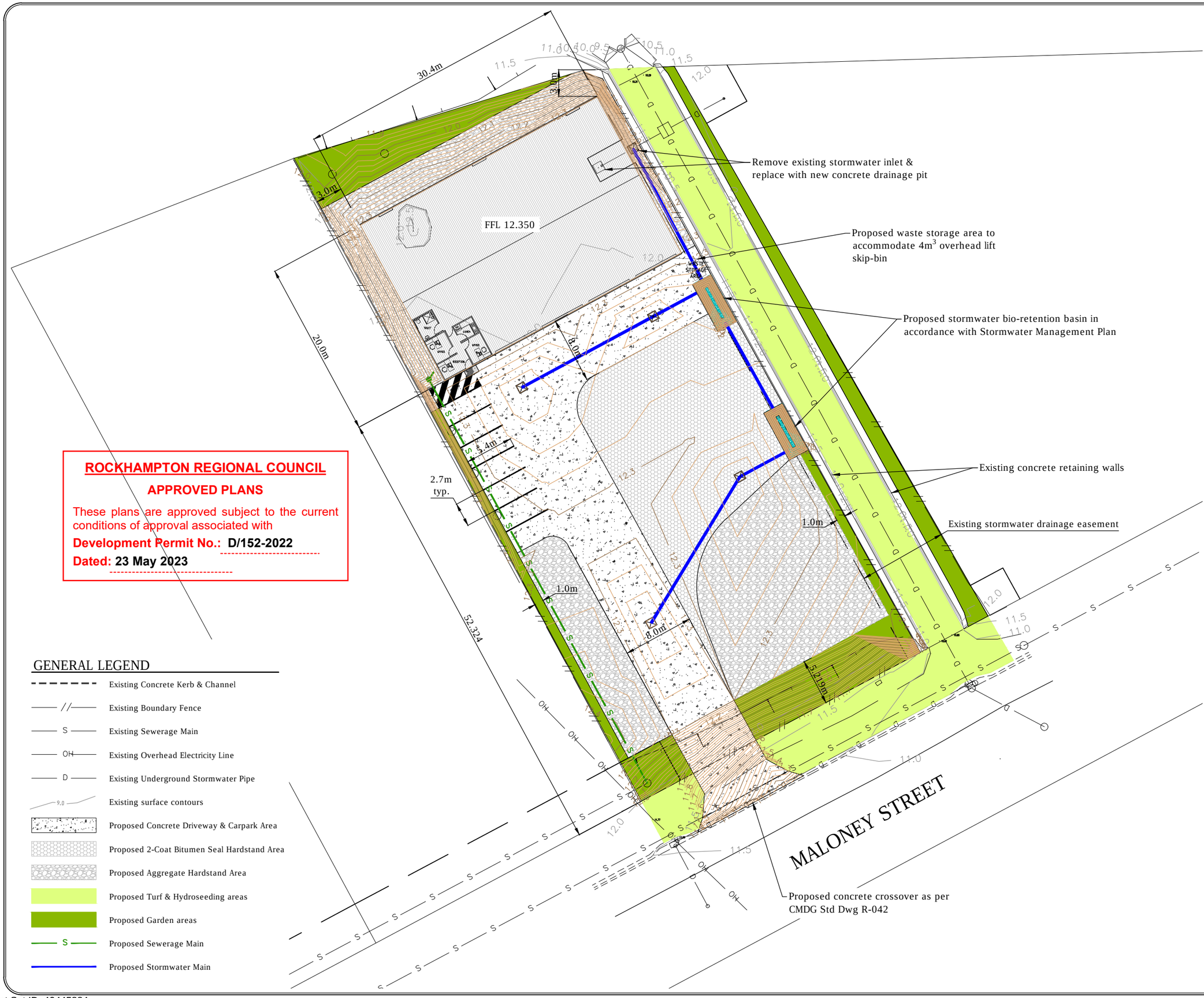

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/152-2022

Dated: 23 May 2023

GENERAL LEGEND

- Existing Concrete Kerb & Channel
- Existing Boundary Fence
- Existing Sewerage Main
- Existing Overhead Electricity Line
- Existing Underground Stormwater Pipe
- Existing surface contours
- Proposed Concrete Driveway & Carpark Area
- Proposed 2-Coat Bitumen Seal Hardstand Area
- Proposed Aggregate Hardstand Area
- Proposed Turf & Hydroseeding areas
- Proposed Garden areas
- Proposed Sewerage Main
- Proposed Stormwater Main

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0 2.0 8.0m 1:400

DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
HARSHA WEERASINGHE	8372

SIGNATURE

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REVISION / ISSUE REGISTER

No.	DATE	REMARKS
A	10/22	MCU SUBMISSION
B	01/23	INFO REQUEST RESPONSE
C	02/23	INFO REQUEST 2 RESPONSE

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

SITE LAYOUT PLAN

DWG No. 22-004/SK01 | C

DO NOT SCALE - IF IN DOUBT ASK

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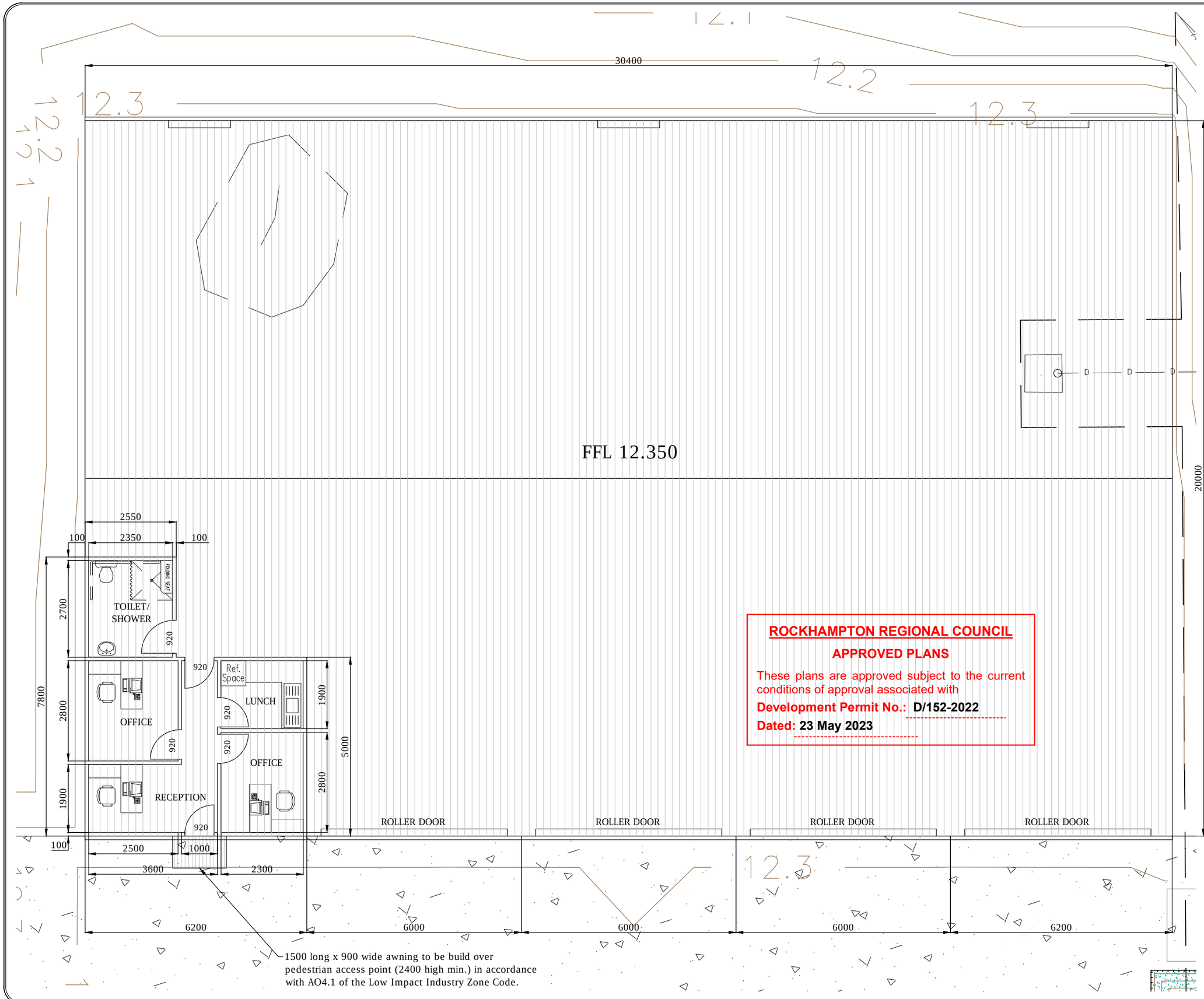

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SCALES:

0 2.0 8.0m 1:400

DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
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TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

FLOOR PLAN

DWG No. 22-004/SK02 C

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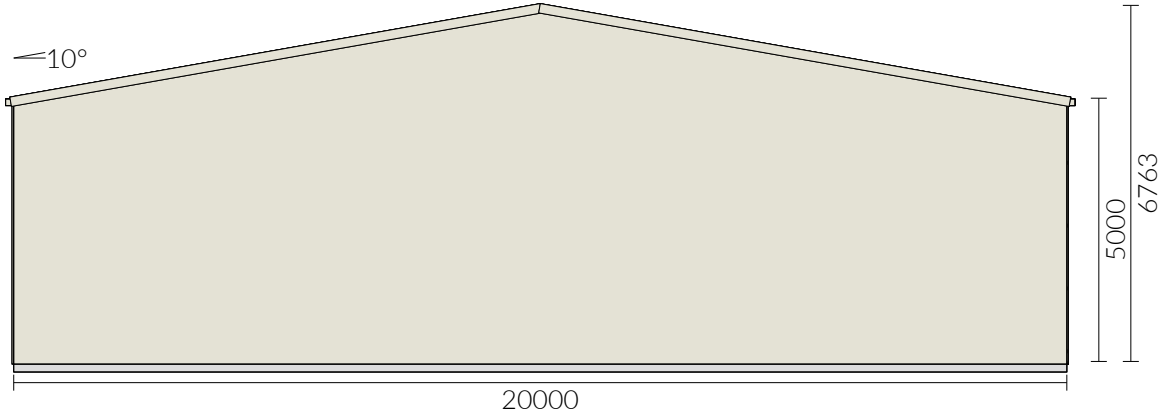
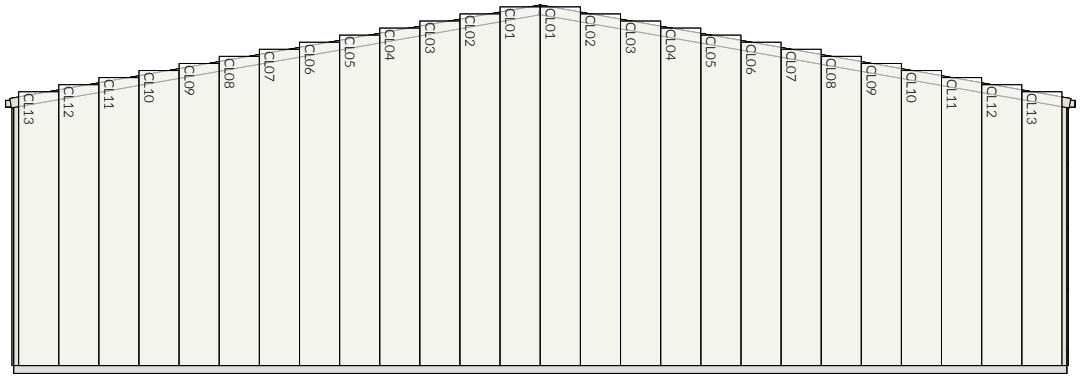
MAIN FRAME 1 ELEVATION WITH CLADDING

Viewed from front of building.



MAIN FRAME 1 ELEVATION CLAD SHEETS

Viewed from front of building.



ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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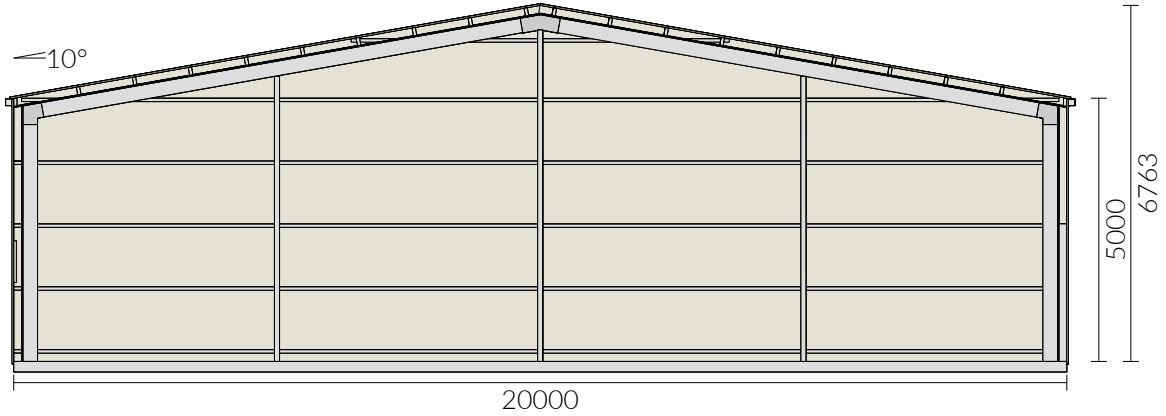
Development Permit No.: **D/152-2022**

Dated: **23 May 2023**

Drawings by Quotec System Pty Ltd. All work to be in accordance with accompanying engineer's details.

