 2
 - STAGE 1 & 2 WORKS
 - WORKS BY OTHERS

- NOTES:**
- FOR STAGE 1 AND STAGE 2 ROAD WORKS DETAILS REFER DRAWINGS C3-05 & C3-06.
 - FOR STORMWATER DETAILS REFER DRAWING C6-01
 - FOR TYPICAL ROAD CROSS SECTIONS REFER DRAWINGS C3-15 & C3-16
 - TIMING OF STAGES SUBJECT TO PROGRAMMING OF HIGH STREET ROAD UPGRADES.



Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
7	ISSUED FOR REVIEW	CW	CR	17.10.18
8	ISSUED FOR REVIEW	RG	CW	26.03.19
9	RAIN GARDEN REINSTATED	RG	CW	29.03.19
10	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19

Rev	Revision Description	By	App	Date
11	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
12	ISSUED FOR APPROVAL	RG	CW	05.10.21

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Client

TOGA

Title
**STAGING PLAN – STAGE 3
ULTIMATE ROAD DESIGN**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

Drawn
S.MANANDHAR
Designer
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C3-07

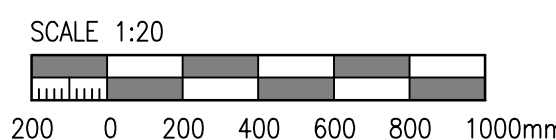
Revision
12

1. CONCRETE COMPRESSIVE STRENGTH (F'c) AT 28 DAYS, TO BE 20MPa FOR KERB AND GUTTER.
2. LAYBACKS TO BE 20MPa, REINFORCED WITH SL72 MESH.
3. ROAD SUB-BASE SHALL BE EXTENDED 150mm BEHIND REAR OF KERB AND GUTTER WITH THE THICKNESS TO BE NOT LESS THAN THE ROAD PAVEMENT SUB-BASE THICKNESS.
4. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE STATED.
5. ALL EXPOSED EDGES TO BE ROUNDED TO 20mm RADIUS.



NOTE:
PRAM RAMPS HAVE NO LIP AT INVERT OF GUTTER

1. KERB RAMP DETAILS ARE BASED ON AS 1428.1
- "DESIGN FOR ACCESS AND MOBILITY".
2. CONCRETE TO BE 25MPa (F_c) AT 28 DAYS.
3. KERB RAMP TO BE DOWELLED INTO BACK OF KERB
4. ALL DIMENSIONS ARE IN MILLIMETRES
5. SHARP TRANSITIONS ARE CRITICAL IN GUIDING PEDESTRIANS WITH VISION IMPAIRMENTS.



Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.
6	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.
7	ISSUED FOR APPROVAL	RG	CW	05.10.2

Rev	Revision	Description	By	App	Date

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 TOGA

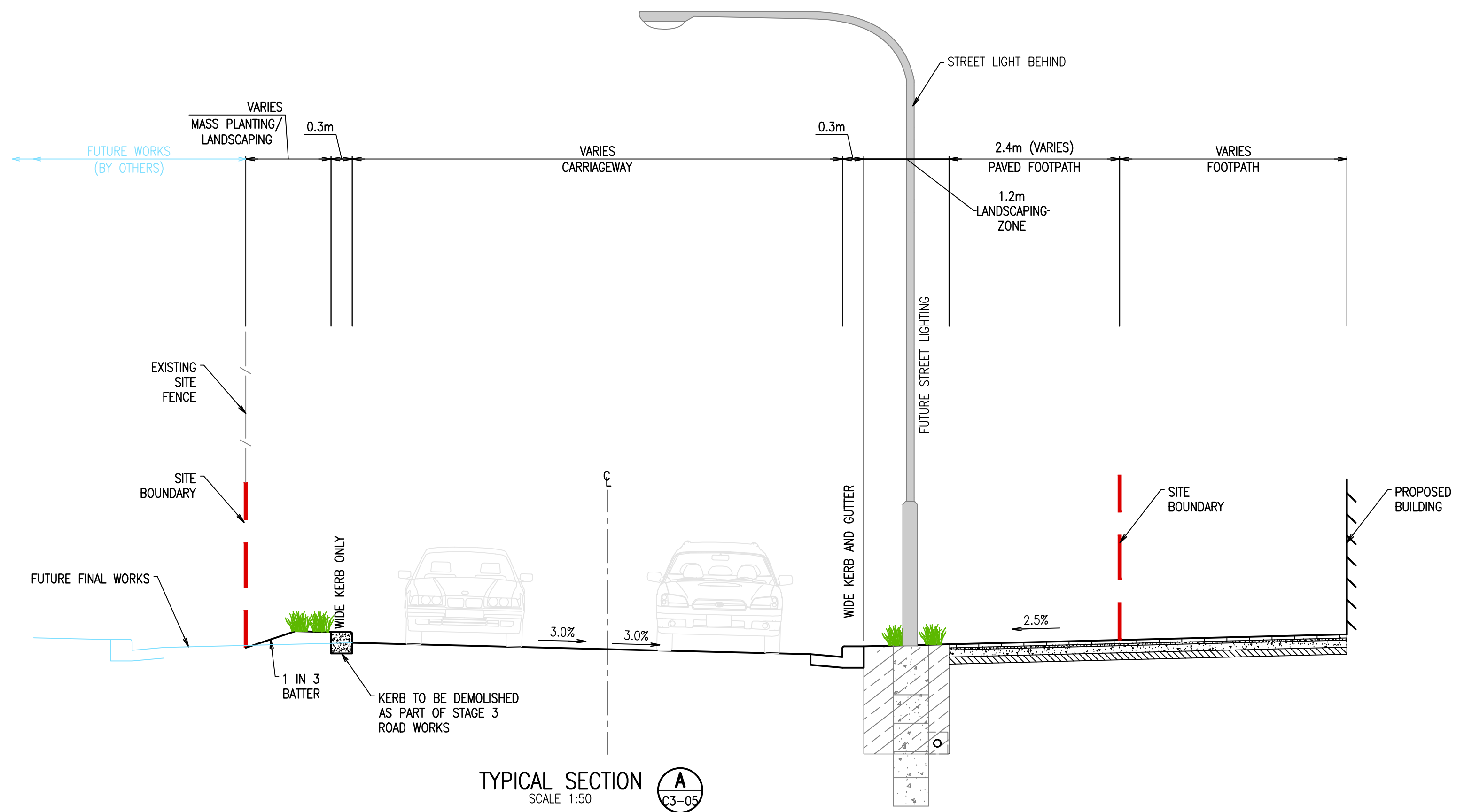
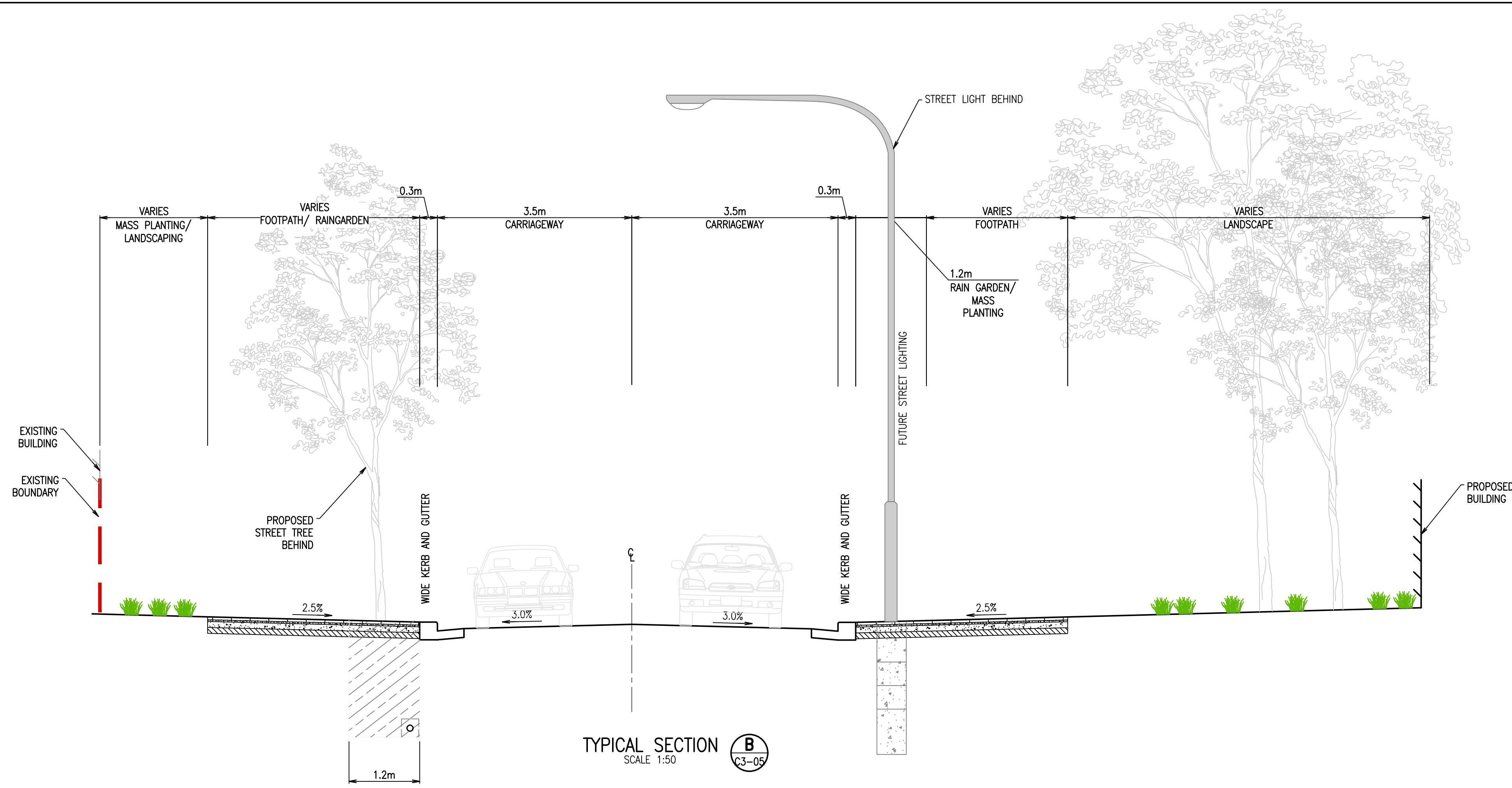
Project
HIGH STREET PENRITH

FOR APP
Drawing Number
C3-10

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Revisio
7



Rev	Revision Description	By	App	Date
1	ISSUED FOR PRELIMINARY COORDINATION	SM	CW	06.03.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
7	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
8	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	06.05.19
9	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	02.03.20
10	ISSUED FOR APPROVAL	RG	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR PRELIMINARY COORDINATION	SM	CW	06.03.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
7	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
8	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	06.05.19
9	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	02.03.20
10	ISSUED FOR APPROVAL	RG	CW	05.10.21

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Client

TOGA

Title
TYPICAL ROAD CROSS SECTIONS - SHEET 1 OF 2

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

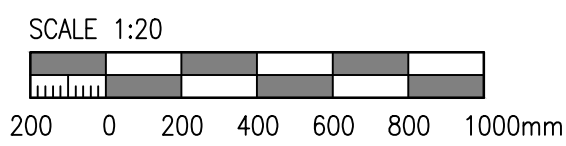
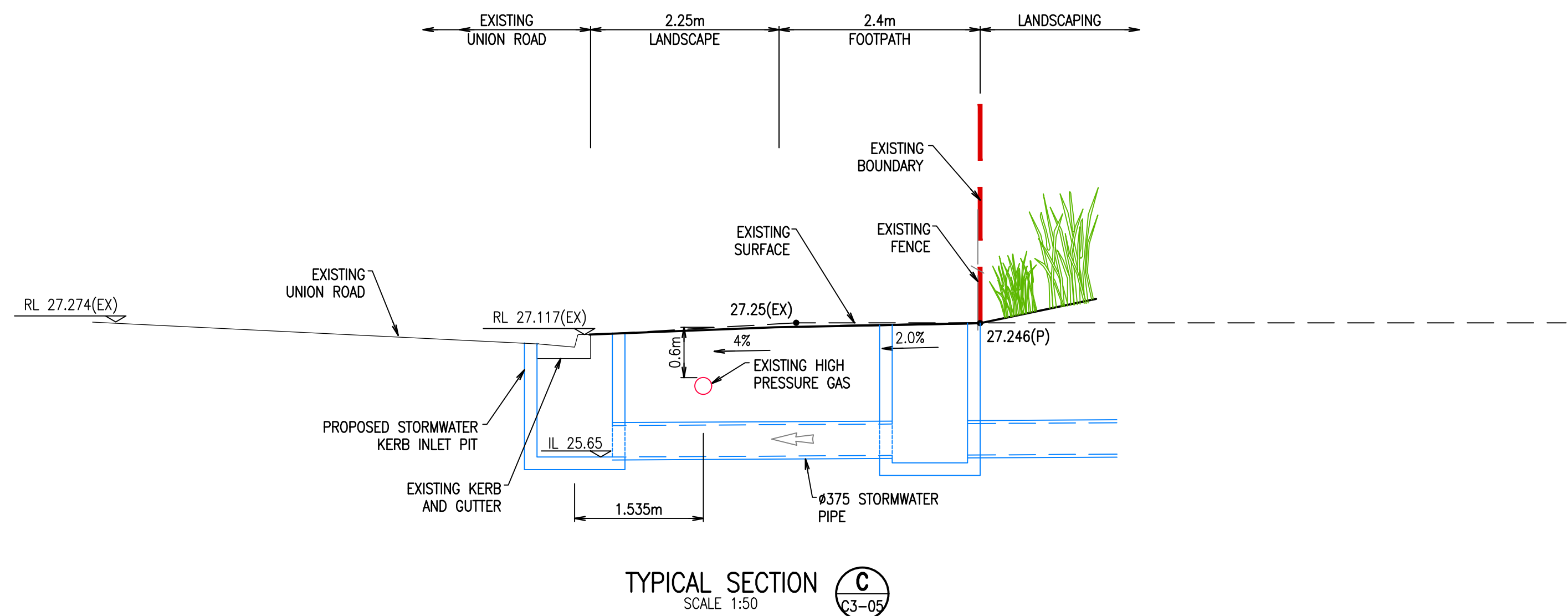
Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C3-15

Revision
10



Rev	Revision Description	By	App	Date
1	ISSUED FOR PRELIMINARY COORDINATION	SM	CW	06.03.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
8	ISSUED FOR APPROVAL	RG	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR PRELIMINARY COORDINATION	SM	CW	06.03.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
8	ISSUED FOR APPROVAL	RG	CW	05.10.21

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Title
**TYPICAL ROAD CROSS SECTIONS -
SHEET 2 OF 2**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

