



SITE BASED STORMWATER MANAGEMENT PLAN

Proposed Residential Townhouse Development
MG Land Pty Ltd
202 Baileys Mountain Road, Upper Coomera
Lot 58 on SP191940

Prepared for:

MG Land Pty Ltd

Approved by:

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EXECUTIVE SUMMARY

This report examines and evaluates options for Stormwater Management during the construction and operational phase for the Proposed Residential Townhouse Development at 202 Baileys Mountain Road, Upper Coomera.

The strategies proposed in this report will provide short and long term community benefits with an Environmentally Sensitive Design emphasis.

The Water Sensitive Urban Design objectives are met by:

Erosion and Sediment Control

Provision of sediment fencing, sediment basin and drainage structure protection during construction.

Stormwater Quality

Stormwater produced by the development is proposed to be treated by a bioretention basin.

Stormwater Quantity

The lawful point of Discharge is to be maintained post development.

Peak stormwater flows are proposed to be mitigated with the provision of On Site Detention provided in the bioretention basin to ensure that no increase in flows post development occurs.

1.0 INTRODUCTION

1.1 GENERAL INTRODUCTION

Cozens Regan Group Pty Ltd has been commissioned by MG Land Pty Ltd to prepare a Site Based Stormwater Management Plan for the Proposed Residential Townhouse Development at 202 Baileys Mountain Road, Upper Coomera.

This Site Based Stormwater Management Plan is required to support a proposed Material Change of Use application to Gold Coast City Council.

The proposed area of works is shown on the architectural site plan contained in Appendix A.

1.2 SCOPE OF PLAN

In accordance Councils' City Plan and the Land Development Guidelines - Water Sensitive Urban Design, the matters which have been addressed within the scope of this report and the area to which they apply are described below.

- Erosion and Sediment Control
- Stormwater Quality
- Stormwater Quantity

1.3 SITE LOCATION

The subject site is described as Lot 58 on SP191940 located at 202 Baileys Mountain Road, Upper Coomera. The site is bound by Baileys Mountain Road to the East, Reserve Road to the South and vacant land to the West and North.

The subject site and approximate area of works is shown in Figure 1 below.



Figure 1 – Aerial Photograph (Qld Globe)

1.4 SITE DESCRIPTION

The site is currently vacant but historically a house existed, and the remnants of some ancillary features still remain. The site is mostly cleared with a number of existing trees, the ground has good grass coverage throughout.

The site generally falls from the north west to the south east. The levels of the site range from RL 36.80 in the north west corner down to R.L 20.80 in the south east corner.

The total site area is equal to 3,087 ha. A contour and detail survey has been produced for the site and is contained within Appendix B

1.5 DESCRIPTION OF DEVELOPMENT

The proposed development incorporates the construction of a Residential Townhouse Development. The development will require the construction of buildings, access driveways, parking areas, stormwater, sewer, water supply and landscaping.

Refer the Architectural Site Plan contained within Appendix A for more information in regards to the proposed development.

2.0 SEDIMENT AND EROSION CONTROL

2.1 OBJECTIVES

The objectives of this erosion and sediment control plan are:

- a) To conceptually address the issue of erosion and sediment control for the construction of the proposed Residential Townhouse Development on the site.
- b) To demonstrate that the water quality of the receiving waters is not worsened by the site development.
- c) Minimise sediment transport in surface water runoff during the construction and operational stages.
- d) Provide a monitoring and maintenance programme for implementation during the construction phase.

2.2 POTENTIAL SEDIMENT GENERATION

The development will result in one catchment from which sediment can be generated. The area to be disturbed is approximately 2.0 ha which is the proposed earthworks area. While the potential exists for sediment to be generated during the construction phase, the potential sediment volume is dependent upon rainfall, site topography, the material type exposed, flow characteristics, and the construction practices and programme.

Control of the construction impacts is the primary objective for sediment and erosion control practices.

The management of erosion and sediment control for the development has been undertaken in accordance with Gold Coast City Council Planning Scheme – Land Development Guidelines and the referenced Best Management Practices for Sediment and Erosion Control.

Based on the expected potential for sediment generated, the provision of a high efficiency sediment basin has been proposed along with a series of stabilised drains, sediment fence traps and stormwater pit protection measures. These provisions are considered adequate to control the mobilisation of sediment.

The installation of pollution control devices in the operational phase will decrease further the potential sediment loading; however the effect of these is ignored.

2.3 CONSTRUCTION PHASE CONTROL MEASURES

The works proposed to control erosion are:

- a) Erect sediment and dust fences at the lower perimeter of the site. Sediment fences to be included on site safety fence, including hessian or approved dust control cloth.
- b) Construct sediment basins in specified areas.
- c) Remove from the site any material which is not required for rehabilitation of disturbed areas.
- d) Preparation of roadways, building pads and removal of surplus material off site.
- e) Stabilise flow paths along proposed roadways
- f) Exposed soils and stockpiles are to be watered, as required, to minimise soil losses as a result of wind.
- g) Place geo-textile field gully inlet filters and drainage structure protection around entry points to the drainage system until the pavement is complete or until grass is established.
- h) Finalised earthworks to be top soiled and seeded/hydro-mulched or landscaped as directed.

- i) Construct buildings.
- j) Geo-textile filters to be replaced with mesh filters until landscaping is complete and stabilised.
- k) Maintain all sediment devices and other interim controls regularly. Including the removal of accumulated sediment.
- l) Remove sediment fences and inlet filters including accumulated sediment after the establishment of the landscaping and grass cover.

2.4 MAINTENANCE

The installation of erosion and sediment control devices requires maintenance of these devices to ensure their effectiveness in the control of potential environmental impact. Summary of the maintenance requirements for this project are detailed below.

The Contractor is responsible for the installation and maintenance of the sediment and erosion control measures during the construction phase and the defects liability period (normally six months).

Maintenance responsibilities for the establishment of vegetation, that is the requirement to irrigate the plants and grass used to generate ground cover lies with the Contractor initially but ultimately reverts to the owner once the defects liability period has expired.

Maintenance will require:

- a) Inspection of silt fences and drainage paths during construction and after any rainfall event.
- b) Clean out sediment build-up following each event that causes deposits.
- c) Clean up soil and sediment deposits promptly as they occur.
- d) Provide inlet protection where soil disturbance is to occur.

2.5 RESPONSES TO COMPLAINTS

Complaints during this type of construction usually relate to noise and dust. Generally the complaint is made known to the Contractor, the Principal, the Superintendent and/or the Council.

The Contractor shall keep a record of all complaints identifying the nature of the complaint and any remedial action taken to address such complaint. The Contractor shall act as soon as possible to remedy the problem, if the complaint is considered valid and reasonable. A complaints record shall be made available by the contractor for regular inspection by the Superintendent. For the purpose of direction by others, the Contractor's details are to be supplied to Council prior to commencement of the works.

Complaints relating to dust shall require the Contractor to immediately water the exposed earth surfaces and any soil stockpile areas as well as haul roads to control dust. Such watering shall occur immediately after the complaint is registered with the Contractor. Watering should continue periodically until conditions suit, or the works are completed to a state that prevents dust transport.

2.6 MONITORING

The installation of the erosion and sediment control measures as detailed in this report and attached figures will ameliorate potential impact to water quality in the receiving waters. A monitoring program is proposed to ensure that the control measures achieve the desired goals. It is considered appropriate that only a visual monitoring program be required. Following rainfall events and prior to discharge water quality monitoring will be conducted on the any stored water to check suspended solids.

3.0 STORMWATER QUALITY ASSESSMENT

3.1 WATER QUALITY TREATMENT TARGETS

The Gold Coast City Council City Plan – Land Development Guidelines - Water Sensitive Urban Design sets the requirements for stormwater quality management for the site which also reference the Queensland State Planning policy.

The Objective for stormwater treatment consist of pollution reduction targets as follows.

Table 3.1: Pollutant Reduction Targets

Pollutant	Reduction Target
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants	90%

As the development is for a residential development a bioretention solution meeting the above targets is proposed.

3.2 BIORETENTION SIZING & SPECIFICATION

As discussed in section 3.1 in order to meet the pollutant reduction targets a bioretention basin is proposed. To confirm the proposed size of the bioretention basin to meet the targets, water quality modelling with the software package MUSIC has been undertaken. The Music model has been calibrated in accordance with the Gold Coast City Council MUSIC modelling guidelines.

The catchment breakdown for the site has been determined as follows.

Table 3.2: Pollutant Reduction Targets

Catchment	Area Type	Area	Impervious Fraction
TOWNHOUSE DEVELOPMENT SITE	Roofs	0.5768	100%
	Roads & Driveways	0.5609	100%
	Ground	0.5925	30%

Bioretention Basin

Filter Media Area = 180m²
Filter Media Depth = 700mm
Extended Detention Depth = 0.30m
Extended Detention Area = 191 m²

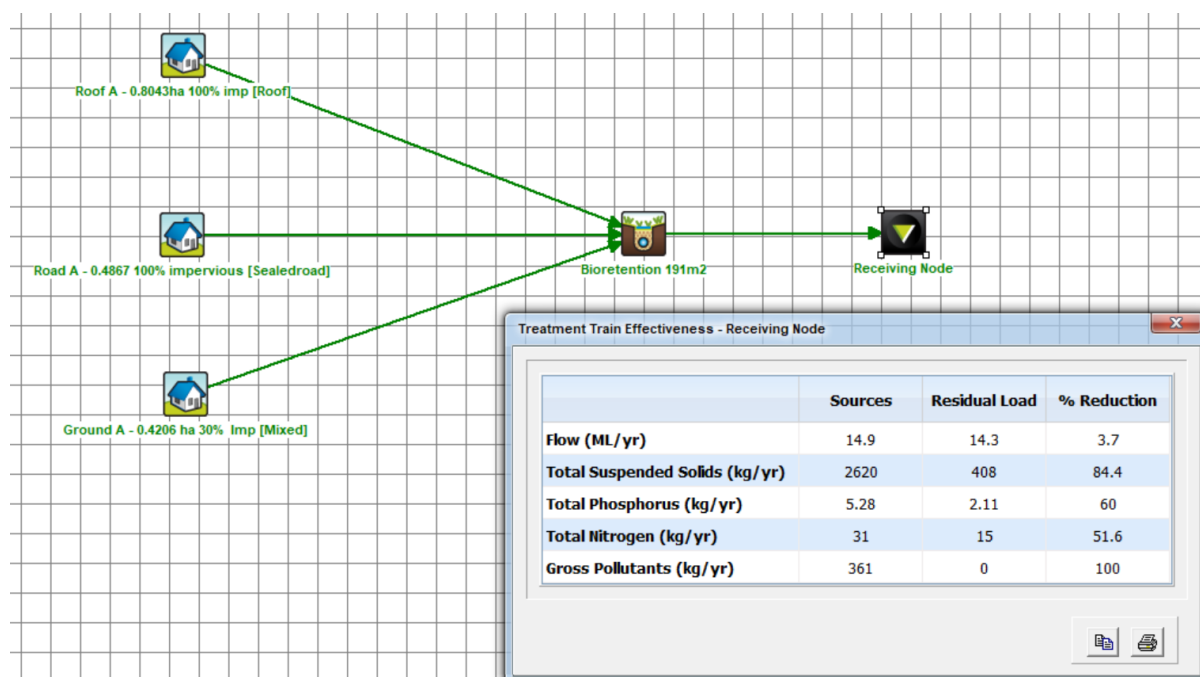


Figure 3.2: MUSIC Model output

As demonstrated above the proposed music model confirms the pollutant reduction achieved is 84.4% for TSS, 60.0% for TP, 51.6% for TN and 100% for GP.

The proposed bioretention basins therefore provide sufficient treatment in accordance the Council requirements. Refer to 230094/SK05_Bioretention Basin Plan & Details for the location and layout of the treatment system and 230094/SK00-SK02 for the Civil stormwater drainage system.

3.3 MONITORING

The objective is to provide a stormwater drainage system that reduces the impact the development may pose to the local environment. Management practices to assist in the reduction of the reliance on the primary treatment structures will be implemented.

Provision of long term water quality monitoring for this development is considered impractical and is not supported.

The Contractor/Builder is responsible for the installation and maintenance of the primary control measures, being the bioretention basin during the construction phase and the defects liability period.

Maintenance responsibilities for the operating life of the project revert to the Owner/ business operators once the defects liability period has expired.

Maintenance will require as a minimum:

- Regular inspections after rainfall events.
- Cleaning/replacement of the treatment devices in accordance with the Water by Design Technical Guidelines.
- Removal of accumulated gross pollutants.

Failure to maintain the proposed stormwater treatment devices and infrastructure will lead to poor site amenity, increased potential for erosion, scouring, increased discharges of stormwater pollutants, and higher potential for adverse stormwater impacts to be imposed on adjacent and downstream properties and waterways.

4.0 STORMWATER QUANTITY

4.1 LAWFUL POINT OF DISCHARGE

In accordance with Section 3 of the Queensland Urban Drainage Manual all development must address the 3 Point Lawful Point of Discharge Test.

The criteria for determining the lawful point of discharge are:

(i) Will the proposed development alter the site's stormwater discharge characteristics in a manner that may substantially damage a third party property?

It is the objectives of this stormwater quantity assessment to ensure that 'no worsening' occurs and therefore the answer to this test is no and thus no further steps are required to obtain tenure for a lawful point discharge (assuming any previous circumstances and changes were lawful).

The development site is proposed to discharge into the existing waterway traversing the site via a piped drainage system. This existing waterway is considered the sites lawful points of discharge.

The subject development does not propose to alter the drainage characteristics of the site and thus the tenure for lawful point of discharge is not required.

4.2 OBJECTIVES

In accordance with the requirements of Gold Coast City Council – City Plan Version 6 the development is to ensure the following design objectives are met for stormwater quantity over the site.

All runoff from developed catchments is managed to ensure that property and infrastructure upstream or downstream is protected from impacts of flooding and meets with the following:

- 1) development does not adversely impact on land, drainage system or watercourse;
- 2) the flood behaviour of the whole catchment must not change as a result of the development; and
- 3) at the boundary of the development site or at nominated locations downstream of the development the following is achieved:
 - (a) no increase in peak flood flow rate for all events up to and including the 1% AEP (i.e. 100 year ARI) event;
 - (b) no increased in peak flood velocities;
 - (c) no increase in flood level for all events up to and including the 1% AEP (i.e. 100 year ARI) event;
 - (d) no material change in rate of flood rise; and
 - (e) stormwater outfall or discharge is located to avoid conflict with existing usage of downstream land or impact on existing waterway or drainage.

4.3 EXTERNAL CATCHMENTS

The site is affected by external catchments which discharge through the site. These catchments have been further assessed within the Hydraulic Impact Assessment prepared by Alan & Dennis..

4.4 DETERMINATION OF AN INCREASE IN PEAK STORMWATER DISCHARGE

In accordance with QUDM the rational method was adopted to calculate the peak stormwater discharges for the site to compare both the pre-developed and developed scenario.

Parameters adopted for use in the rational method calculation are in accordance with the Queensland Urban Drainage Manual and are highlighted below.

TABLE 4.4.1: RATIONAL METHOD PEAK FLOWS

Catchment	Area (ha)	Tc (exist)	Tc (Dev)	ARI	% AEP/EY	Existing			Post development		
						C	I (mm/hr)	Q (m³/s)	C	I (mm/hr)	Q (m³/s)
Proposed Townhouse Site	1.73	14	11	1	1 EY	0.56	80.1	0.216	0.67	89	0.285
				2	0.5EY	0.6	100	0.288	0.71	111	0.379
				5	0.2EY	0.67	124	0.399	0.8	138	0.531
				10	10%	0.70	143	0.481	0.84	158	0.638
				20	5%	0.74	163	0.580	0.88	181	0.765
				50	2%	0.81	189	0.736	0.97	209	0.974
				100	1 %	0.84	208	0.840	1.00	231	1.110

The peak stormwater discharge comparison was assessed for all AEP's 1EY, 0.5EY, 0.2EY, 10%, 5%, 2% up to the 1% AEP event.

Refer to Appendix D for more detailed peak stormwater discharge calculations.

The results from these calculations show that the development will result in an increase in peak stormwater flows in the unmitigated state due to an increase in the amount of impervious area and a decrease in the time of concentration and therefore mitigation is required.

4.5 ON SITE DETENTION/RETENTION

Hydrologic Routing Analysis

In order to meet the Gold Coast City Council and QUDM requirements of a 'no-worsening' affect to downstream stormwater infrastructure, the peak stormwater flows for the developed scenario are required to be reduced to that equal to or less than pre-developed conditions. This reduction in peak stormwater discharge is proposed to be met by providing an on-site stormwater detention system.

In accordance with QUDM and as requested by Gold Coast City Council, the hydraulic modelling was assessed within computer routing software (Drains) to assess the pre-development and post development cases to determine the volume of On Site Detention required to maintain pre-developed flows.

A breakdown of the pre, post and mitigated flows and proposed detention are shown in the following table.

TABLE 4.5 – DRAINS PEAK DISCHARGE CALCULATIONS

Catchment	ARI	AEP/EY	Pre-developed Flow Rates (m ³ /s)	Post-developed Flow Rates un-mitigated (m ³ /s)	Post-developed Flow Rates mitigated (m ³ /s)
Proposed Townhouse Site	1	1 EY	0.216	0.277	0.214
	2	0.5 EY	0.288	0.370	0.287
	5	0.2 EY	0.400	0.513	0.395
	10	10% AEP	0.487	0.627	0.481
	20	5% AEP	0.583	0.750	0.577
	50	2% AEP	0.738	0.927	0.737
	100	1% AEP	0.883	1.04	0.881

TABLE 4.6 – ON SITE DETENTION CALCULATIONS

Catchment	ARI	AEP	ON SITE DETENTION (m ³)
Proposed Townhouse Site	100	1%	247

This On Site Detention Storage is proposed to be provided within the proposed bioretention basin above the extended detention depth.

An orifice plate or weir arrangement will be required to be installed within the discharge control pit in order to restrict flows to that equal or less than existing.

The abovementioned stormwater detention requirements if installed correctly will sufficiently attenuate stormwater flows to that of predevelopment rate and will mitigate any potential adverse effects on downstream/neighbouring infrastructure or property in accordance with the objectives of this section.

Refer to Appendix E for peak stormwater Calculations & Drains Model Results.

Refer to 230176/SK01-SK02_Concept Civil Works Plans and 230176/SK05_Concept Bio Basin Plan & Details for more information relating to the detention location and outlet configuration.

5.0 PUBLIC SAFETY RISK ASSESSMENT -BIORETENTION BASIN

5.1 INTRODUCTION

This Public Safety Risk Assessment has been prepared for the proposed stormwater detention and bioretention basin located adjacent to the internal road and external recreational link. The assessment has been undertaken to demonstrate compliance with:

- Healthy Waters Code – Performance Outcome PO10
- City of Gold Coast Land Development Guidelines (LDG)
- Queensland Urban Drainage Manual (QUDM)
- Water by Design guidelines

The assessment specifically addresses public safety risks associated with the use of retaining walls around the basin and the basin's proximity to public access areas.