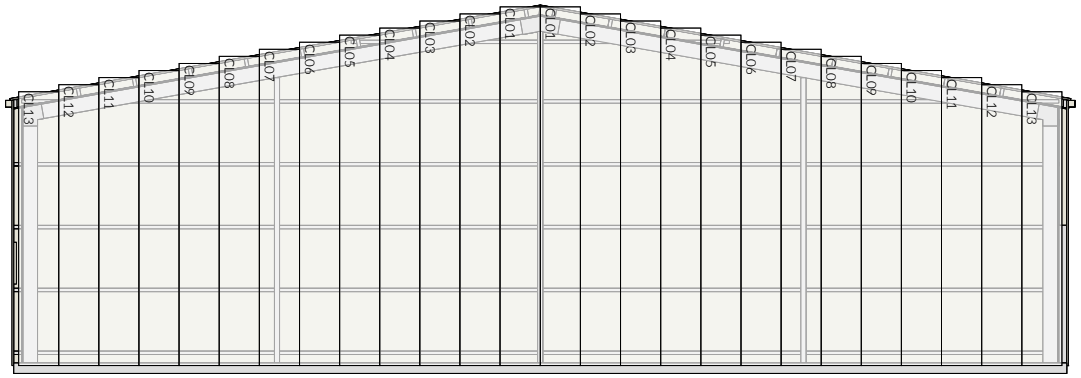
MAIN FRAME 6 ELEVATION WITH CLADDING

Viewed from front of building.



MAIN FRAME 6 ELEVATION CLAD SHEETS

Viewed from front of building.



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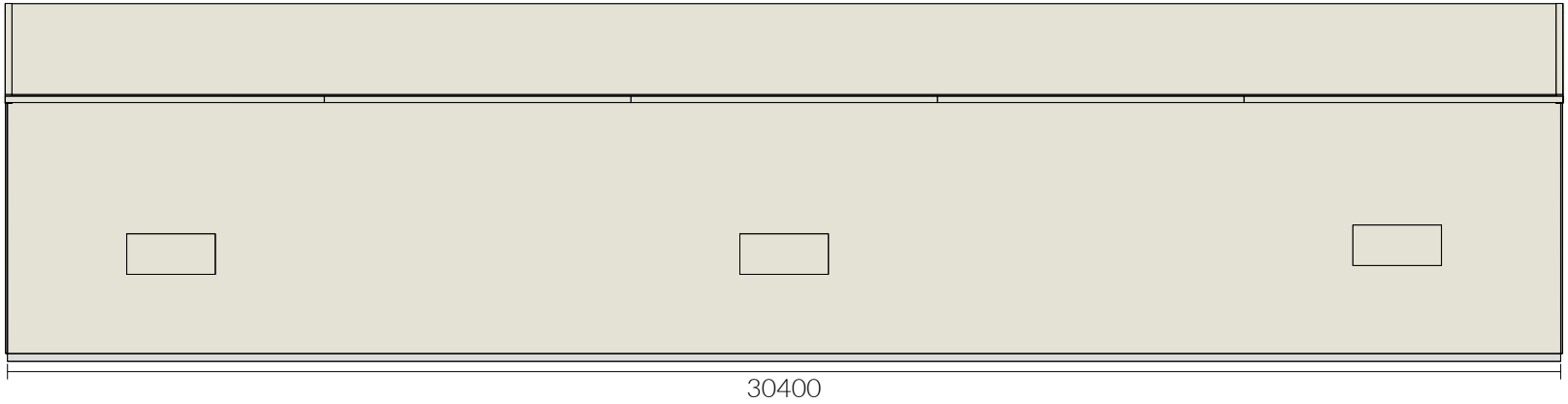
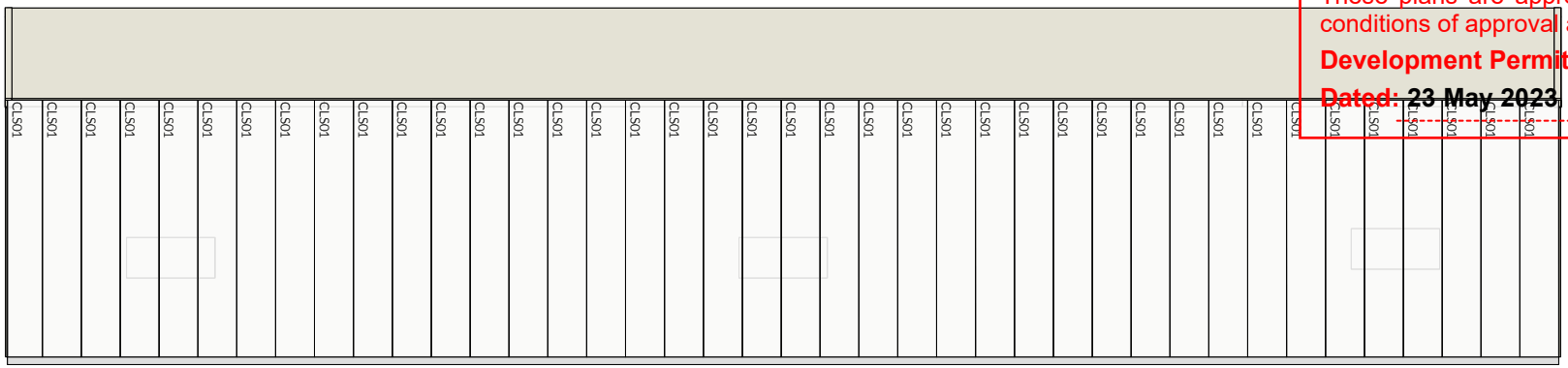
LEFT SIDE MAIN BUILDING ELEVATION WITH CLADDING

Viewed from left of building.



LEFT SIDE MAIN BUILDING ELEVATION CLAD SHEETS

Viewed from front of building.



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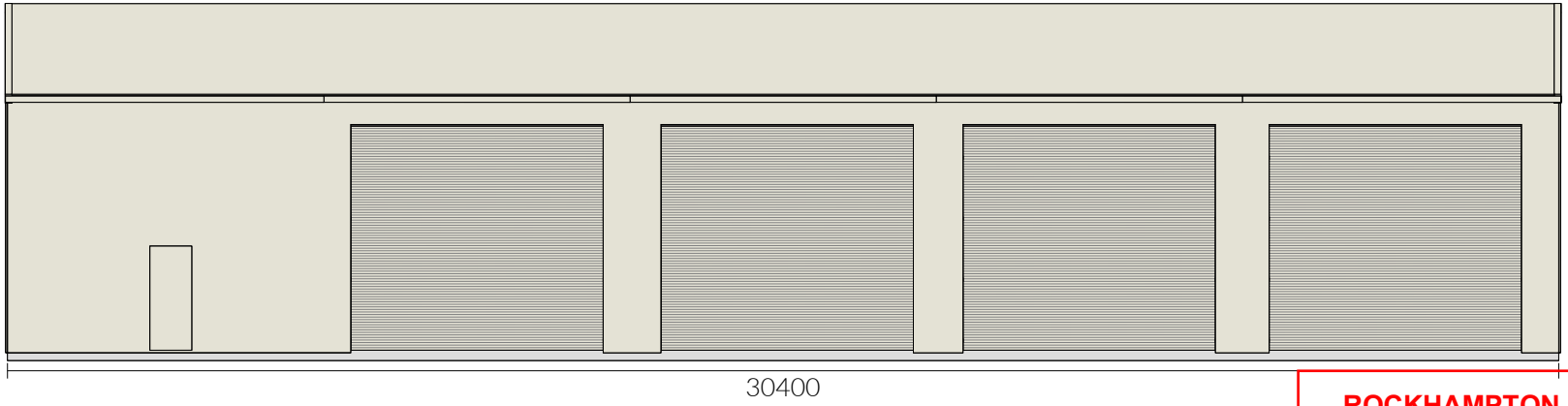
RIGHT SIDE MAIN BUILDING ELEVATION WITH CLADDING

Viewed from right of building.



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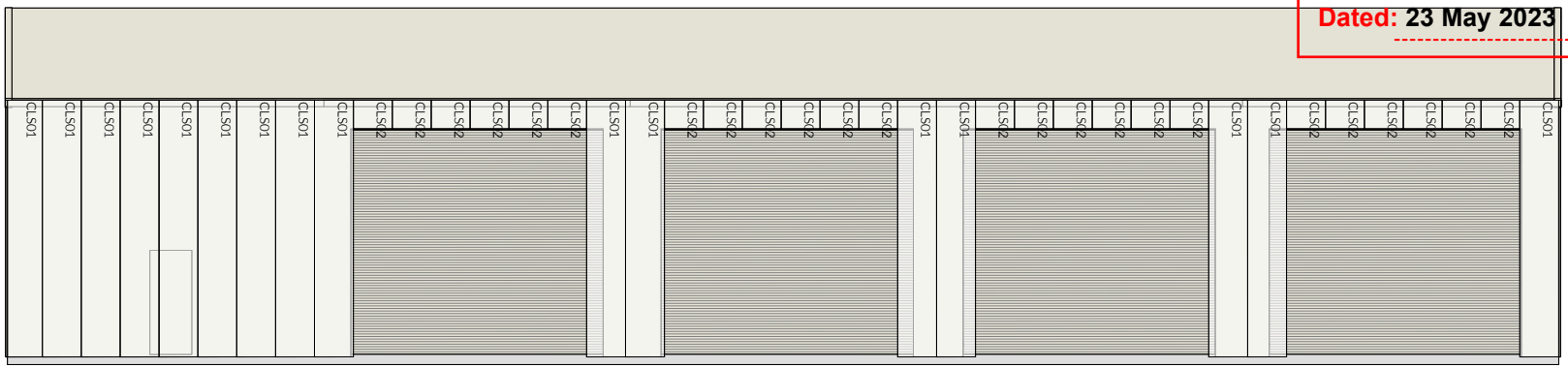
RIGHT SIDE MAIN BUILDING ELEVATION CLAD SHEETS

Viewed from front of building.



CONCEPTUAL STORMWATER MANAGEMENT PLAN

Proposed Industrial Development
159 Maloney Street, Kawana

Lots 39 on SP263881

For TCB Investments Pty Ltd

17 March 2023

File No: OSK6352-0002

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: **D/152-2022**

Dated: **23 May 2023**

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

DOCUMENT CONTROL SHEET

Title:	Conceptual Stormwater Management Plan
Document No:	OSK6352-0002
Original Date of Issue:	17 March 2023
Project Manager:	Aaron Pianta
Author:	Ben Grant
Client:	TCB Investments Pty Ltd
Client Contact:	Russell Schirmer – Contour Consulting
Client Reference:	159 Maloney Street, Kawana
Synopsis:	This *Conceptual Stormwater Management Plan* describes the existing site characteristics, and corresponding stormwater quantity and quality management controls to be implemented during the operation phase of the development.

Reviewed by RPEQ	Reg. No.	Signed	Date
Aaron Pianta	10423		17 March 2023

Revision/Checking History			
Revision No	**Date**	**Checked By**	**Issued By**
A	17 March 2023	Scott Newland	Ben Grant

Distribution		
Recipient	**No of Copies**	**Method**
Russell Schirmer – Contour Consulting	1	PDF

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FIGURES

APPENDICES

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1.0 INTRODUCTION

1.1 Background

OSKA Civil Consultants has been commissioned by TCB Investments Pty Ltd to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application (DA) to the Rockhampton Regional Council (RRC) for the proposed Industrial Development situated at 159 Maloney Street, Kawana.

The subject site is described as Lots 39 on SP263881 and has a total site area of 0.339ha.

1.2 Scope

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development.

This CSWMP aims to:

- Establish the required performance criteria for both the existing and proposed stormwater quantity and quality improvement systems;
- Provide a conceptual design of stormwater infrastructure including stormwater quality improvement devices and stormwater quantity management controls;
- Demonstrate the modelled post-development stormwater quality discharging from the site does not adversely impact on the water quality and ecological values of downstream watercourses;
- Demonstrate stormwater runoff is conveyed through the site to a Lawful Point of Discharge (LPOD) in accordance with the Queensland Urban Drainage Manual (QUDM); and
- Provide reporting and monitoring mechanisms whereby the performance of this system can be measured enabling identification of corrective actions/alterations required to ensure the above mentioned objectives are maintained.

This CSWMP has been prepared in accordance with the IEAust *Australian Runoff Quality: Guide to Water Sensitive Urban Design, Queensland State Planning Policy 2017*, IPWEA *Queensland Urban Drainage Manual (QUDM) Fourth Edition (2017) Queensland Water Quality Objectives (2009), Rockhampton Regional Council (RRC) Planning Scheme (2015) and Capricorn Municipal Development Guidelines (2020)*.

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2.0 SITE DESCRIPTION

2.1 Location

The subject site is located on 159 Maloney Street, Kawana. The site fronts Maloney Street to the south, an open grass area/drainage reserve to the north and existing industrial lots to the east and west. The site covers a total combined area of 0.339ha with details as summarised in Table 1 and as located in Figure 1.

Table 1: Site Description

Client	Lot and Property Description	Street Address
TCB Investments Pty Ltd	*Lots 39 on SP263881*	*159 Maloney Street, Kawana*

Figure 1: Locality Plan (Source: Nearmap)

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2.2 Site Topography

The majority of the existing site is relatively flat with a slight grade to the north at approximately 1% with ground levels on site ranging from 10.88m AHD to 12.40m AHD. The site contains an existing drainage channel and pipe along the eastern boundary that grades towards the existing drainage reserve to the north. Based on the provided survey and aerial information, any stormwater runoff from ground surfaces drains to the existing drainage channel to the east of the site and to the existing drainage reserve to the north of the site.

Refer to Appendix A for further details on the site survey.