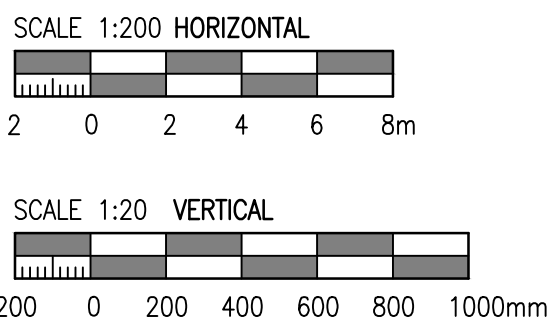
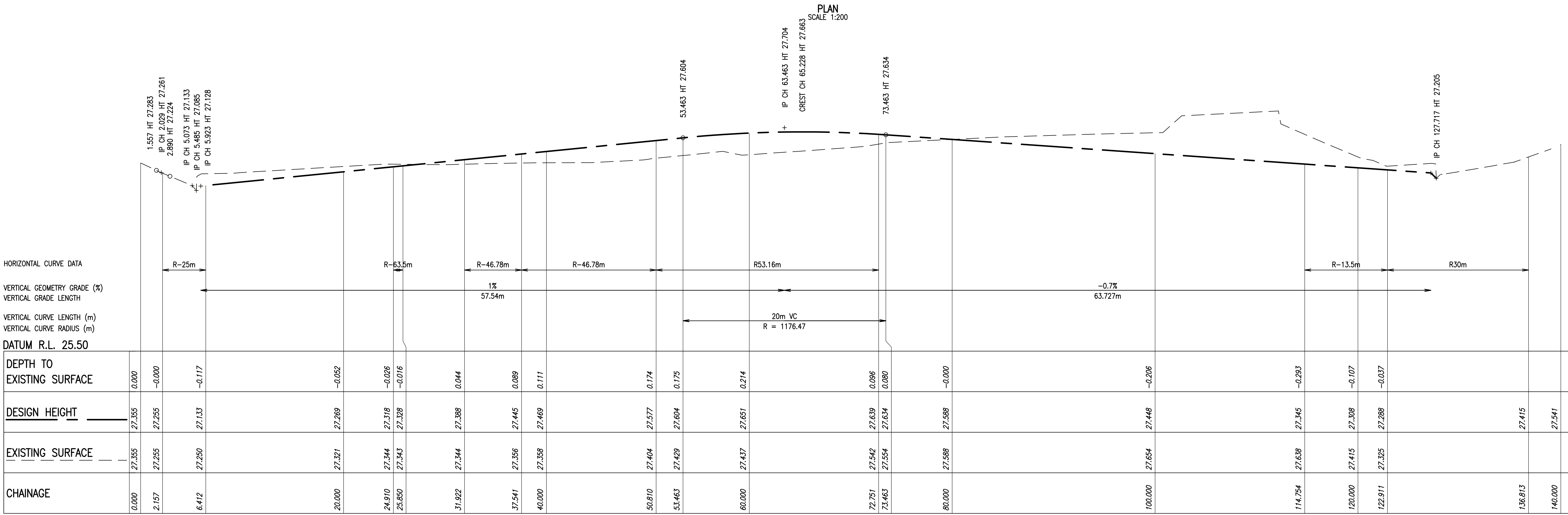
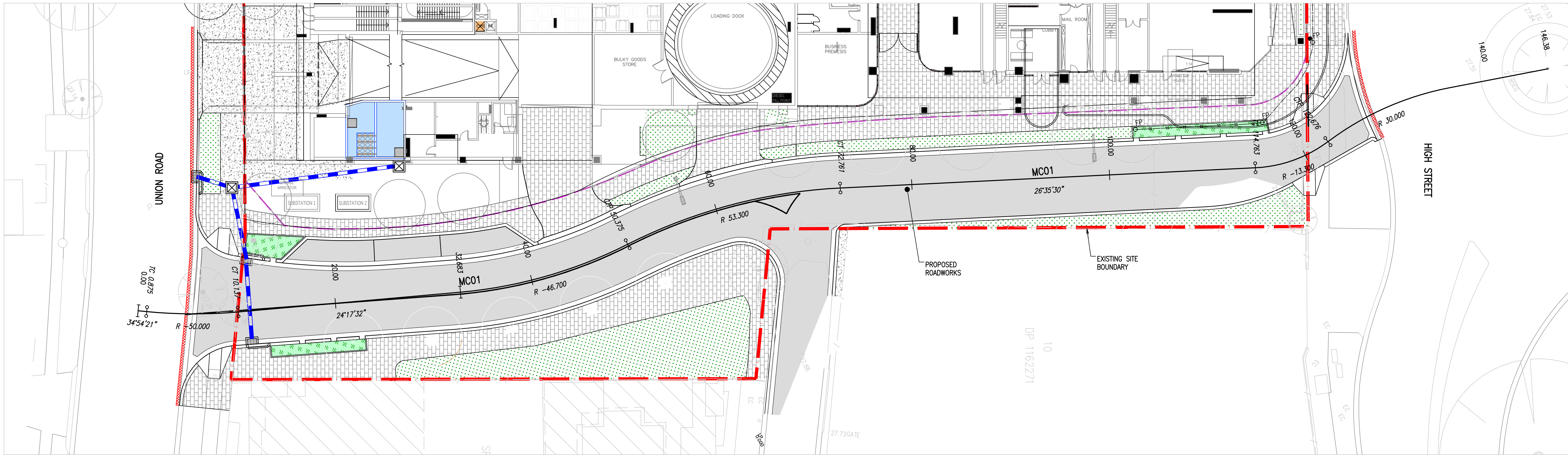
Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C3-16

Revision
8



Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	07.12.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
8	ISSUED FOR APPROVAL	RC	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	07.12.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
8	ISSUED FOR APPROVAL	RC	CW	05.10.21

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**ROADWAY LONGITUDINAL SECTION
ULTIMATE ROAD**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

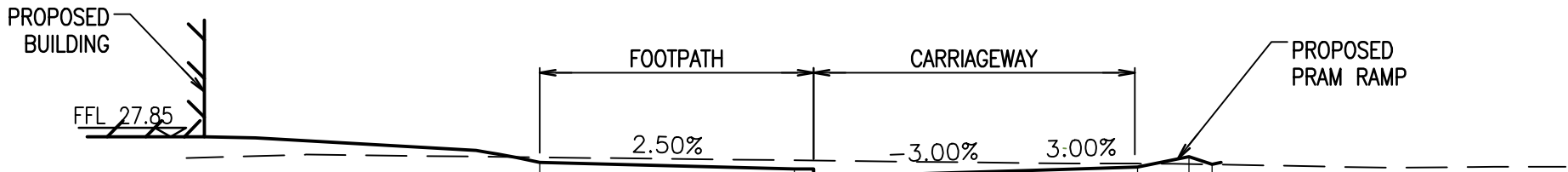
Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

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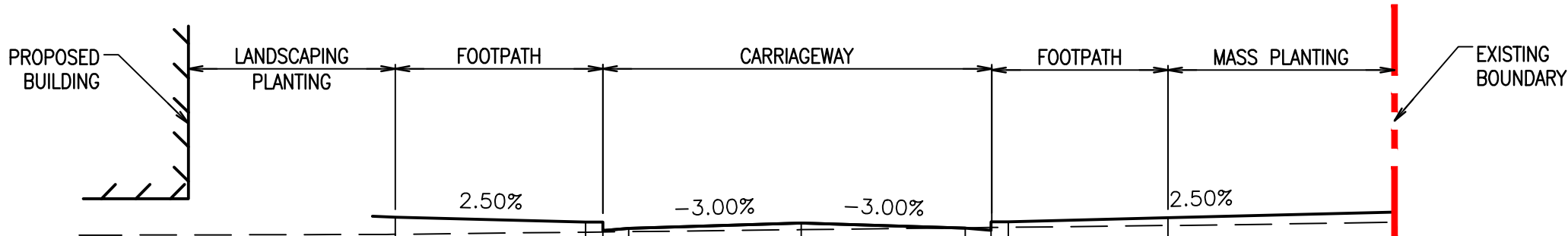
Drawing Number
C3-20

Revision
8



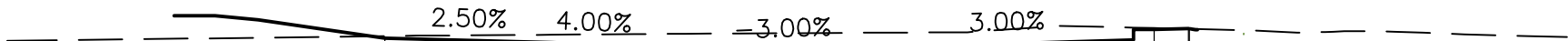
DATUM R.L. 26.00					
DESIGN HEIGHT		27.422		27.323	
SUBGRADE HEIGHT		27.422		27.323	
EXISTING SURFACE		27.503		27.448	
OFFSETS		-7.562		-2.850	

CHAINAGE 120.000



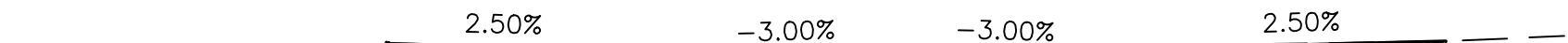
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DESIGN HEIGHT		27.573		27.490	
SUBGRADE HEIGHT		27.573		27.490	
EXISTING SURFACE		27.275		27.356	
OFFSETS		-7.061		-3.002	

CHAINAGE 40.000



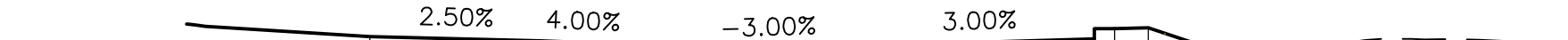
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DESIGN HEIGHT		27.572		27.511	
SUBGRADE HEIGHT		27.572		27.511	
EXISTING SURFACE		27.603		27.637	
OFFSETS		-7.232		-4.800	

CHAINAGE 100.000



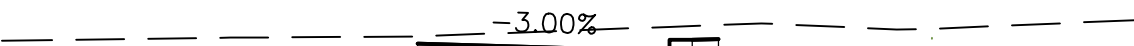
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DESIGN HEIGHT		27.360		27.279	
SUBGRADE HEIGHT		27.360		27.279	
EXISTING SURFACE		27.271		27.298	
OFFSETS		-7.352		-3.373	

CHAINAGE 20.000



DATUM R.L. 26.00					
DESIGN HEIGHT		27.715		27.651	
SUBGRADE HEIGHT		27.715		27.651	
EXISTING SURFACE		27.540		27.557	
OFFSETS		-7.351		-4.800	

CHAINAGE 80.000



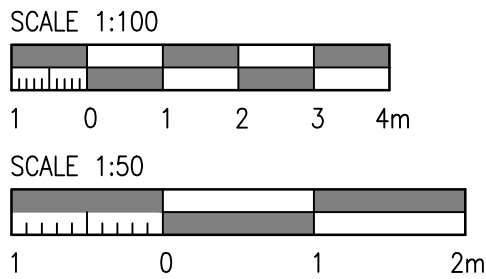
DATUM R.L. 26.00					
DESIGN HEIGHT		27.164		27.085	
SUBGRADE HEIGHT		27.164		27.085	
EXISTING SURFACE		27.260		27.397	
OFFSETS		0.000		3.330	

CHAINAGE 9.394



DATUM R.L. 26.00					
DESIGN HEIGHT		27.703		27.623	
SUBGRADE HEIGHT		27.703		27.623	
EXISTING SURFACE		27.347		27.388	
OFFSETS		-5.403		-2.850	

CHAINAGE 60.000



Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
5	ISSUED FOR DEVELOPMENT APPLICATION	RC	CR	21.02.20
6	ISSUED FOR APPROVAL	RC	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
5	ISSUED FOR DEVELOPMENT APPLICATION	RC	CR	21.02.20
6	ISSUED FOR APPROVAL	RC	CW	05.10.21

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ACN 010 580 248

Client

TOGA

Title
**ROADWAY CROSS SECTIONS –
SHEET 1**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
13.02.20

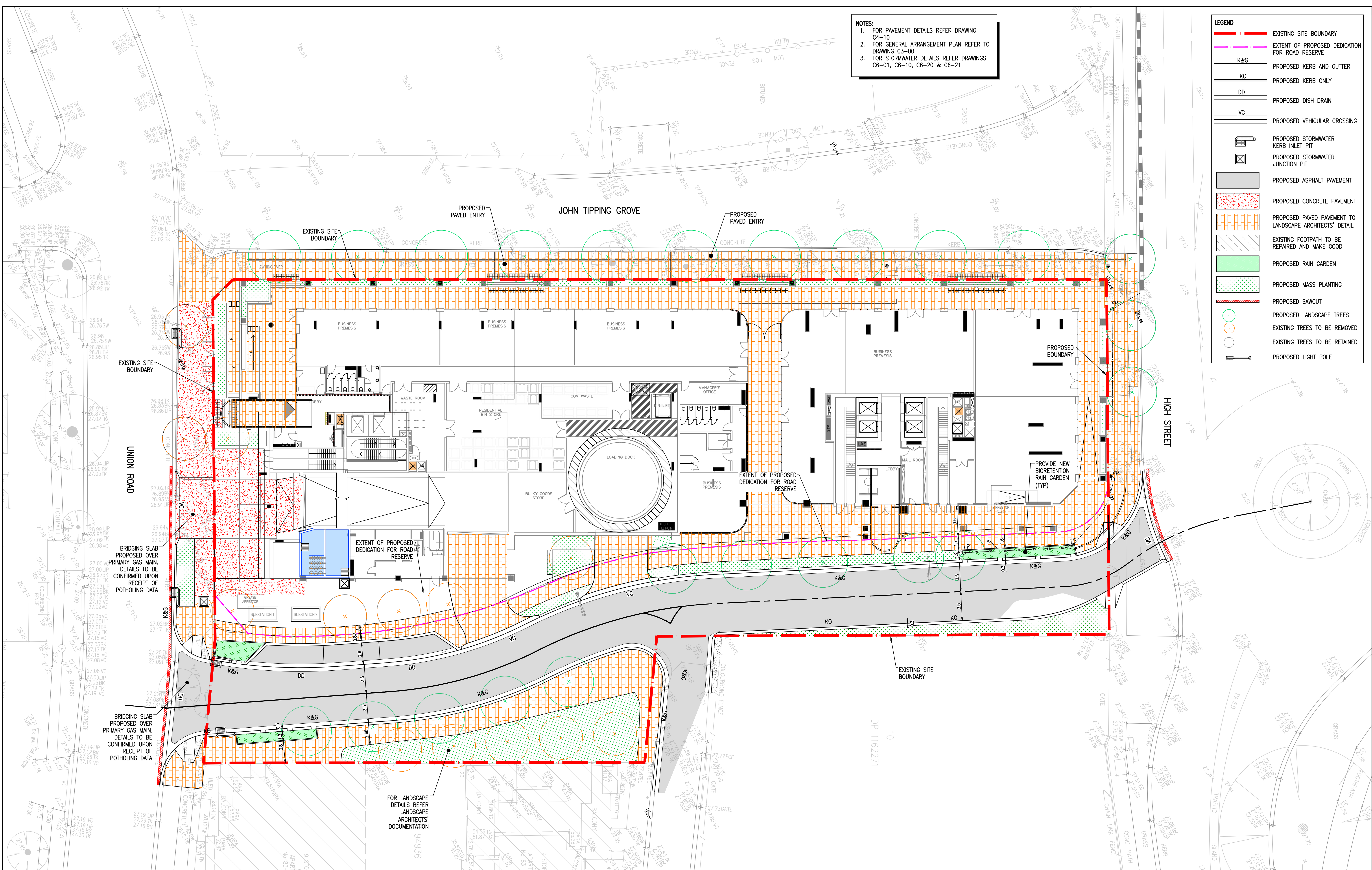
Drawn
S.MANANDHAR
Designer
C.WAITE

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C3-40

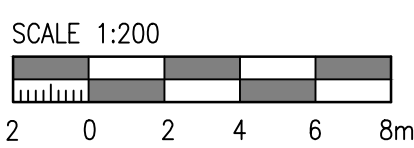
Revision
6



NOTES:
1. FOR PAVEMENT DETAILS REFER DRAWING C4-10
2. FOR GENERAL ARRANGEMENT PLAN REFER TO DRAWING C3-00
3. FOR STORMWATER DETAILS REFER DRAWINGS C6-01, C6-10, C6-20 & C6-21

LEGEND

- EXISTING SITE BOUNDARY
- EXTENT OF PROPOSED DEDICATION FOR ROAD RESERVE
- K&G PROPOSED KERB AND GUTTER
- KO PROPOSED KERB ONLY
- DD PROPOSED DISH DRAIN
- VC PROPOSED VEHICULAR CROSSING
- PROPOSED STORMWATER KERB INLET PIT
- PROPOSED STORMWATER JUNCTION PIT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- PROPOSED PAVED PAVEMENT TO LANDSCAPE ARCHITECTS' DETAIL
- EXISTING FOOTPATH TO BE REPAIRED AND MAKE GOOD
- PROPOSED RAIN GARDEN
- PROPOSED MASS PLANTING
- PROPOSED SAWCUT
- PROPOSED LANDSCAPE TREES
- EXISTING TREES TO BE REMOVED
- EXISTING TREES TO BE RETAINED
- PROPOSED LIGHT POLE



Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
7	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
8	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
9	ISSUED FOR APPROVAL	RG	CW	05.10.21

Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	04.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
7	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
8	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
9	ISSUED FOR APPROVAL	RG	CW	05.10.21

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ACN 010 580 248



Client

PAVEMENT LAYOUT PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

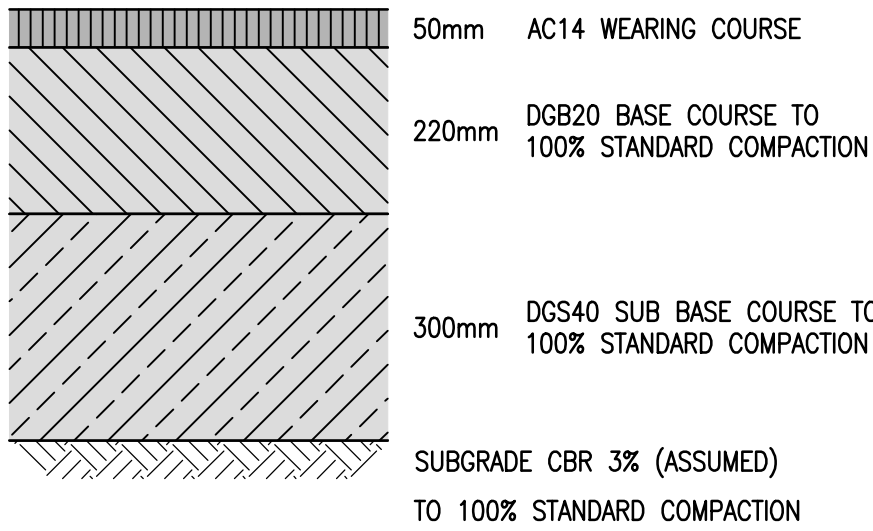
Drawn
S.MANANDHAR
Designer
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

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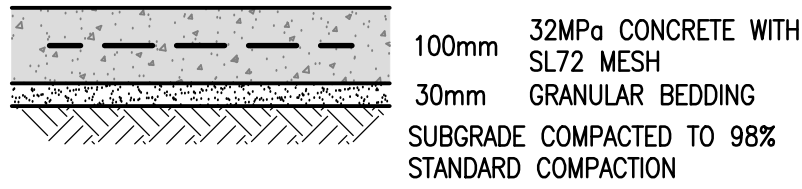
Drawing Number
C4-01

Revision
9

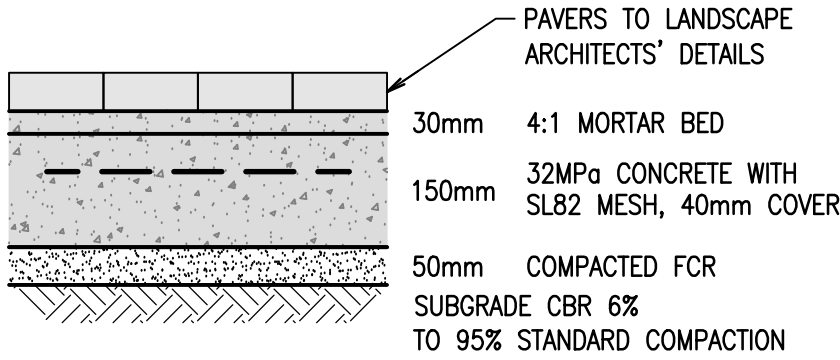


FULL ROAD DEPTH
ASPHALT PAVEMENT
SCALE 1:10

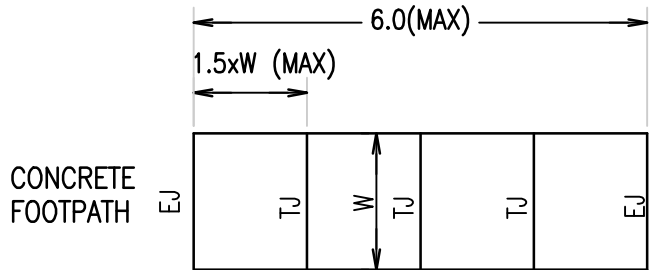
NOTE:
ESAs = 5X10⁵
DESIGN LIFE = 20YRS



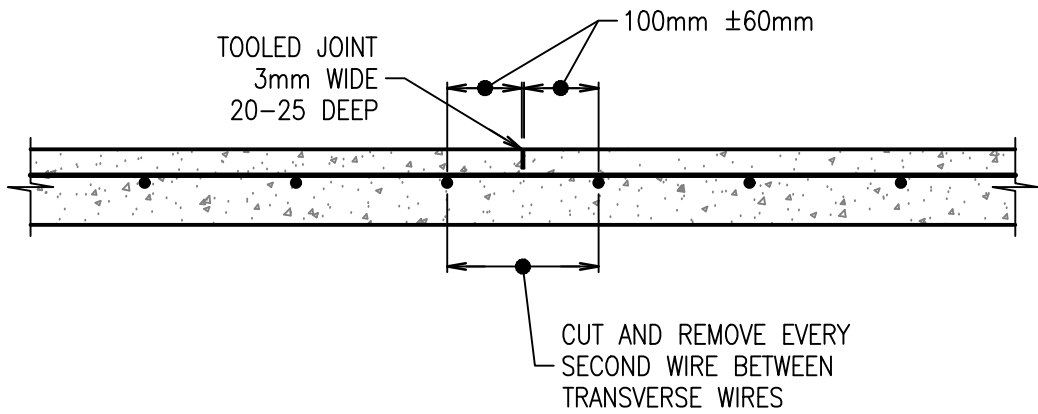
CONCRETE FOOTPATH PAVEMENT
TYPICAL DETAIL
SCALE 1:10



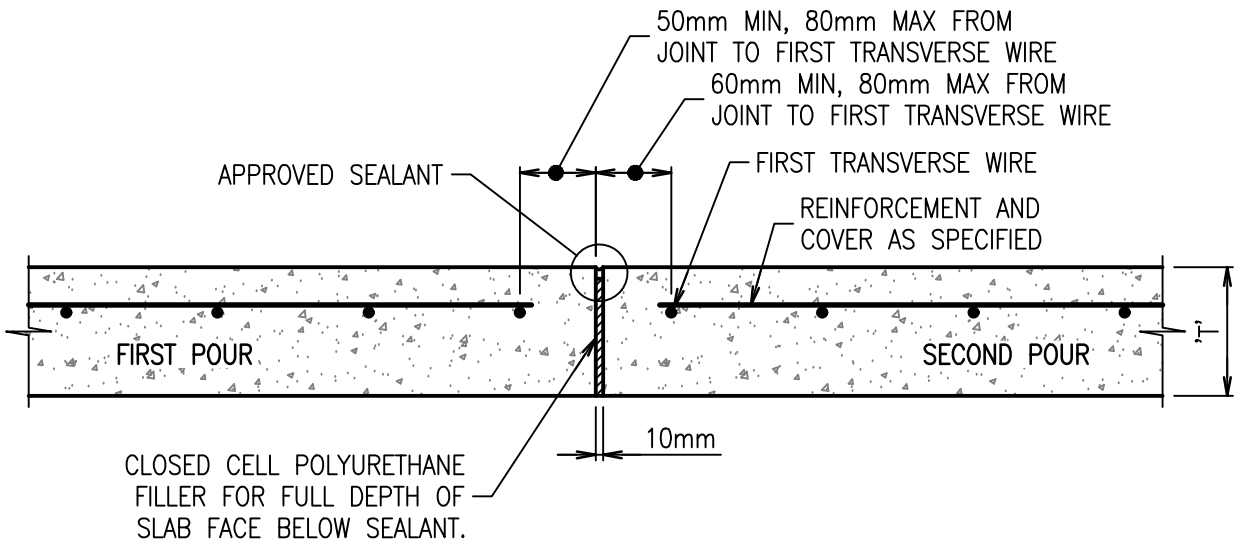
PAVED CONCRETE FOOTPATH PAVEMENT
TYPICAL DETAIL
SCALE 1:10



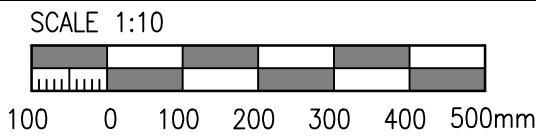
TJ: TROWELLED JOINT
EJ: EXPANSION JOINT
TYPICAL FOOTPATH JOINTING
NTS



TOOLED JOINT (TJ) DETAIL
SCALE 1:10



EXPANSION JOINT (EJ) DETAIL
SCALE 1:10



Rev	Revision Description	By	App	Date
1	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
5	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
6	ISSUED FOR APPROVAL	RG	CW	05.10.21

Rev	Revision Description	By	App	Date
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ACN 010 580 248



Client

Title
PAVEMENT DETAILS

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
06.05.19

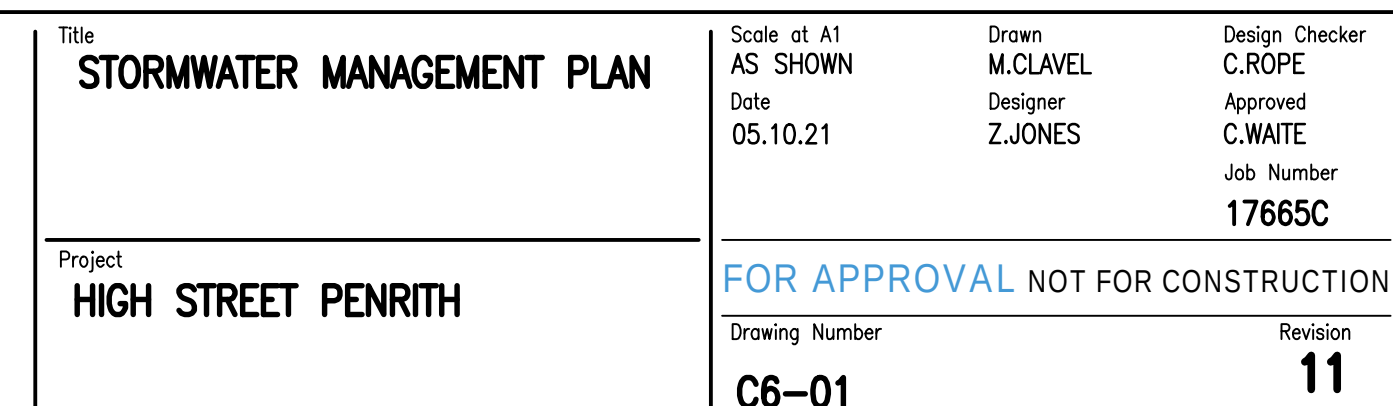
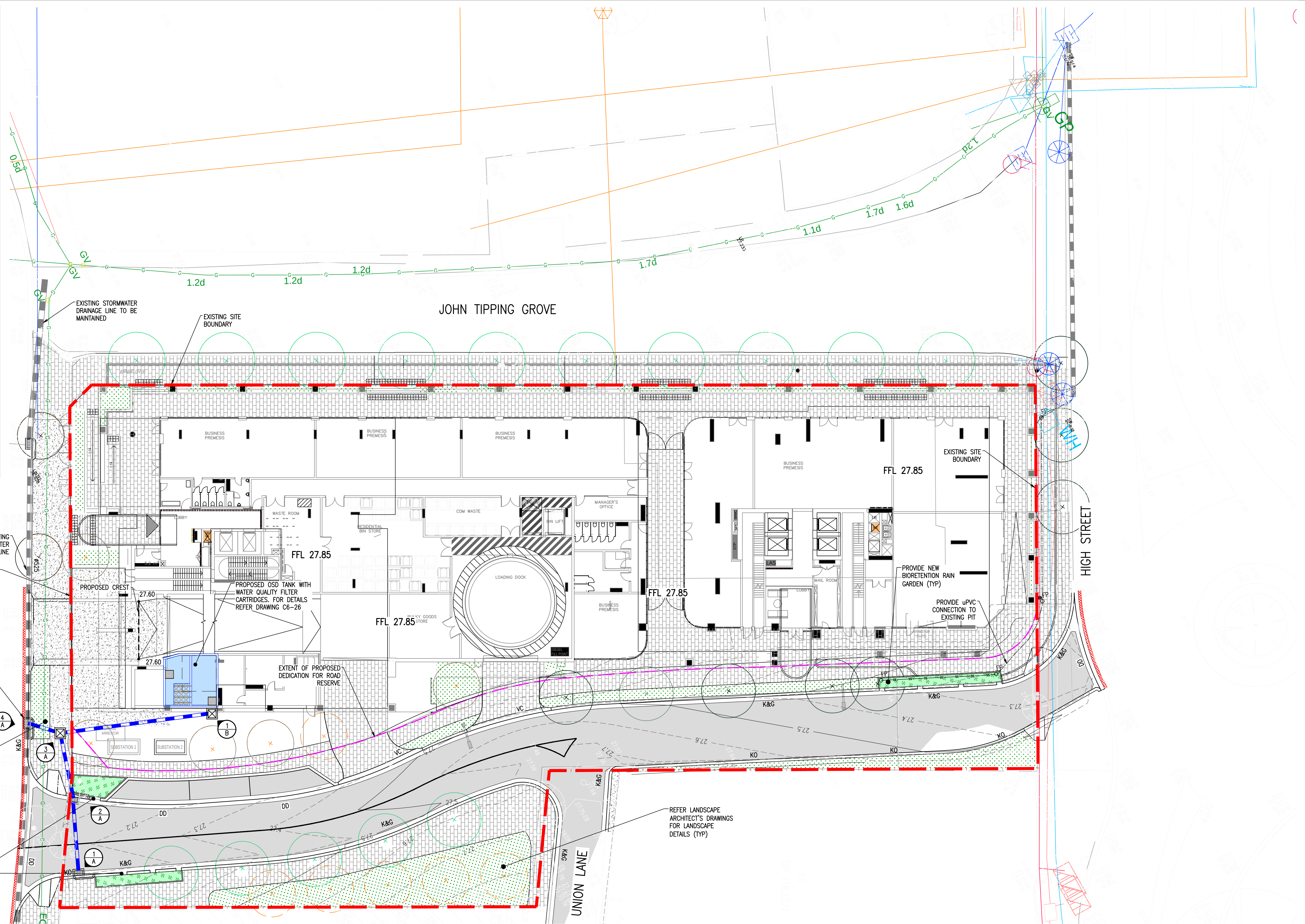
Drawn
S.MANANDHAR
Designer
R.ATHERTON