5.2 SITE CONSTRAINTS AND NEED FOR RETAINING WALLS

Due to physical constraints of the site, including: existing ground levels and site gradients, limited available land between the road corridor and recreational link, required basin storage depth to achieve detention volume and hydraulic outfall levels, it is not practically achievable to construct the basin with standard batters that would comply with typical basin side slope requirements.

As a result, a retaining wall solution is required around sections of the basin perimeter to achieve the required detention volume while maintaining the approved road and recreational link layout.

This outcome is consistent with that typically provided for a higher density residential development such as this and is consistent with that previously supported by Council in numerous past projects.

The use of retaining walls in this instance is therefore considered unavoidable due to site constraints rather than a preferred design outcome.

5.3 IDENTIFIED PUBLIC SAFETY RISKS

Potential public safety risks associated with the basin include:

- Fall risk from the top of retaining walls into the basin,
- Unauthorised public access into the basin,
- Risk to vehicles at the end of the adjacent driveway,
- Risk to persons entering the basin during storm events,
- Maintenance personnel safety.

5.4 RISK MITIGATION MEASURES

5.4.1 Retaining Wall and Safety Fence

The maximum retaining wall height adjacent to the recreational link is approximately **2.2 m**. To mitigate fall risk and prevent unauthorised access, a **1.2 m high safety fence** will be installed along the full length of the retaining wall adjacent to publicly accessible areas.

This fencing:

- Prevents direct access to the wall edge,
- Acts as fall protection,
- Is consistent with QUDM recommendations for exclusion where fall hazards exist,
- Is considered sufficient given the wall height and basin configuration.

5.4.2 Warning Signage

Warning signage will be installed in visible locations around the basin perimeter, particularly adjacent to the recreational link and road frontage. Signage will include:

- FLOOD ZONE – RAIN MAY CAUSE WATERS TO RISE QUICKLY FOR YOUR SAFETY DO NOT ENTER.

This is consistent with LDG and QUDM guidance regarding risk awareness and public hazard notification.

5.4.3 Vehicular Barrier

A vehicular barrier will be installed at the end of the driveway adjacent to the basin to prevent vehicles from accidentally entering the basin or impacting the retaining wall. This barrier will be designed to relevant safety standards and positioned to stop vehicle intrusion into the basin area.

5.4.4 Access and Egress During Storm Events

In the rare event that a person gains access to the basin or falls into the basin during a storm event (including the 1% AEP event), safe egress is available via the 2.5 m wide vehicle maintenance access ramp provided into the basin.

The ramp:

- Provides a trafficable escape path,
- Has a trafficable gradient suitable for pedestrian egress,
- Is accessible during storm events,
- Is consistent with QUDM requirements that basins allow safe egress.

This significantly reduces residual risk to acceptable levels.

5.4.5 Basin Depth and Hydraulic Safety

The basin is a detention/bioretenention system that only temporarily stores stormwater during storm events. The basin:

- Remains dry between storm events,
- Fills gradually during storm events,
- Drains following storm events,
- Does not function as a permanent water body.

5.4.6 Maintenance Access Safety

Maintenance access is provided in accordance with LDG requirements, including:

- 2.5 m wide vehicle access ramp,
- Maintenance access around the basin perimeter where required,
- Safe working areas for maintenance personnel separated from public areas where possible.

5.5 PUBLIC SAFETY RISK ASSESSMENT CONCLUSION

Due to site constraints, the use of retaining walls for the basin is unavoidable; however, the design incorporates multiple safety measures to mitigate public risk, including:

- 1.2 m high safety fencing along retaining walls,
- Warning signage,
- Vehicular barrier protection,
- Controlled maintenance access,
- Safe egress via maintenance ramp,
- Temporary storage only (no permanent water body).

With the above mitigation measures in place, the proposed basin is considered to comply with:

- PO10 of the Healthy Waters Code,
- QUDM public safety requirements,
- Land Development Guidelines,
- Water by Design safety principles.

The residual public safety risk is therefore considered **low and acceptable**.

6.0 QUALIFICATIONS

This site based stormwater management plan for 202 Baileys Mountain Road, Upper Coomera has been prepared specifically for this development as requested by MG Land Pty Ltd. Our analysis and approach is limited to the scope stated at the beginning of the report. As such third parties are not authorised to utilise this report without the written approval and advice from Cozens Regan Group Pty Ltd.

Cozens Regan Group Pty Ltd relied on the following supplied information in preparation of this report:

- Building and site layout supplied by Red Door Architecture.
- Detailed Survey supplied by Focus on Surveying
- Rainfall data provided by the Bureau of Meteorology

The accuracy of this report is dependent on the accuracy of the information supplied.

While Cozens Regan Group Pty Ltd has taken every precaution to ensure the accuracy of the assessment it should be noted that the design is based on predicted rainfall data only and as such future observed flows may vary from that predicted.

REFERENCES

- Gold Coast City Council City Plan – Land Development Guidelines - Water Sensitive Urban Design (WSUD)
- Water by Design - Music Modelling Guidelines 2006
- State Planning Policy 2017 – Health Waters
- Queensland Urban Drainage Manual 2016(Natural Resources and Water)
- Urban Stormwater – Queensland best practice environmental guidelines January 2009 (Environmental Protection Agency)
- Queensland Water Quality Guidelines Version 3 September 2009 (Department of Environment and Resource Management)
- Urban Stormwater Quality Planning Guidelines (Department of Environment and Resource Management 2010);

Appendix A

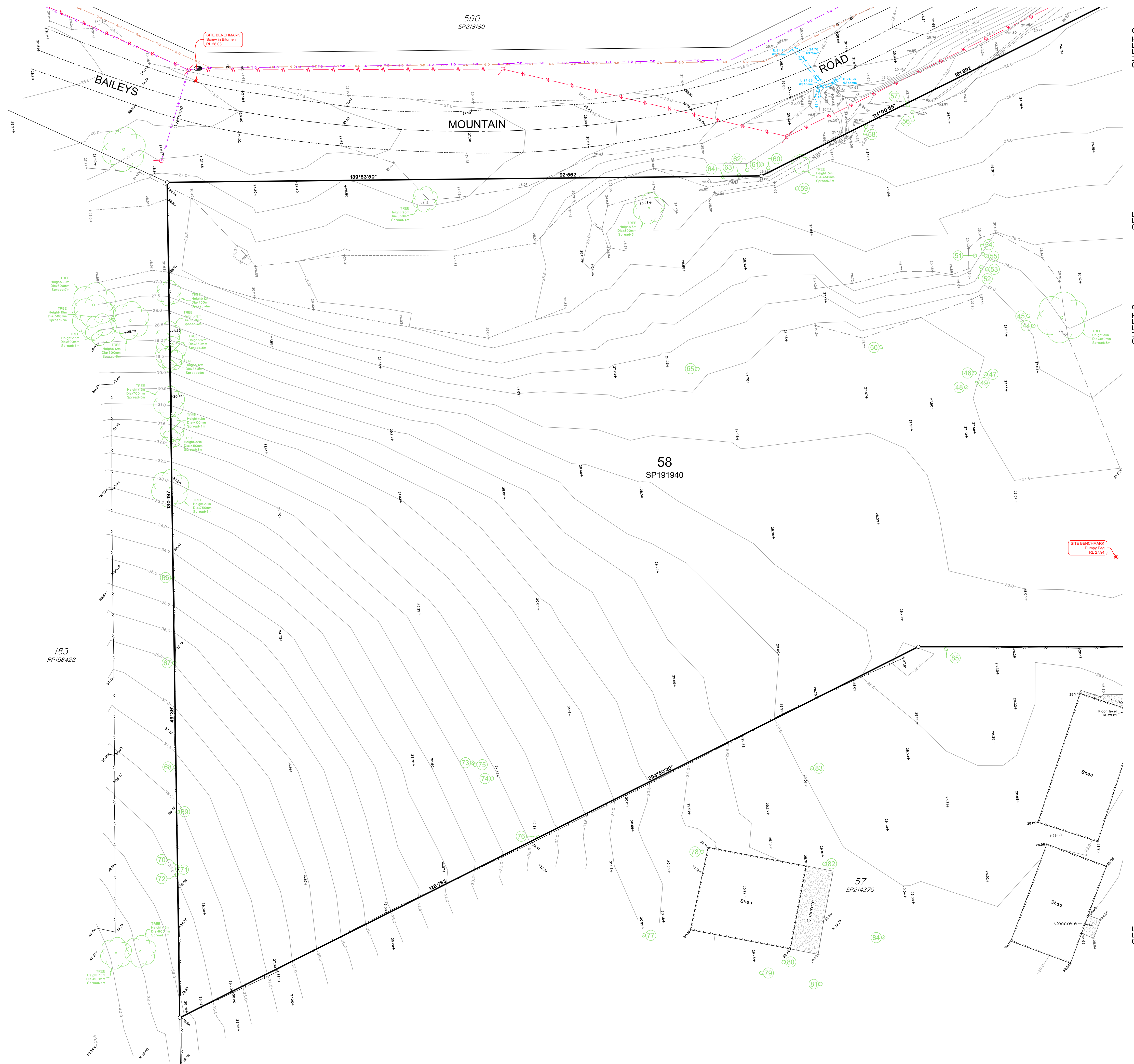
Proposed Site Plan



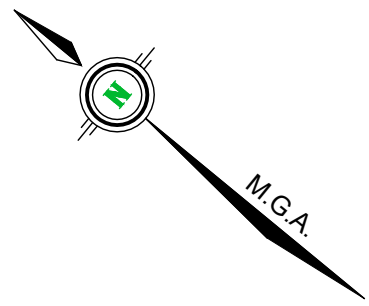
RED DOOR
ARCHITECTURE

Appendix B

DETAIL SURVEY



Sheet No.	Surveyed By:	Date Surveyed:
1 of 3	SAB	19.06.23
Dwg. No.		Issue
MGH-323.DET.01		A



SHEET 1

SEE

SEE



SHEET 3

Client

MG Homes

Project

**Detail Survey of
202 Baileys Mountain Road,
Upper Coomera**
Described as Lot 58 on SP191940

Scale: 1:300 at A1

Datum: AHD vide PSM 9055

RL: 7.251m

Contour Int: 0.5m

Locality: Upper Coomera

LGA: Gold Coast City

Cadfile: MGH-323.DET.01

A INITIAL ISSUE
Issue Description

SSD 26.06.23 MP
Drw Date Appd

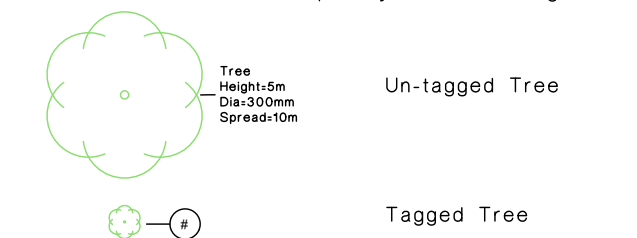
Notes

The title boundaries shown hereon were not marked at the time of survey and have been compiled from previous survey.
Services shown hereon have been located where possible by field survey. 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.

LEGEND

BB	Bottom of bank	---
BW	Bottom of wall	---
BX	Building	---
CG	Change of grade	---
CL	Centreline of road	---
EBT	Edge of bitumen	---
ECO	Edge of concrete	---
ELP	Light Pole	---
EMH	Electricity Pit	---
EP	Electricity Pole	---
ERD	Edge of gravel road	---
EW	Edge of water	---
FHP	Fire Hydrant Pillar	---
FNX	Fence	---
GB	Garden	---
GMK	Gas Marker	---
GTS	Gully pit	---
HWL	Headwall	---
KCL	Kerb lip	---
KIN	Kerb invert	---
KTB	Kerb top back	---
MHO	Ø\$mm	---
MHS	\$x	---
PDV	Patio or Deck	---
RWP	Recycled Water Pipe	---
SGN	Traffic sign	---
SHD	Shed	---
SMH	Sewer Manhole	---
TB	Top of Bank	---
TEP	Telstra Pit	---
TRE	Tree	---
TW	Top of wall	---

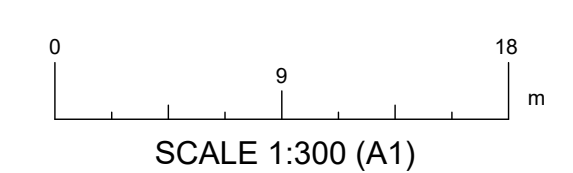
Tree Legend
for further information on tagged trees and
TPZs see report by SS Consulting



Service Location Legend
eLoc - Position Via Electronic Locator

UNDERGROUND SERVICES - ALPHA CLASSIFICATION
AS PER AUSTRALIAN STANDARD AS5488.

Sewer main	5.0	5.0	5.0
Stormwater drainage	SW.0	SW.0	SW.0
Water main	W.0	W.0	W.0
Telstra service	T.0	T.0	T.0
NBN service	NBN.0	NBN.0	NBN.0
Gas supply	G.0	G.0	G.0
Electricity supply	E.0	E.0	E.0

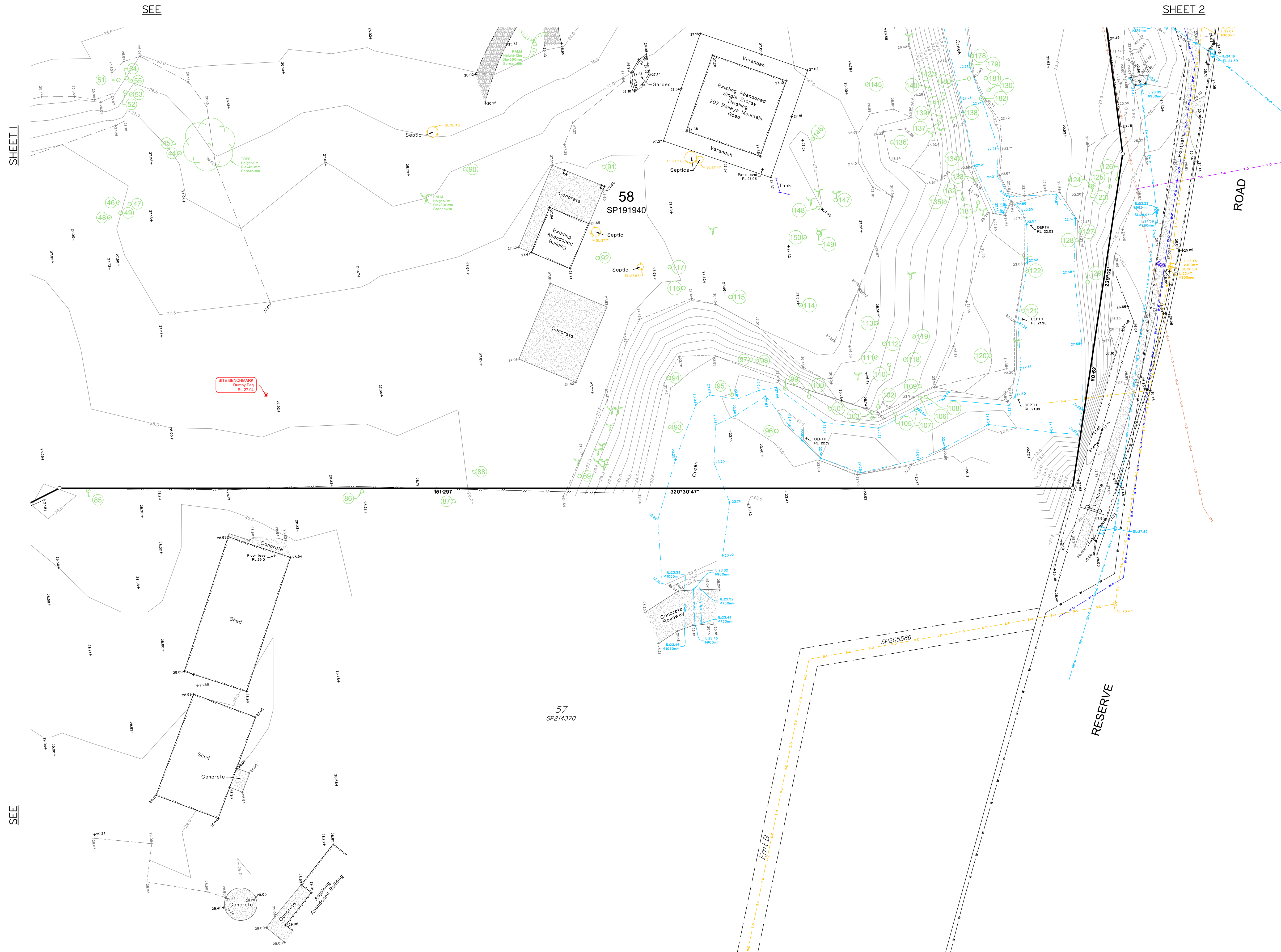
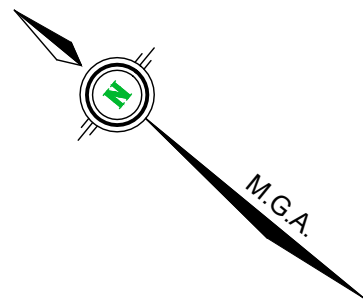


SCALE 1:300 (A1)



www.focussurvey.com.au
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Suite 6, 214 Waterworks Road, Ashgrove, QLD 4060
Unit 4b, 115a Point Cartwright, Buddina - 4575

Sheet No. 2 of 3
Dwg. No. MGH-323.DET.01
Surveyed By: SAB
Date Surveyed: 19.06.23
Issue: A



Client

MG Homes

Project
**Detail Survey of
202 Baileys Mountain Road,
Upper Coomera**
Described as Lot 58 on SP191940

Scale: 1:300 at A1
Datum: AHD vide PSM 9055
RL: 7.251m
Contour Int: 0.5m
Locality: Upper Coomera
LGA: Gold Coast City
Cadfile: MGH-323.DET.01

A INITIAL ISSUE
Issue Description
SSD 26.06.23
Drw Date Appd

Notes
The title boundaries shown hereon were not marked at the time of survey and have been compiled from previous survey.
Services shown hereon have been located where possible by field survey. 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.

LEGEND		
BB	Bottom of bank	---
BW	Bottom of wall	---
BX	Building	---
CG	Change of grade	---
CL	Centreline of road	---
EBT	Edge of bitumen	---
ECO	Edge of concrete	---
ELP	Light Pole	---
EMH	Electricity Pit	---
EP	Electricity Pole	---
ERD	Edge of gravel road	---
EW	Edge of water	---
FHP	Fire Hydrant Pillar	---
FNX	Fence	---
GB	Garden	---
GMK	Gas Marker	---
GTS	Gully pit	---
HWL	Headwall	---
KCL	Kerb lip	---
KIN	Kerb invert	---
KTB	Kerb top back	---
MHO	Ø\$mm	---
MHS	\$x	---
PDV	Patio or Deck	---
RWP	Recycled Water Pipe	---
SGN	Traffic sign	---
SHD	Shed	---
SMH	Sewer Manhole	---
TB	Top of Bank	---
TEP	Telstra Pit	---
TRE	Tree	---
TW	Top of wall	---

Tree Legend
for further information on tagged trees and TPZs see report by S5 Consulting

Un-tagged Tree

Tagged Tree

Service Location Legend
eLoc - Position Via Electronic Locator

UNDERGROUND SERVICES - ALPHA CLASSIFICATION
AS PER AUSTRALIAN STANDARD AS5488.