2.3 Vegetation and Land Use

The subject site currently consists of grassed open space with an existing retaining wall, drainage channel and pipe along the eastern boundary. Access to the site is gained from the south via Maloney Street.

An aerial photograph taken on the 8 December 2022 of the subject site is included in Figure 2.

Figure 2: Aerial Image of the Site (Source: Nearmap – Image taken 8 December 2022)

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2.4 Proposed Development

The proposed development for the site consists of an Industrial Development. The site will have internal road/hardstand areas covering the majority of the site with a proposed shed at the rear of the site. Access to the site will be provided from the south via Maloney Street.

Refer to Contour Consulting, Site Layout Pan (Ref: 22-004 SK001) for further proposed site layout details included in Appendix B.

2.5 Proposed Conceptual Drainage

It is proposed that the majority of the site's captured stormwater be conveyed to proposed bio-retention basins. The Stormwater Quality Improvement Devices (SQID) will treat the majority of the site's stormwater runoff with as a minimum the Q3-month flow rate being treated by SQID's, with the remainder (greater than Q3 month) to bypass the SQID system discharging directly into the existing drainage channel. All runoff from the proposed road/hardstand areas are to drain through OceanGuards pit inserts prior to discharging into the bio-retention basins. The stormwater connection to the Lawful Point of Discharge (LPOD) is conceptual at this stage, with all captured flows to be discharged into the existing drainage infrastructure to the east of the site.
The proposed drainage regime for the development is to be detail designed by a Building Hydraulics consultant at the detailed design phase.

2.6 Rainfall Data

Rainfall intensity data has been obtained from the Australian Bureau of Meteorology's 2016 Design IFD Rainfall System. The data has been extracted for the nearest grid cell at Latitude 23.3375 (S) and Longitude 150.5125 (E). The IFD data and average rainfall intensities used in this report are in accordance with the procedures outlined in Geosciences Australia, Australian Rainfall and Runoff 2019.

3.0 DATA

Data which has been sourced or provided, in order to prepare this report for the site, was gathered from the following sources:

- Site Survey Plan included as Appendix A;
- Proposed site layout provided by Contour Consulting, Site Layout Pan (Ref: 22-004 SK001);
- LIDAR data for the subject site sourced from Australian Government Elevation and Depth Foundation Spatial Data (ELVIS), Date Source: 2015, DEM Data;
- Rainfall and Meteorological 2016 IFD Data by the Australian Bureau of Meteorology;
- Information Extracted from Rockhampton Regional Council's - Interactive Mapping Portal;
- Aerial Imagery by Nearmap (Accessed on 08 December 2022); and
- MUSIC data sourced from Rainfall Station 39083, Rockhampton;

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4.0 SITE HYDROLOGY

4.1 Background

The following sections define the method and parameters utilised within the hydrologics of the site, in order to establish a simulation of the anticipated flow regime and peak discharge at the Lawful Point of Discharge (LPOD). A Rational Method calculation has been provided for comparison of the pre and post development peak flow rates.
The Rational Method (Section 4.3 of the Queensland Urban Drainage Manual - QUDM 2017) is a suitable estimation technique, given its flexibility in its data requirements and is able to produce satisfactory estimates of peak site discharges based on the following data input:

- specific intensity frequency duration (IFD) data;
- length/type of flow path;
- contributing catchment areas; and
- coefficient of discharge.

4.2 Pre Development

4.2.1 Catchment Definition and Lawful Point of Discharge

The pre-development site has been analysed as a singular internal catchment and has a total contributing area of 3,391m^2. However, the development will not propose any works within the existing drainage channel along the eastern boundary and will have a proposed development extent of 2,788m^2. Stormwater captured on ground surfaces is conveyed as sheet flow into the existing drainage channel to the east of the site.

The existing Lawful Point of Discharge (LPOD) for the subject site (for analysis in accordance with QUDM), is the existing drainage channel to the east of the site.

The catchment area and LPOD for the subject site are shown on OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK6352/P001/A) included as Appendix C.

4.2.2 Coefficient of Runoff

The pre-development coefficient of runoff (C year) was determined based on Table 4.5.4 in QUDM. The pre-development catchment, based on the provided survey and aerial information, has 0m^2 of impervious surfaces, which equates to a fraction impervious (fi) of 0.00. Using a one hour, ten-year rainfall intensity ($^1I_{10}$) of 65.7 mm/hr and Table 4.5.4 in QUDM with average grass cover and medium permeability, a C10 value of 0.66 has been adopted for the pre-development catchment.

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The following pre-development coefficients of runoff (as shown in Table 2) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100 year Average Recurrence Interval (ARI) storms).

Table 2: Pre Development Coefficient of Runoff

Catchment	C_2	C_{10}	C_{20}	C_{100}
PRE	0.56	0.66	0.70	0.80

4.2.3 Time of Concentration

The Time of Concentration (TOC) for the pre development catchment has been calculated in accordance with QUDM Section 4.6.6 – Overland Flow. Friend's Equation ($t = (107*n*L^{0.333})/S^{0.2}$) has been used to calculate the initial travel time using sheet flow. Please refer to *Table 3* for the calculated time of concentration for the pre development catchment.

Table 3: Pre Development Time of Concentration

Catchment	Catchment Area (ha)	Catchment Properties	Time of Concentration		
			Overland flow Friend's Equation	Concentrated Overland Flow Figure 4.8	Total t_c
Pre Development Catchment	0.279	Average grassed surface	Horton's (n) = 0.035 L = 77m Slope = 1% t = 15.9 mins	N/A	16 mins

4.2.4 Design Flow Rates

Pre-development peak flow rates have been estimated for the adopted storms using design rainfall intensities from the Bureau of Meteorology IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3}$ CIA) has been used to estimate the subject site's design peak flow rates. The pre-development peak flows for the subject site are presented in Table 4.

Table 4: Pre Development Peak Flow Estimation – Rational Method

PRE					
Annual Exceedance Probability	**AEP**	39%	10%	5%	1%
Coefficient of Runoff	**C**	0.56	0.66	0.70	0.80
Area of Catchment (ha)	**A**	0.279	0.279	0.279	0.279
Average Rainfall Intensity (mm/h)	**I**	99	139	160	212
Peak Flow Rate (m^3/s)	**Q**	**0.043**	**0.071**	**0.086**	**0.131**

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4.3 Post Development

4.3.1 Catchment Definition and Lawful Point of Discharge

The post-development scenario has been analysed as the same internal catchment (Development Extent) as described in the pre-development scenario and has a contributing area of 2,788m^2.

Stormwater collected from the proposed road/hardstand areas shall be conveyed via an internal network of pits and pipes and conveyed to the proposed bio-retention basins. The captured flows within the basins are to be discharged to the east of the site into the existing drainage channel (the site's LPOD). The runoff from the remaining ground and roof areas are to discharge directly into the existing drainage channel.

The internal building drainage design to facilitate this stormwater strategy is to be coordinated with the Building Hydraulic Engineer at the detailed design phase.

The post development catchment area and LPOD are detailed on OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK6352/P002/A) included as Appendix D.

4.3.2 Coefficient of Runoff

The post-development coefficients of runoff (C year) were determined using the fraction impervious method as specified in QUDM.

Based on the supplied architectural plans, the post-development catchment has approximately 2,256m^2 of impervious surfaces which equates to a fraction impervious (fi) of 0.81. Using a one-hour, ten-year rainfall intensity ($^1I_{10}$) of 65.7 mm/hr, a C10 value of 0.85 has been adopted for the post-development catchment.

The following post-development Coefficients of Runoff (as shown in *Table 5*) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100-year ARI storms).

Table 5: Post Development Coefficient of Runoff

Catchment	C_2	C_{10}	C_{20}	C_{100}
POST	0.72	0.86	0.90	1.00

4.3.3 Time of Concentration

The Time of Concentration for the post developed catchment has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the post-development catchment will have a time of concentration that will incorporate 5 minutes of the roof to ground time plus one minute of pipe flow. This equates to a total travel time of six (6) minutes.

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4.3.4 Design Flow Rates

Post-development peak flow rates have been calculated for the adopted storms using design rainfall intensities from the Bureau of Meteorology 2016 IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3}$ CIA) has been used to estimate the required design peak flow rates for the subject site. The post-development peak flows for the subject site are presented in Table 6.

Table 6: Post Development Catchment Peak Flow Estimation – Rational Method

POST					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	**C**	0.72	0.85	0.90	1.00
Area of Catchment (ha)	**A**	0.279	0.279	0.279	0.279
Average Rainfall Intensity (mm/h)	**I**	138	194	222	292
Peak Flow Rate (m^3/s)	**Q**	**0.077**	**0.128**	**0.154**	**0.227**

4.4 Change in Flow Rates

The difference in peak flow rates calculated from the total pre and post developed site has been estimated via The Rational Method, with the results detailed in Table 7.

Table 7: Change in Peak Flow Rates Estimation – Rational Method

Annual Exceedance Probability	**AEP**	39%	10%	5%	1%
Pre Developed Peak Flow Rate (m^3/s)	**Q**	0.043	0.071	0.086	0.131
Post Developed Peak Flow Rate (m^3/s)	**Q**	0.077	0.128	0.154	0.227
Change in Peak Flow Rate (m^3/s)	**Q**	**+0.034**	**+0.057**	**+0.068**	**+0.096**

The Rational Method assessment has demonstrated that an increase in peak flow rates discharging to the existing drainage channel is anticipated due to the proposed development. On-Site Detention (OSD) would typically be required to mitigate flows to the pre-development conditions, however the site is located within the lower end of the contributing catchment with the site directly adjacent to an existing drainage reserve. Therefore, the development will not propose any formal stormwater detention structures as the site is located within the lower end of the Fitzroy River catchment and if detention is provided it is anticipated that the peak flows may coincide with the wider catchments flood peak.

4.5 External Catchments

The subject site and the surrounding area were examined to determine if any localised external catchments will contribute to the site. The site was deemed to contain an external catchment from the south that conveys flows along the eastern boundary of the site. The flows are conveyed through the existing stormwater system consisting of pipe and overland (channel) flow that runs along the eastern boundary of the subject site. The existing system is anticipated to be sufficiently designed and sized to convey up to the 1% AEP flows with the channel constructed as part of an industrial subdivision (D\377-2012) in 2012. The existing ground levels on site will be maintained which will provide sufficient freeboard for the proposed development. As such, the development will not analyse the external catchment flows as it is anticipated that the existing channel and pipe system is sized sufficiently to convey the external flows up to the 1% AEP.

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5.0 STORMWATER QUALITY ASSESSMENT

5.1 Background

The development of the land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourses. During the construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediments and nutrients washing from the site.

The following sections describe the construction and operational phase controls and water quality modelling of the proposed treatment train in compliance with Council guidelines.

5.2 Construction Phase

A high risk of stormwater pollution will occur from the site during the construction phase due to erosion and sediment transportation off-site to the receiving environment. The majority of this risk results from construction activities disturbing the site and exposing areas of soil to the direct erosive influence of the environment.

The following section outlines the procedures necessary to minimise erosion and control sediment during construction in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document.

5.2.1 Key Pollutants

The key pollutants have been identified for the Construction Phase of this development.

Table 8: Key Pollutants, Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material offcuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.
Toxic Materials	Cement slurry, asphalt primer, solvents, cleaning agents, and wash waters (e.g., from tile works).
Acids or Alkaline substances	Acid sulphate soils, cement slurry and wash waters.

5.2.2 Sediment and Erosion Controls

Sediment and Erosion Control devices (S&EC) employed on the site shall be designed and constructed in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document as shown on OSKA Consulting Group, Sediment and Erosion Control Plan (Ref: OSK6352/P005/A); OSKA Consulting Group, Sediment and Erosion Control Details (Ref: OSK6352/P006/A) included as Appendix F.

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Pre-Construction

- Stabilised site access/exit onto Maloney Street to the south;
- Sediment fences to be located around the perimeter of the site;
- Dust fencing to be installed if required; and
- Educate site personnel to the requirements of Erosion and Sediment Control Plan.

Initial Construction

- Maintain construction access/exit, sediment fencing, dust fences and all other existing controls as required;
- Construct diversion drains to convey disturbed site run-off to the temporary sediment traps; and
- Confine construction activities to stages to minimise areas of disturbance at any given time.

Second Stage Construction

- Maintain construction access/exit, sediment fencing, dust fences, diversion drain and all other existing controls as required;
- Progressively revegetate finished areas where applicable;
- Divert runoff from undisturbed areas around disturbed areas; and
- Drainage structure protection around field inlets and gully pits.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include covering the soil and watering. Road accesses are to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dust from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter, hydrocarbons, toxic materials, acids or alkaline substances.

5.2.3 Water Quality Monitoring and Inspections

To ensure that the water quality objectives are being met during the construction phase of the development, water quality monitoring shall be conducted. Water quality monitoring shall use a calibrated probe or sampling and testing at a NATA registered laboratory.

Location: Monitoring Stations MS1 shown on OSKA Consulting Group, *Sediment and Erosion Control Plan* (Ref: OSK6352/P005/A).

Parameters: Site discharge criteria.

Frequency: Following at least 30 mm of rainfall in a 24-hour period.

The contractor shall be responsible for the inspection and maintenance of all sediment and erosion control devices. Additional controls and review of existing controls shall be undertaken in response to the results of the above-mentioned monitoring program.

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5.2.4 Reporting

An inspection report shall be written by a suitably qualified and experienced scientist/engineer following each water quality monitoring episode. The report shall include at least the following information:

- Name, address and real property description for the development site;
- Council file reference number (if known);
- Monitoring locations;
- Performance criteria;
- Results for each monitoring location, identifying any breaches of performance criteria;
- Recommended corrective actions to be taken and additional sediment and erosion controls, if required; and
- Inspection reports shall be provided to the contractor for their action and compilation in an on-site register.