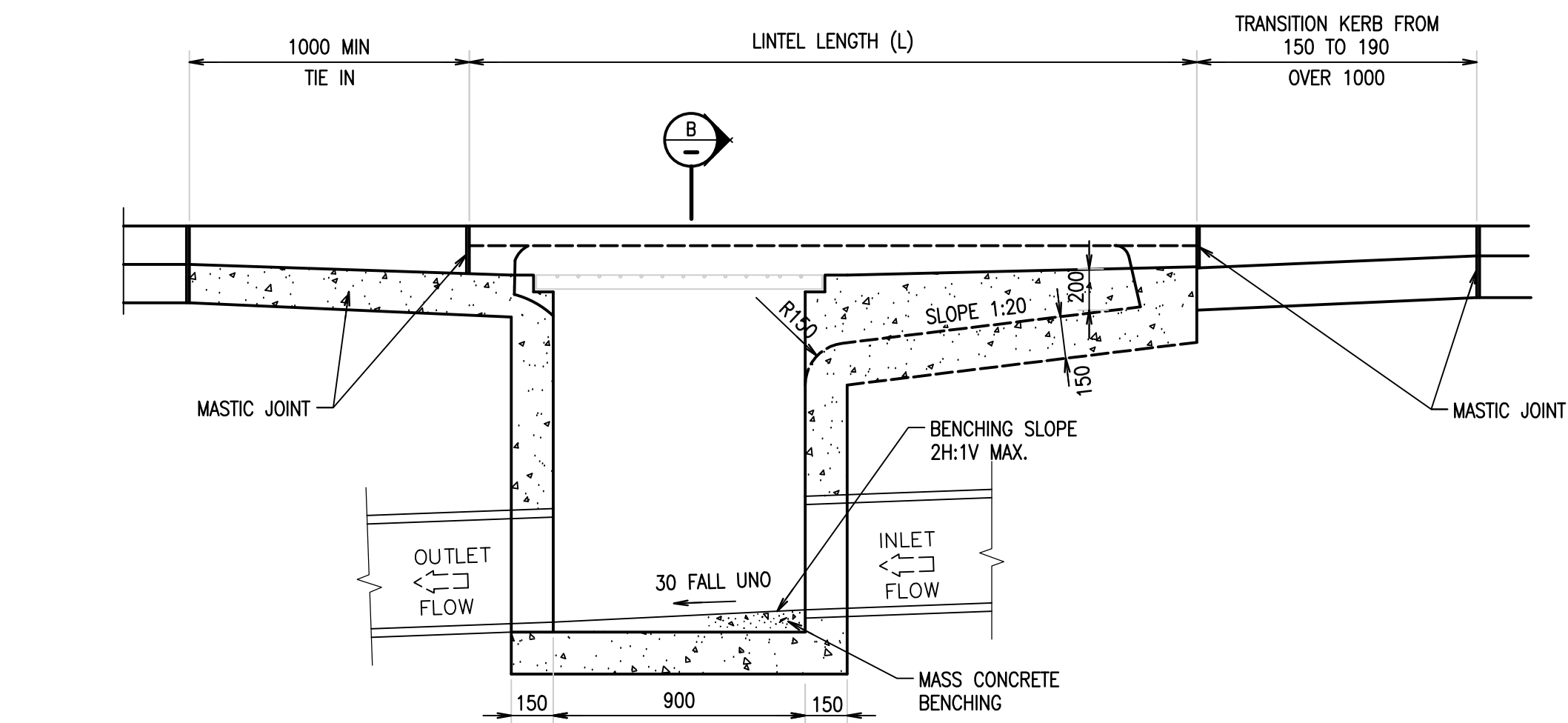
Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

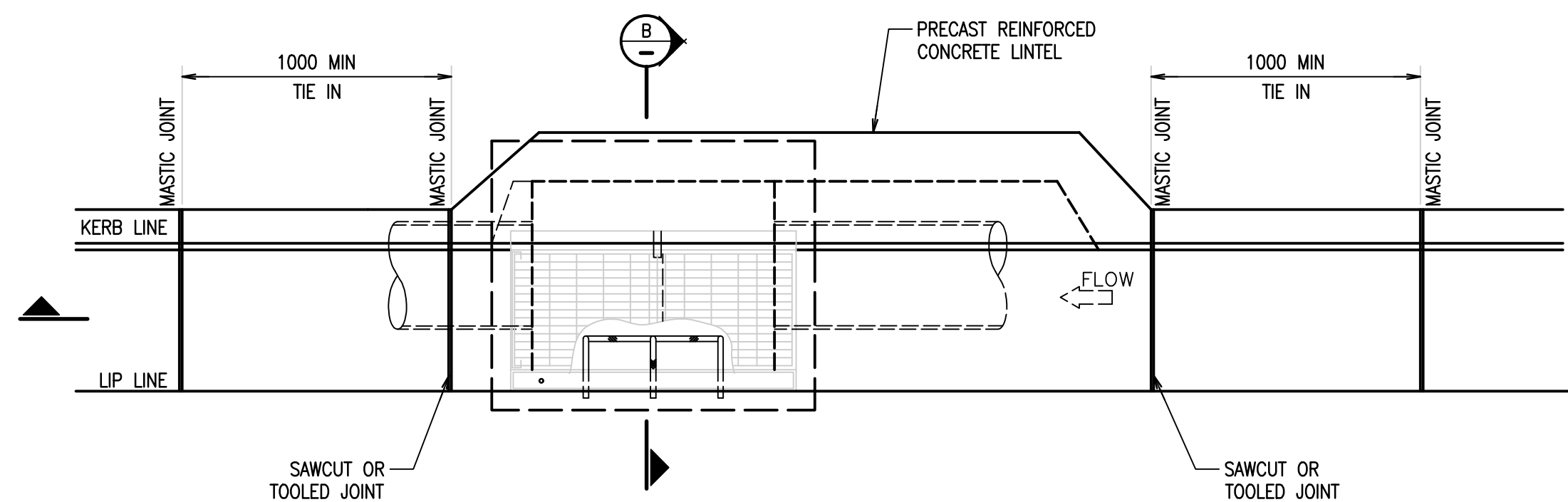
Drawing Number
C4-10

Revision
6





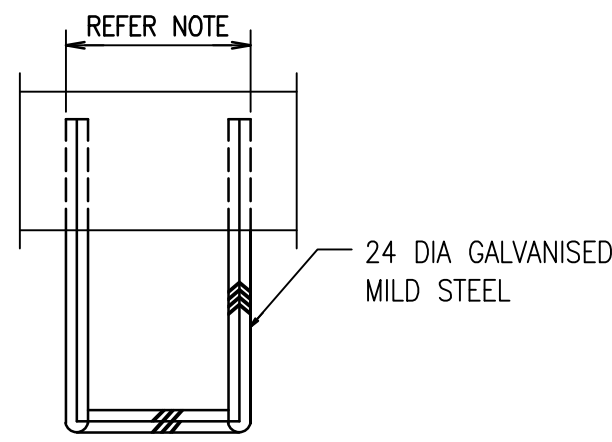
SECTION A
SCALE 1:20



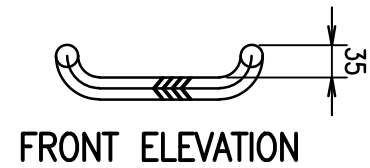
PLAN
SCALE 1:20
ON GRADE PIT WITH LINTEL

DRILL 30mm DIA HOLE x 120mm DEEP AND EPOXY INTO WALL WITH EPOXY MORTAR EQUAL TO EPIREZ 633 (NON SAG) - IN PRECAST PITS. DEPTH OF EMBEDMENT IS TO BE IN ACCORDANCE WITH PIT MANUFACTURER'S DETAILS

SIDE ELEVATION



PLAN

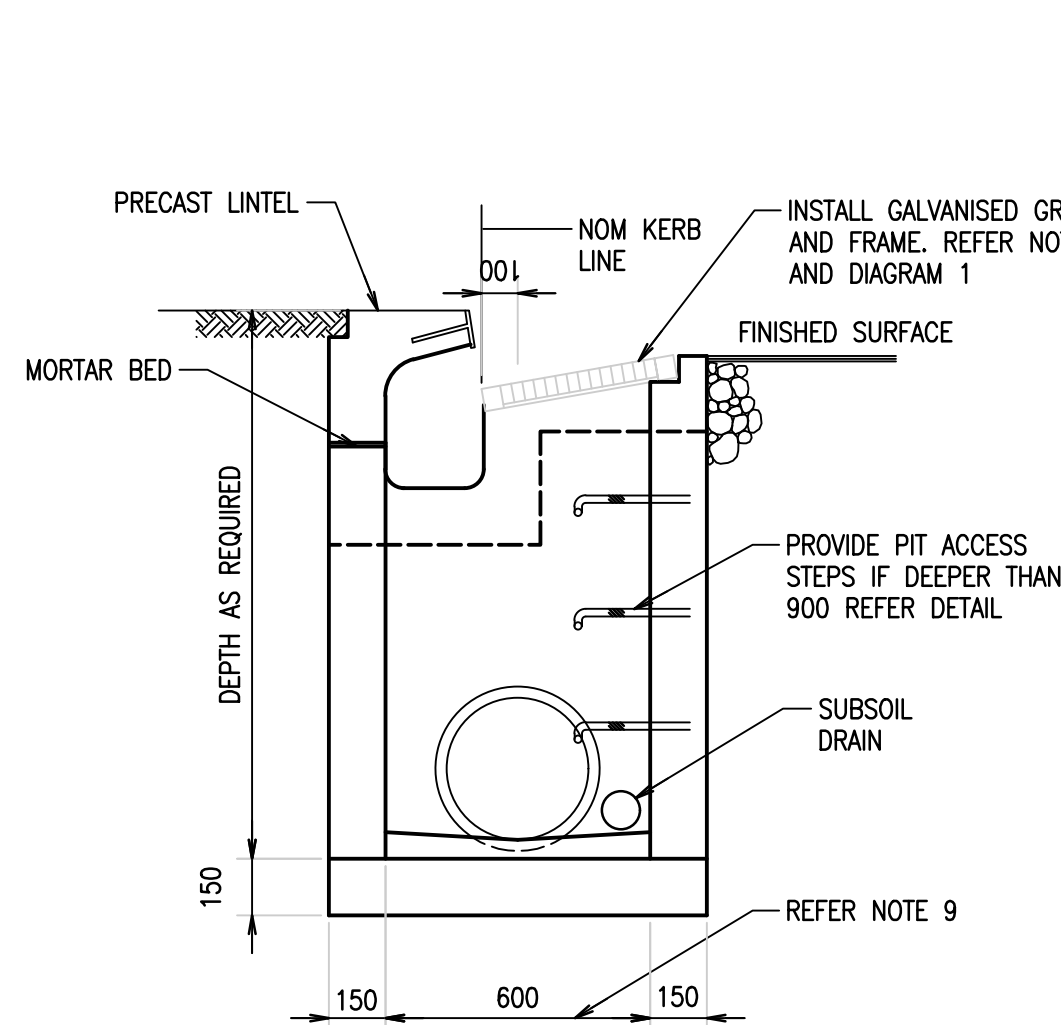


NOTES:

1. WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2. STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3. SPACING OF STEPS TO BE UNIFORM TO WITHIN ± 8 mm IN EACH PIT.

PIT STEP IRON DETAILS
NTS

SECTION



SECTION B
SCALE 1:20

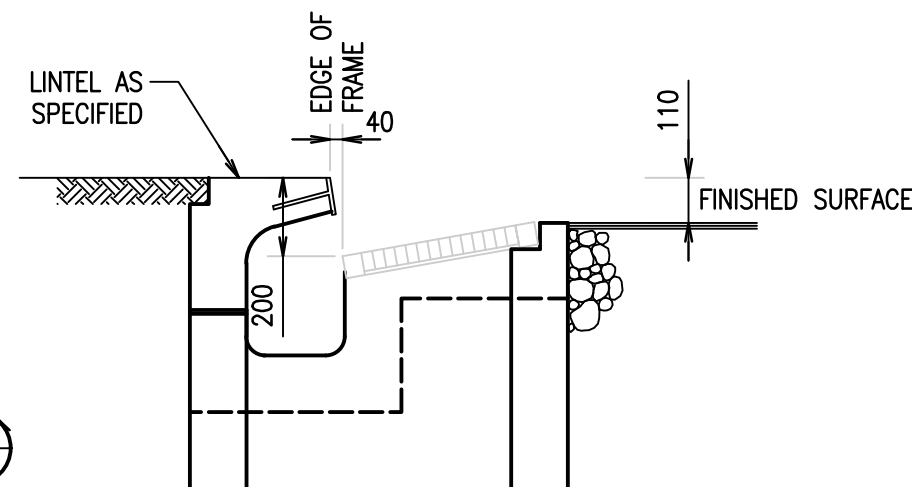
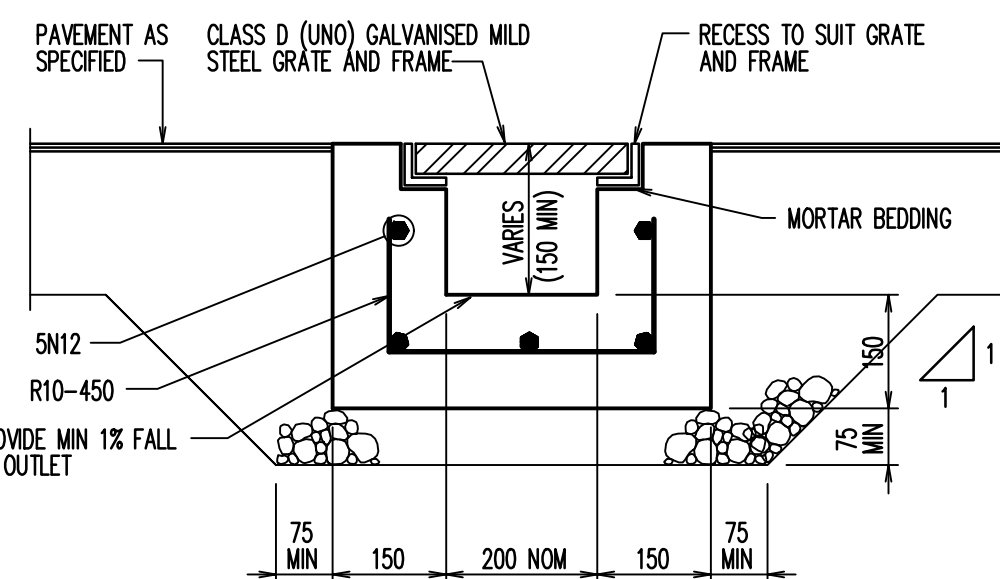


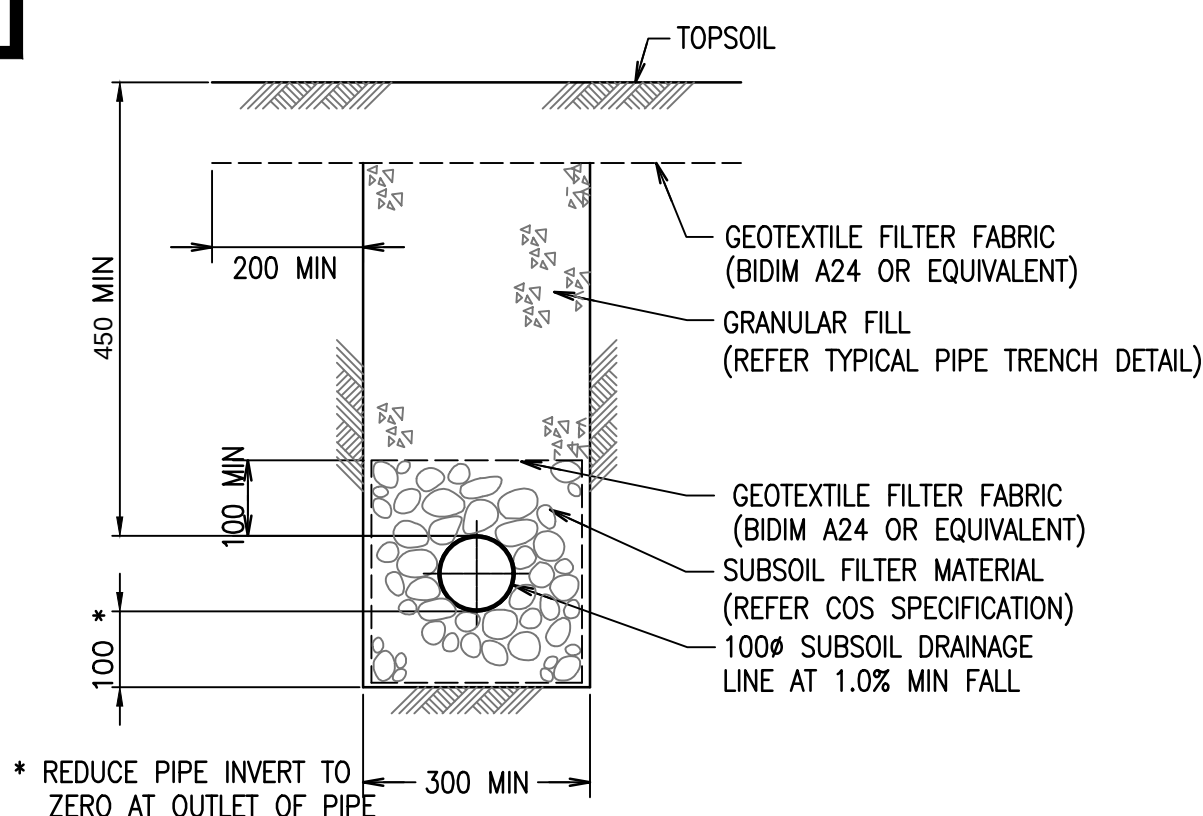
DIAGRAM 1
SCALE 1:20

NOTES:

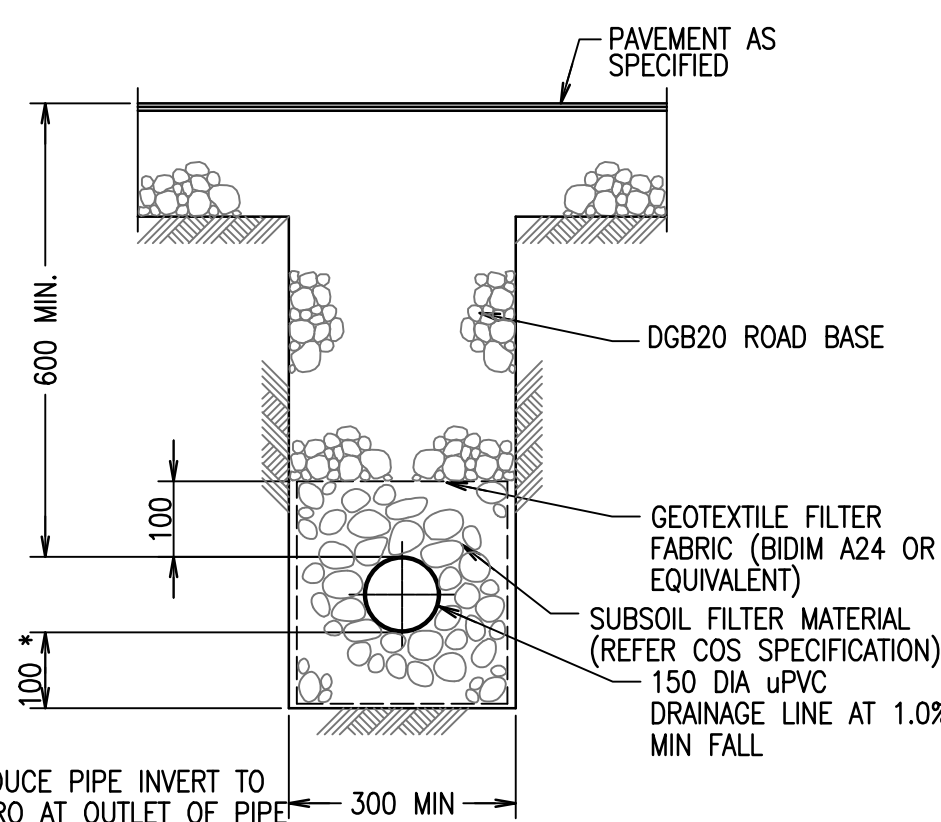
1. CONCRETE TO BE 25MPa @ 28 DAYS.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE
3. BACKFILL ADJACENT TO PITS TO BE APPROVED GRANULAR MATERIAL.
4. A 3000 LENGTH OF APPROVED "FILTER FABRIC" WRAPPED 100 SUB-SOIL DRAIN OR EQUIVALENT IS TO BE PROVIDED AND CONNECTED TO THE UPSTREAM PIT WALL.
5. PIT GRATE AND FRAME TO BE "WELDLOK" G651-D GULLY WITH SKIRTED BASE OR EQUIVALENT FOR ALL ROADS, FITTED WITH A LOCKABLE "J" BOLT OR EQUIVALENT.
6. APPROVED STEP IRONS SHALL BE PROVIDED WHERE THE PIT EXCEEDS 1200 IN DEPTH. THEY SHALL BE LOCATED AS DIRECTED AND STAGGERED TO GIVE 300 SPACING VERTICALLY AND 300 SPACING HORIZONTALLY.
7. FLOOR OF PIT TO BE BENCH TO MID POINT OF OUTLET PIPE WHERE OUTLET PIPE GREATER THAN 600 DIAMETER.
8. CONTRACTOR TO ENSURE CLEARANCE BETWEEN LINTEL AND OPENED GRATE.
9. WHERE DEPTH OF PIT IS GREATER THAN 1200 INTERNAL WIDTH OF PIT TO BE INCREASED TO 900x900 FOR FULL DEPTH BELOW PAVEMENT.
10. LIFTING LUGS TO BE FILLED AFTER INSTALLATION.



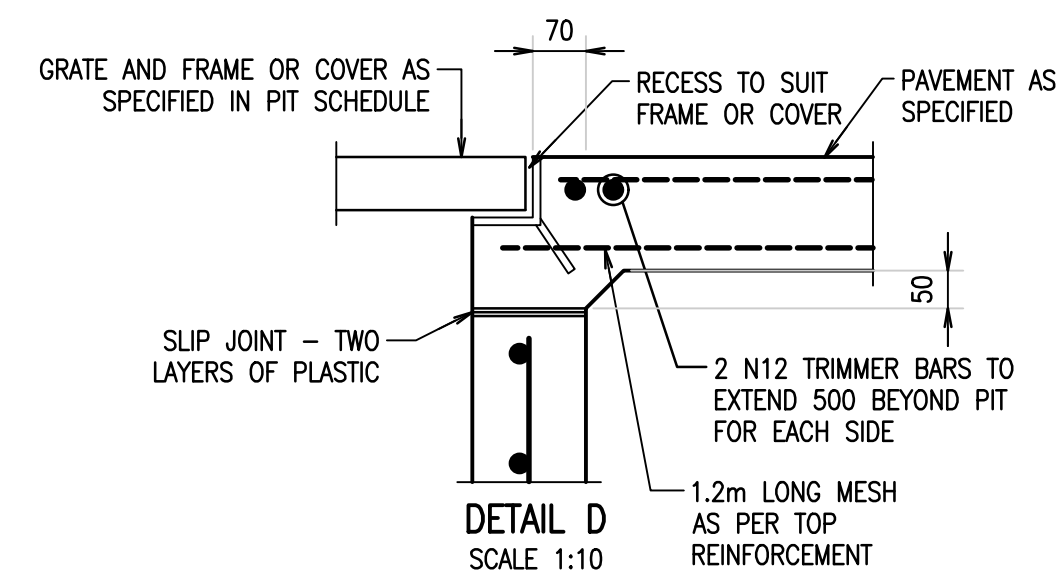
Grated Drain
SCALE 1:10



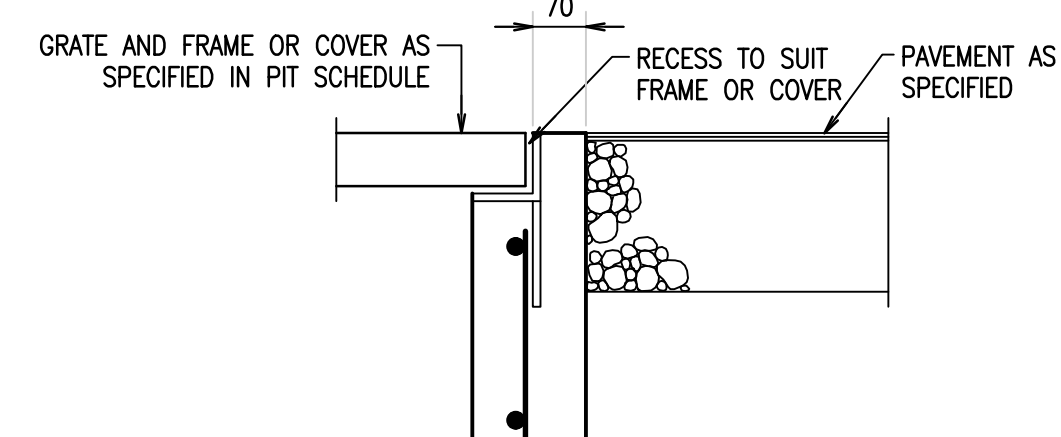
SUBSOIL DRAINAGE IN LANDSCAPE AREAS
NTS



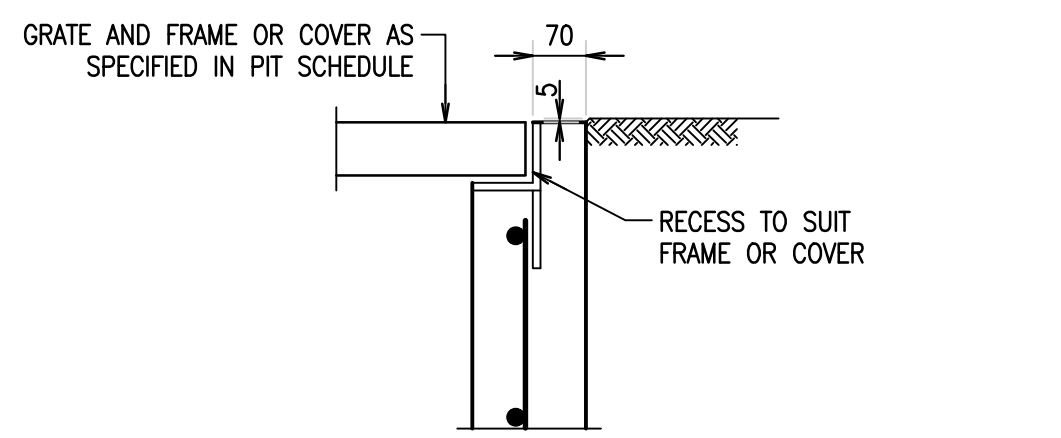
SUBSOIL DRAINAGE IN PAVED AREAS
NTS



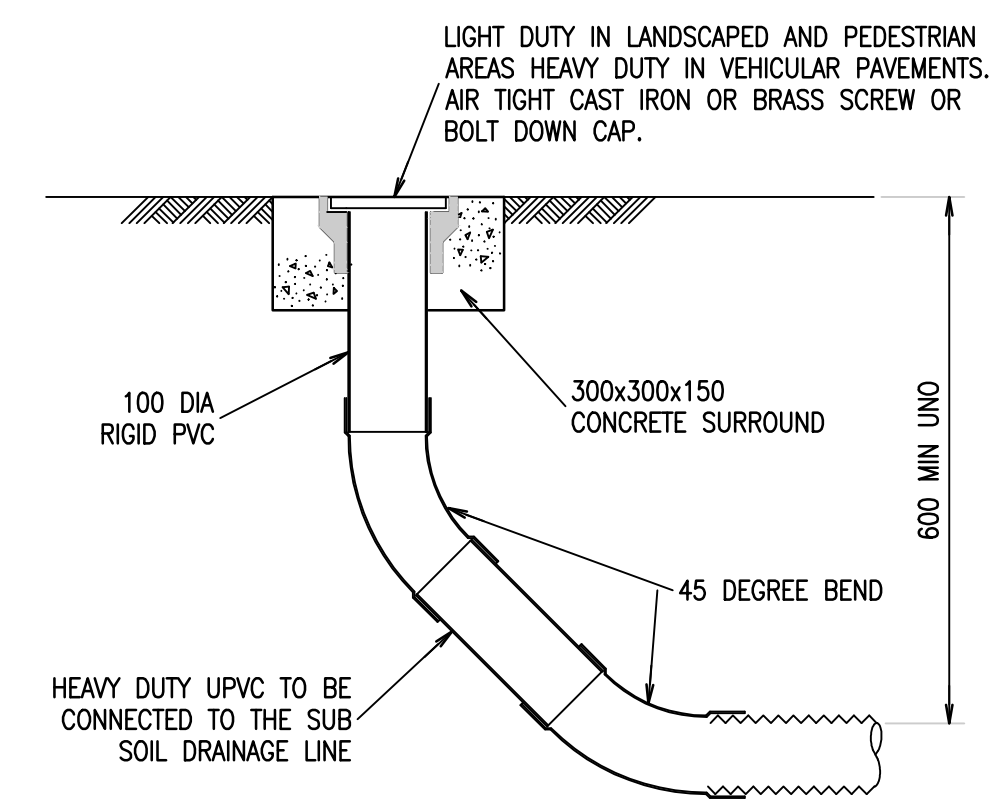
DETAIL D
SCALE 1:10



DETAIL E
SCALE 1:10



DETAIL F
SCALE 1:10



FLUSHING POINT (FP)
SCALE 1:10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
6	ISSUED FOR DEVELOPMENT APPLICATION	RC	CR	21.02.20
7	ISSUED FOR APPROVAL	RC	CW	05.10.21

Rev	Revision Description	By	App	Date
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4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
6	ISSUED FOR DEVELOPMENT APPLICATION	RC	CR	21.02.20
7	ISSUED FOR APPROVAL	RC	CW	05.10.21