Sewer main

Stormwater drainage

Water main

Telstra service

NBN service

Gas supply

Electricity supply

0 9 18 m
SCALE 1:300 (A1)



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Sheet No.
3 of 3
Dwg. No.
MGH-323.DET.01
Surveyed By
SAB
Date Surveyed
19.06.23
Issue
A

Appendix C

Concept Engineering Plans

Appendix D

RATIONAL METHOD CALCULATIONS

Project Number: 230094
Description: Stormwater Quantity Assessment
Designed: TWN 11/10/2024
Location: 202 BAILEYS MOUNTAIN ROAD

CATCHMENT: A

PRE-DEVELOPMENT tc		
Major		
Standard Inlet time:	N/A	min
Friends Eqn:		
High point RL	37.2	m AHD
Low point RL	34.8	m AHD
Flow length:	20.0	m
Site slope	12.0	%
Hortons 'n'	0.045	
Overland flow travel time	7.94	min
Channel Flow 1		
High point RL	34.8	m AHD
Low point RL	24.8	m AHD
Flow length	125.0	m
Slope	0.08	m
Hydraulic Radius	0.025	A/WP
n	0.03	
V	0.81	
Channel Travel Time	2.58	min
Channel Flow 2		
High point RL	24.8	m AHD
Low point RL	20.8	m AHD
Flow length	241.0	m
Slope	0.02	m
Hydraulic Radius	0.24	A/WP
n	0.045	
V	1.11	
Channel Travel Time	3.62	min

POST DEVELOPMENT tc.		
Major		
Standard Inlet time:	5.0	min
Kerb and channel flow		
High point RL	33.4	m AHD
Low point RL	26.2	m AHD
Flow length	230.0	m
Slope	3.1	%
Kerb travel time	3.25	min
Pipe flow		
High point RL	23.7	m AHD
Low point RL	22.5	m AHD
Flow length	32.0	m
Slope	0.0375	m
Pipe Size	750	mm
n	0.013	
Q	2.22	m3/s
Pipe travel time	0.106	min
Channel Flow		
High point RL	22.2	m AHD
Low point RL	20.8	m AHD
Flow length	82.0	m
Slope	0.02	m
Hydraulic Radius	0.045	A/WP
n	0.03	
V	0.55	
Channel Travel Time	2.48	min
Calculated tc	10.84	min
Adopted tc	11.0	min

QUDM Eqn 4.06

QUDM Fig 4.10

FROM FLOW CHART

Refer QUDM 4.06.10

Calculated tc	14.15	min
Adopted tc	14.0	min

MAX 20 min. Refer QUDM 4.06.1

MAX 20 min. Refer QUDM 4.06.1

INITIAL DETENTION SIZING

Written by OC 17/07/2009

Based on QUDM 5.05 'Flood-Routing for Small Basins - Initial Sizing'

Updated by TWN Jan 2013

Flood Event	Discharge Coeff. of Runoff		Rainfall Intensity		Qi (m3/s)	Qo (m3/s) (allowable outlet flow)	Vi Approx. Inflow Volume (m³) 4 * Qi * tc/ 3	Vi =	Ratio r = (Qi-Qo)/Qi	Culp (1948)	Boyd (1989)	Carroll (1990)	Basha (1994)	Average Vs	Maximum Estimated Vs
	Existing Cy	Post-D'ment Cy	Existing I mm/hr	Post-D'ment I mm/hr						$Vs=r\{(1+2r)/3\}Vi$	$Vs=r*Vi$	$Vs=\{r(3+5r)/8\}Vi$	$Vs=\{r(2+r)/3\}Vi$		
										Vs m³/s	Vs m³/s	Vs m³/s	Vs m³/s		
1	0.56	0.67	80	89	0.285	0.216	251		0.24	30.3	61.1	32.2	45.7	42.3	61.1
2	0.6	0.71	100	111	0.379	0.288	333		0.24	39.2	79.5	41.7	59.4	54.9	79.5
5	0.67	0.80	124	138	0.531	0.399	467		0.25	57.6	115.5	61.2	86.6	80.2	115.5
10	0.7	0.84	143	158	0.638	0.481	561		0.25	68.6	137.9	72.9	103.3	95.7	137.9
20	0.74	0.88	163	181	0.765	0.580	674		0.24	81.0	163.5	86.1	122.2	113.2	163.5
50	0.81	0.97	189	209	0.974	0.736	857		0.24	104.2	209.9	110.8	157.1	145.5	209.9
100	0.84	1.00	208	231	1.110	0.840	977		0.24	118.0	238.0	125.5	178.0	164.9	238.0

Initial Sizing: QUDM (5.05.1)

Note: Initial sizing in above table does not allow for any run-off routing or relationship between catchment size and time of concentration

CALCULATION OF INITIAL RUNOFF - QUDM Section 4.00			
	PRE-DEV'T	POST-DEV'T	
Catchment area (ha)	1.730	1.730	Ha
Impervious area (ha)	0.040	1.320	
Fraction impervious	0.02	0.76	
Intensity - 1 hr, 10 yr (mm/hr)	64.9		IFD: Coomera
t _e existing (min.)	14.00		
t _e post-developed (min.)	11.00		

ESTIMATION OF PEAK FLOWS										
ARI	Existing				Post development				Difference in runoff	
	C	I (mm/hr)	Q (m³/min)	Q (m³/s)	C	I (mm/hr)	Q (m³/min)	Q (m³/s)	Increase (L/s)	Increase %
1EY	0.56	80.1	12.93	0.216	0.67	89	17.10	0.285	69	32.2%
0.5EY	0.6	100	17.30	0.288	0.71	111	22.72	0.379	90	31.4%
0.2EY	0.67	124	23.95	0.399	0.8	138	31.83	0.531	131	32.9%
10%	0.70	143	28.86	0.481	0.84	158	38.27	0.638	157	32.6%
5%	0.74	163	34.78	0.580	0.88	181	45.93	0.765	186	32.1%
2%	0.81	189	44.14	0.736	0.97	209	58.45	0.974	239	32.4%
1%	0.84	208.00	50.38	0.840	1.00	231.00	66.61	1.110	270	32.2%

APPROX. PEAK FLOWS LESS THAN Q1				
ARI	% of Q1	Existing (L/s)	Post dev't (L/s)	% inc
1 mth	25%	53.9	71.2	32.2%
2 mth	40%	86.2	114.0	32.2%
3 mth	50%	107.8	142.5	32.2%
4 mth	60%	129.3	171.0	32.2%
6 mth	75%	161.7	213.7	32.2%
9 mth	90%	194.0	256.5	32.2%
12 mths (Q1)	100%	215.6	284.9	32.2%

SUMMARY			CHECKED	COMMENT
Item	Existing	Proposed		
Area Ha	1.730	1.730		
Imperv A	0.040	1.320		
FI %	0.0%	0.8%		
tc mins	14.00	11.00		
10yr 1hr I	64.9	64.9		
C10	0.70	0.84		
C100	0.84	1.00		
Q10 m³/s	0.481	0.638		
Q20 m³/s	0.580	0.765		
Q50 m³/s	0.736	0.974		
Q100 m³/s	0.840	1.110		
Initial Vs	Ave (m³)	Max Est Vs (m³)		
Q10	95.7	137.9		
Q20	113.2	163.5		
Q50	145.5	209.9		
Q100	164.9	238.0		

CHECKED:

Appendix E

DRAINS MODEL RESULTS

TOWNHOUSE RESIDENTIAL DEVELOPMENT

AT - 202 BAILEYS MOUNTAIN RD, UPPER COOMERA

FOR - MG LAND PTY LTD

EROSION AND SEDIMENT CONTROL

PRELIMINARY ISSUE

JOB NUMBER 230094

DRAWING SCHEDULE

- C02 EROSION & SEDIMENT CONTROL COVER SHEET AND SITE NOTES
- C03 EROSION & SEDIMENT CONTROL SITE CATCHMENTS
- C04 PHASE 1 BULK EARTHWORKS PLAN
- C05 PHASE 2 ROADWORKS & DRAINAGE PLAN
- C06 PHASE 3 STABILISATION PHASE PLAN
- C07 EROSION AND SEDIMENT CONTROL DETAILS
- C08 TYPE B DEEMED TO COMPLY SEDIMENT BASIN DETAILS

E&SC PLAN OBJECTIVE

DESIGN AND CERTIFICATION OF THE EROSION AND SEDIMENT CONTROLS REQUIRED TO COMPLY WITH THE STATE, LOCAL GOVERNMENT AND BEST PRACTICE EROSION AND SEDIMENT CONTROLS FOR ALL THE PHASES OF CONSTRUCTION DURING THE CIVIL WORKS.

APPLICABLE GUIDELINES

STATE PLANNING POLICY 2017
BEST PRACTICE EROSION AND SEDIMENT CONTROL (IECA, 2008)
APPENDIX B – SEDIMENT BASIN DESIGN (IECA 2018)

SITE LOCATION & DESCRIPTION

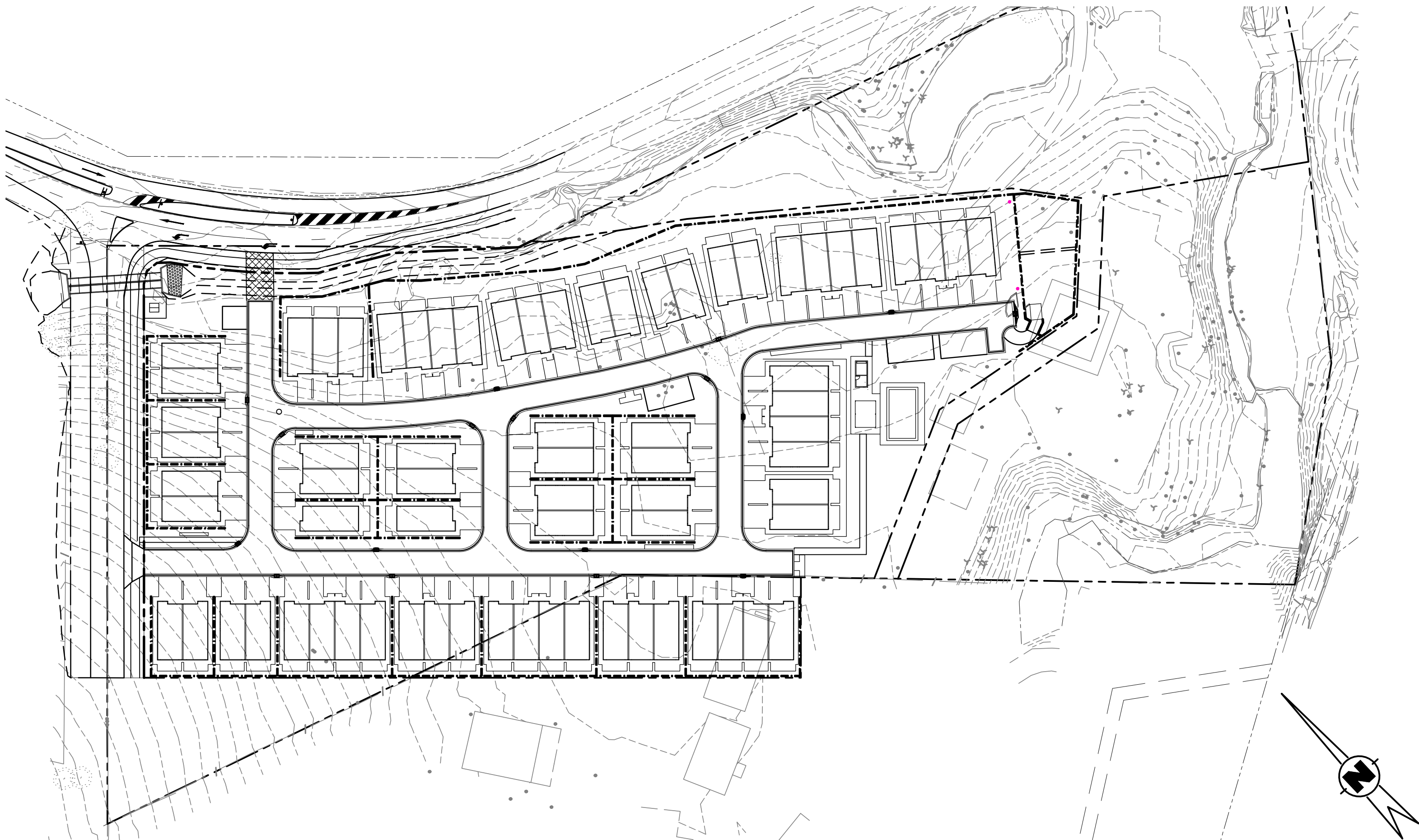
THE SITE IS SITUATED AT 202 BAILEYS MOUNTAIN ROAD,
UPPER COOMERA QLD

SITE SOILS

THE PROFILE OF SOILS ON SITE GENERALLY CONSISTS OF 0–400mm OF SILT, UNDELAIRD BY 400–1600mm CLAY FOUNDED ON ROCK.
PLEASE REFER TO AW GEOTECHNICS REPORT DATED 27/03/2023

MAINTENANCE SCHEDULE

Control	IECA Standard Drawing Reference	IECA Construction Phase Maintenance Frequency	Responsible
Erosion control blankets	ECB-01	Fortnightly or after runoff producing events	Contractor
Light mulching	M-01	Fortnightly or after run off producing events	Contractor
Site entry and exit point	Exit-02	Prior to forecast rain, daily during extended periods of rainfall, after runoff producing rainfall or otherwise fortnightly	Contractor
Fibre rolls	FR-01	Prior to forecast rain, daily during extended periods of rainfall, after runoff producing rainfall or otherwise weekly	Contractor
Sediment fence	SF-02	Weekly and after significant rain, make necessary repairs immediately	Contractor
Kerb sediment inlet traps	ESC-03	Prior to forecast rain, daily during extended periods of rainfall, after runoff producing rainfall or otherwise weekly	Contractor
Grated stormwater inlet sediment trap	ESC-02	Prior to forecast rain, daily during extended periods of rainfall, after runoff producing rainfall or otherwise weekly	Contractor
Sediment basin	Sediment basin design factsheet page 22	Prior to forecast rain, daily during extended periods of rainfall, after runoff producing rainfall or otherwise weekly	
Diversion Drains & Channels	CD-02, DC-01	Weekly and after runoff producing rain fall	Contractor
Check Dams	RCD-01	Weekly and after runoff producing rain fall	Contractor



LOCALITY PLAN



IMPORTANT NOTE:



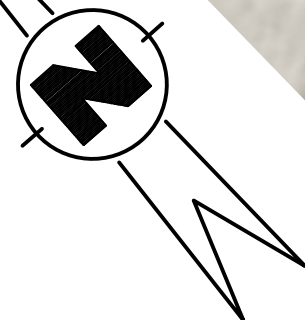
ALL UNDERGROUND SERVICES SHOULD BE LOCATED ONSITE BY RELEVANT AUTHORITIES BEFORE ANY WORK IS COMMENCED.



UNDER QUEENSLAND LEGISLATION, THE GENERAL BIOSECURITY OBLIGATION REQUIRES ALL REASONABLE STEPS TO BE TAKEN TO PREVENT THE SPREAD OF FIRE ANTS.

ALL SUSPECTED SIGHTINGS OF FIRE ANTS MUST BE REPORTED WITHIN 24 HOURS OF THEIR DISCOVERY (PH: 13 25 23). THE MOVEMENT OF FIRE ANTS IS PROHIBITED. FAILING TO COMPLY MAY INCUR PENALTIES.

THE CONTRACTOR SHALL ACQUIRE THE NECESSARY PERMITS AND EDUCATION TO MOVE ORGANIC MATERIALS THAT MAY CONTAIN FIRE ANTS.



LEGEND

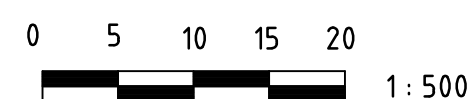
--- PROPOSED CATCHMENT AREAS

No.	DATE	ISSUE	REVISED	CHECKED
P3	06/25	PRELIMINARY ISSUE UPDATES	B.A.R.	T.W.N.
P2	10/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P1	03/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.

IN ASSOCIATION WITH

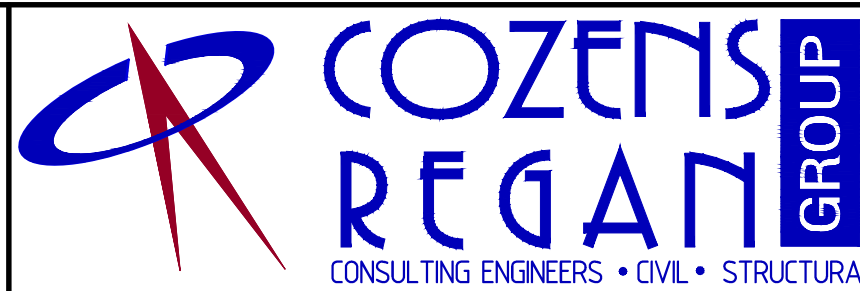
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE A
SCALE B



DATUM AHD (U.N.O.)