If the above-mentioned performance criteria are exceeded and results from the downstream monitoring stations show significant deterioration from upstream results (if applicable), the contractor shall implement all recommendation of the inspection report within one (1) working day of receipt of the report.

5.3 Operational Phase

The following sections provide details of the Stormwater Quality Improvement Devices (SQID's) proposed for the operational phase of the development. OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6352/P003/A); OSKA Consulting Group, Conceptual Stormwater Management Details (Ref: OSK6352/P004/A) in Appendix E illustrates the size and location of the proposed SQID's.

5.3.1 Stormwater Quality Objectives

To protect the water quality of the downstream watercourses the following Water Quality Objectives (WQO's) have been applied to stormwater runoff from the site in accordance with the RRC Planning Scheme 2015.

Best Management Practices (BMP) are required to be demonstrated for all Development Applications within the Rockhampton Regional Council region and are recommended to be implemented by the developer. Where practicable, methods such as first flush devices, and discharging stormwater to landscaped/grassed areas prior to discharge to the LPOD, are to be incorporated into the site's stormwater strategy, where the opportunity is available.

The following load reduction targets must be achieved when assessing the post-development treatment train (comparison of unmitigated developed case versus developed mitigated case).

- 80% reduction in Total Suspended Sediment (TSS)
- 60% reduction in Total Phosphorus (TP)
- 45% reduction in Total Nitrogen (TN)
- 90% reduction in litter (sized 5 mm or greater)

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5.3.2 Post Development MUSIC Modelling

To assess the potential quantities of pollutants anticipated to be discharged from the site, the water quality modelling package 'Model for Urban Stormwater Improvement Conceptualisation' (MUSIC) V6.3 by eWATER has been applied. MUSIC Modelling Parameters and delineated data have been sourced from Water by Design, MUSIC Modelling Guidelines, and where possible, via online MUSIC Link data.

Rainfall data has been sourced from Rainfall Station 39083, (Rockhampton) using a date range from 1999 to 2010 and a 6 Minute Time Step, in accordance with RRC requirements.

5.3.3 Stormwater Quality Improvement Devices

A Water Sensitive Urban Design (WSUD) approach has been adopted for the site with the stormwater runoff from the road/hardstand areas being conveyed through OceanGuard pit inserts prior to being treated by two separate bio-retention basins located along the eastern boundary of the site. The bio-retention basins will treat runoff from the proposed road/hardstand areas of the development as it is deemed more suitable for the proposed site use with the proposed roof and ground areas to bypass the proposed treatment system. The roof area that is bypassing the proposed treatment system is not envisaged to cause any major adverse effects on the downstream waterways with the roof area to only accumulate and discharge minimal pollutants into the receiving system. The ground areas proposed to bypass the treatment system are anticipated to be similar to the existing site and will discharge directly into the LPOD.
It is to be noted that all areas bypassing the proposed treatment system will not be included in the MUSIC modelling as they are not anticipated to cause any major adverse effects to the downstream receiving waterways.

The proposed SQID's have been provided for modelling purposes only and is subject to council approval. Accordingly, similar alternative devices may be adopted with council review and approval.

The adopted MUSIC catchment areas for the subject site are as follows;

Table 9: Adopted MUSIC Catchment Areas

Catchment	Area (m^2)	% Impervious
Southern Road (Industrial)	921	100
Northern Road (Industrial)	694	100
TOTAL Site	**1 615**	

Stormwater runoff captured from the road areas will be conveyed through OceanGuard Pit inserts prior to discharging into one of the two bio-retention basins.
All inlet pits within the development are to contain an OceanGuard pit insert.

An illustration of the MUSIC model of the adopted operational treatment train for the post-development site has been provided in Figures 3 and 4.

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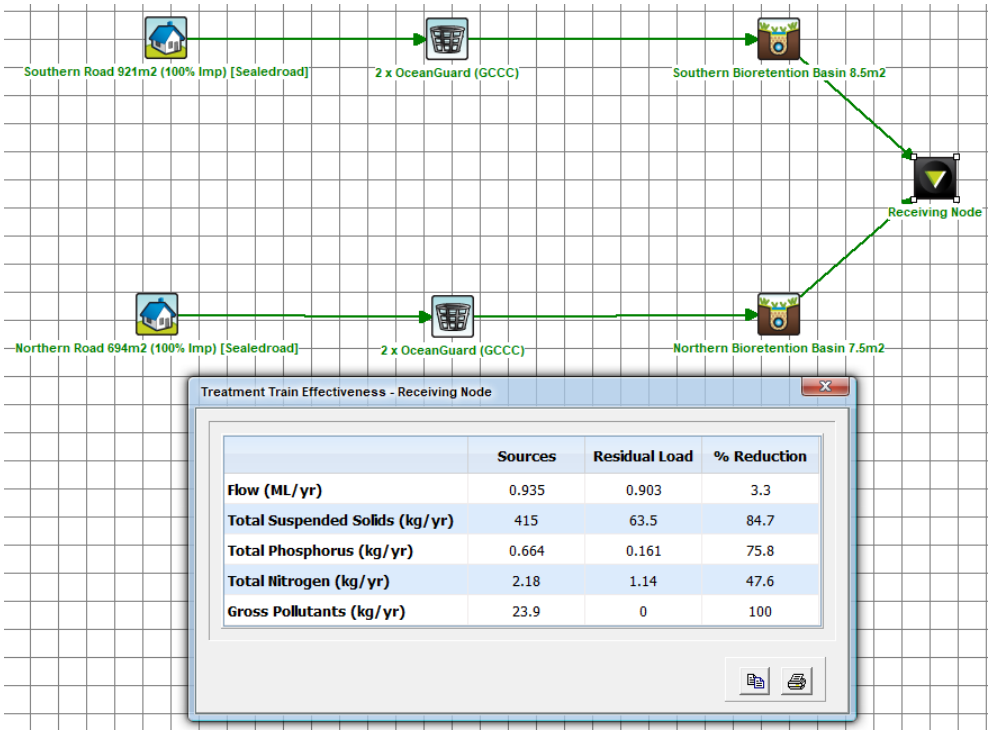

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.935	0.903	3.3
Total Suspended Solids (kg/yr)	415	63.5	84.7
Total Phosphorus (kg/yr)	0.664	0.161	75.8
Total Nitrogen (kg/yr)	2.18	1.14	47.6
Gross Pollutants (kg/yr)	23.9	0	100

Figure 3: Operational Phase Treatment Train (Source: MUSIC Model)

5.3.4 Design Parameters of the Stormwater Quality Improvement System

Detailed design of the stormwater treatment train shall be in accordance with the Water Sensitive Urban Design (WSUD), Technical Design Guidelines for South East Queensland – Version 1 (June 2006).

Bio-Retention Basins

A bio-retention basin is designed to pond stormwater allowing it to percolate through a layer of filter media, typically sandy loam. Runoff passing through the filter media is collected with a perforated pipe discharging to the downstream drainage infrastructure. The bio-retention basin shall be located to treat the majority of the stormwater from the development area.

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The bio-retention basins have been modelled with the following properties:

- Filter media — Sandy Loam;
  5 – 10% Organic Content in accordance with AS1289.4.1.1;
  Average D50 0.45 mm;
  Ksat 200 mm/hr;
  TN Content = 400 mg/kg;
  Orthophosphate Content = 30 mg/kg;
- Filter media depth — 0.40 m;
- Drainage layer — 0.20 m;
- Extended detention depth — 0.30 m;
- Seepage — 0 mm/hr;
- Filter Area — 8.5m^2 Southern Basin & 7.5m^2 Northern Basin;
- Surface Area — Same as filter area above.

For further details of the proposed bio-retention basins refer to OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6352/P003/A); OSKA Consulting Group, Conceptual Stormwater Management Details (Ref: OSK6352/P004/A) included at Appendix E.

OceanGuard

The Ocean Protect OceanGuard with 200micron mesh bag (OG-200) are an insert that is designed to fit into stormwater pits and trap any pollutants that would usually flow into the drainage network. It has openings to allow water to bypass the screening bag during high flows

For details of the proposed SQID's please refer to Appendix G which details Ocean Protects, *OceanGuard Typical Arrangement.*

5.3.5 Post Development Modelling Results - Mitigated

The modelled Stormwater Quality Improvement Devices (SQID) have demonstrated a reduction in the amount of sediments and nutrients discharging from the proposed residential development. Table 10 illustrates the effectiveness of the SQID's in the treatment train for the development.

Table 10: Treatment Train Effectiveness at Receiving Node

Parameter	Post	Post Mitigated	Reduction	Water Quality Objectives
Flow (ML/yr)	0.935	0.903	3.3 %	-
TSS (kg/yr)	415	63.5	84.7 %	80 %
TP (kg/yr)	0.664	0.161	75.8 %	60 %
TN (kg/yr)	2.18	1.14	47.6 %	45 %
Gross Pollutants (kg/yr)	23.9	0	100 %	90 %

The results demonstrate that the proposed SQID's meet the intended Water Quality Objectives for Gross Pollutants, Suspended Solids, Phosphorous and Nitrogen levels, in accordance with the Rockhampton Regional Council Requirements.

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6.0 OPERATIONAL PHASE MAINTENANCE REQUIREMENTS

The proposed stormwater management devices will require maintenance and monitoring to ensure that they function as designed. The following section provides an outline of the necessary maintenance tasks for the proposed devices.

6.1 Bio-retention Basin Maintenance

The most intensive period of maintenance is during the plant establishment period (first two years) when weed removal and replanting may be required. It is also the time when large loads of sediments could impact on plant growth particularly in developing catchments with poor building controls.

Maintenance is primarily concerned with:

- Maintenance of flow to and through the bio-retention basin;
- Maintaining vegetation;
- Preventing undesired overgrowth vegetation from taking over the bio-retention basin;
- Removal of accumulated sediments; and
- Litter and debris removal.

Vegetation maintenance will include:

- Fertilising plants;
- Removal of noxious plants or weeds; and
- Re-establishment of plants that die.

Sediments accumulated at the inlets need to be monitored. Depending on the catchment activities the deposition of sediment can tend to smother plants and reduce the ponding volume available. Should excessive sediment build-up it will impact on the plant health and require removal before it reduces the infiltration rate of the filter media. The proposed SQID will require regular maintenance and monitoring to ensure that it functions as designed.

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Table 11: Bio-retention Basin Maintenance Schedule

Bio-retention Basin Maintenance Checklist			
Inspection Frequency: 3 Monthly	**Date of Visit:**		
Location:			
Description:			
Site Visibility:			
Inspection Items	**Yes**	**No**	**Action Required (Details)**
Sediment accumulation at inflow points?			
Litter basin?			
Erosion at inlet or other key structures (e.g. crossovers)?			
Traffic damage present?			
Evidence of dumping (Building waste, oils etc)?			
Vegetation condition satisfactory (density, weeds etc)?			
Replanting required?			
Mowing required?			
Clogging of drainage points (sediment or debris)?			
Evidence of ponding?			
Damage/vandalism to structures present?			
Surface clogging visible?			
Drainage system inspected?			
Resettling of system required?			
Comments:			

6.2 OceanGuard

The OceanGuard's frequency of maintenance will depend on the catchment conditions. The maintenance regime includes trash, debris and sediment removal. Inspections to ensure the system is operating effectively are to be carried out biannually and after any major storm events. A maintenance contract with Ocean Protect will include OceanGuard cleaning every 4 months.

Detailed inspection and maintenance instructions for the OceanGuard are detailed in Ocean Protect, OceanGuard *Operations and Maintenance Manual* found in *Appendix G*.

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7.0 ASSET HANDOVER

The proposed stormwater quality devices shall be dedicated to the owner following the time of practical completion for the proposed development. An Asset Handover Checklist is provided as Table 12 as a guideline for the necessary steps to be taken prior to the end of the maintenance period.

Table 12: Asset Handover Checklist

Asset Location:		
Construction By:		
Maintenance Period:		
Treatment:	**Y**	**N**
Actual treatment performance equivalent to design:		
Maintenance:		
Maintenance Plans Provided:		
Inspection and maintenance undertaken as per maintenance plan:		
Inspection and maintenance forms provided:		
Asset inspected for defects:		
Asset Information:		
Design assessment checklist provided:		
As constructed plans provided:		
Copies of all permits provided:		
Digital files provided:		

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8.0 CONCLUSIONS

OSKA Civil Consultants has been commissioned by Contour Consulting to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application (DA) to the Rockhampton Regional Council (RRC) for the proposed Industrial Development situated at 159 Maloney Street, Kawana. This CSWMP intends to provide an optimised stormwater management system that would be compatible and readily integrated into the proposed site use.

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development and satisfies the requirements of the Rockhampton Regional Council Guidelines.

A hydrological analysis demonstrated that the anticipated post-development peak flow rates discharging from the site are higher than pre-development flow rates, however due to the site adjacent to an existing drainage reserve and located within the lower end of the Fitzroy River catchment, the development will not propose any formal stormwater detention structures.

The subject site was determined to have an influencing external catchment from the south. The external catchments flows are to be captured and conveyed by the existing stormwater infrastructure within Maloney Street that includes the existing drainage channel and pipe along the site's eastern boundary. It is anticipated that the existing stormwater infrastructure has been sufficiently designed and sized to convey the external catchments flows up to the 1% AEP event.