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ACN 010 580 248

Client

TOGA

Title
STORMWATER DETAILS

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
12.02.20

Drawn
S.MANANDHAR
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

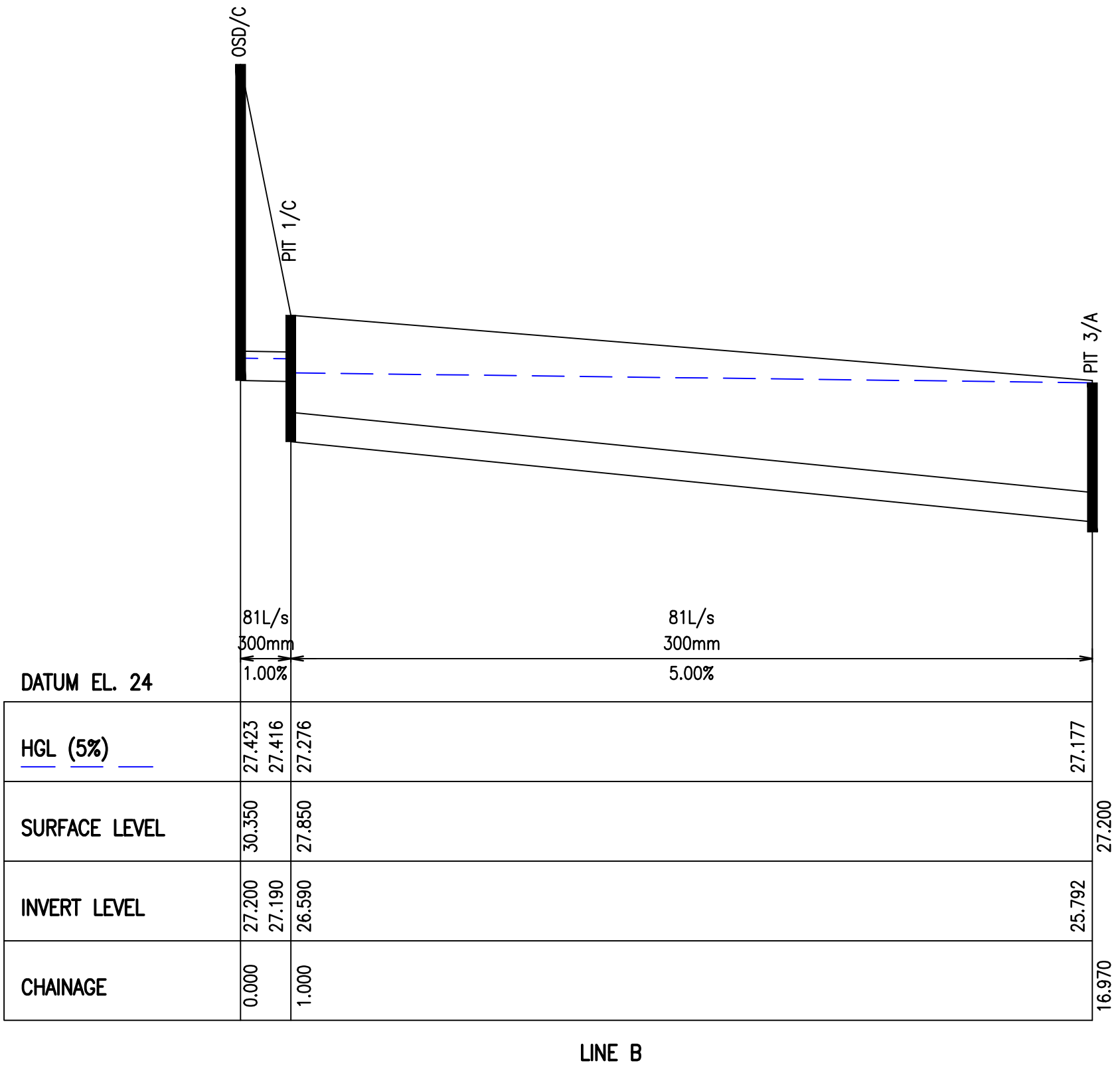
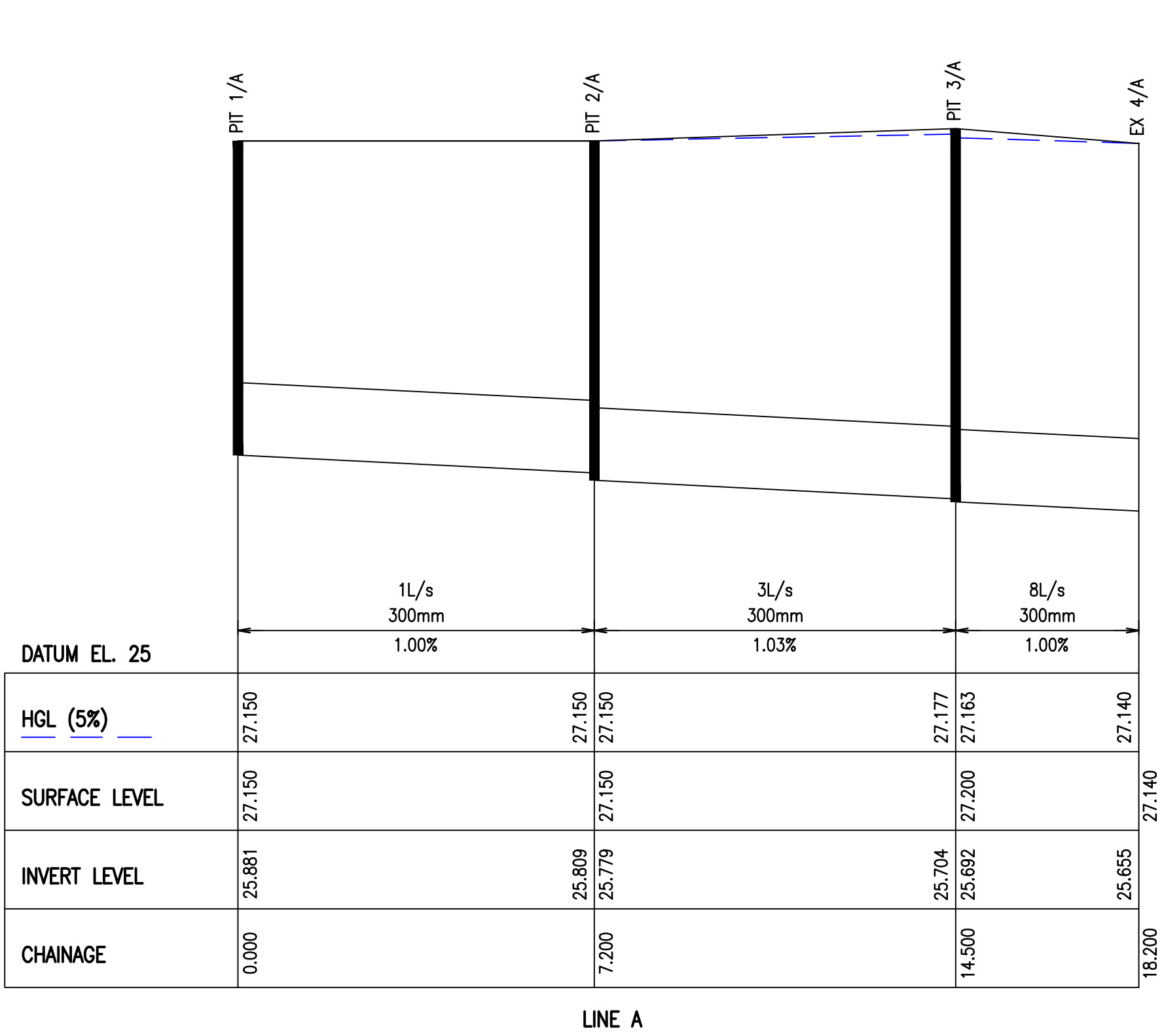
Drawing Number
C6-10

Revision
7

MINIMUM INTERNAL DIMENSIONS FOR
STORMWATER AND INLET PITS

DEPTH TO INVERT OF OUTLET	MINIMUM INTERNAL DIMENSIONS (mm)	
	RECTANGULAR	
	WIDTH	LENGTH
≤600	450	450
>600 ≤900	600	600
>900 ≤1200	600	900
>1200	900	900

- NOTES:
- PIT DEPTHS > 1200 REQUIRE STEP IRONS.
 - PIPE SUPPORT HS3 TYPE IN ACCORDANCE WITH AS3725.
 - ALL PIPES TO BE RCP UNLESS NOTED OTHERWISE.
 - ALL RCP PIPE CLASSES AS NOTED IN BRACKETS ON THE LONGSECTION.
 - MINIMUM COVER OF 400mm DURING CONSTRUCTION.
 - ALL COVERS TO BE IN ACCORDANCE WITH COUNCIL STANDARDS AND SPECIFICATION.



SCALE 1:100 HORIZONTAL

SCALE 1:20 VERTICAL

Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	RA	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
8	ISSUED FOR APPROVAL	RC	CW	05.10.21

Rev	Revision Description	By	App	Date
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4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	18.06.18
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7	ISSUED FOR DEVELOPMENT APPLICATION	MC	CW	21.02.20
8	ISSUED FOR APPROVAL	RC	CW	05.10.21

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TOGA

Title
**STORMWATER LONGSECTIONS –
SHEET 1 OF 2**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
21.02.20

Drawn
M.CLAVEL
Designer
M.CLAVEL

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

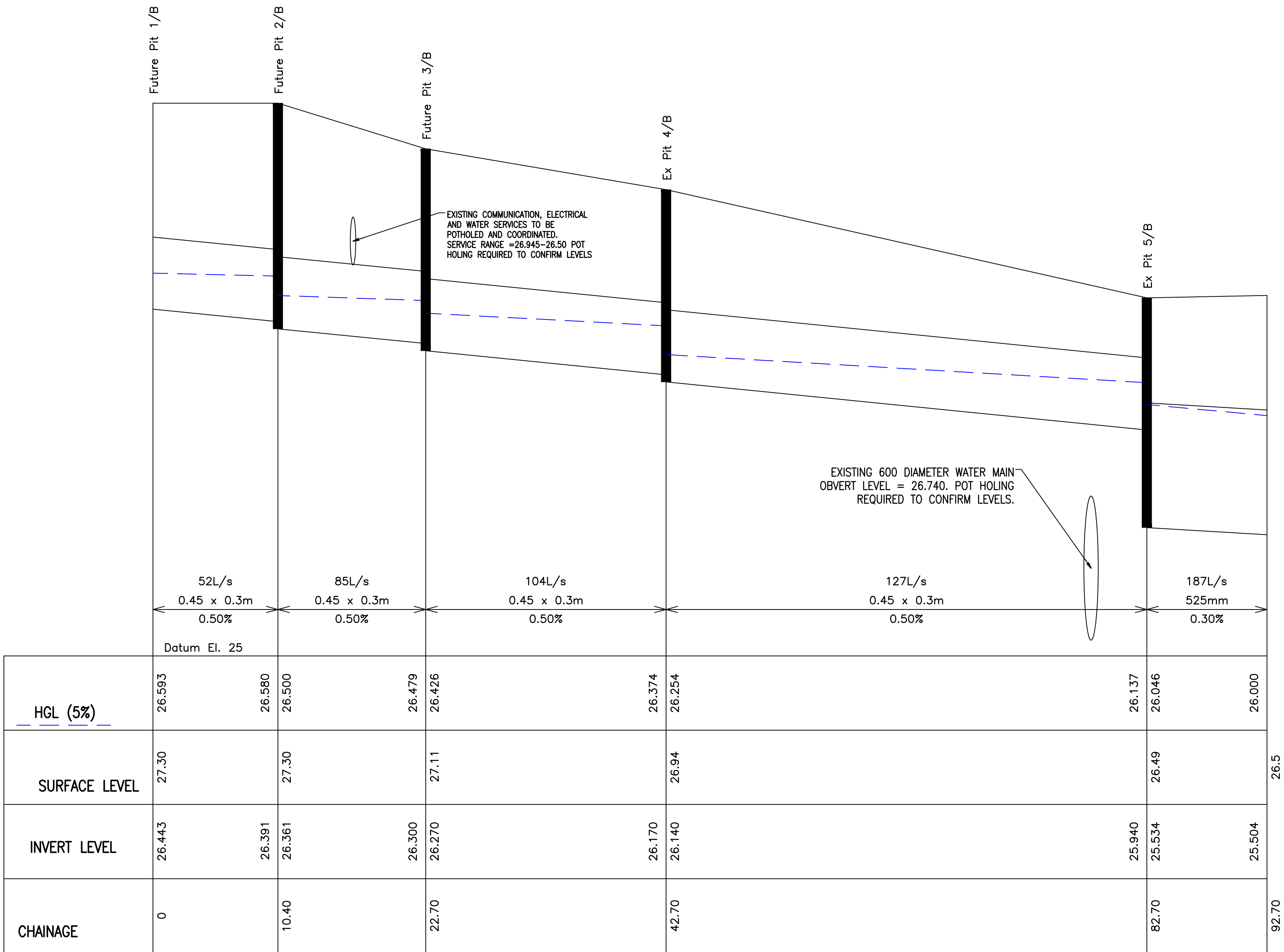
Drawing Number
C6-20

Revision
8

MINIMUM INTERNAL DIMENSIONS FOR
STORMWATER AND INLET PITS

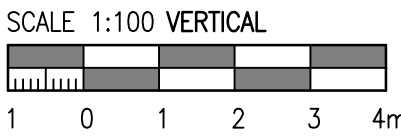
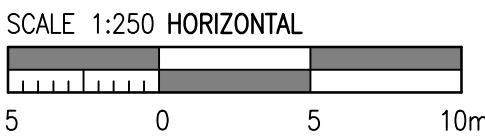
DEPTH TO INVERT OF OUTLET	MINIMUM INTERNAL DIMENSIONS (mm)	
	RECTANGULAR	
	WIDTH	LENGTH
≤600	450	450
>600 ≤900	600	600
>900 ≤1200	600	900
>1200	900	900

- NOTES:
- PIT DEPTHS > 1200 REQUIRE STEP IRONS.
 - PIPE SUPPORT HS3 TYPE IN ACCORDANCE WITH AS3725.
 - ALL PIPES TO BE RCP UNLESS NOTED OTHERWISE.
 - ALL RCP PIPE CLASSES AS NOTED IN BRACKETS ON THE LONGSECTION.
 - MINIMUM COVER OF 400mm DURING CONSTRUCTION.
 - ALL COVERS TO BE IN ACCORDANCE WITH COUNCIL STANDARDS AND SPECIFICATION.



LINE B

NOTE: LINE B IS TO BE CONSTRUCTED IN THE ULTIMATE STAGE 3 ROAD CASE



Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	ZJ	CR	18.06.18
2	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
4	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
5	ISSUED FOR APPROVAL	RG	CW	05.10.21

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ACN 010 580 248



Client

Title
**STORMWATER LONGSECTIONS –
ULTIMATE STAGE 3 DESIGN**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
21.02.20

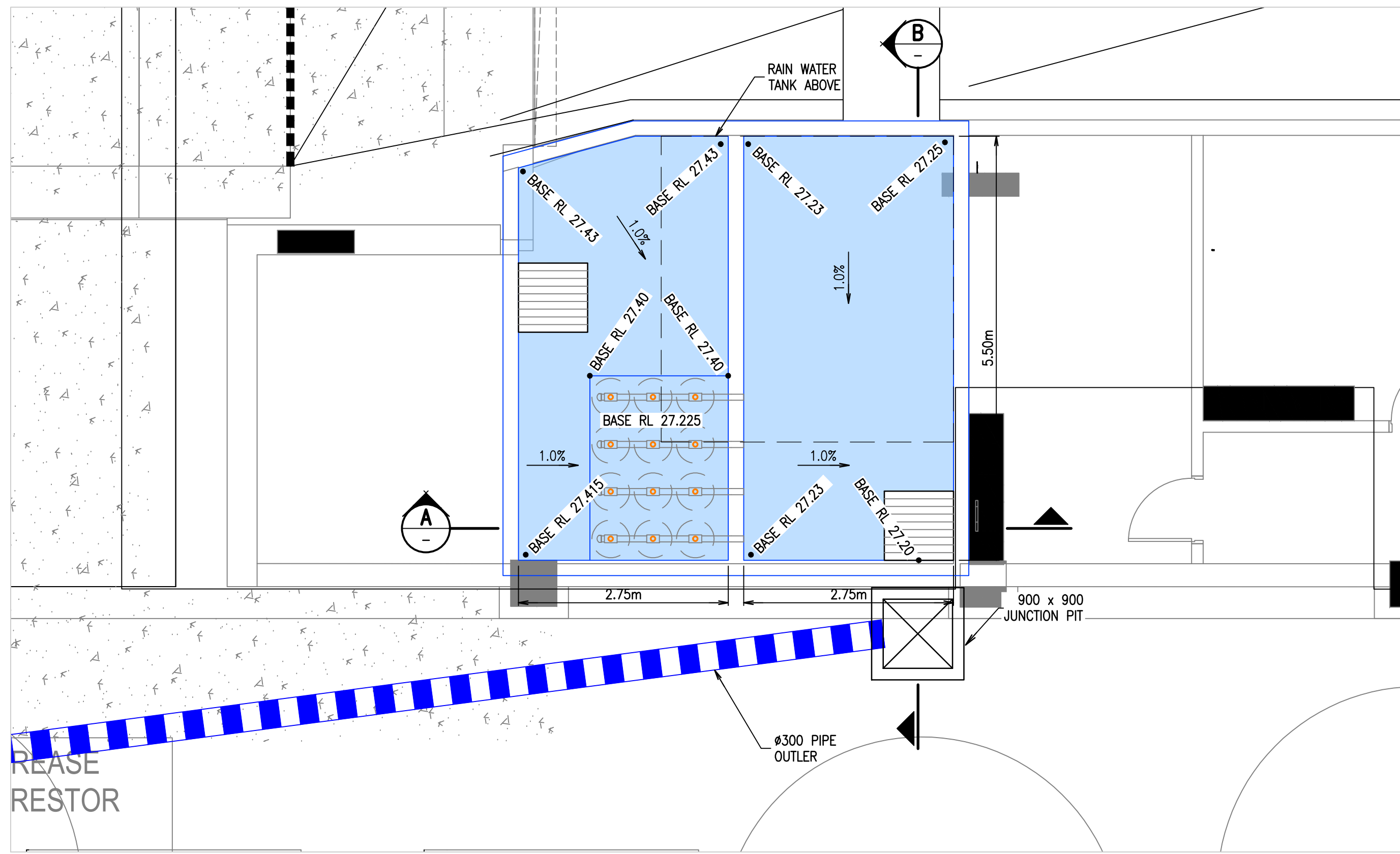
Drawn
S.MANADHAR
Designer
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