SCALES SHOWN ARE AT A1 SIZE

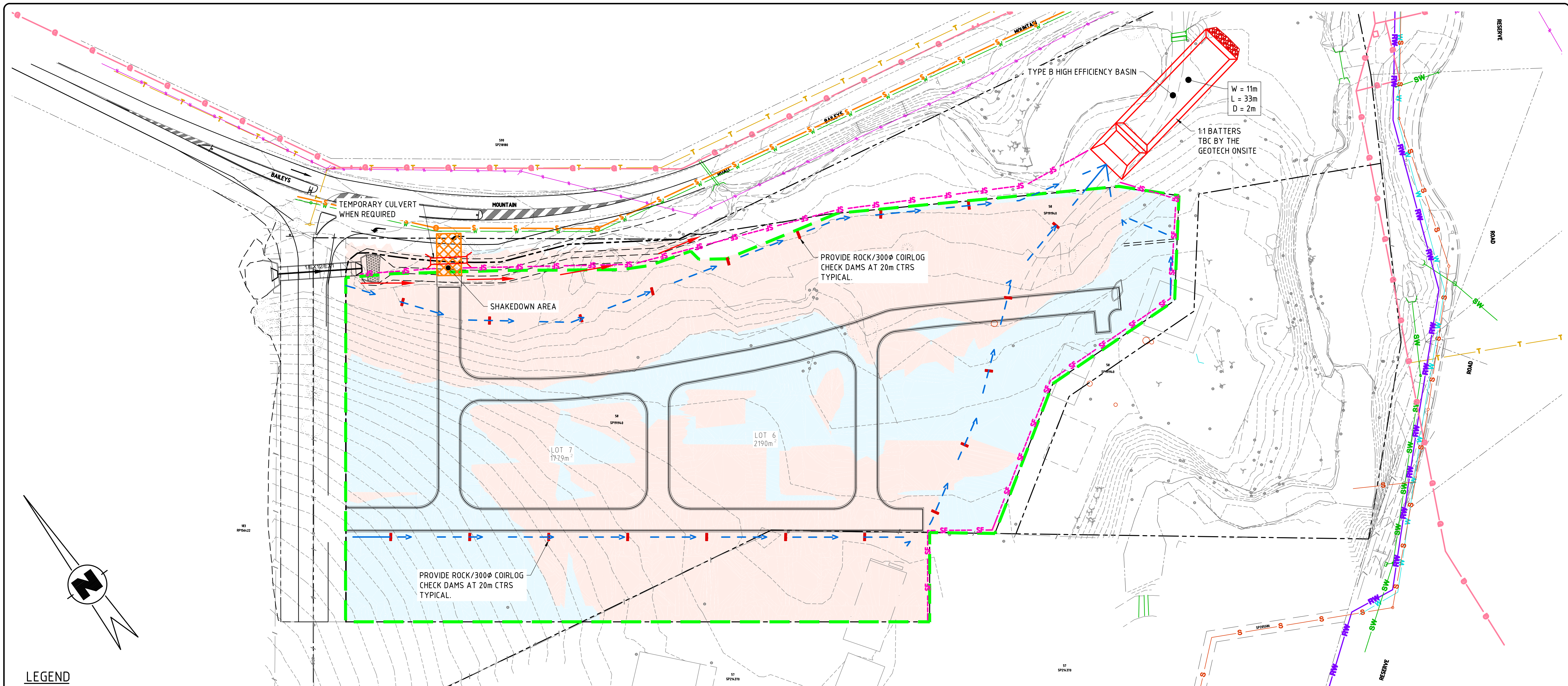


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Member Firm

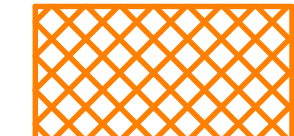
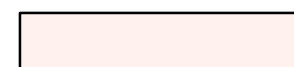
DESIGNED TWN
DRAWN B.A.R.
CHECKED TWN
APPROVED FOR AND ON BEHALF OF
COZENS REGAN GROUP PTY LTD
(RPEQ No 157351)

CLIENT MG LAND PTY LTD
PROJECT PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
EROSION & SEDIMENT CONTROL SITE CATCHMENTS

JOB NO. 230094
DRAWING NO. C03
ISSUE P1P2P3



LEGEND

-  SF DENOTES SILTATION FENCE AS PER IECA STD DRG. SF.01 & 02
-  SHAKE DOWN AREA AS PER IECA STD DRG. EXIT - 01
-  DWD - DIVERSION DRAIN FLOW PATH WITH A14 GEOTEXTILE LINER/OR VITAL BOND MATT HR @ 20 DILUTION AND COIRLOG CHECK DAMS
-  CLEAN WATER DIVERSION CHANNEL. GEOTEXTILE LINED AND ROCK CHECK DAMS AT 25m SPACING.
-  HIGH EFFICIENCY 'TYPE B' SEDIMENT BASIN INSTALLED & MAINTAINED GENERALLY AS PER 'TYPE B DEEMED TO COMPLY' PROPOSED IN APPENDIX A OF WATER BY DESIGN DOCUMENT TITLED SEDIMENT MANAGEMENT ON CONSTRUCTION SITES AND AS SHOWN ON DRG C06.
-  BASIN CATCHMENT AREA
-  SPILLWAY AS PER IECA STD ES-1
-  AREA OF FILL
-  AREA OF CUT

POLYMER SPRAY APPLICATION RATE:
100L OF POLYMER 1000L OF WATER =
10% POLYMER/WATER SOLUTION.

LOCATION OF ALL SEDIMENT
BASIN TO BE CONFIRMED ON
SITE WITH RPEQ/CPESC

IMPORTANT NOTE:



ALL UNDERGROUND SERVICES SHOULD BE LOCATED ONSITE BY RELEVANT AUTHORITIES BEFORE ANY WORK IS COMMENCED.

 UNDER QUEENSLAND LEGISLATION, THE GENERAL BIOSECURITY OBLIGATION REQUIRES ALL REASONABLE STEPS TO BE TAKEN TO PREVENT THE SPREAD OF FIRE ANTS.

ALL SUSPECTED SIGHTINGS OF FIRE ANTS MUST BE REPORTED WITHIN 24 HOURS OF THEIR DISCOVERY (PH: 13 25 23). THE MOVEMENT OF FIRE ANTS IS PROHIBITED. FAILING TO COMPLY MAY INCUR PENALTIES.

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HIGH EFFICIENCY BASIN No.1 PARAMETER (DEEMED TO COMPLY)

	BASIN
CATCHMENT SIZE	1.70 HA
SETTLING VOLUME (330m ³ /HA)	561m ³
SETTLING DEPTH TO SPILLWAY CREST (1-2m)	2.0m
SEDIMENT STORAGE (30% OF SETTLING VOLUME)	163m ³
SPILLWAY WIDTH	11; 1:1 BATTERS 0.5m FREE BOARD
FOREBAY SIZE (10% SETTLING)	56m ³

CHECK DAMS SPACING

DRAIN SLOPE %	CHECK DAM HEIGHT (mm)	CHECK DAM MIN SPACING (m)
1%	500	50
2%	500	25
3%	500	17
4%	500	13
5%	500	10
6%	500	8
7%	500	7
8%	500	6
9%	500	6
10%	500	5

EROSION AND SEDIMENT CONTROL SEQUENCING NOTES

PHASE 1A: INSTALLATION OF PRIMARY AND PERIMETER SEDIMENT CONTROLS

- CONSTRUCT SITE ENTRY AND EXIT POINT
- ERECT VEGETATION PROTECTION FENCING AND SURVEY CLEARING LIMITS.
- CARRY OUT VEGETATION REMOVAL OF THE SEDIMENT BASIN AND DIVERSION/CATCH DRAIN AREAS ONLY.
- CONSTRUCT SEDIMENT BASINS AS DETAILED. VOLUME OF THE SEDIMENT BASINS TO BE CONFIRMED TO RPEQ/CPESC VIA SURVEY PICK UP.
- CONSTRUCT SILT FENCES
- CONSTRUCT DIVERSION DRAINS AS DETAILED. DRAINS TO BE ADJUSTED TO NEW LEVELS AS THE SITE CHANGES THROUGHOUT THE PHASE.

PHASE 1B: VEGETATION REMOVAL AND EARTHWORKS

- COMPLETE THE REMAINING VEGETATION REMOVAL AND GRUBBING FOR THE SITE.
- STRIP AND STOCKPILE TOPSOIL ENSURING UPSTREAM DIVERSION BUNDS AND DOWNSTREAM SILT FENCES AROUND THE STOCKPILE AREAS ARE IN PLACE.
- CARRY OUT BULK EARTHWORKS IN ACCORDANCE WITH PROJECT DRAWINGS.
- ONCE EARTHWORKS HAVE BEEN COMPLETED ALL DISTURBED ARE TO BE STABILISED WITH HEAVY POLYMER SPRAY. INSPECT THE SPRAY EVERY 6 WEEK AND TOUCH UP ANY AREAS THAT SHOW DETERIORATION.

No.	DATE	ISSUE	REVISED	CHECKED
P5	01/04/26	PRELIMINARY ISSUE - ARCH UPDATE	B.A.R.	T.W.N.
P4	06/25	PRELIMINARY ISSUE UPDATES	B.A.R.	T.W.N.
P3	02/25	PRELIMINARY ISSUE UPDATE	B.A.R.	T.W.N.
P2	10/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P1	03/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.

IN ASSOCIATION WITH

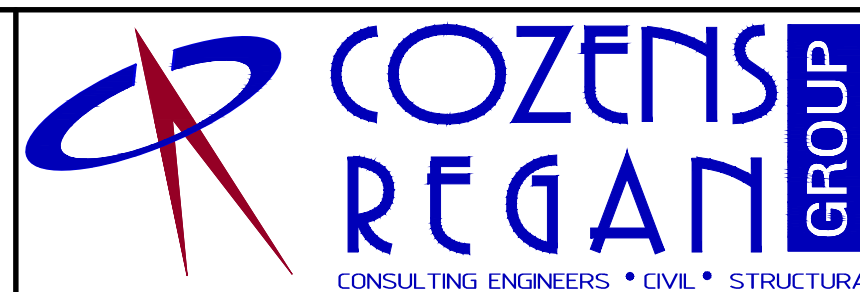
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE A
SCALE B

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DATUM AHD (U.N.O.)

SCALES SHOWN ARE AT A1 SIZE

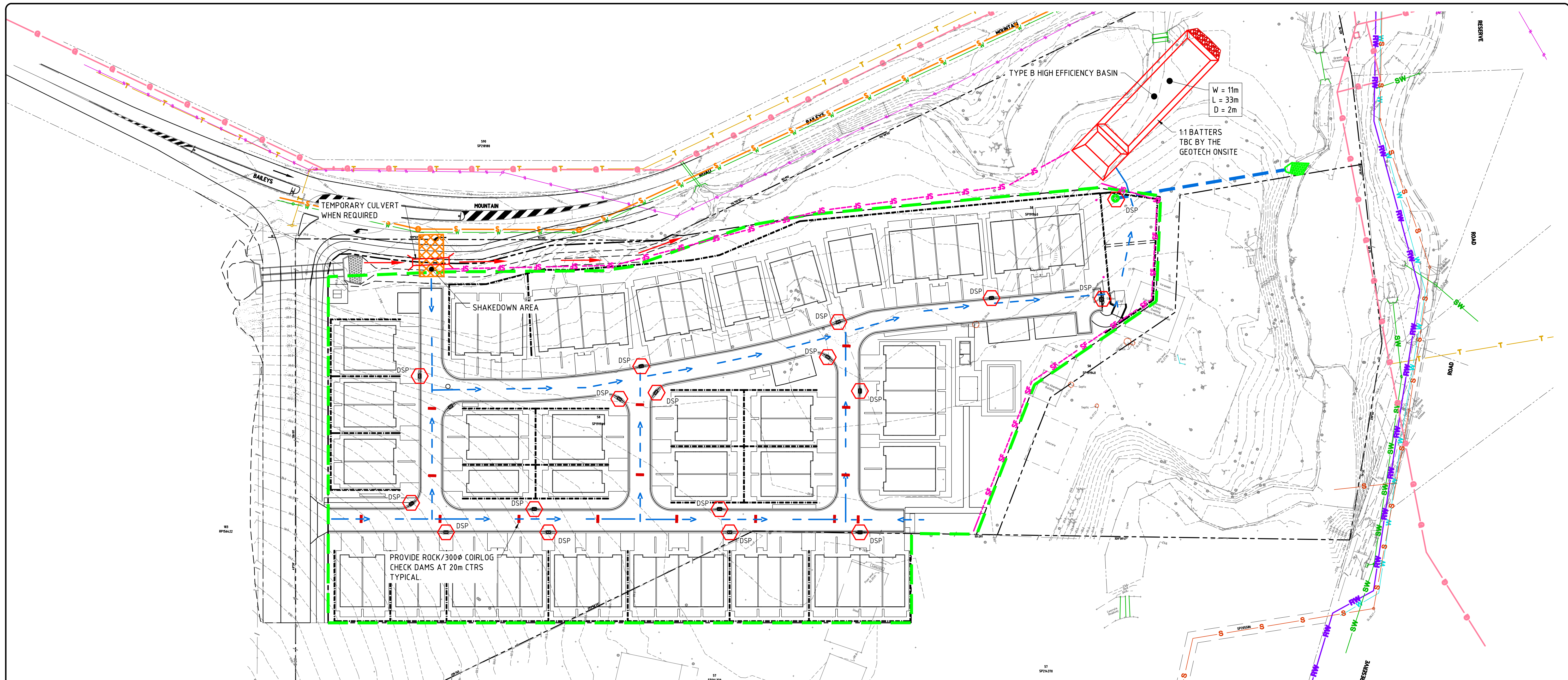


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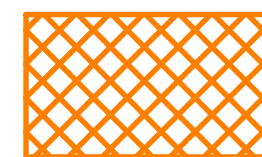
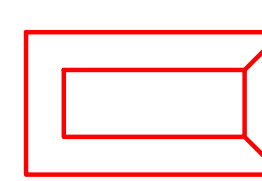
DESIGNED T.W.N.
DRAWN B.A.R.
CHECKED T.W.N.
APPROVED FOR AND ON BEHALF OF
COZENS REGAN GROUP PTY LTD
(RPEQ No 157351)

CLIENT MG LAND PTY LTD
PROJECT PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
PHASE 1A & 1B PRELIMINARIES, VEGETATION REMOVAL & EARTHWORKS

JOB NO. 230094
DRAWING NO. C04
ISSUE P1P2P3P4P5



LEGEND

-  DENOTES SILTATION FENCE AS PER IECA STD DRG. SF.01 & 02
-  SHAKE DOWN AREA AS PER IECA STD DRG. EXIT - 01
-  DWP - DIVERSION DRAIN PATH WITH A14 GEOTEXTILE LINER/OR VITAL BOND MATT HR @ 20 DILUTION AND COIRLOG CHECK DAMS
-  CLEAN WATER DIVERSION CHANNEL, GEOTEXTILE LINED AND ROCK CHECK DAMS AT 25m SPACING.
-  HIGH EFFICIENCY 'TYPE B' SEDIMENT BASIN INSTALLED & MAINTAINED GENERALLY AS PER 'TYPE B' DEEMED TO COMPLY' PROPOSED IN APPENDIX A OF WATER BY DESIGN DOCUMENT TITLED SEDIMENT MANAGEMENT ON CONSTRUCTION SITES AND AS SHOWN ON DRG C06.
-  BASIN CATCHMENT AREA
-  SPILLWAY AS PER IECA STD ES-1

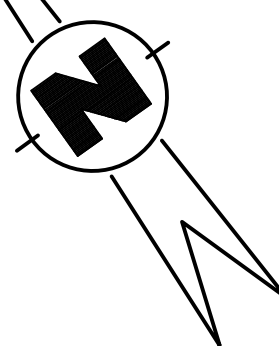
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EROSION AND SEDIMENT CONTROL SEQUENCING NOTES

PHASE 2 - BALANCE OF BULK EARTHWORKS, ROADWORKS AND UNDERGROUND SERVICES INSTALLATION

- MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES (I.E. SILT FENCES, CHECK DAMS, CLEAN WATER DIVERSION DRAIN) DURING THE CONSTRUCTION OF THE UNDERGROUND SERVICES AND ROADWAY.
- ONCE THE CONSTRUCTION OF THE UNDERGROUND SERVICES AND ROADWAY HAS BEEN COMPLETED ALL DISTURBED AREA ARE TO BE STABILISED VIA HEAVY POLYMER SPRAY AND WITHIN 6 WEEK TIMEFRAME.
- CONNECT ANY SEALED PAVEMENTS TO THE STORMWATER SYSTEM AND INSTALL KERB INLET PROTECTIONS ONCE ALL GULLY PITS ARE CONSTRUCTED AND BASE COURSE HAS BEEN LAID.
- HES BASINS TO REMAIN UNTIL 70% OF THE SITE HAS BEEN STABILISED.

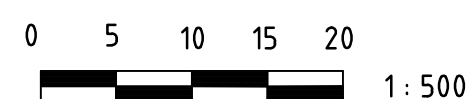
POLYMER SPRAY APPLICATION RATE:
100L OF POLYMER 1000L OF WATER =
10% POLYMER/WATER SOLUTION.

No.	DATE	ISSUE	REVISED	CHECKED
P4	01/04/26	PRELIMINARY ISSUE - ARCH UPDATE	B.A.R.	T.W.N.
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P2	10/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P1	03/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.

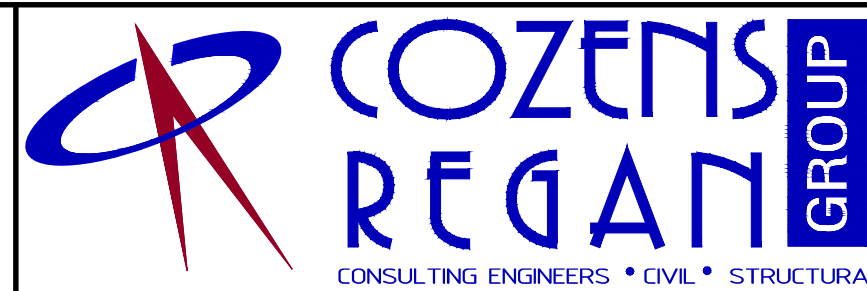
IN ASSOCIATION WITH

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE A
SCALE B



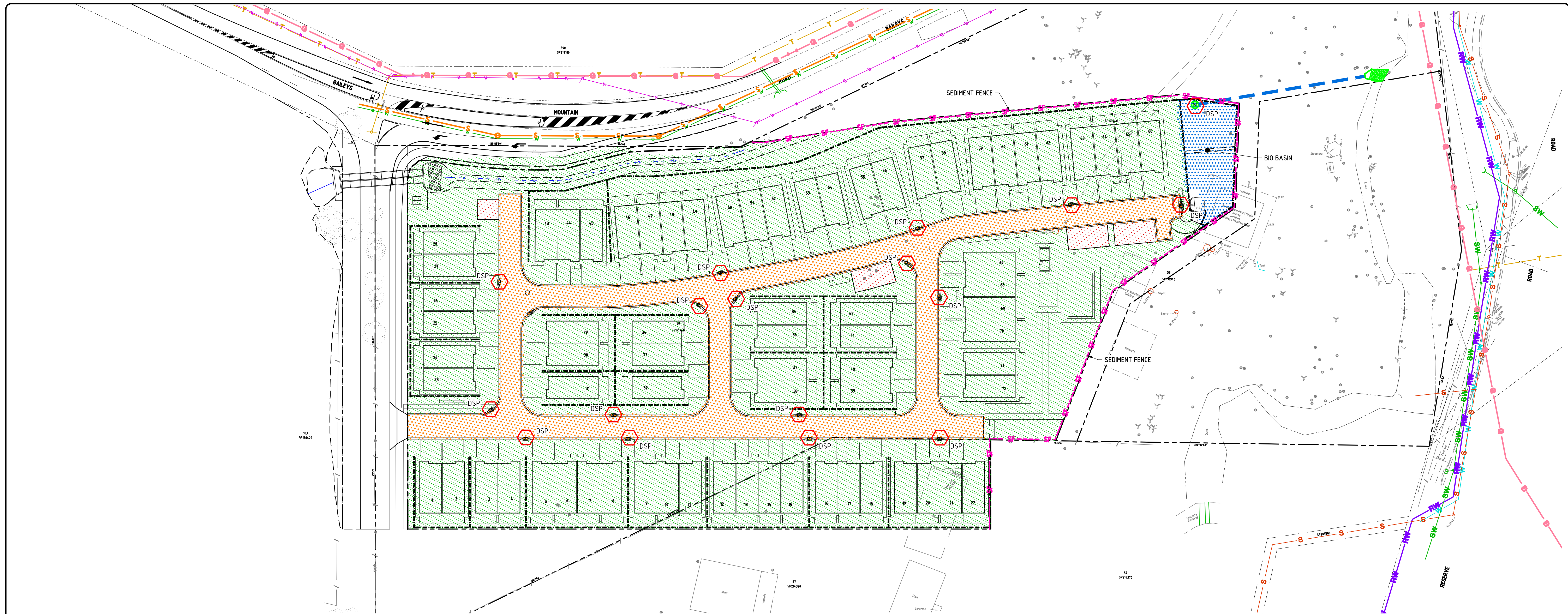
DATUM AHD (U.N.O.) SCALES SHOWN ARE AT A1 SIZE



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CHECKED T.W.N.
APPROVED FOR AND ON BEHALF OF
COZENS REGAN GROUP PTY LTD
(RPEQ No 157351)

CLIENT MG LAND PTY LTD
PROJECT PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
PHASE 2 ROADWORKS AND SERVICES
JOB NO. 230094
DRAWING NO. C05
ISSUE P1P2P3P4



LEGEND

- POLYMER SPRAY
- DSP
DENOTES DRAINAGE STRUCTURE PROTECTION
- PROPOSED AC PAVEMENT
- PROPOSED CONCRETE PAVEMENTS
- SF
DENOTES SILTATION FENCE
AS PER IECA STD DRG. SF-01 & 02
- PROPOSED BIO RETENTION BASIN

IMPORTANT NOTE:

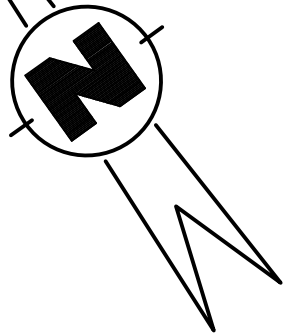


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EROSION AND SEDIMENT CONTROL SEQUENCING NOTES

PHASE 3: STABILIZATION AND MAINTENANCE

- MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL ALL DISTURBED AREAS HAVE BEEN STABILISED.
- REMOVE SEDIMENT BASIN.
- INSTALL DOWNSTREAM OF THE BASIN ANY SHORT TERM CONTROL MEASURES REQUIRED TO DECOMMISSION THE BASIN WITHOUT CAUSING ANY EROSION, SEDIMENT OR ENVIRONMENTAL HARM.
- REMOVE AND DISPOSE OF PONDED WATER AND STORED SEDIMENT WITHOUT CAUSING ANY EROSION, SEDIMENT OR ENVIRONMENTAL HARM.
- REMOVE SITE ENTRY AND EXIT POINT.
- ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES TO BE ERECTED AND MAINTAINED AS DIRECTED BY RPEQ/CPESC.
- DISTURBED AREAS TO BE PERIODICALLY STABILISED WITH HEAVY POLYMER SPRAY PRIOR TO RAIN EVENTS AT THE DIRECTION OF THE RPEQ/CPESC. THE CONTRACTOR MUST INFORM THE RPEQ/CPESC OF UPCOMING SIGNIFICANT RAIN EVENTS ASAP SO THE RPEQ/CPESC CAN ASSIST IN PREPARING THE SITE FOR SUCH EVENTS.