OSKA Civil Consultants has adopted a Water Sensitive Urban Design (WSUD) approach, in accordance with the State Planning Policy, to managing the stormwater runoff from the proposed developments road/hardstand areas by treating stormwater runoff within two (2) bio-retention basins with 7.5m^2 of bio filter area for the northern catchment and 8.5m^2 for the southern catchment and a minimum total of 4 x Ocean Protect OceanGuard pit inserts with a pit insert to be installed within each pit within the proposed development. The SQID's utilised within the MUSIC model have been adopted to demonstrate a potential treatment system, pending council approval.

A monitoring and maintenance plan for the proposed infrastructure has been included. A sediment and erosion control plan is provided for the construction phase of the development and shall be implemented by the contractor and developer.

This stormwater quality strategy has been defined by demonstrating the preliminary requirements and layout of the proposed development to demonstrate compliance with the State Planning Policy 2017 and the RRC Planning Scheme Stormwater Quality Management requirements.

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APPENDIX

A

Site Survey Plan

Document Set ID: 40445886
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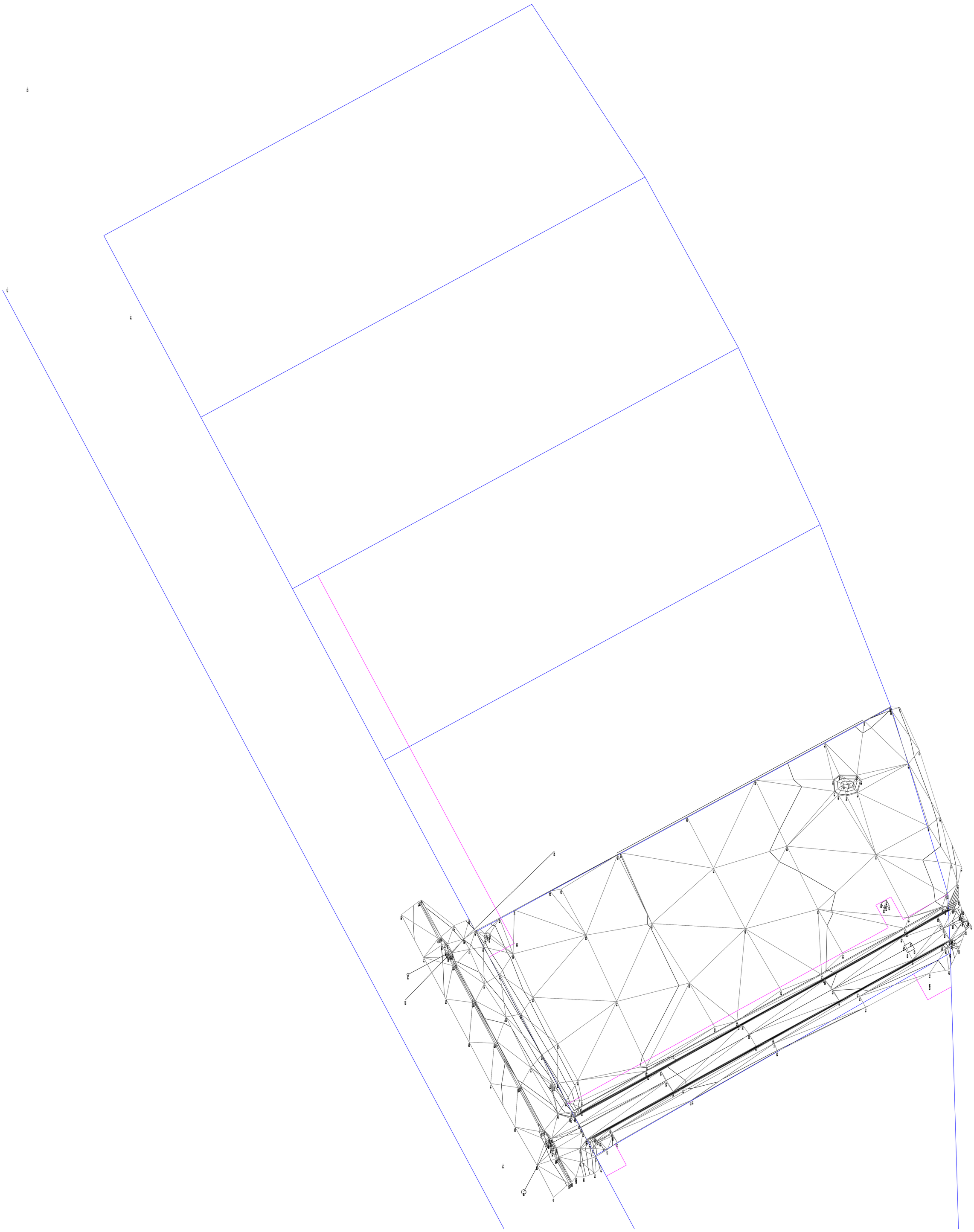


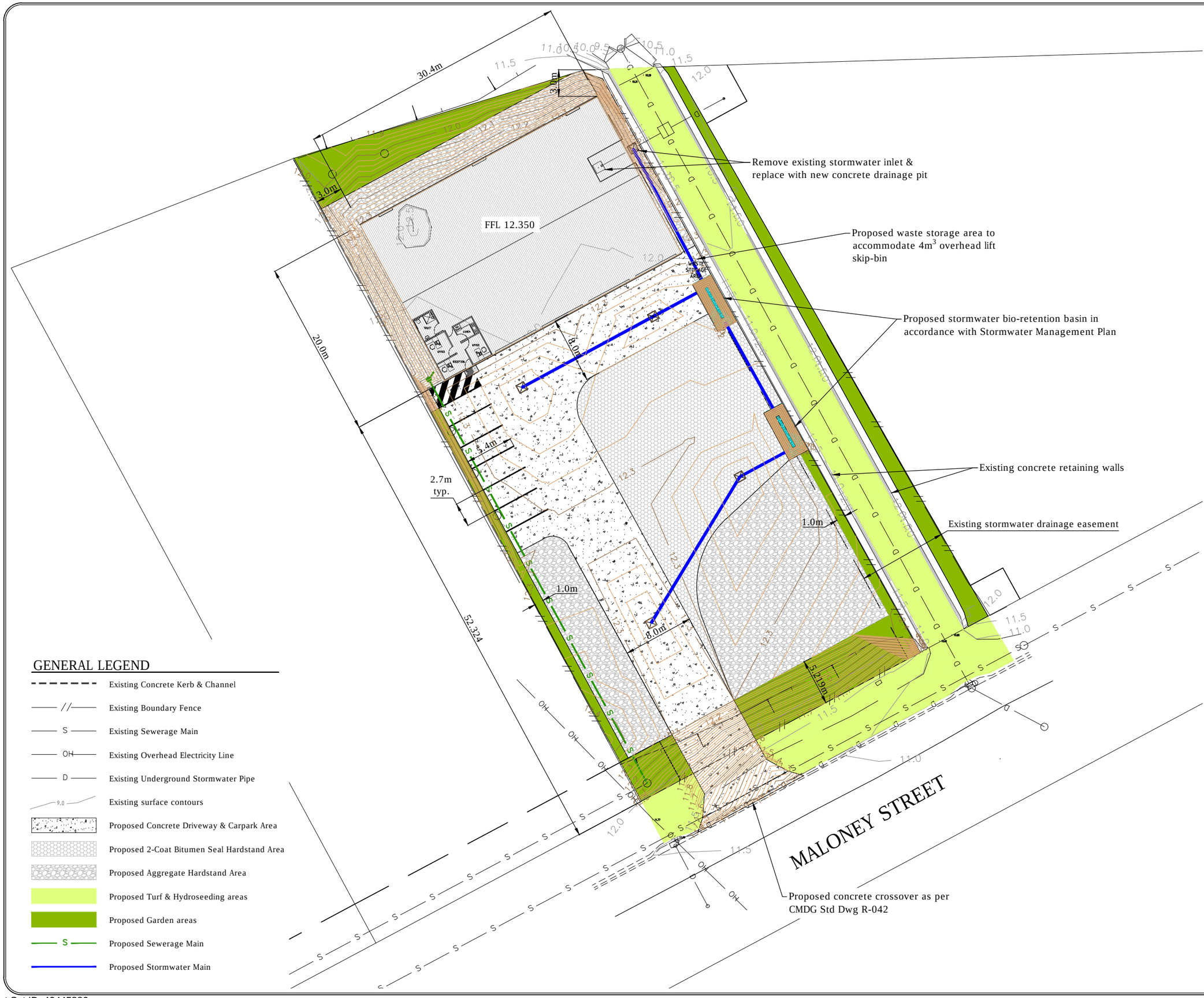
Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

B

Contour Consulting, Site Layout Pan (Ref: 22-004 SK001)

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023



GENERAL LEGEND

- Existing Concrete Kerb & Channel
- Existing Boundary Fence
- Existing Sewerage Main
- Existing Overhead Electricity Line
- Existing Underground Stormwater Pipe
- Existing surface contours
- Proposed Concrete Driveway & Carpark Area
- Proposed 2-Coat Bitumen Seal Hardstand Area
- Proposed Aggregate Hardstand Area
- Proposed Turf & Hydroseeding areas
- Proposed Garden areas
- Proposed Sewerage Main
- Proposed Stormwater Main

Contour Consulting

ABN 98 125 137 348

349 Hobler Avenue
Frenchville
Rockhampton QLD 4701
Central Queensland

Telephone: 07 4928 2898
Email: contour.consulting@bigpond.com

SCALES:

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DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
HARSHA WEERASINGHE	8372

SIGNATURE

SIRIS & ASSOCIATES
CONSULTING ENGINEERS
ADDRESS: Shop 3 5-7 Normanby St, Yeppoon, 4703
PHONE: 07 4930 2877 (office), 0407 119 734 (mobile)
ABN:34 481 028 699

REVISION / ISSUE REGISTER

No.	DATE	REMARKS
A	10/22	MCU SUBMISSION
B	01/23	INFO REQUEST RESPONSE
C	02/23	INFO REQUEST 2 RESPONSE

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

SITE LAYOUT PLAN

DWG No. 22-004/SK01 | C

DO NOT SCALE - IF IN DOUBT ASK

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

C

OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK6352/P001/B)

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

LEGEND

- STORMWATER CATCHMENT BOUNDARY
- (A) STORMWATER CATCHMENT I.D.
- 80.0 EXISTING SURFACE CONTOURS
- ● LPOD LAWFUL POINT OF DISCHARGE
- FLOW DIRECTION
- SITE BOUNDARY
- EXISTING EASEMENT BOUNDARY

EXISTING SERVICES LEGEND

- S EXISTING SEWER (FROM SURVEY)
- E-O/H EXISTING OVERHEAD ELECTRICAL (FROM SURVEY)
- SWD EXISTING STORMWATER (FROM SURVEY)

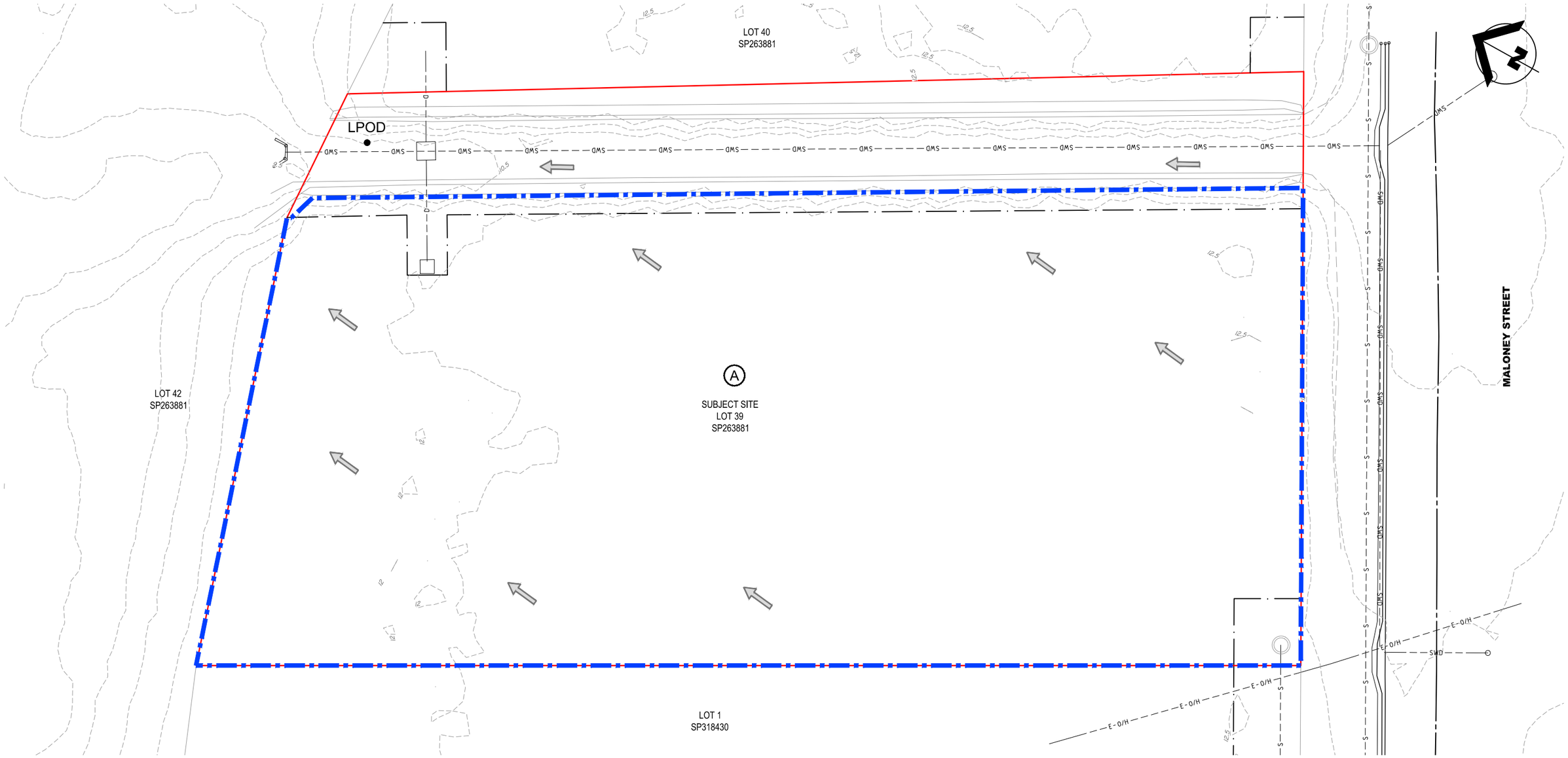
NOTE:

THE LAWFUL POINT OF DISCHARGE FOR THE SITE IS THE EXISTING DRAINAGE CHANNEL.