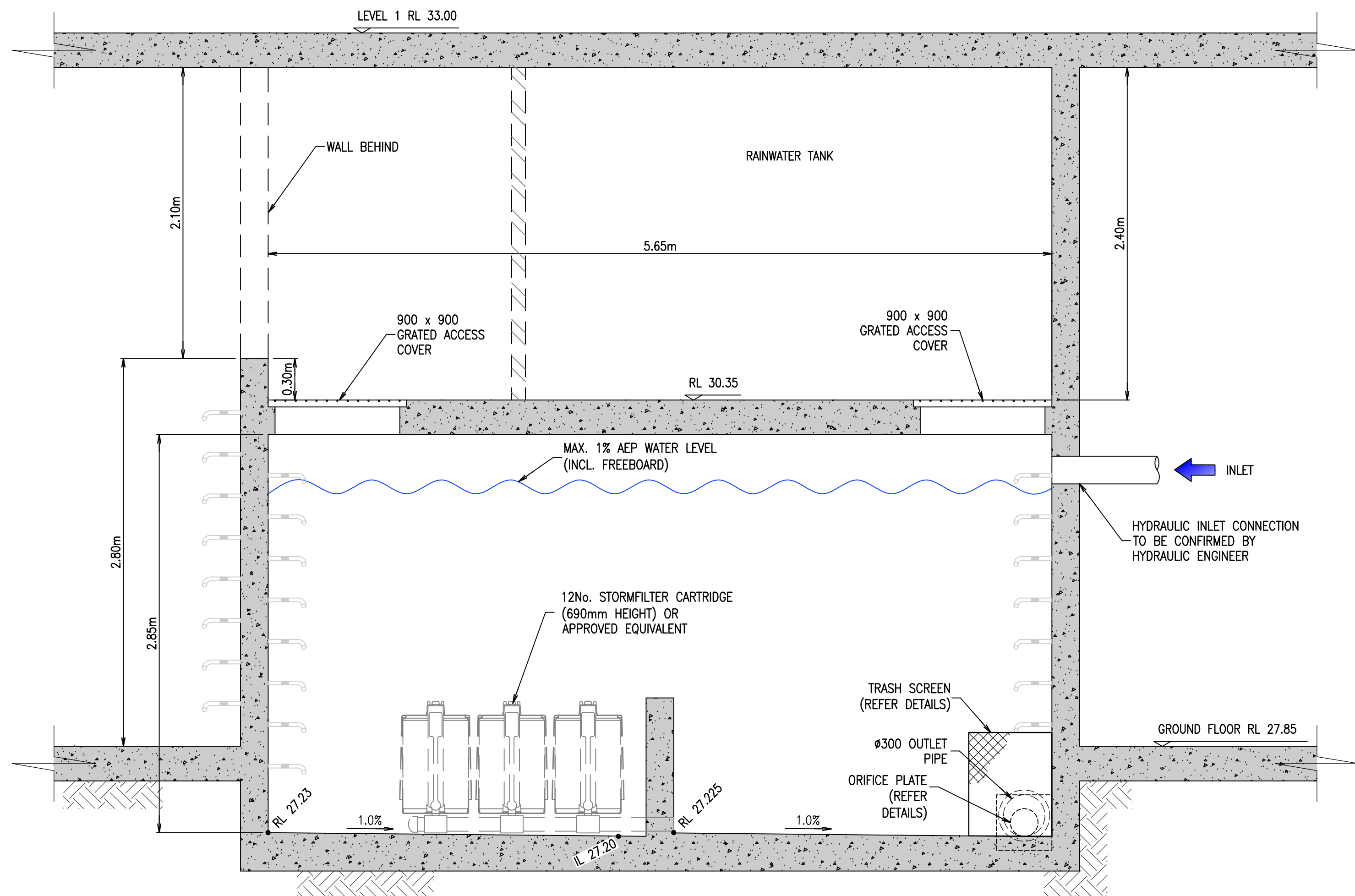
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Drawing Number
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Revision
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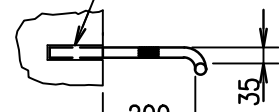


ON SITE DETENTION TANK PLAN
SCALE 1:50



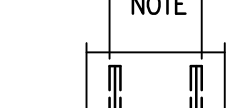
ON SITE DETENTION TANK SECTION
SCALE 1:25

DRILL 30mm DIA HOLE x 120mm DEEP AND EPOXY INTO WALL WITH EPOXY MORTAR EQUAL TO EPIREZ 633 (NON SAG) - IN PRECAST PITS, DEPTH OF EMBEDMENT IS TO BE IN ACCORDANCE WITH PIT MANUFACTURER'S DETAILS



SIDE ELEVATION

REFER NOTE

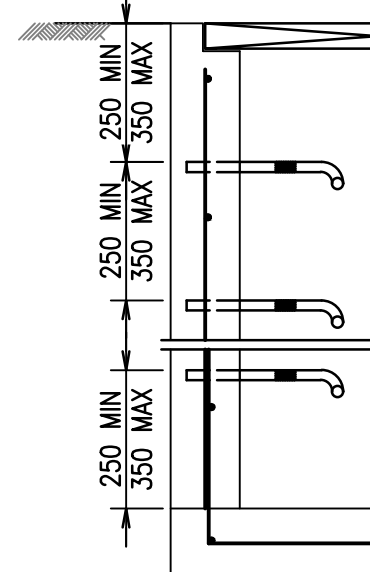


PLAN

24 DIA GALVANISED MILD STEEL



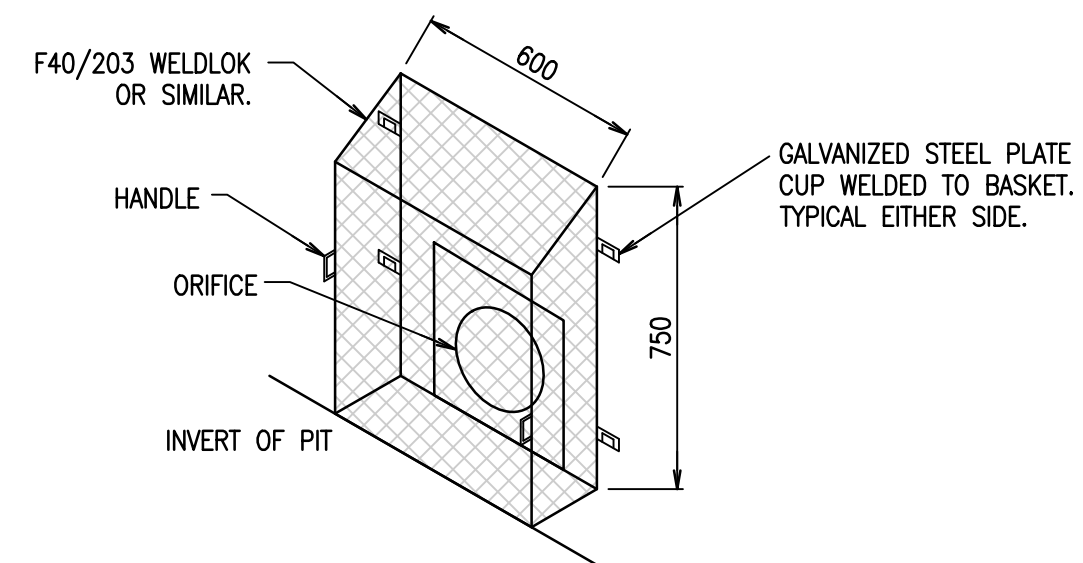
FRONT ELEVATION



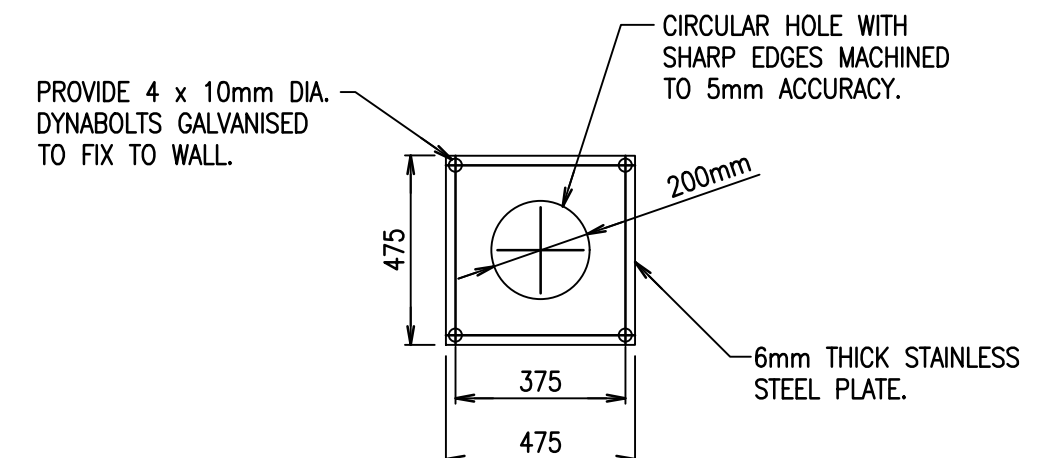
SECTION

PIT STEP IRON DETAIL
SCALE 1:20

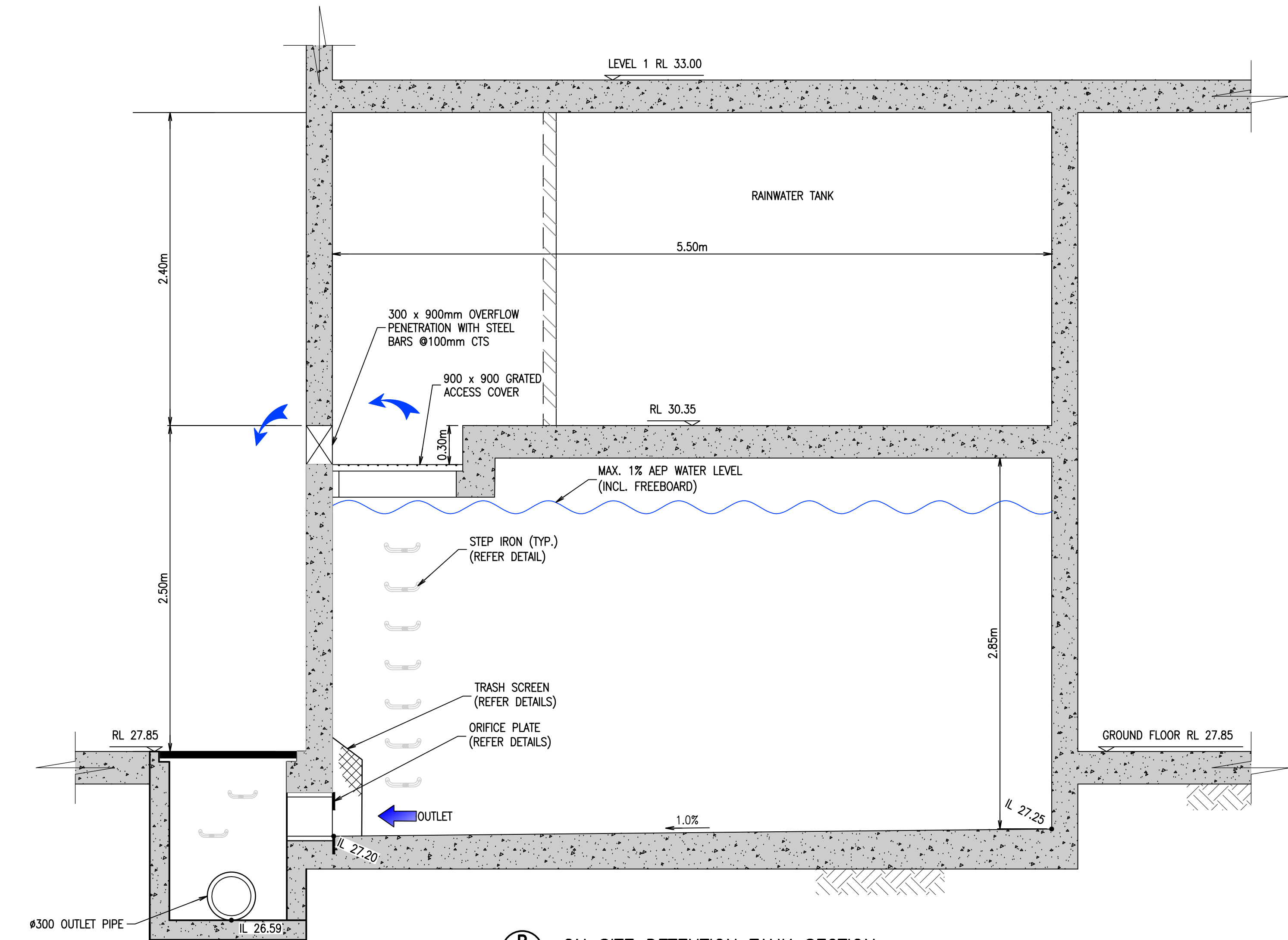
- NOTES:
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 2. STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
 3. SPACING OF STEPS TO BE UNIFORM TO WITHIN ± 8 mm IN EACH PIT.