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P1	03/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.

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SCALE A
SCALE B



SCALES SHOWN ARE AT A1 SIZE



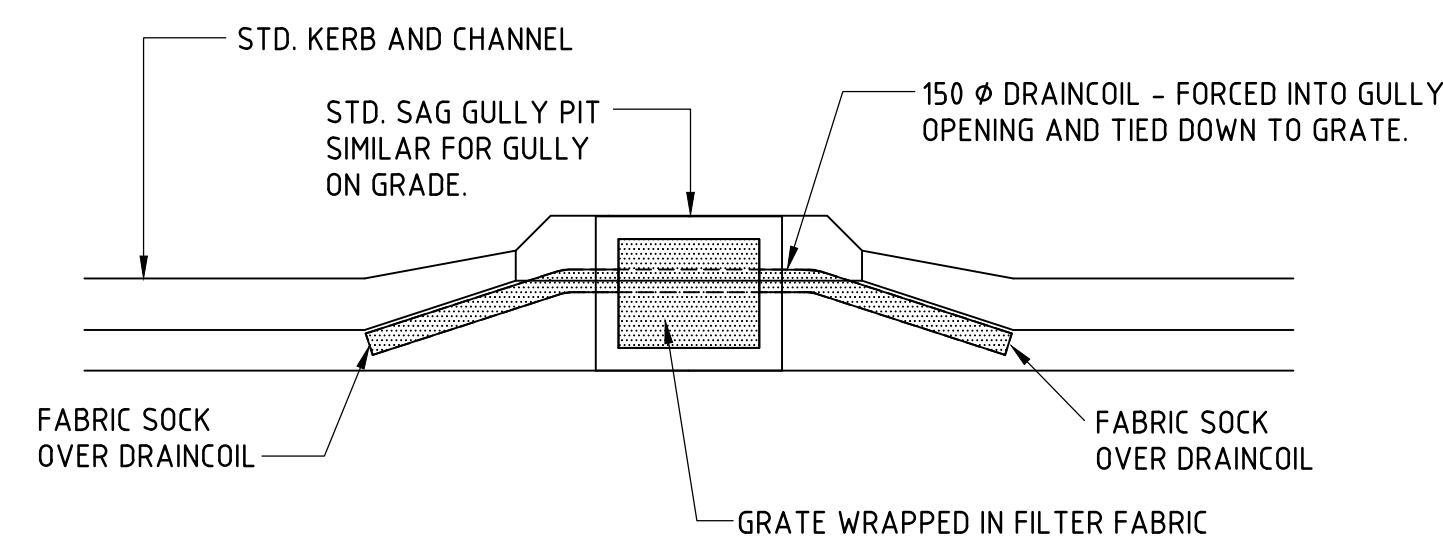
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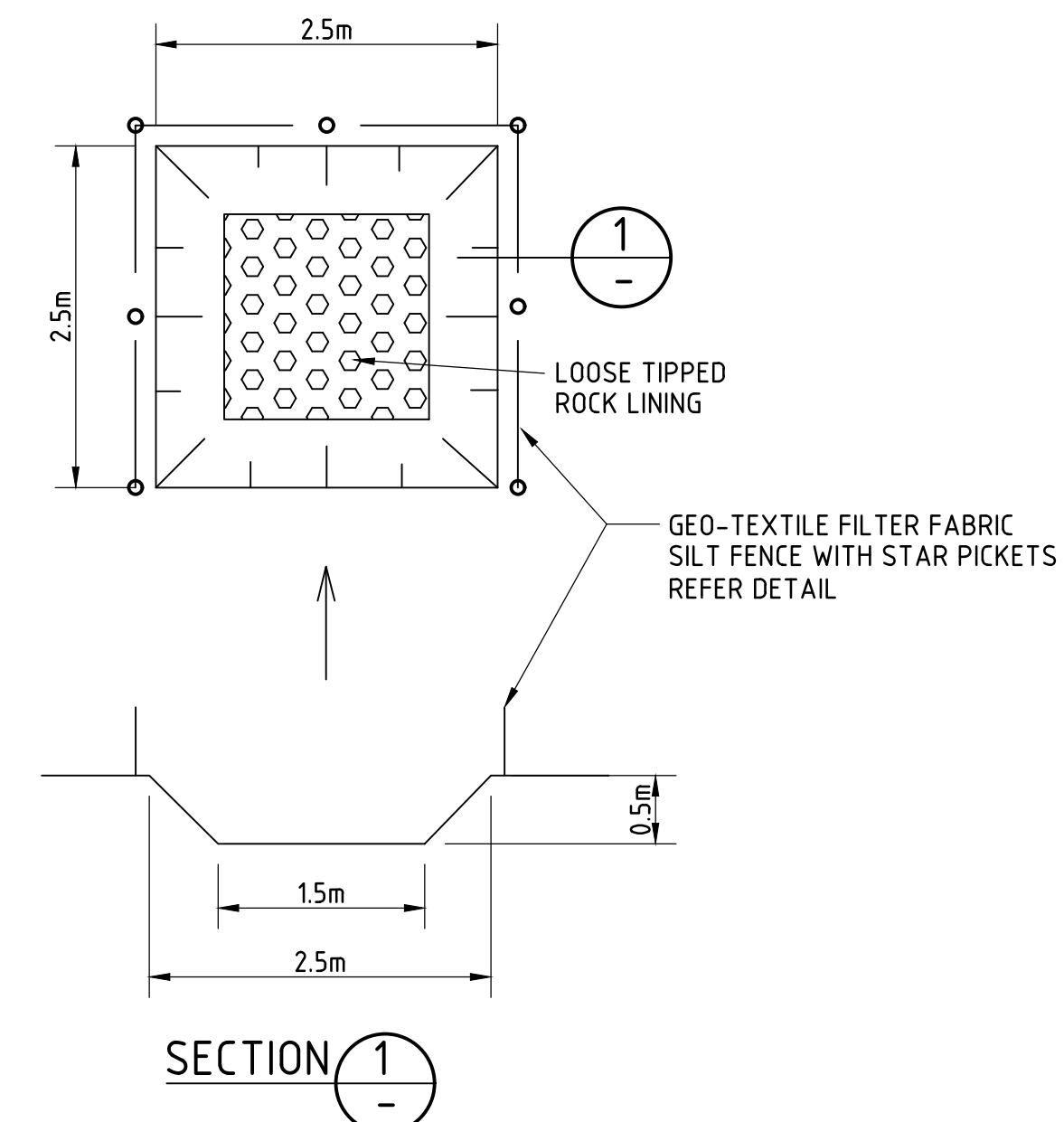
PROJECT
PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
PHASE 3 STABILISATION PLAN

JOB NO. 230094
DRAWING NO. C06
ISSUE P1P2P3P4P5



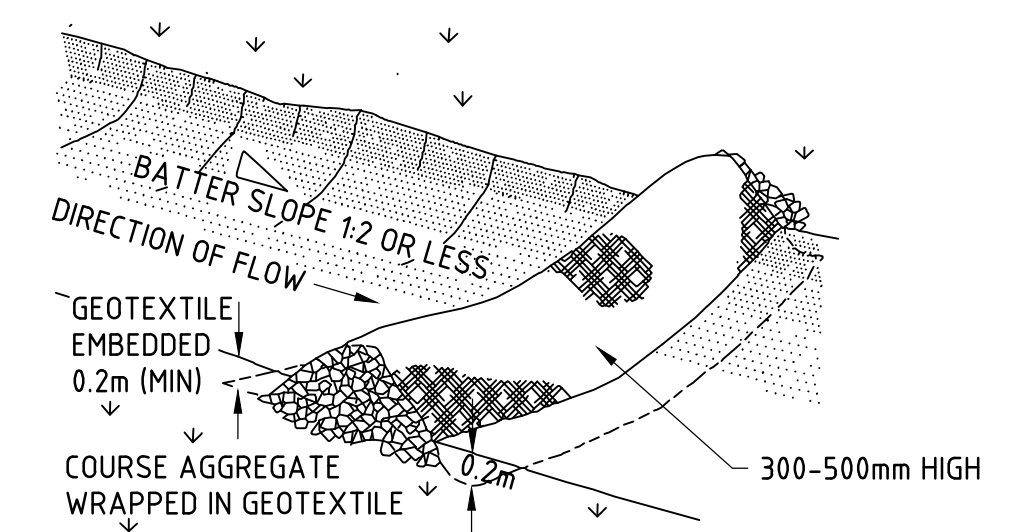
SILTATION CONTROL AT GULLY PIT (EXISTING)

SCALE 1:50
TO BE PROVIDED AT EXISTING GULLY PITS EXTERNAL TO SITE WHERE DIRECTED.

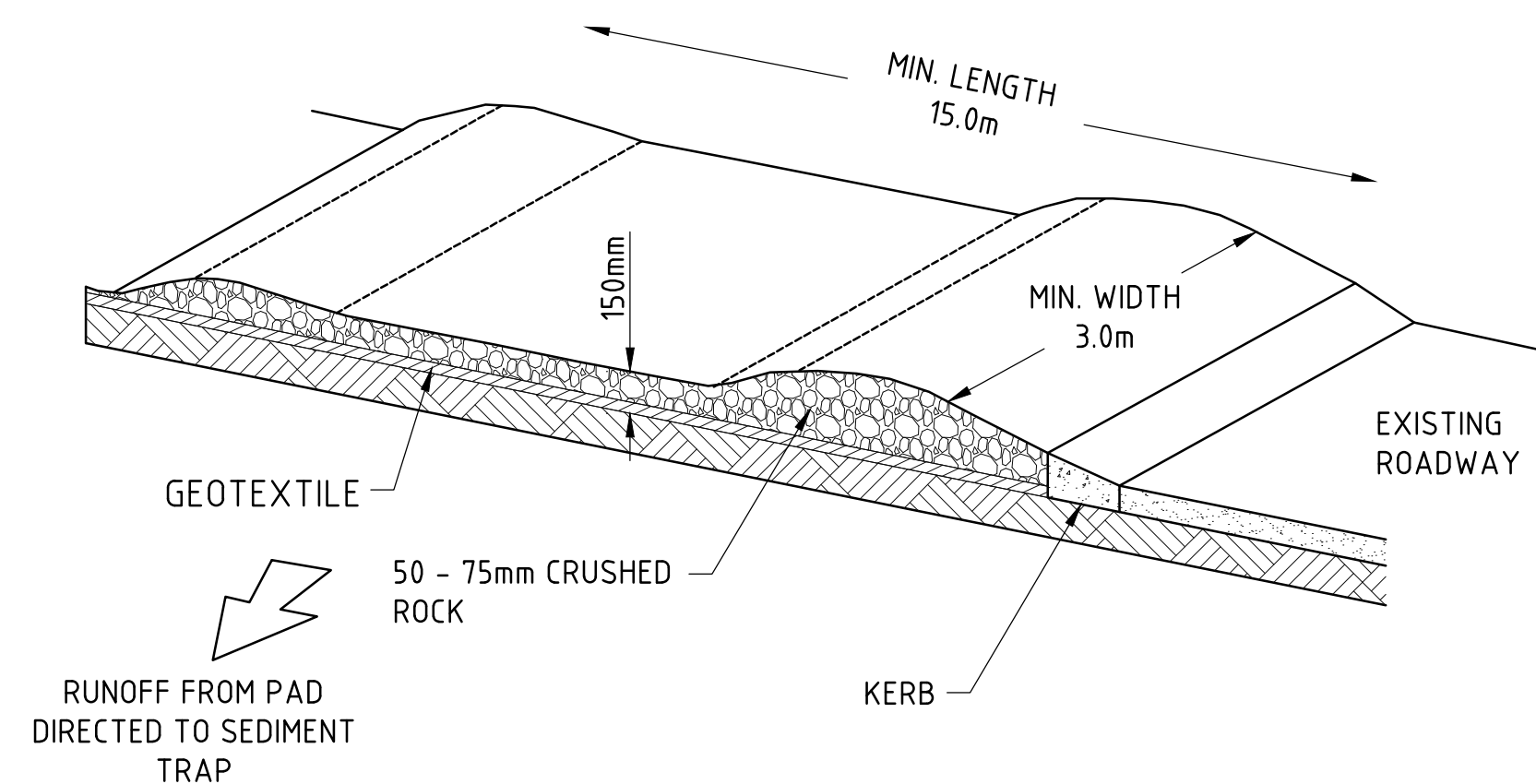


SILTATION TRAP DETAILS

SCALE 1:50

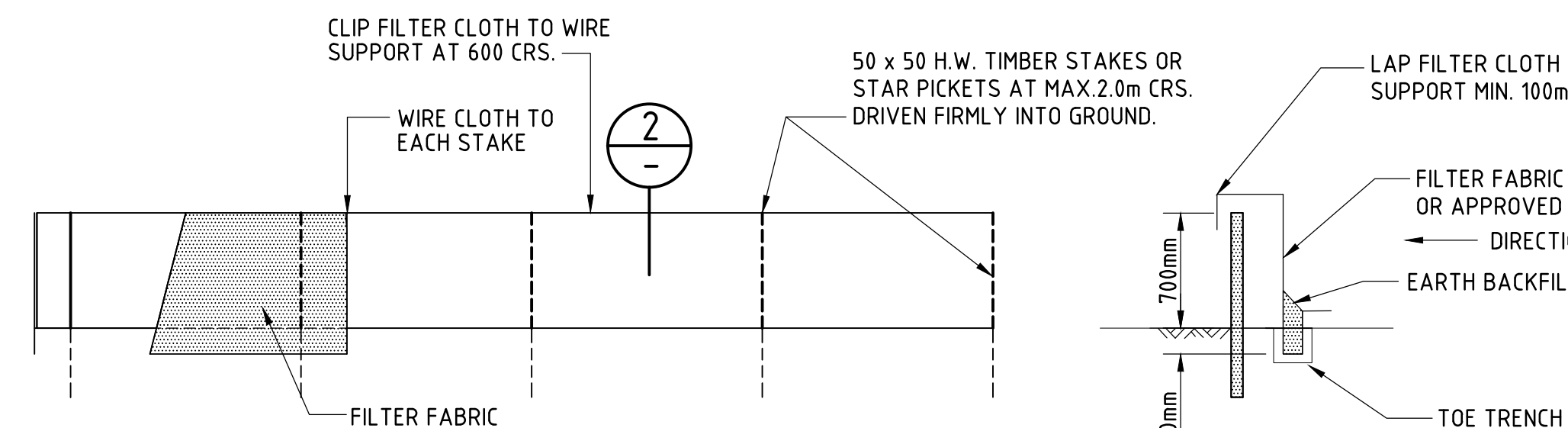


ROCK CHECK DAM



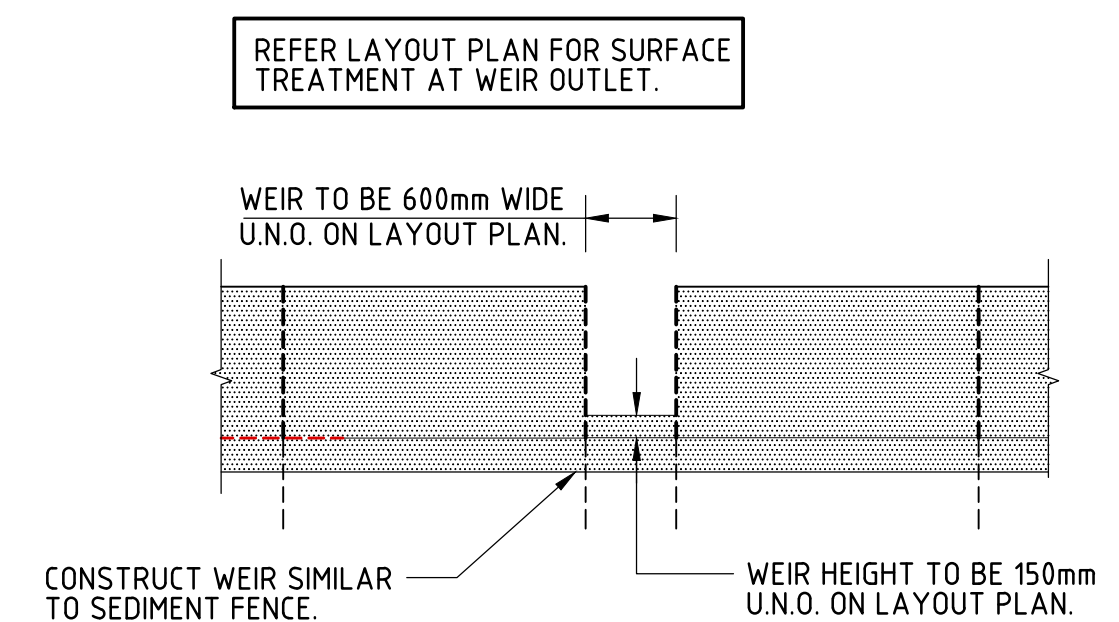
ROCK SHAKE DOWN AREA DETAIL

SCALE N.T.S.