STORMWATER CATCHMENT TABLE	
STORMWATER CATCHMENT I.D.	AREA (m²)
A	2788
TOTAL	2788

REPORT ISSUE
NOT FOR CONSTRUCTION

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS



ISSUE No.	DATE	AMENDMENT
A	17-03-23	ISSUED FOR REPORT

OSKA CONSULTING GROUP

CLIENT: TCB INVESTMENTS PTY LTD

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
159 MALONEY STREET, KAWANA
ROCKHAMPTON 4701

DESIGN	DRAWN	APPROVED
BG	YL	

TITLE: PRE DEVELOPMENT CATCHMENT PLAN

SCALE: 1:150 AT A1, 1:300 AT A3 — 0 5 10 15m

PROJECT NO.: OSK6352

DWG NO.: P001

ISSUE: A

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

D

OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK6352/P002/A)

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

LEGEND

- STORMWATER CATCHMENT BOUNDARY
- STORMWATER QUALITY CATCHMENT
- (A) STORMWATER CATCHMENT I.D.
- 80.0 EXISTING SURFACE CONTOURS
- LPOD LAWFUL POINT OF DISCHARGE
- FLOW DIRECTION
- SITE BOUNDARY
- EXISTING EASEMENT BOUNDARY
- PROPOSED FIELD INLET WITH OCEANGUARD

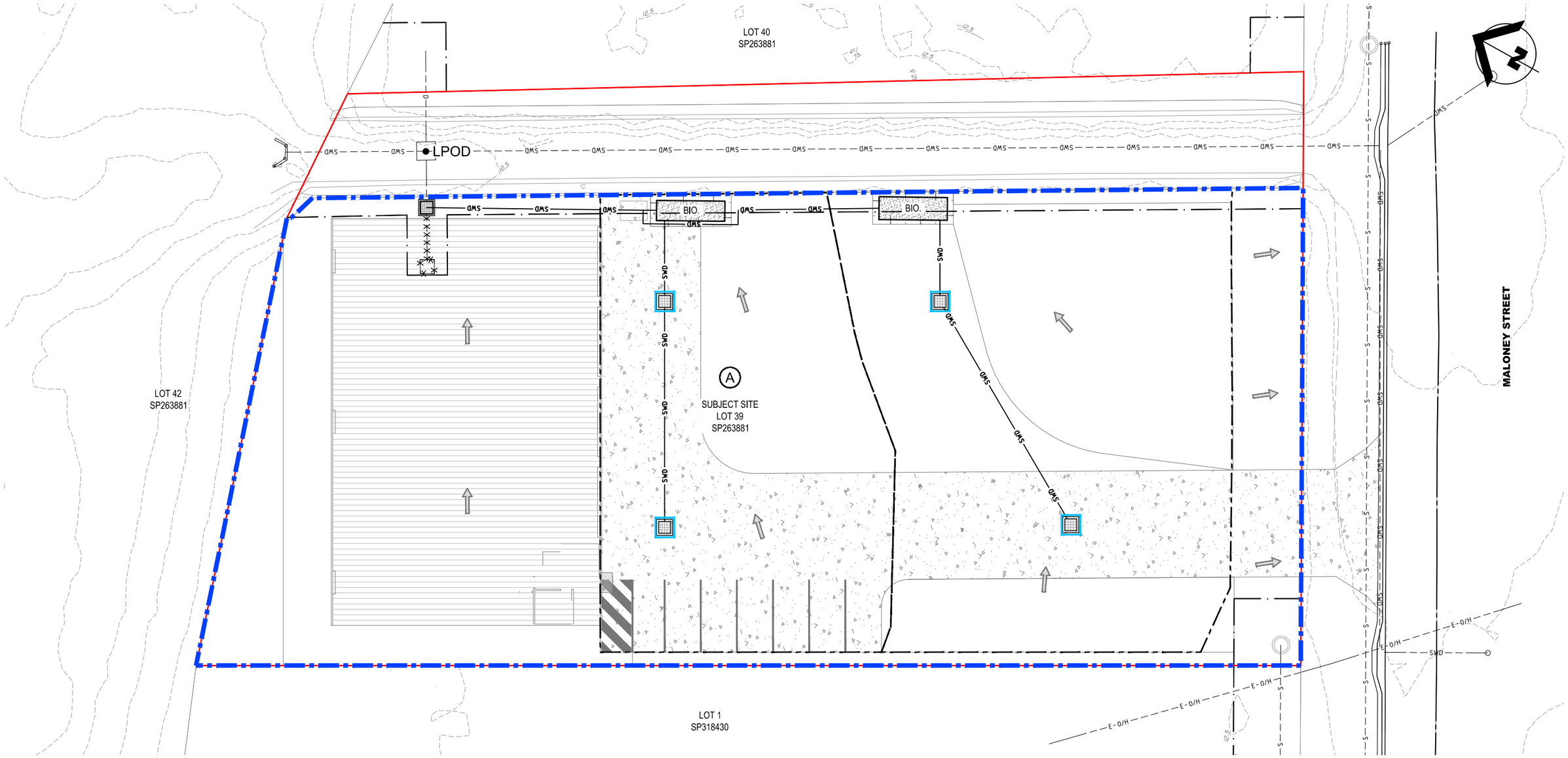
EXISTING SERVICES LEGEND

- S EXISTING SEWER
- E-O/H EXISTING OVERHEAD ELECTRICAL
- SWD EXISTING STORMWATER

STORMWATER CATCHMENT TABLE	
STORMWATER CATCHMENT I.D.	AREA (m²)
A	2788
TOTAL	2788

REPORT ISSUE
NOT FOR CONSTRUCTION

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS



ISSUE No.	DATE	AMENDMENT
A	17-03-23	ISSUED FOR REPORT

OSKA CONSULTING GROUP

CLIENT: TCB INVESTMENTS PTY LTD

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
159 MALONEY STREET, KAWANA
ROCKHAMPTON 4701

DESIGN	DRAWN	APPROVED
BG	YL	

TITLE: POST DEVELOPMENT CATCHMENT PLAN

SCALE: 1:150 AT A1, 1:300 AT A3 (0, 5, 10, 15m)

PROJECT NO.: OSK6352

DWG NO.: P002

ISSUE: A

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

E

OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6352/P003/A); OSKA Consulting Group, Conceptual Stormwater Management Details (Ref: OSK6352/P004/A)

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

LEGEND

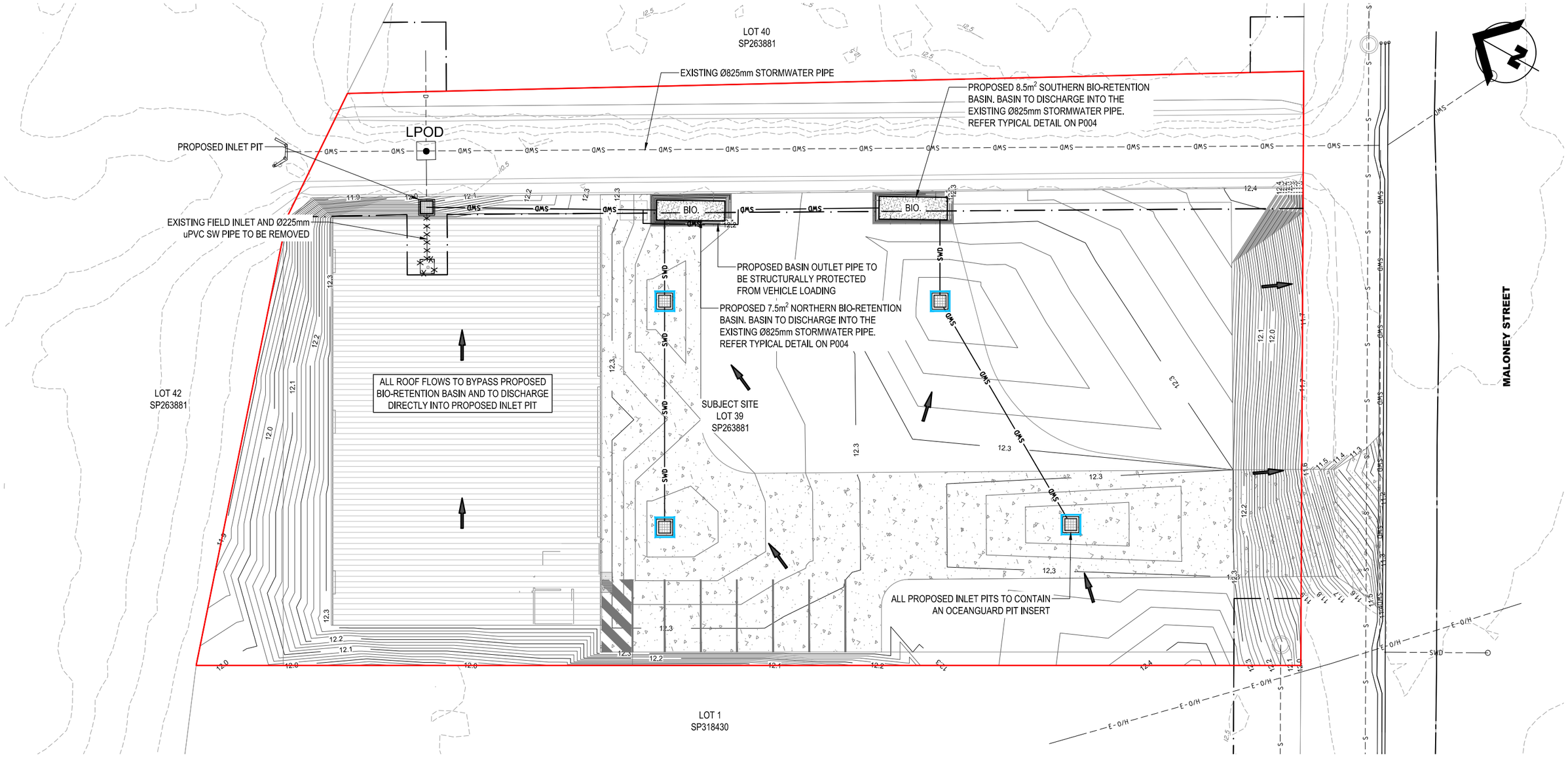
- EXISTING SURFACE CONTOURS
- FINISHED SURFACE CONTOURS
- LPOD — LAWFUL POINT OF DISCHARGE
- SWD — PROPOSED STORMWATER PIPE
- INDICATIVE LOCATION OF PROPOSED FIELD INLET
- PROPOSED FLOW DIRECTION
- SITE BOUNDARY
- BIO. — PROPOSED BIO RETENTION BASIN
- PROPOSED FIELD INLET WITH OCEANGUARD
- EXISTING EASEMENT BOUNDARY

EXISTING SERVICES LEGEND

- S — EXISTING SEWER (FROM SURVEY)
- E-O/H — EXISTING OVERHEAD ELECTRICAL (FROM SURVEY)
- SWD — EXISTING STORMWATER (FROM SURVEY)

REPORT ISSUE
NOT FOR CONSTRUCTION

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS



ISSUE No.	DATE	AMENDMENT
A	17-03-23	ISSUED FOR REPORT

OSKA CONSULTING GROUP

CLIENT	DESIGN	DRAWN	APPROVED
TCB INVESTMENTS PTY LTD	BG	YL	

PROJECT
PROPOSED INDUSTRIAL DEVELOPMENT
159 MALONEY STREET, KAWANA
ROCKHAMPTON 4701

TITLE
CONCEPTUAL STORMWATER MANAGEMENT PLAN

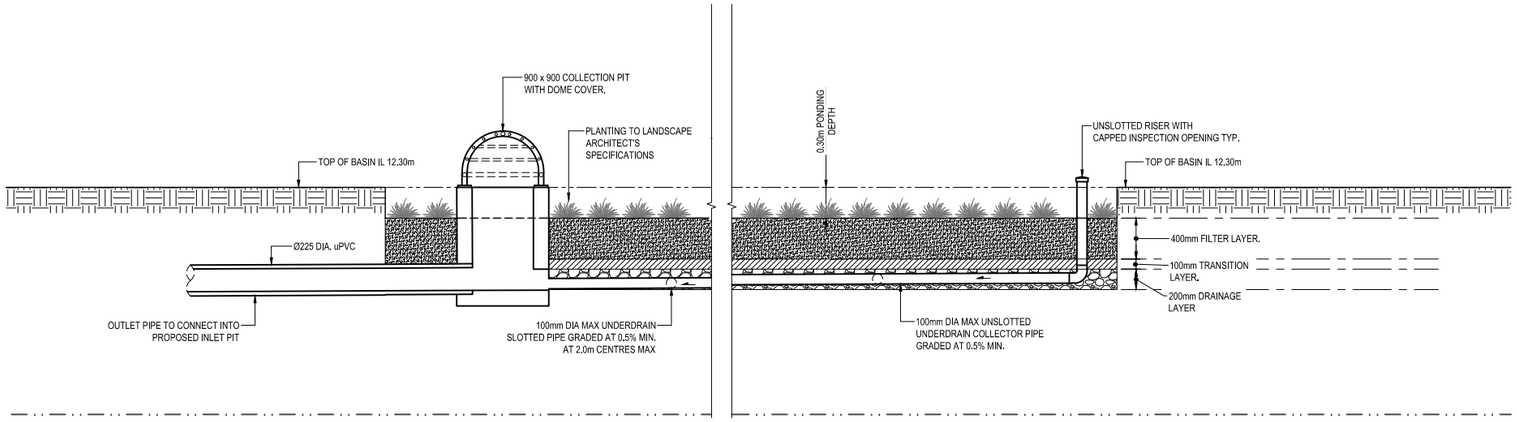
SCALE
1:150 AT A1
1:300 AT A3
0 5 10 15m

PROJECT NO.
OSK6352

DWG NO.
P003

ISSUE
A

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023



NORTHERN AND SOUTHERN
BIO-RETENTION BASIN - TYPICAL SECTION

NTS

NOTE:

THE NORTHERN BIO-RETENTION BASIN IS TO HAVE 7,5m^2 OF FILTER AREA AND THE SOUTHERN BIO-RETENTION BASIN IS TO HAVE 8.5m^2 OF FILTER AREA. ALL RUNOFF FROM THE ROAD AREAS TO DRAIN THROUGH AN OCEANGUARD PIT INSERT PRIOR TO DISCHARGE INTO THE BIO-RETENTION BASIN.