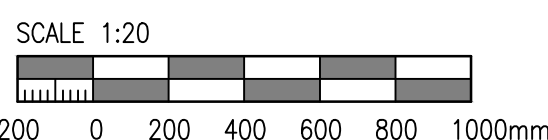
TRASH SCREEN DETAIL
SCALE 1:20



ORIFICE PLATE DETAIL
SCALE 1:20



ON SITE DETENTION TANK SECTION
SCALE 1:25



Rev	Revision Description	By	App	Date
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3	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
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Web: www.robertbird.com
ACN 010 580 248



Client

**ON SITE DETENTION TANK TYPICAL
DETAILS**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
21.02.20

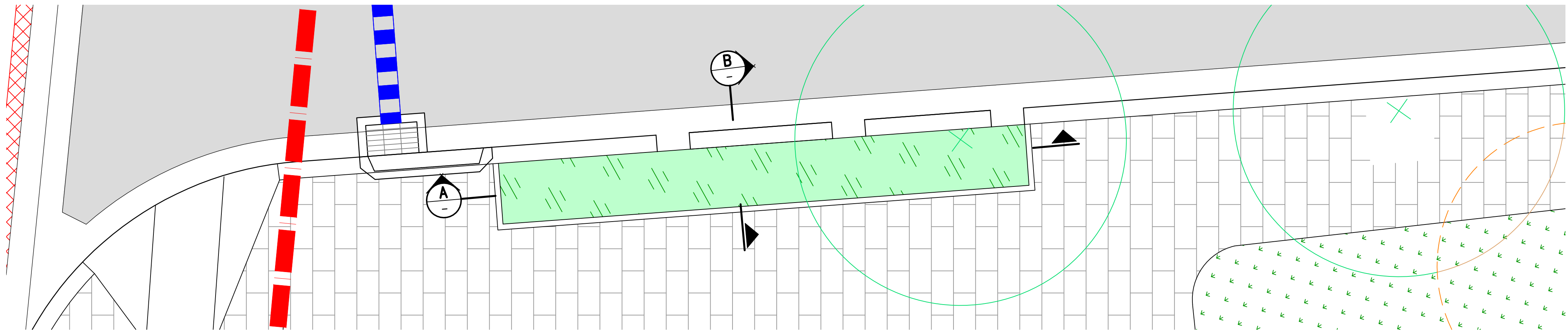
Drawn
M.CLAVEL
Designer
M.CLAVEL

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

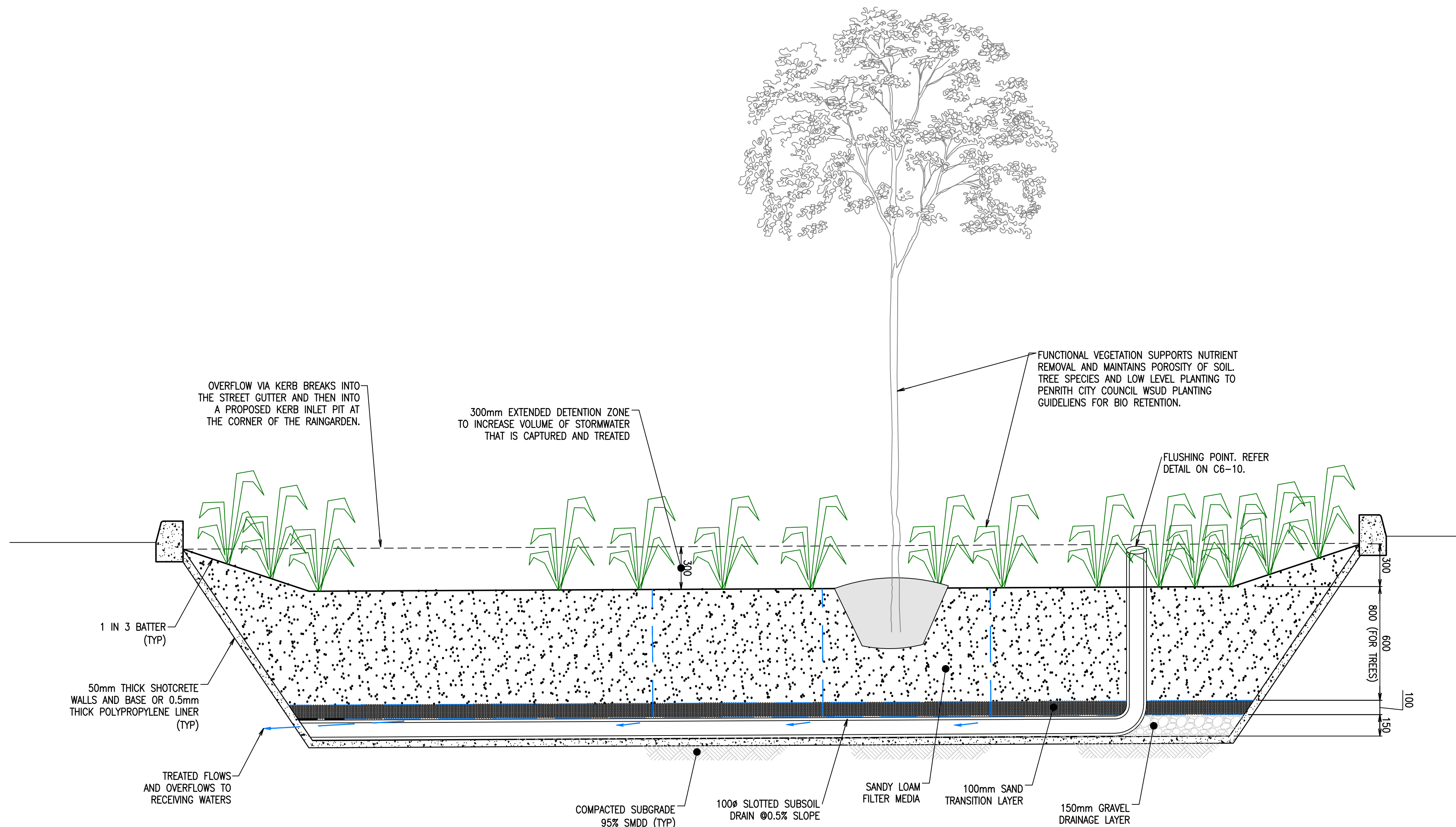
FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C6-26

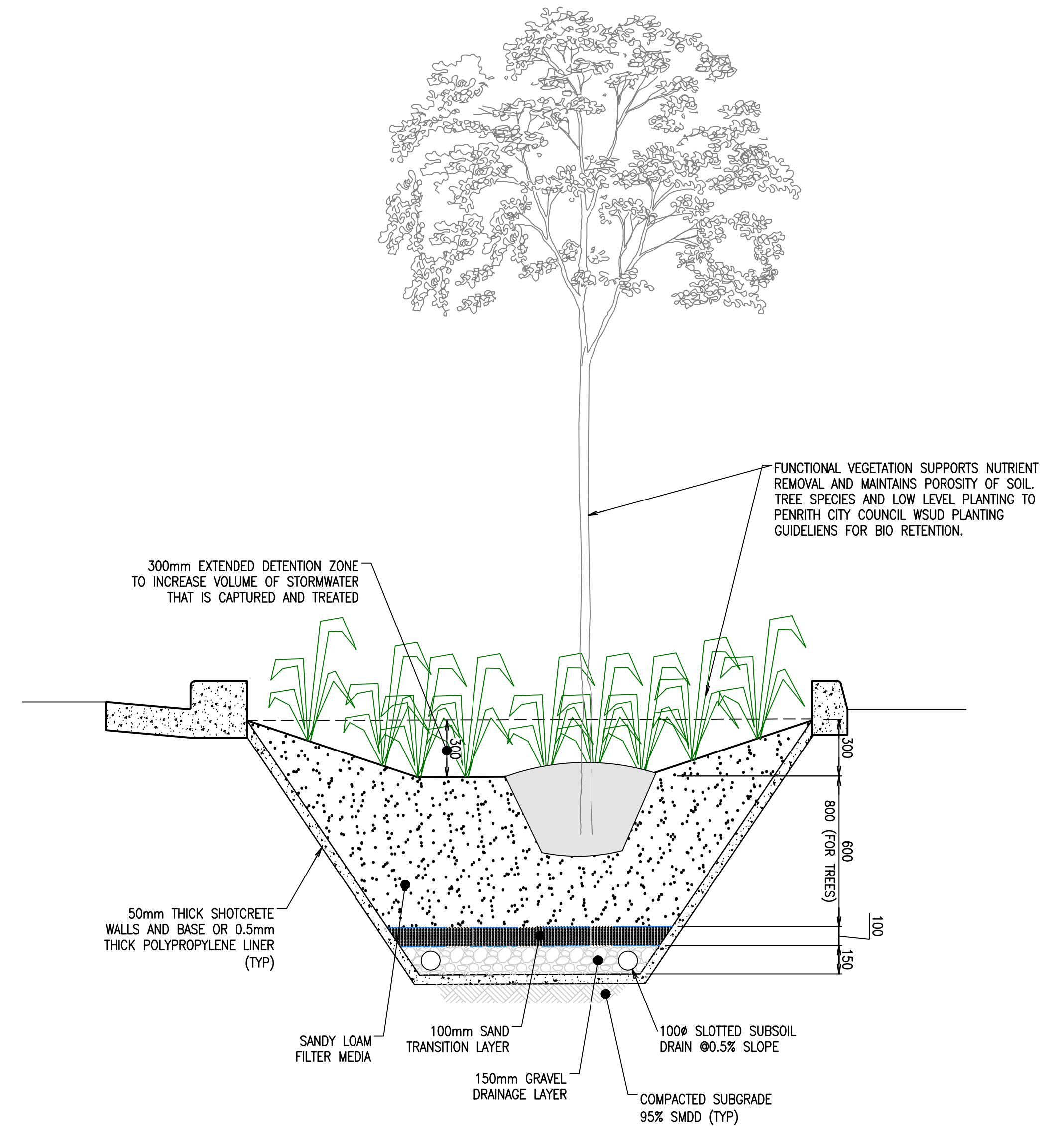
Revision
8



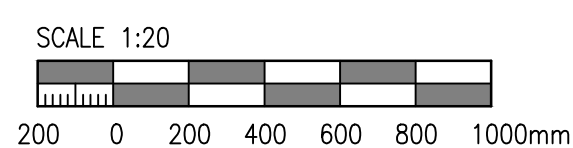
WSUD RAINGARDEN
PLAN VIEW
SCALE 1:50



BIORETENTION SYSTEM ARRANGEMENT
(WSUD TREATMENT DEVICE)
SCALE 1:20



BIORETENTION SYSTEM ARRANGEMENT
(WSUD TREATMENT DEVICE)
SCALE 1:20



Rev	Revision Description	By	App	Date
1	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	15.03.18
2	ISSUED FOR FINAL COORDINATION	SM	CW	23.05.18
3	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
6	ISSUED FOR DEVELOPMENT APPLICATION	RC	CR	21.02.20
7	ISSUED FOR APPROVAL	RC	CW	05.10.21

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ACN 010 580 248



Client

Title
**BIORETENTION SYSTEM TYPICAL
ARRANGEMENT DETAILS**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
06.05.19

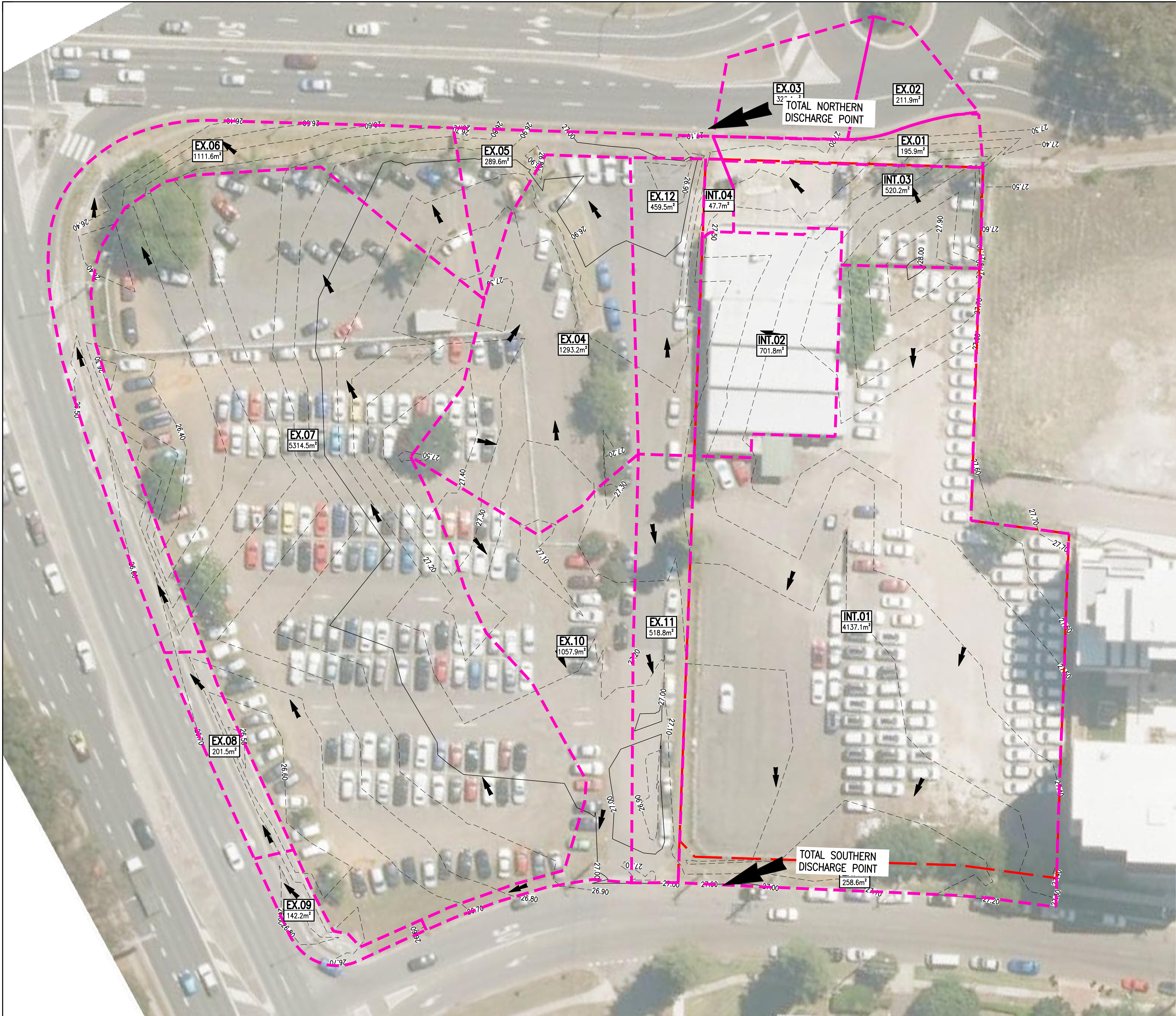
Drawn
S.MANANDHAR
Designer
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

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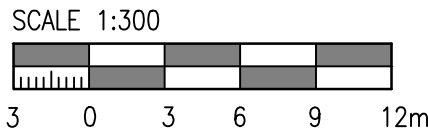
Drawing Number
C6-30

Revision
7



LEGEND	
	EXISTING SITE BOUNDARY
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	EXISTING STORMWATER DRAINAGE PIT
	EXISTING CATCHMENT BOUNDARY
	EXISTING SURFACE FLOW RUNOFF
	CATCHMENT LABEL
	CATCHMENT AREA

PRE DEVELOPMENT CATCHMENT SUMMARY				
CATCHMENT	Area	% IMPERVIOUS	Discharge (l/s) 20% AEP	100% AEP
SOUTHERN DISCHARGE				
INT.01	4137.1	80	108.5	239.4
NORTHERN DISCHARGE				
INT.02	701.8	100	24.5	51.4
INT.03	47.7	80	1.3	2.8
INT.04	520.2	80	13.6	30.1
Total Northern Discharge			39.4	84.3



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4	ISSUED FOR DEVELOPMENT APPLICATION	SM	CW	28.05.18
5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
8	ISSUED FOR APPROVAL	RG	CW	05.10.21

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5	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	19.06.18
6	ISSUED FOR DEVELOPMENT APPLICATION	SM	CR	05.05.19
7	ISSUED FOR DEVELOPMENT APPLICATION	RG	CR	21.02.20
8	ISSUED FOR APPROVAL	RG	CW	05.10.21

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ACN 010 580 248



Client

Title
**PRE-DEVELOPMENT CATCHMENT
PLAN**

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

Drawn
M.CLAVEL
Designer
R.ATHERTON

Design Checker
C.ROPE
Approved
C.WAITE
Job Number
17665C

FOR APPROVAL NOT FOR CONSTRUCTION

Drawing Number
C6-51

Revision
8



LEGEND

EXISTING SITE BOUNDARY

DETAINED CATCHMENT AREA (AND DETAINED)

TREATED CATCHMENT AREA (NOT DETAINED)

BYPASS CATCHMENT AREA (EXTERNAL TO SITE)

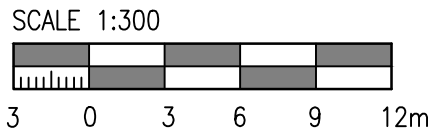
PROPOSED SURFACE FLOW RUNOFF

1/A

23m²

CATCHMENT LABEL

CATCHMENT AREA



Rev	Revision Description	By	App	Date
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Client

POST-DEVELOPMENT CATCHMENT
PLAN

Project
HIGH STREET PENRITH

Scale at A1
AS SHOWN
Date
05.10.21

Drawn
S.MANADHAR
Date
Z.JONES

Design Checker
C.ROPE
Approved
C.WAITE

Job Number
17665C

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Drawing Number
C6-56

Revision
9



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