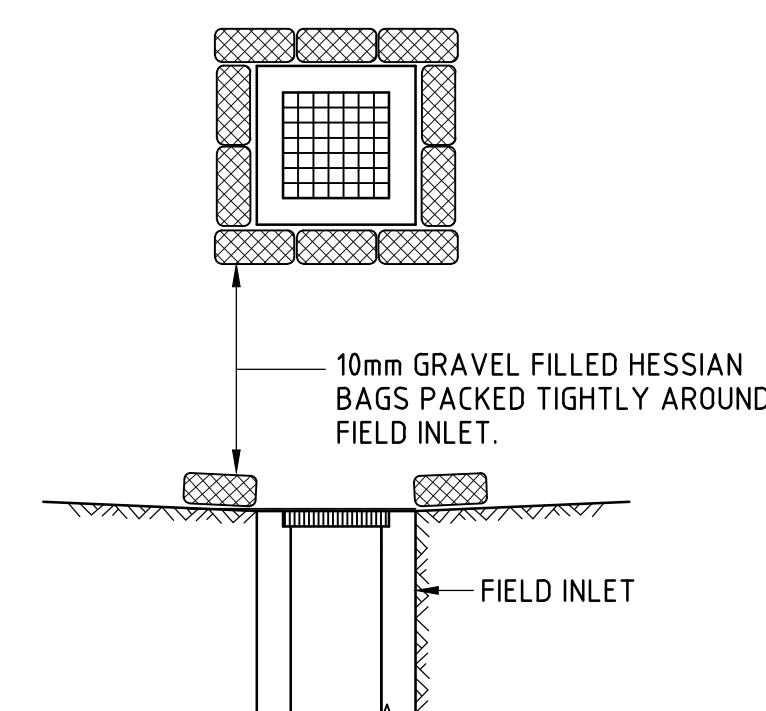
SEDIMENT FENCE DETAILS

SCALE 1:50



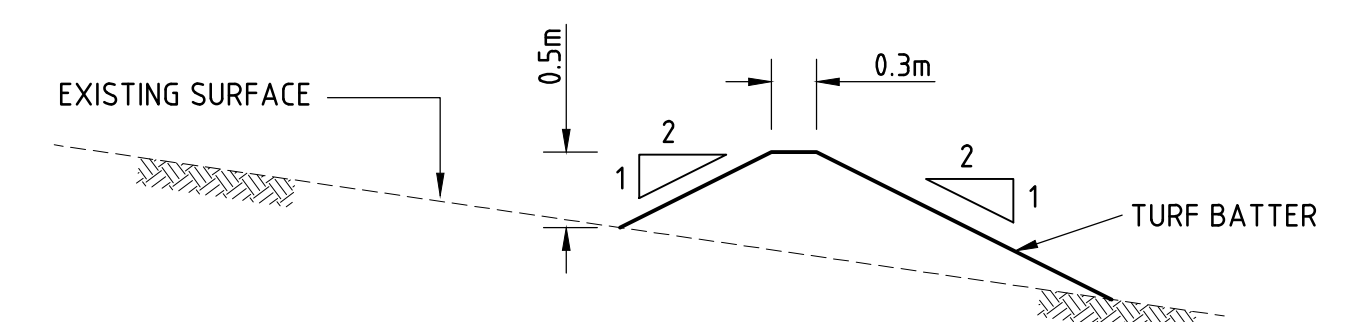
SEDIMENT FENCE WEIR

SCALE 1:50



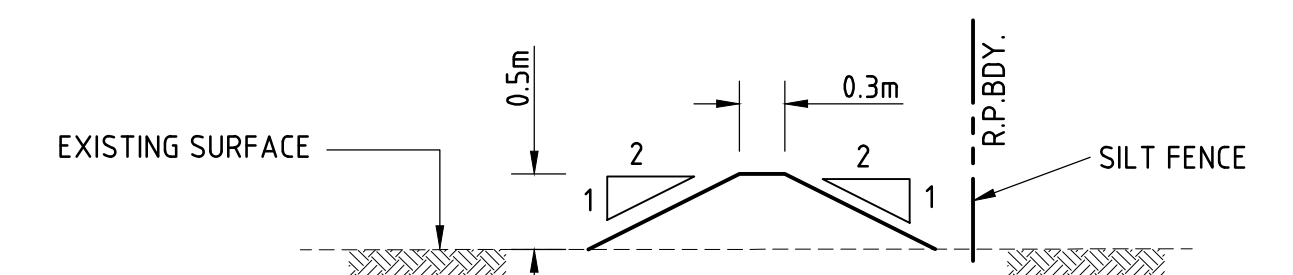
INLET STRUCTURE

1:50
(STRUCTURE COMPLETE)



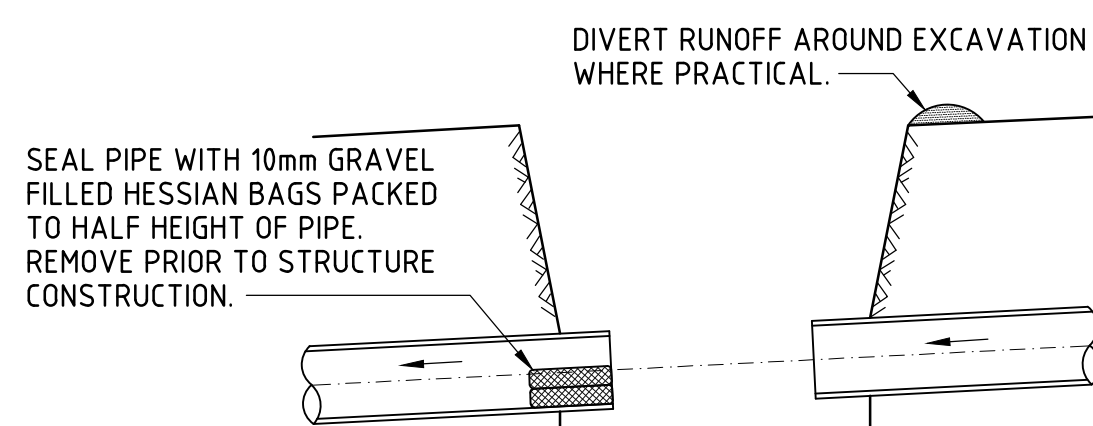
TYPICAL DIVERSION DRAIN DETAIL.

SCALE 1:50



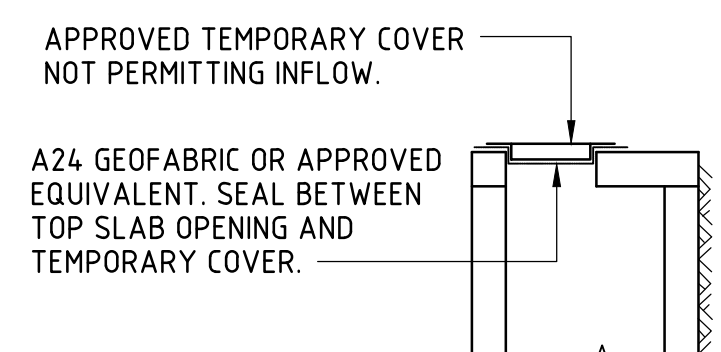
TYPICAL BUND DETAIL.

SCALE 1:50



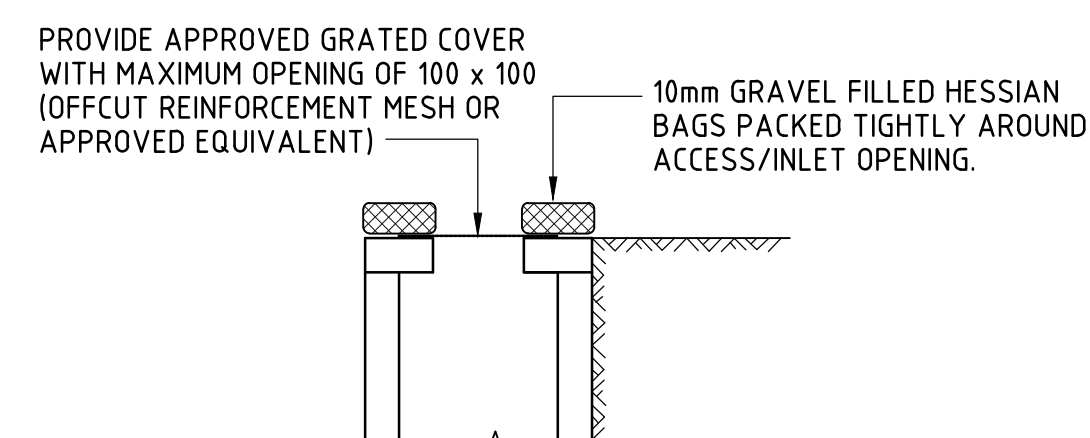
EXCAVATION

1:100
EXCAVATION AND PIPE INSTALLATION



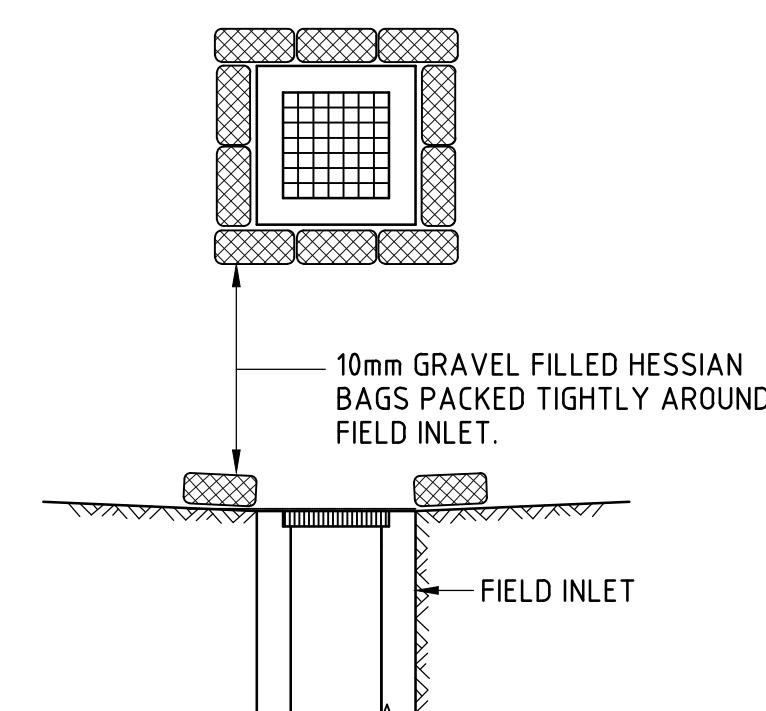
ACCESS CHAMBER

1:50



INLET STRUCTURE

1:50
(STRUCTURE COMPLETE UP TO TOP SLAB)



INLET STRUCTURE

1:50
(STRUCTURE COMPLETE)

STAGE 1

STAGE 2

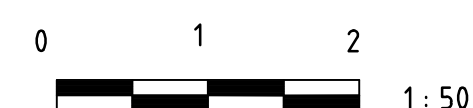
STAGE 3

No.	DATE	ISSUE	REVISED	CHECKED
P1	03/24	PRELIMINARY ISSUE		

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SCALE A
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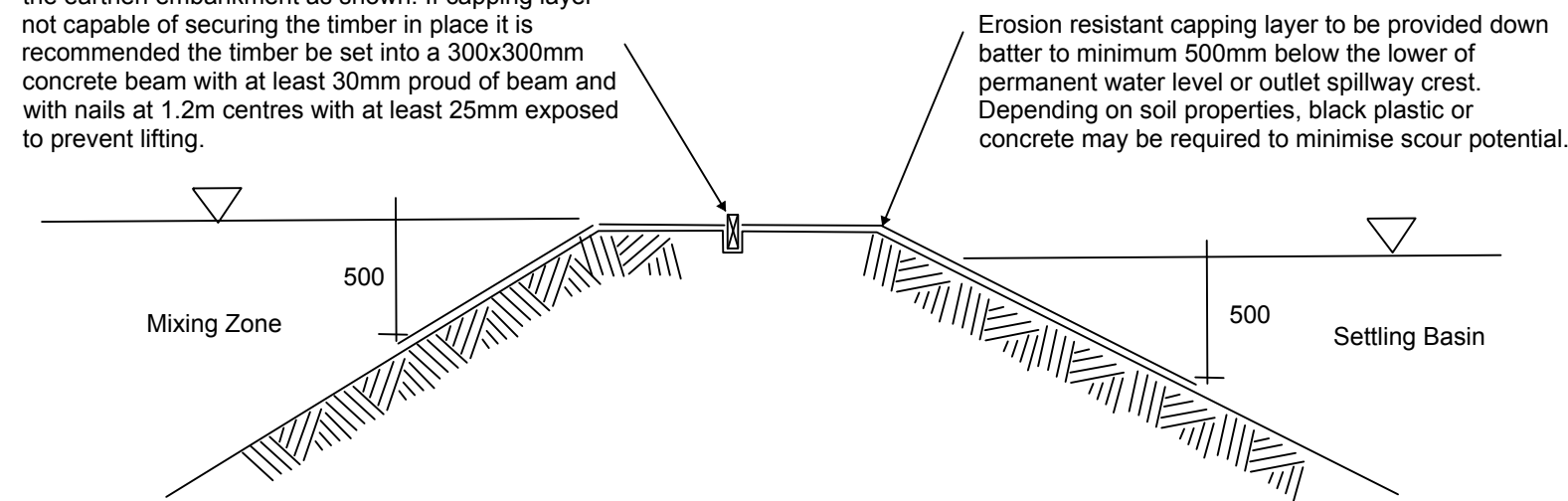
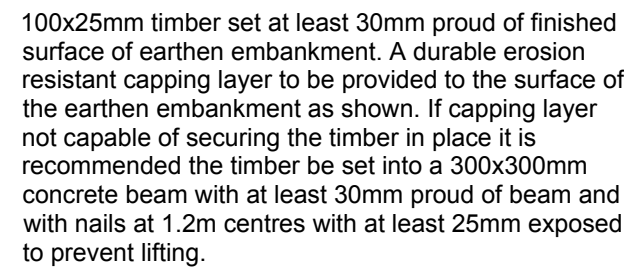


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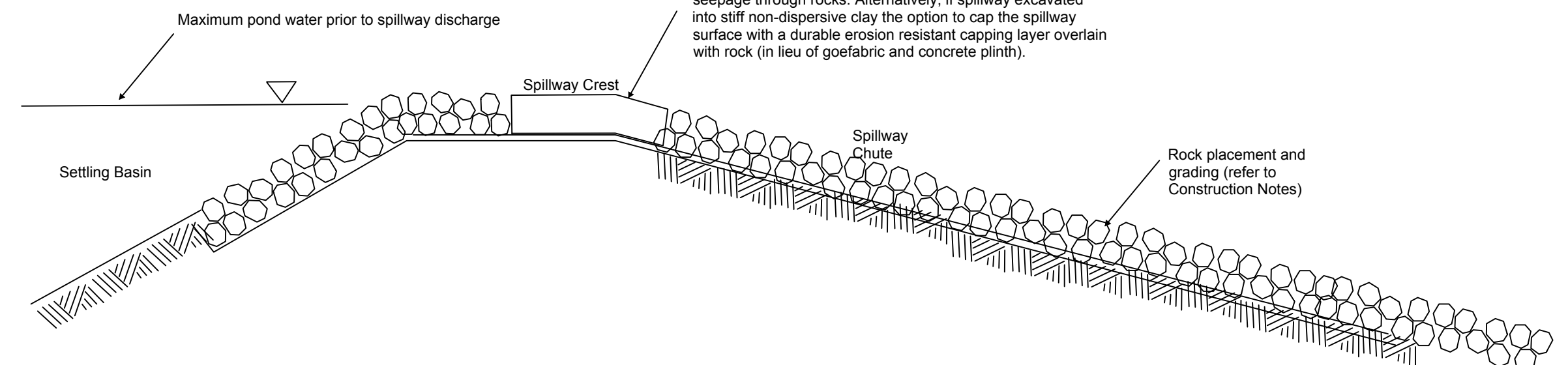
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DRAWN BAR
CHECKED TWN
APPROVED FOR AND ON BEHALF OF
COZENS REGAN GROUP PTY LTD
(IRPEQ No 15735)

CLIENT MG LAND PTY LTD
PROJECT PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
EROSION & SEDIMENT CONTROL DETAILS

JOB NO. 230094
DRAWING NO. C07
ISSUE P1



Level Spreader Details - Typical Cross Section (NTS)



Outlet Spillway Details - Typical Cross Section (NTS)

Standard Type B High Efficiency Sediment Basin for Small Catchments (<2ha)

Auto Doser

1. Installed to manufacturers specification.
2. Doser and supply of flocculant to be provided on level pad within 10m of dosing point.
3. All-weather access track to be provided to doser.

Materials-

5. Earth Fill: clean soil with Emerson Class 2(1), 3, 4 or 5 and free of roots, woody vegetation, rocks and other unsuitable material. Soil with Emerson Class 4 and 5 may not be suitable depending on particle size distribution and degree of dispersion. Class 2(1) should only be used upon recommendation from geotechnical specialist.
6. Spillway rock: hard, angular, durable, weather resistant and evenly graded rock with 50% by weight larger than the specified nominal (d50) rock size. Large rock should dominate, with sufficient small rock to fill the voids between larger rock. the diameter of the largest rock should be no larger than 1.5 times the nominal rock size. The specific gravity should be at least 2.5.
7. Durable erosion resistant capping to manufacturers specifications, if Geotextile fabric used it is to be heavy duty, needle-punched, non-woven cloth, minimum 'bidim' A24 or equivalent.

8. Notwithstanding any description contained with approved plans or specifications, the Contractor shall be responsible for satisfying themselves as to the nature and extent of the specified works and the physical and legal conditions under which the works will be carried out. This shall include means of access, extent of clearing, nature of the materials to be excavated, type and size of mechanical plant required, location and suitability of water supply for construction and testing purposes, and any other likely matters affecting the construction of the works.
9. Refer to approved plans for location, dimensions, and construction details. If there are questions or problems with the location, dimensions, or method of installation, contact the engineer or responsible on-site officer for assistance.
10. Before starting any clearing or construction, ensure all the necessary materials and components are on the site to avoid delays in completing the sediment basin once works begin.
11. Install requires short term sediment control measures downstream of the proposed earthworks to control sediment runoff during construction of the basin.
12. The area to be covered by the embankment, borrow pits and incidental works, together with an area extending beyond the limits of each for a distance not exceeding five (5) metres all around must be cleared of all trees, scrub, stumps, roots, dead timber and rubbish and disposed of in a suitable manner. Delay clearing the main basin area until the embankment is complete.
13. Ensure all holes made by grubbing within the embankment footprint are filled with sound material, adequately compacted, and finished flush with the natural surface.

14. Before construction of the cut-off trench or any ancillary works within the embankment footprint, all grass growth and topsoil must be removed from the area to be occupied by the embankment and must be deposited clear of this area and reserved for topdressing the completed embankment.