REPORT ISSUE
NOT FOR CONSTRUCTION

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

ISSUE No.	DATE	AMENDMENT
A	17-03-23	ISSUED FOR REPORT

OSKA CONSULTING GROUP

CLIENT: TCB INVESTMENTS PTY LTD

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
159 MALONEY STREET, KAWANA
ROCKHAMPTON 4701

DESIGN	DRAWN	APPROVED
BG	YL	

TITLE: CONCEPTUAL STORMWATER MANAGEMENT DETAILS

SCALE: 1:50 AT A1, 1:100 AT A3 (0 1 2 3 4 5m)

PROJECT NO. OSK6352

DWG NO. P004

ISSUE A

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

F

OSKA Consulting Group, Sediment and Erosion Control Plan (Ref: OSK6352/P005/A); OSKA Consulting Group, Sediment and Erosion Control Details (Ref: OSK6352/P006/A)

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

SEDIMENT & EROSION CONTROL LEGEND

- SF — SEDIMENT FENCE
- S.E.P. — LOCATION OF STABILISED ENTRY/EXIT POINT
- DSP — DRAINAGE STRUCTURE PROTECTION
- LPOD — LAWFUL POINT OF DISCHARGE
- 80.0 — FINISHED SURFACE CONTOURS
- 80.0 — EXISTING SURFACE CONTOURS
- MS1 — WATER QUALITY MONITORING STATION
- EXISTING EASEMENT BOUNDARY

EXISTING SERVICES LEGEND

- S — EXISTING SEWER (FROM SURVEY)
- E-O/H — EXISTING OVERHEAD ELECTRICAL (FROM SURVEY)
- SWD — EXISTING STORMWATER (FROM SURVEY)

REPORT ISSUE
NOT FOR CONSTRUCTION

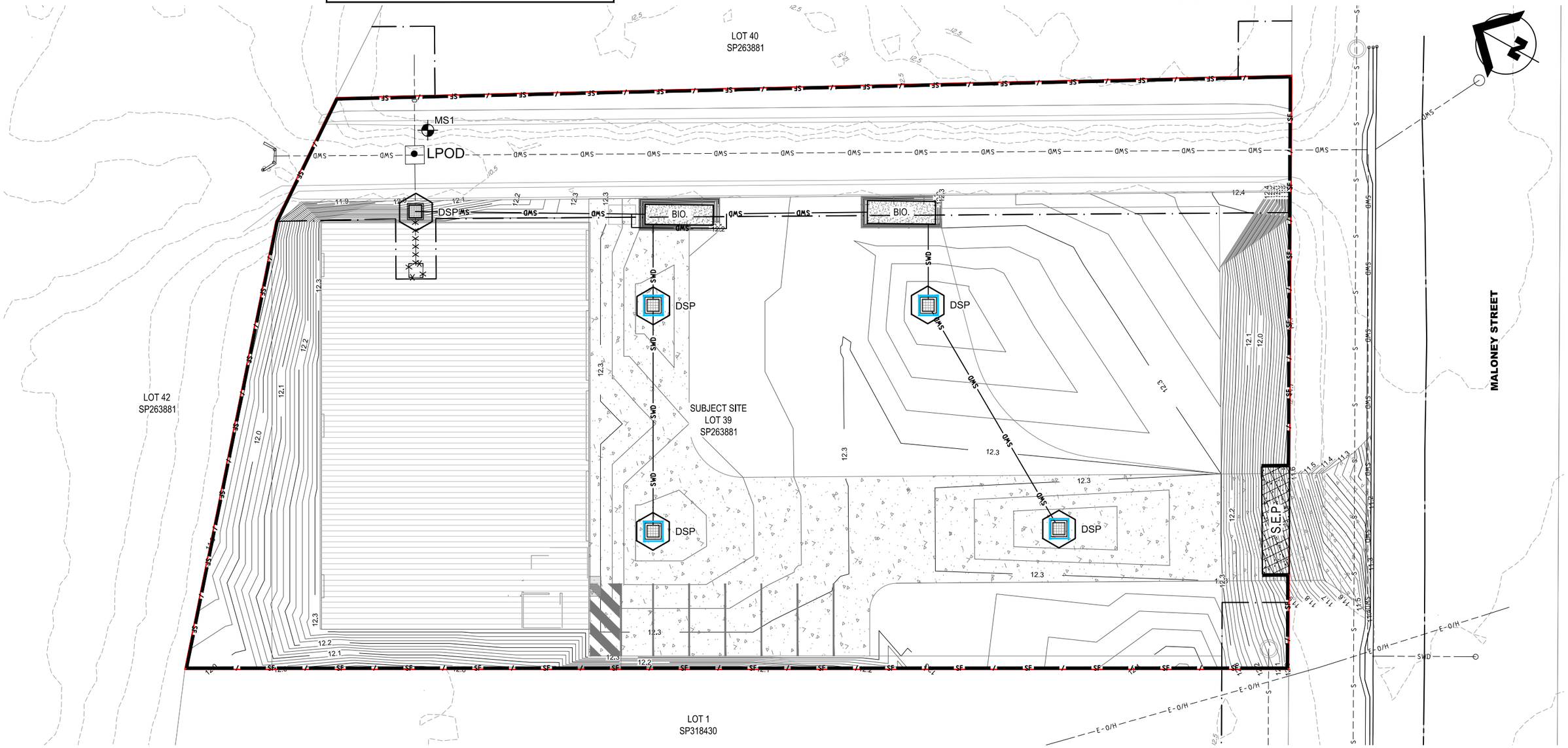
CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

SEDIMENT AND EROSION CONTROL NOTES

1. THE PROJECT SEDIMENT AND EROSION CONTROL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SITE'S APPROVED STORMWATER MANAGEMENT PLAN.
2. CONSTRUCTION IS TO BE PROGRAMMED TO PROVIDE INSTALLATION OF PERIMETER LANDSCAPING / SURFACE TREATMENTS AS EARLY AS PRACTICAL.
3. THE CONTRACTOR'S WORKS PROGRAM IS TO BE REVIEWED AT THE PRESTART MEETING. ALTERATIONS TO THE PROGRAM MAY BE REQUIRED TO ENSURE SATISFACTORY EROSION AND SEDIMENT CONTROL.
4. SAFETY ISSUES MUST BE CONSIDERED AND MONITORED FOR EACH DEVICE TO THE SATISFACTION OF THE SUPERINTENDENT.
5. SEDIMENT FENCE FILTER FABRIC IS TO BE APPROVED BY THE ENGINEER. FILTER CLOTH AND SHADE CLOTH IS NOT TO BE USED.
6. SEDIMENTATION MANAGEMENT DEVICES SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AND MAINTAINED AT A SUITABLE LEVEL/ CONDITION THROUGHOUT CONSTRUCTION.
7. SEDIMENT FENCES ARE TO BE CLEANED OUT WHEN CAPACITY IS REDUCED BY 30%.
8. DRAINAGE STRUCTURE PROTECTION IS TO BE CLEANED FOLLOWING EACH SIGNIFICANT RUNOFF PRODUCING STORM
9. ACCESS TO THE SITE IS TO BE PROVIDED BY THE CONTRACTOR. APPROVAL IS TO BE OBTAINED FROM COUNCIL FOR THE LOCATION OF THE SITE ACCESS POINT AND WASH DOWN AREA WHICH IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ACCESS TO AND FROM THE SITE IS TO BE VIA THE SHAKEDOWN FACILITY ONLY. ALL VEHICLES ARE TO BE WASHED DOWN PRIOR TO LEAVING THE SITE.
10. THE CONTRACTOR SHALL PROVIDE TEMPORARY DRAINAGE CONTROLS TO DIVERT FLOW FROM UNDISTURBED AREAS AROUND DISTURBED AREAS AND DIRECT FLOW FROM DISTURBED AREAS TOWARD CONTROL DEVICES.
11. SEDIMENT TRAP WILL COLLECT SEDIMENT DURING RUN-OFF EVENTS . DEWATERING OF THIS SEDIMENT TRAP CAN ONLY OCCUR WHEN TSS IS <50MG/L AND PH IS BETWEEN 6.5 - 8.5 IN ACCORDANCE WITH IECA GUIDELINES.
12. CONTRACTOR IS TO PROVIDE TEST RESULTS CONFIRMING ALL SEDIMENT BASIN DISCHARGE MEETS THE FOLLOWING CRITERIA -

POLLUTANT	CRITERIA
pH	6.5 - 8.5
DISSOLVED OXYGEN	90th %ile > 80% SATURATION OR 6mg/L
HYDROCARBONS	NO VISIBLE SHEEN ON RECEIVING WATERS
TOTAL SUSPENDED SOLIDS	90th %ile < 50mg/L

13. A SUITABLY QUALIFIED PERSON IN ACCORDANCE WITH CITY PLAN SCHEDULE 1 - DEFINITIONS IS TO SUPERVISE THE IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES FOR THE SITE AND CERTIFY THAT THE REQUIREMENTS OF ENVIRONMENT PROTECTION ACT 1994, STATE PLANNING POLICY AND IECA ARE BEING ACHIEVED.



			CLIENT: TCB INVESTMENTS PTY LTD	DESIGN: BG	DRAWN: YL	APPROVED:	TITLE: SEDIMENT AND EROSION CONTROL PLAN	PROJECT NO.: OSK6352
			PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT 159 MALONEY STREET, KAWANA ROCKHAMPTON 4701				SCALE: 1:150 AT A1 1:300 AT A3 (0 5 10 15m)	DWG NO.: P005
A	17-03-23	ISSUED FOR REPORT						ISSUE: A
ISSUE No.	DATE	AMENDMENT						

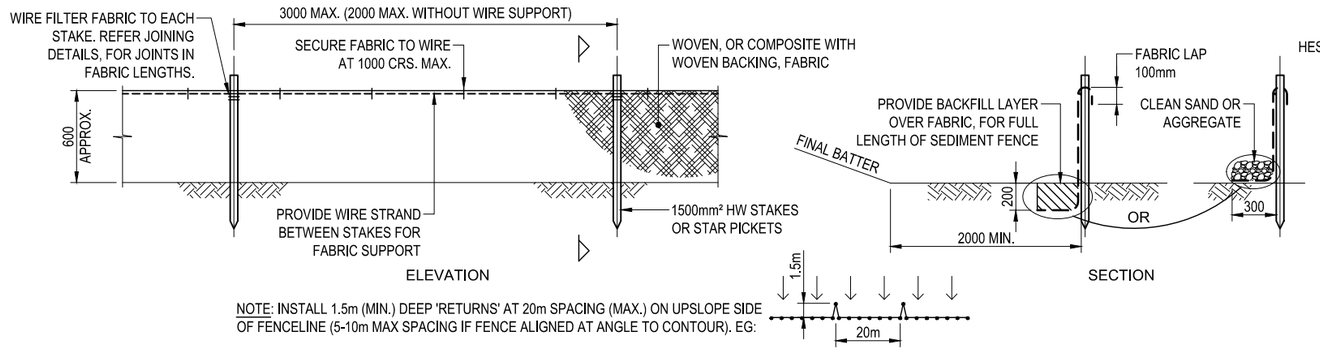
OSKA CONSULTING GROUP

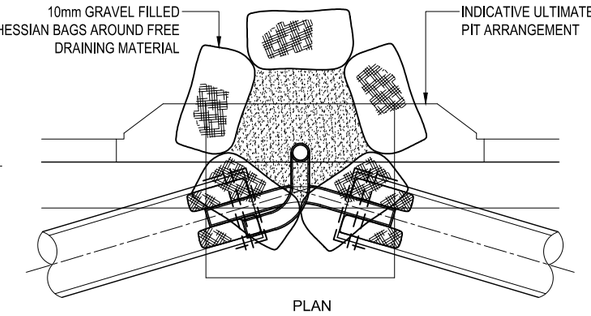
Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