15. Excavate a cut-off trench along the centre line of the earth fill embankment. Cut the trench to stable soil material, but in no case make it less than 600mm deep. the cut-off trench must extend into both abutments to at least the elevation of the outlet spillway crest. Make the minimum bottom width wide enough to permit operation of the excavation and compaction equipment, but in no case less than 600mm. Make the side slopes of the trench no steeper than 1:1 (H:V).
16. Ensure all water, loose soil, and rock are removed from the trench before backfilling commences. The cut-off trench must be backfilled with select earth-fill of the type specified for the embankment, and this soil must have a moisture content and degree of compaction the same as specified for the core zone.
17. Material excavated from the cut-off trench may be used in the construction of the embankment provided it is suitable and it is placed in the correct zone according to its classification.

18. Scarify areas on which fill is to be placed before placing the fill.
19. Ensure all fill material used to form the embankment meets the specifications certified by a soil scientist of geotechnical specialist.
20. The fill material must contain sufficient moisture so it can be formed by hand into a ball without crumbling. If water can be squeezed out of the ball, it is too wet for proper compaction. Place fill material in 150 to 200mm continuous layers over the entire length of the fill area and then compact before placement of further fill.
21. Unless specified on the approved plans, compact the soil at about 1% to 2% wet optimum and to 95% modified or 100% standard compaction.embankment to an elevation 10% higher than the design height to allow for settling
22. Where both dispersive and non-dispersive classified earth-fill materials are available, non-dispersive earth-fill must be used in the core zone. the remaining classified earth-fill materials must only be used as directed by the site superintendent.

23. Where specified, construct the embankment to an elevation 10% higher than the design height to allow for settling; otherwise finished dimensions of the embankment after application of the durable erosion resistant capping layer must conform to the drawing with a tolerance of 75mm from specified dimensions.
24. Ensure debris and other unsuitable building waste is not placed within the earth embankment.
25. After completion of the embankment all loose uncompacted earth-fill material on the upstream and downstream batter must be removed prior to applying the durable erosion resistant capping layer.
26. Apply durable erosion resistant capping layer to all exposed earth as directed within the approved plans.

27. The spillway must be excavated as shown on the plans, and the excavated material if classified as suitable, must be used in the embankment, and if not suitable it must be disposed of into spoil heaps.
28. Ensure excavated dimensions allow adequate boxing-out such that the specified elevations, grades, chute width, and entrance and exit slopes for the emergency spillway will be achieved after placement of the rock or other scour protection measures as specified in the plans.
29. Place specified scour protection measures on the emergency spillway. Ensure the finished grade blends with the surrounding area to allow a smooth flow transition from spillway to downstream channel.

30. If a synthetic filter fabric underlay is specified, place the fabric directly on the prepared foundation, if more than 1 sheet of filter fabric is required, overlap the edges by at least 300mm and place anchor pins at minimum 1m spacing along the overlap. bury the upstream end of the filter fabric a minimum 300mm below ground and where necessary, bury the lower end of the fabric or overlap a minimum 300mm over the next downstream section as required. Ensure the filter fabric extends at least 1000mm upstream of the spillway crest.
31. Take care not to damage the fabric during or after placement. If damage occurs, remove the rock and repair the sheet by adding another layer of fabric with a minimum overlap of 300mm around the damaged area. If extensive damage is suspected, remove and replace the entire sheet.
32. Where large rock is used, or machine placement is difficult, a minimum 100mm layer of fine gravel, aggregate, or sand may be needed to protect the fabric.
33. Placement of rock should follow immediately after placement of the filter fabric. Place rock so that it forms a dense, well graded mass of rock with a minimum of voids. The desired distribution of rock throughout the mass may be obtained by selective loading at the quarry and controlled dumping during final placement.
34. The finished slope should be free of pockets of small rock or clusters of large rocks. Hand placing may be necessary to achieve the proper distribution of rock sizes to produce a relatively smooth, uniform surface. The finished grade of the rock should blend with the surrounding area. No overfall or protrusion of rock should be apparent.

35. Ensure that the final arrangement of the spillway crest will not promote excessive flow through the rock such that the water can be retained within the settling basin at the elevation no less than 50mm above of below the nominated spillway crest elevation.
Establishing the settling pond-
36. The area to be covered by the stored water outside of the limits of the borrow pits must be cleared of rubbish. Trees must be cut down stump high and removed from the immediate vicinity of the work.
37. Establish all required inflow chutes and inlet baffles, if specified, to enable water to discharge into the basin in a manner that will not cause soil erosion or the re-suspension of settled sediment.
38. Install a sediment storage level marker post with a cross member set just below the top of the sediment storage zone (as specified on the approved plans). Use at least a 75mm wide post firmly set into the basin floor.
39. If specified, install internal settling pond baffles. Ensure the crest of these baffles is set level with, or just below, the elevation of the emergency spillway.
40. Install all appropriate measures to minimise safety risk to on-site personnel and the public caused by the presence of the settling pond. Avoid steep, smooth internal slopes. Appropriately fence the settling pond and post warning signs if unsupervised public access is likely or there is considered to be an unacceptable risk to the public.

P1	03/24	PRELIMINARY ISSUE			B.A.R. T.W.N.
No.	DATE	ISSUE			REVISED CHECKED

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1 : 100

DATUM AHD (U.N.O.) SCALES SHOWN ARE AT A1 SIZE



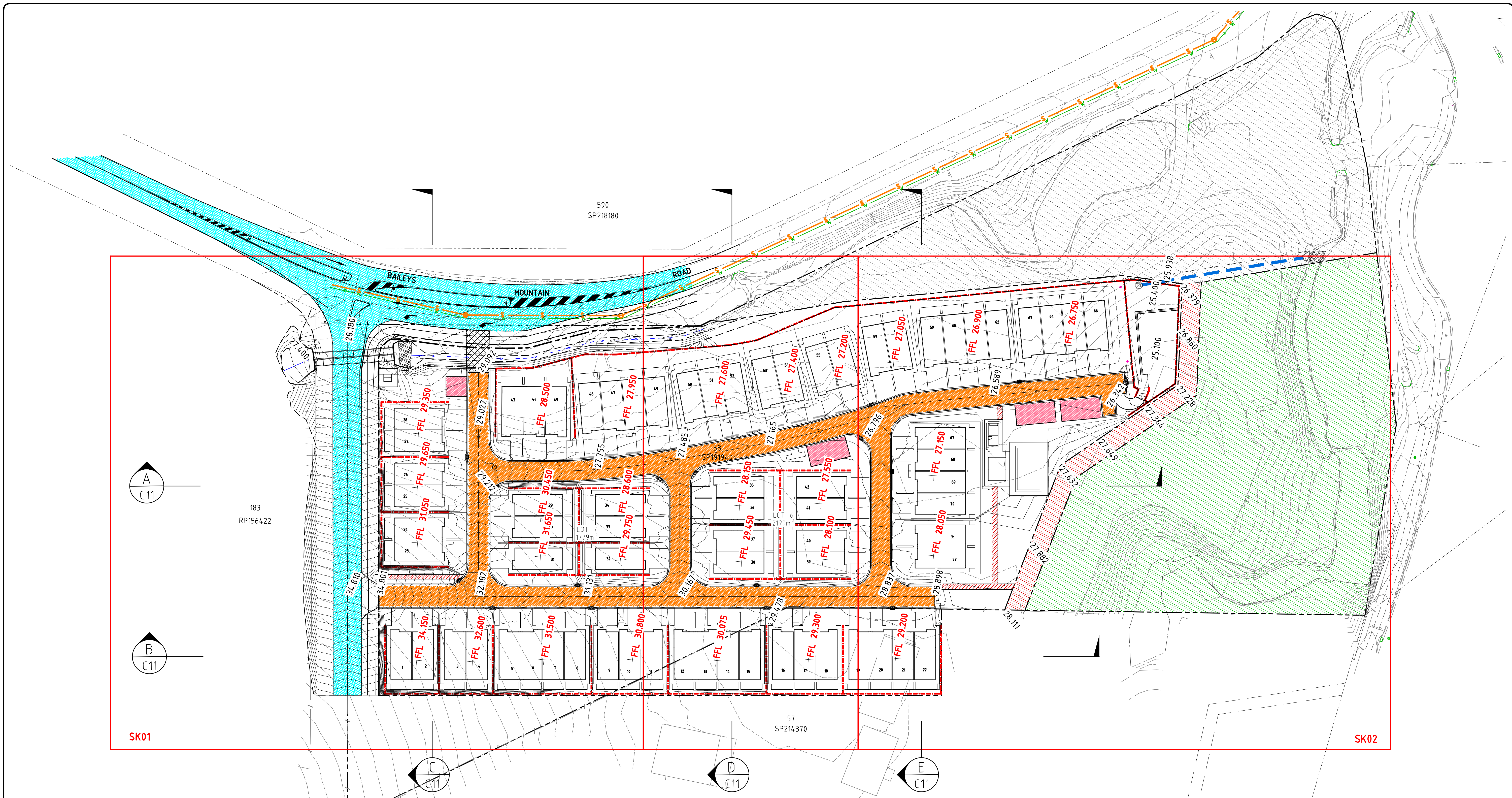
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MG LAND PTY LTD	JOB NO. 230094
PROPOSED TOWNHOUSE DEVELOPMENT 202 BAILEYS MOUNTAIN RD, UPPER COOMERA	DRAWING NO. C08
TYPE 'B' DEEMED TO COMPLY SEDIMENT BASIN DETAILS	ISSUE P1



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SHOULD BE LOCATED ONSITE
BY RELEVANT AUTHORITIES
BEFORE ANY WORK IS COMMENCED.

LEGEND

- 16.0 --- EXISTING CONTOUR
- W EXISTING WATER
- SW EXISTING STORMWATER
- S EXISTING SEWER
- T EXISTING TELSTRA
- G EXISTING HIGH PRESSURE GAS (CL500)
- E EXISTING ELECTRICAL
- RM EXISTING COUNCIL SEWER RISING MAIN
- 83.0 --- PROPOSED CONTOUR
- PROPOSED PRIVATE STORMWATER RETICULATION
- PROPOSED COUNCIL STORMWATER RETICULATION

- + 23.400 FINISHED SURFACE LEVEL
- + FFL 23.200 FINISHED FLOOR LEVEL
- + PAD 22.750 EARTHWORKS PAD LEVEL
- PROPOSED CONCRETE SLEEPER RETAINING WALL OR SIMILAR TO FUTURE DESIGN
- BRW PROPOSED BLOCK RETAINING WALL
- TW TOP OF WALL LEVEL
- BW BOTTOM OF WALL LEVEL
- DENOTES DIVERSION DRAIN
- PROPOSED INTERNAL PRIVATE ROADS/DRIVEWAYS

- PROPOSED CAR PARKING BAYS
- PROPOSED CONCRETE FOOTPATH
- PROPOSED EXTERNAL ROADWORKS
- PROPOSED ROAD RESERVE DEDICATION
- PROPOSED LAND DEDICATION FOR CONSERVATION & WATERWAY
- PROPOSED LGIP RECREATIONAL LINK TO BE DEDICATED TO COUNCIL

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P1	05/24	ORIGINAL ISSUE	B.A.R.	T.W.N.

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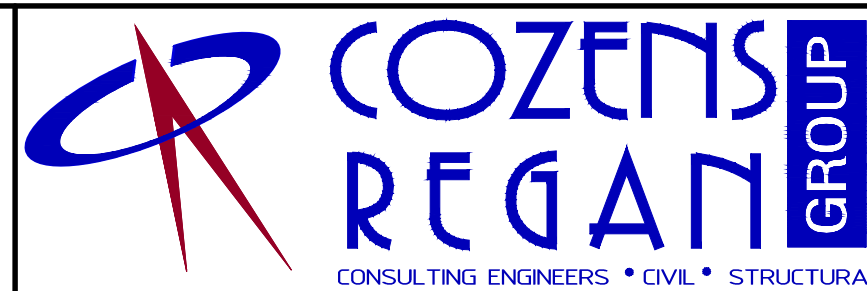
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SCALE A
SCALE B



[DATUM AND (U.N.O.)]

SCALES SHOWN ARE AT A1 SIZE

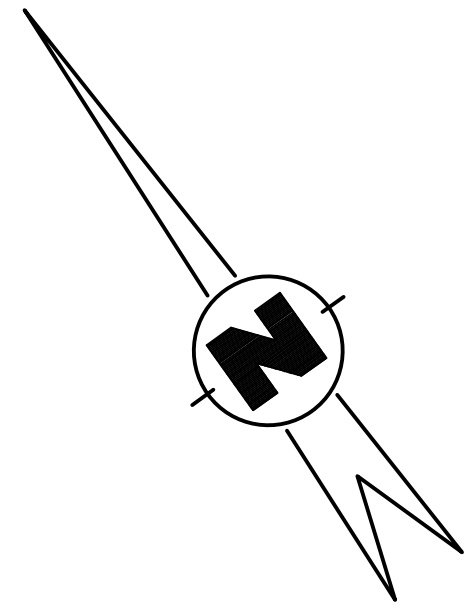


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(RPEQ No 15735)

CLIENT MG LAND PTY LTD
PROJECT
PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
CONCEPT OVERALL SITE PLAN

JOB NO. 230094
DRAWING NO. SK00
ISSUE P1P2P3P4P5



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LEGEND

	EXISTING CONTOUR
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING SEWER
	EXISTING TELSTRA
	EXISTING HIGH PRESSURE GAS (CL500)
	EXISTING ELECTRICAL
	EXISTING COUNCIL SEWER RISING MAIN
	PROPOSED CONTOUR
	PROPOSED PRIVATE STORMWATER RETICULATION
	PROPOSED COUNCIL STORMWATER RETICULATION
	PROPOSED WATER RETICULATION
	PROPOSED SEWERAGE RETICULATION
	FINISHED SURFACE LEVEL
	FINISHED FLOOR LEVEL
	EARTHWORKS PAD LEVEL
	PROPOSED CONCRETE SLEEPER RETAINING WALL OR SIMILAR TO FUTURE DESIGN
	PROPOSED BLOCK RETAINING WALL
	TOP OF WALL LEVEL
	BOTTOM OF WALL LEVEL
	DENOTES DIVERSION DRAIN
	PROPOSED INTERNAL PRIVATE ROADS/DRIVEWAYS
	PROPOSED CAR PARKING BAYS
	PROPOSED CONCRETE FOOTPATH
	PROPOSED EXTERNAL ROADWORKS
	PROPOSED TEMPORARY SITE ACCESS
	PROPOSED DRAINAGE EASEMENT (INDICATIVE ONLY)

A
SK11

B
SK11

C
SK11

D
SK11

No.	DATE	ISSUE	REVISED	CHECKED
P8	01/04/24	PRELIMINARY ISSUE - ARCH UPDATE	B.A.R.	T.W.N.
P7	06/25	PRELIMINARY ISSUE UPDATE	B.A.R.	T.W.N.
P6	02/25	PRELIMINARY ISSUE UPDATE	B.A.R.	T.W.N.
P5	10/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P4	10/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P3	05/24	PRELIMINARY ISSUE - 12 BATTER ADDED	B.A.R.	T.W.N.
P2	05/24	PRELIMINARY ISSUE	B.A.R.	T.W.N.
P1	05/24	ORIGINAL ISSUE	B.A.R.	T.W.N.

IN ASSOCIATION WITH	
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PRELIMINARY
NOT FOR CONSTRUCTION

SCALE A
SCALE B



DATUM AHD (I.U.N.O.) SCALES SHOWN ARE AT A1 SIZE

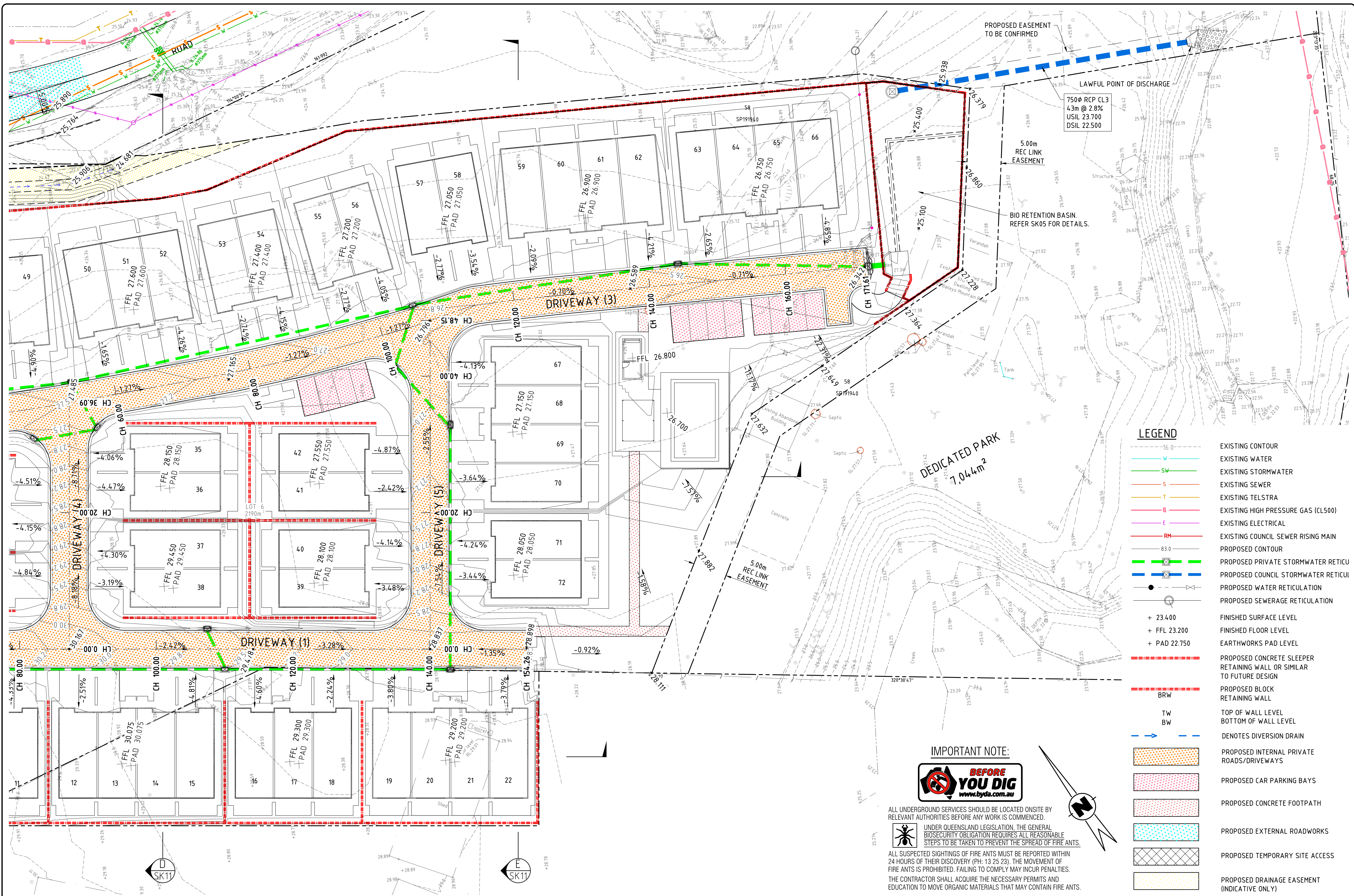


SUITE 7 ADVANCE BUSINESS CENTRE
39 LAWRENCE DRIVE NERANG
PO BOX 2711 NERANG QLD 4211
P: (07) 5578 4100
F: (07) 5578 4092
E: mail@cozreg.com.au
W: www.cozreg.com.au

DESIGNED T.W.N.
DRAWN B.A.R.
CHECKED T.W.N.
APPROVED FOR AND ON BEHALF OF
COZENS REGAN GROUP PTY LTD
(RPEQ No 157351)

CLIENT MG LAND PTY LTD
PROJECT PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
CONCEPT CIVIL WORKS PLAN - 1 OF 2

JOB NO. 230094
DRAWING NO. SK01
ISSUE P1P2P3P4P5P6P7P8



LEGEND	
	EXISTING CONTOUR
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING SEWER
	EXISTING TELSTRA
	EXISTING HIGH PRESSURE GAS (CL500)
	EXISTING ELECTRICAL
	EXISTING COUNCIL SEWER RISING MAIN
	PROPOSED CONTOUR
	PROPOSED PRIVATE STORMWATER RETICULATION
	PROPOSED COUNCIL STORMWATER RETICULATION
	PROPOSED WATER RETICULATION
	PROPOSED SEWERAGE RETICULATION
	FINISHED SURFACE LEVEL
	FINISHED FLOOR LEVEL
	EARTHWORKS PAD LEVEL
	PROPOSED CONCRETE SLEEPER RETAINING WALL OR SIMILAR TO FUTURE DESIGN
	PROPOSED BLOCK RETAINING WALL
	TOP OF WALL LEVEL BOTTOM OF WALL LEVEL
	DENOTES DIVERSION DRAIN
	PROPOSED INTERNAL PRIVATE ROADS/DRIVEWAYS
	PROPOSED CAR PARKING BAYS
	PROPOSED CONCRETE FOOTPATH
	PROPOSED EXTERNAL ROADWORKS
	PROPOSED TEMPORARY SITE ACCESS
	PROPOSED DRAINAGE EASEMENT (INDICATIVE ONLY)



ALL UNDERGROUND SERVICES SHOULD BE LOCATED ONSITE BY RELEVANT AUTHORITIES BEFORE ANY WORK IS COMMENCED.

UNDER QUEENSLAND LEGISLATION, THE GENERAL BIOSECURITY OBLIGATION REQUIRES ALL REASONABLE STEPS TO BE TAKEN TO PREVENT THE SPREAD OF FIRE ANTS.

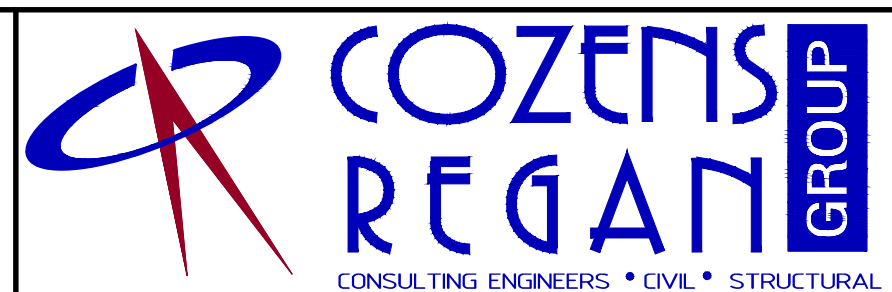
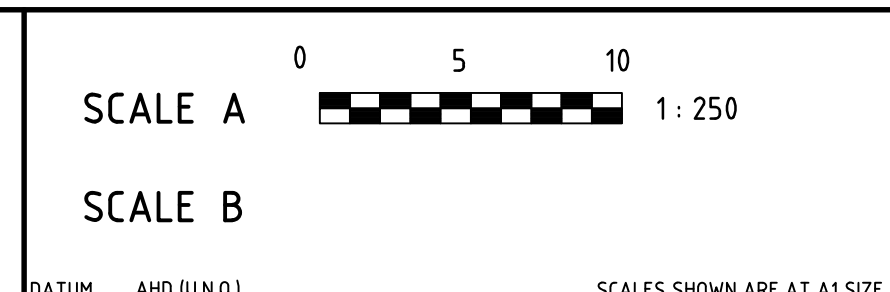
ALL SUSPECTED SIGHTINGS OF FIRE ANTS MUST BE REPORTED WITHIN 24 HOURS OF THEIR DISCOVERY (PH: 13 25 23). THE MOVEMENT OF FIRE ANTS IS PROHIBITED. FAILING TO COMPLY MAY INCUR PENALTIES.

THE CONTRACTOR SHALL ACQUIRE THE NECESSARY PERMITS AND EDUCATION TO MOVE ORGANIC MATERIALS THAT MAY CONTAIN FIRE ANTS.

No.	DATE	ISSUE	REVISED	CHECKED
P1	01/04/26	PRELIMINARY ISSUE - ARCH UPDATE		T.W.N.
P6	06/25	PRELIMINARY ISSUE UPDATE		B.A.R.
P5	02/25	PRELIMINARY ISSUE UPDATE		T.W.N.
P4	10/24	PRELIMINARY ISSUE		T.W.N.
P3	10/24	PRELIMINARY ISSUE		T.W.N.
P2	05/24	PRELIMINARY ISSUE		T.W.N.
P1	05/24	ORIGINAL ISSUE		T.W.N.

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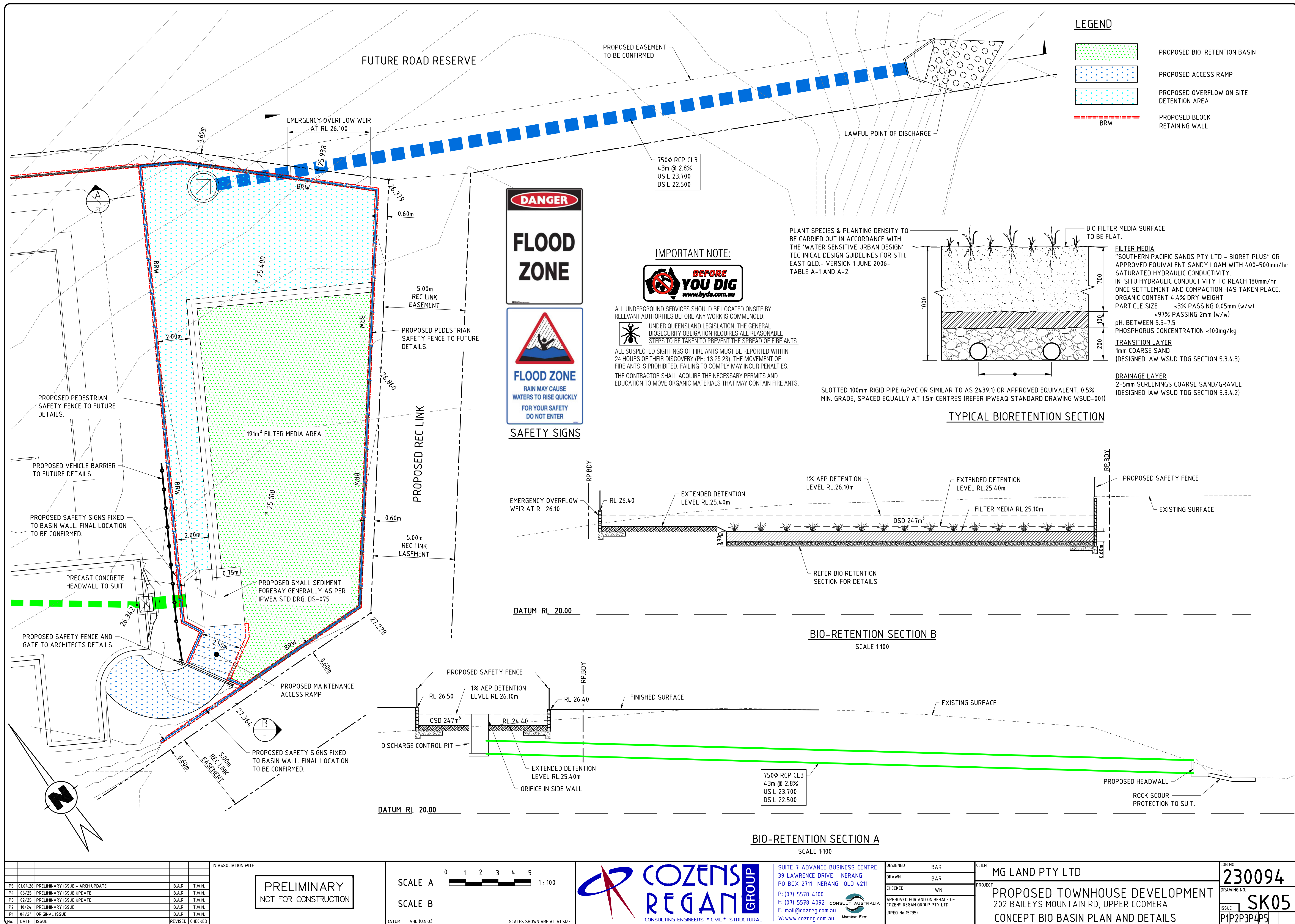


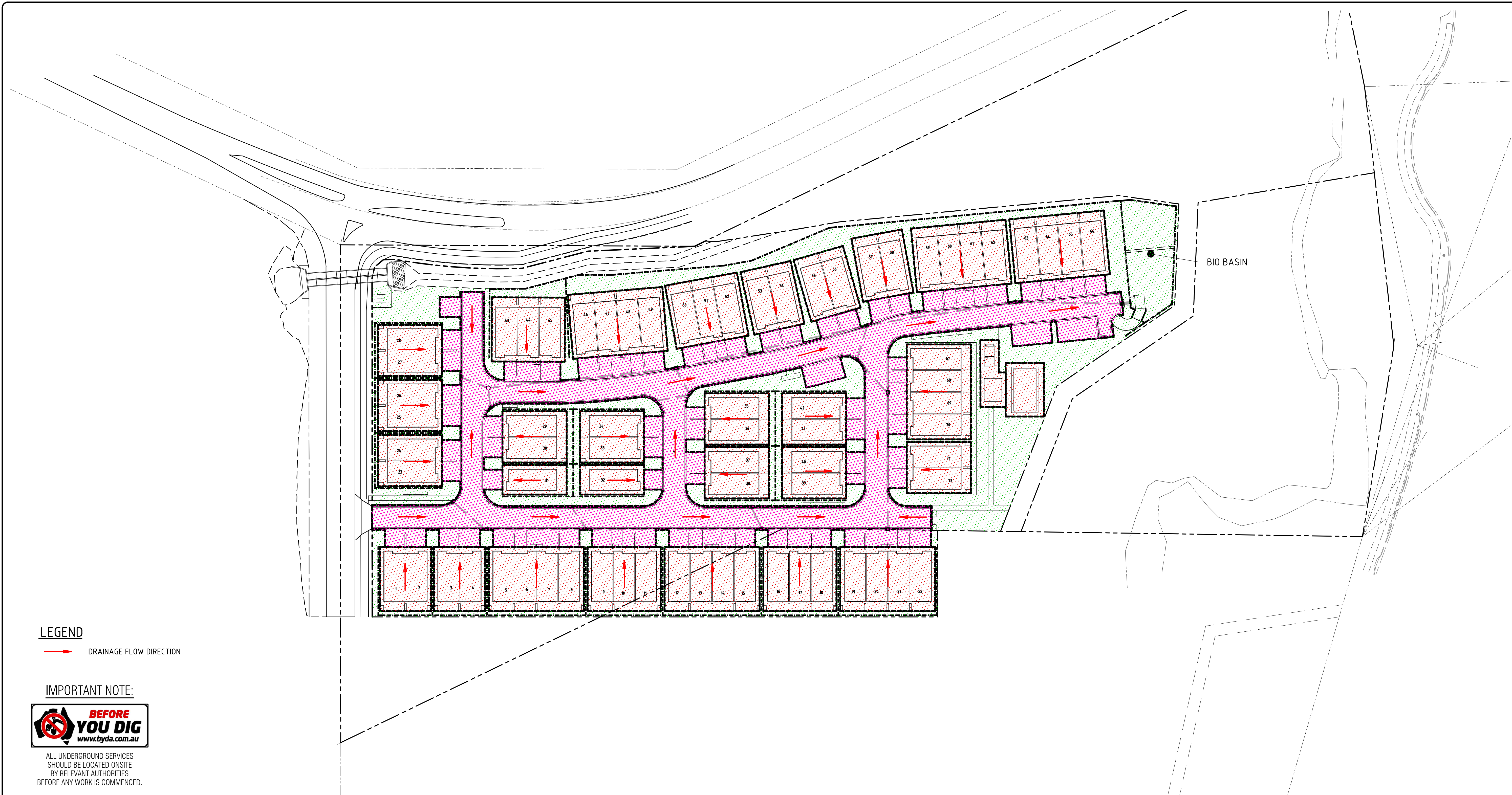
SUITE 7 ADVANCE BUSINESS CENTRE
39 LAWRENCE DRIVE NERANG
PO BOX 2711 NERANG QLD 4211

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E: mail@cozreg.com.au
W: www.cozreg.com.au

DESIGNED	T.W.N.
DRAWN	B.A.R.
CHECKED	T.W.N.

CLIENT	MG LAND PTY LTD	JOB NO.	230094
PROJECT	PROPOSED TOWNHOUSE DEVELOPMENT 202 BAILEYS MOUNTAIN RD, UPPER COOMERA	DRAWING NO.	SK02
	CONCEPT CIVIL WORKS PLAN - 2 OF 2	ISSUE	P1P2P3P4P5P6P7





LEGEND
→ DRAINAGE FLOW DIRECTION

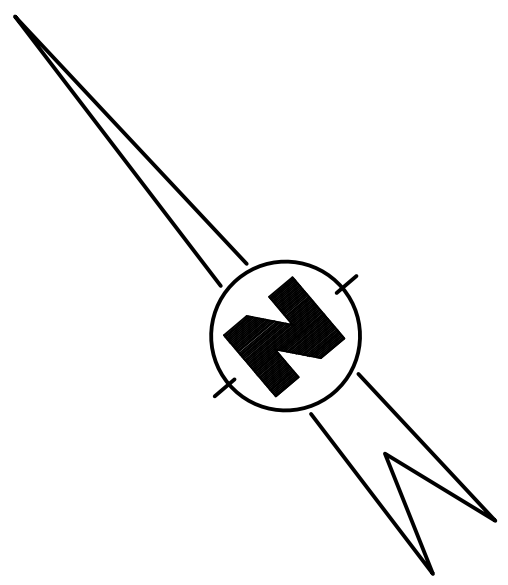
IMPORTANT NOTE:



BEFORE YOU DIG
www.byda.com.au

ALL UNDERGROUND SERVICES SHOULD BE LOCATED ONSITE BY RELEVANT AUTHORITIES BEFORE ANY WORK IS COMMENCED.

MUSIC CATCHMENT TABLE		
CATCHMENT	AREA HA	Fi
ROOF	0.8043	100%
ROAD	0.4867	100%
GROUND	0.4206	30%



No.	DATE	ISSUE	REVISED	CHECKED
P5	01/04/26	PRELIMINARY ISSUE - ARCH UPDATE	B.A.R.	T.W.N.
P4	06/25	PRELIMINARY ISSUE UPDATE	B.A.R.	T.W.N.
P3	02/25	PRELIMINARY ISSUE UPDATE	B.A.R.	T.W.N.
P2	09/24	PRELIMINARY ISSUE - ARCH UPDATE	B.A.R.	T.W.N.
P1	04/24	ORIGINAL ISSUE	B.A.R.	T.W.N.

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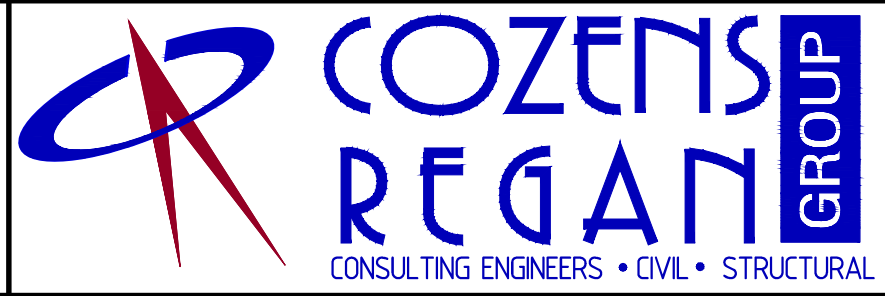
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE A
SCALE B



0 5 10 15 20 1:500

[DATUM AHD (U.N.O.)] SCALES SHOWN ARE AT A1 SIZE



**COZENS
REGAN GROUP**
CONSULTING ENGINEERS • CIVIL • STRUCTURAL

SUITE 7 ADVANCE BUSINESS CENTRE
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CONSULT AUSTRALIA
Member Firm

DESIGNED	TWN
DRAWN	BAR
CHECKED	TWN
APPROVED FOR AND ON BEHALF OF COZENS REGAN GROUP PTY LTD (RPEQ No 157351)	

CLIENT
MG LAND PTY LTD

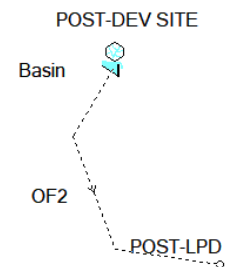
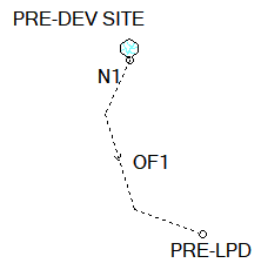
PROJECT
PROPOSED TOWNHOUSE DEVELOPMENT
202 BAILEYS MOUNTAIN RD, UPPER COOMERA
CONCEPT MUSIC PLAN

JOB NO.
230094

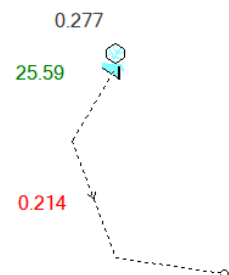
DRAWING NO.
SK20

ISSUE
P1P2P3P4P5

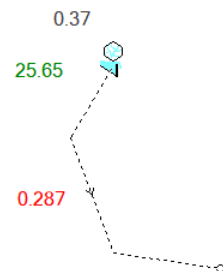
Drains Model Setup



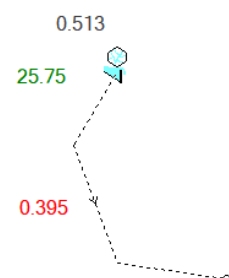
Results for median storm in critical 1EY ensembles
using Lite hydraulic model.



Results for median storm in critical 0.5EY ensembles
using Lite hydraulic model.



Results for median storm in critical 0.2EY ensembles
using Lite hydraulic model.



MG Land Pty Ltd
Proposed Residential Townhouse Development
202 Baileys Mountain Road, Upper Coomera - Lot 58 on SP191940
Site Based Stormwater Management Plan

Results for median storm in critical 10% AEP ensembles
using Lite hydraulic model.



Results for median storm in critical 5% AEP ensembles
using Lite hydraulic model.



Results for median storm in critical 2% AEP ensembles
using Lite hydraulic model.



MG Land Pty Ltd
Proposed Residential Townhouse Development
202 Baileys Mountain Road, Upper Coomera - Lot 58 on SP191940
Site Based Stormwater Management Plan

Results for median storm in critical 1% AEP ensembles
using Lite hydraulic model.