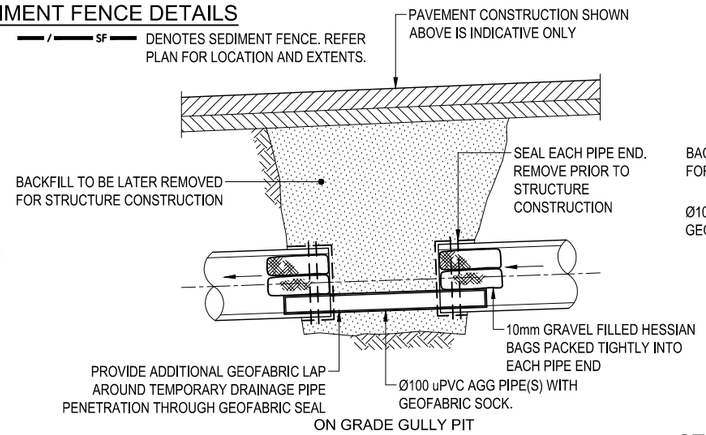
REPORT ISSUE
NOT FOR CONSTRUCTION

SEDIMENT FENCE DETAILS

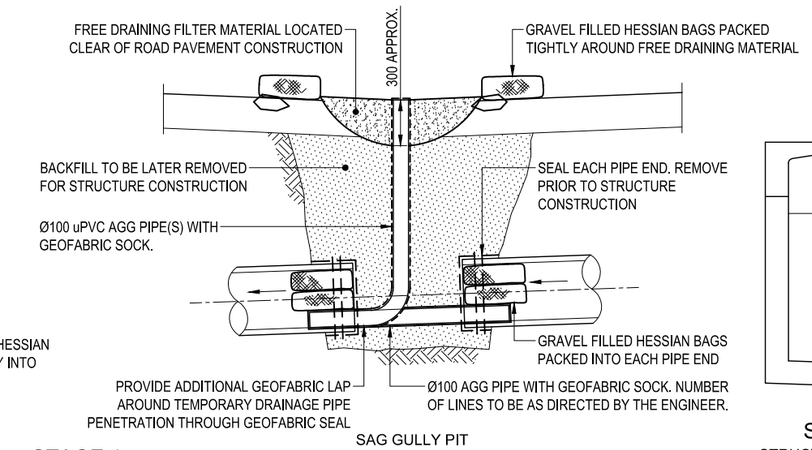
N.T.S. —/—SF— DENOTES SEDIMENT FENCE. REFER PLAN FOR LOCATION AND EXTENTS.



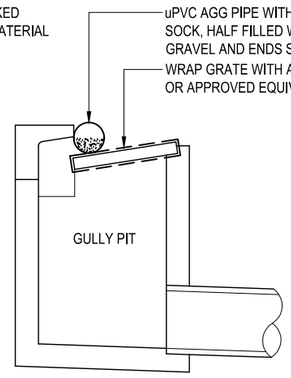




ON GRADE GULLY PIT



SAG GULLY PIT

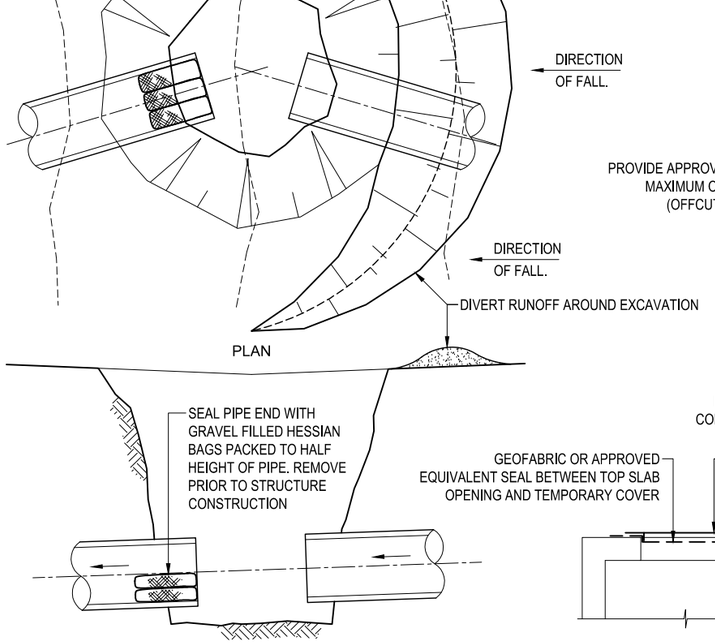


STAGE 2
STRUCTURE COMPLETE

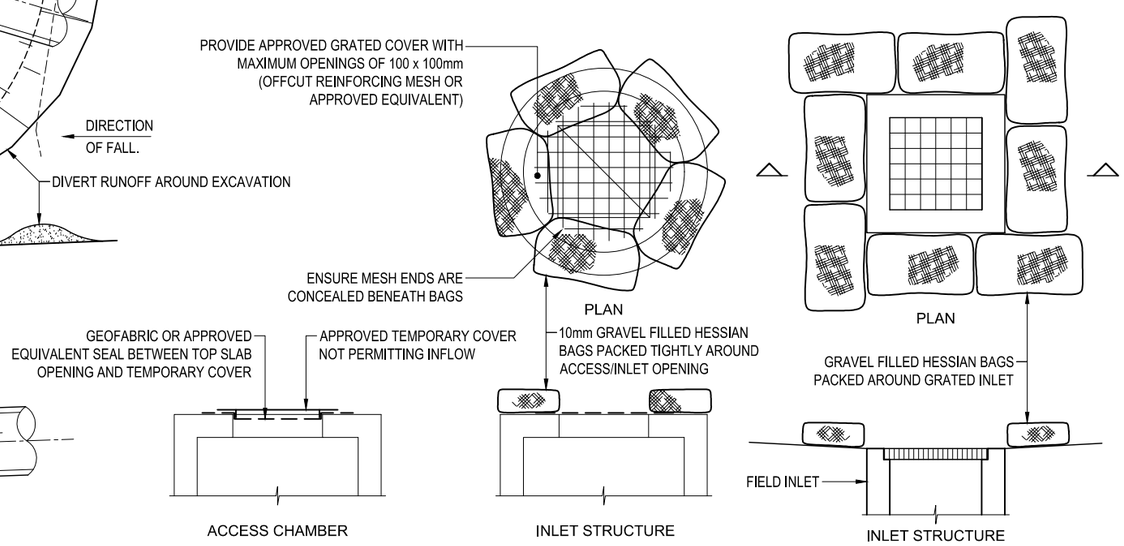
STAGE 1
EXCAVATION, PIPE INSTALLATION AND INTERIM BACKFILLING

ROADWAY GULLY PIT
N.T.S.

DSP DENOTES DRAINAGE STRUCTURE PROTECTION. REFER PLAN FOR LOCATION & EXTENTS.



STAGE 1
EXCAVATION AND PIPE INSTALLATION

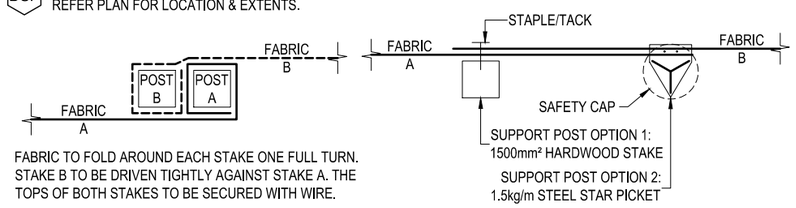


STAGE 2
STRUCTURE COMPLETE UP TO TOP SLAB

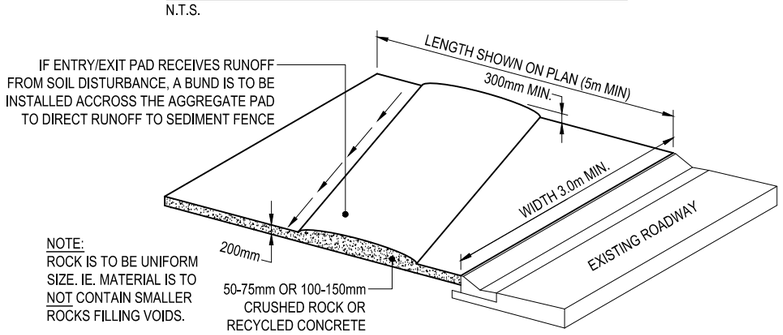
STAGE 3
STRUCTURE COMPLETE

ACCESS CHAMBER / INLET STRUCTURE
N.T.S.

DSP DENOTES DRAINAGE STRUCTURE PROTECTION, REFER PLAN FOR LOCATION & EXTENTS.



SEDIMENT FENCE FABRIC JOINING DETAILS
N.T.S.



STABILISED ENTRY/EXIT POINT
N.T.S. OR APPROVED EQUIVALENT

SEP DENOTES STABILISED ENTRY/EXIT POINT, REFER PLAN FOR LOCATIONS.

ISSUE No.	DATE	AMENDMENT
A	17-03-23	ISSUED FOR REPORT

OSKA CONSULTING GROUP

CLIENT: TCB INVESTMENTS PTY LTD
PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT, 159 MALONEY STREET, KAWANA, ROCKHAMPTON 4701

DESIGN	DRAWN	APPROVED
BG	YL	

TITLE: SEDIMENT AND EROSION CONTROL DETAILS
SCALE:

PROJECT NO. OSK6352
DWG NO. P006
ISSUE A

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

APPENDIX

G

Ocean Protect, OceanGuard – Operations & Maintenance Manual

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

OceanGuard™

Operations & Maintenance Manual

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

Table of Contents

Rev: *1* ***Last Updated:*** *March 2019*

Document Set ID: 40445886
Version: 1, Version Date: 12/04/2023

Introduction

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

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

Why do I need to perform maintenance?

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

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

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

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Health and Safety

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

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

Personnel health and safety

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

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

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

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

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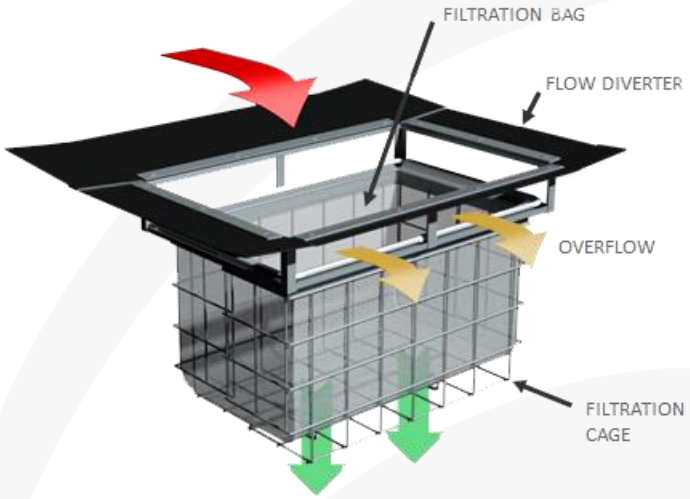
How does it Work?

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



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

Maintenance Procedures

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

Primary Types of Maintenance

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

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

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

Minor Service

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

Hand Maintenance

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

Vacuum Maintenance

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

Major Service (Filter Bag Replacement)

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

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

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

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Additional Reasons of Maintenance

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

Hazardous Material Spill

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

Blockages

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

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

Major Storms and Flooding

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

Disposal of Waste Materials

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

Maintenance Services

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

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

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

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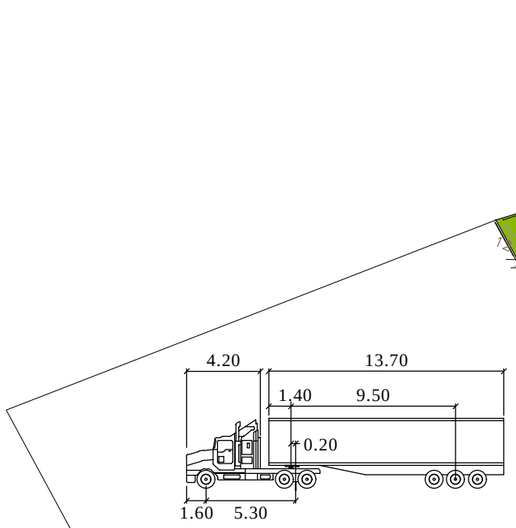

Semi-Trailer (19m) (m)

Prime Mover Width	:2.50
Trailer Width	:2.50
Prime Mover Track	:2.50
Trailer Track	:2.50
Lock to Lock Time	:6.0
Steering Angle	:27.7
Articulating Angle	:70.0

GENERAL LEGEND

- Existing Concrete Kerb & Channel
- Existing Boundary Fence
- Existing Sewerage Main
- Existing Overhead Electricity Line
- Existing Underground Stormwater Pipe
- Existing surface contours
- Proposed Concrete Driveway & Carpark Area
- Proposed 2-Coat Bitumen Seal Hardstand Area
- Proposed Aggregate Hardstand Area
- Proposed Turf & Hydroseeding areas
- Proposed Garden areas
- Proposed Sewerage Main
- Proposed Stormwater Main

Contour Consulting
ABN 98 125 137 348
349 Hobler Avenue
Frenchville
Rockhampton QLD 4701
Central Queensland
Telephone: 07 4928 2898
Email: contour.consulting@bigpond.com

SCALES:

0 2.0 8.0m 1:400

DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
HARSHA WEERASINGHE	8372

SIGNATURE

Harsha R. Weerasinghe
RPEQ 8372

SIRIS & ASSOCIATES
CONSULTING ENGINEERS
ADDRESS: Shop 3 5-7 Normanby St, Yeppoon, 4703
PHONE: 07 4930 2877 (office), 0407 119 734 (mobile)
ABN:34 481 028 699

REVISION / ISSUE REGISTER

No.	DATE	REMARKS
A	10/22	MCU SUBMISSION
B	01/23	INFO REQUEST RESPONSE
C	02/23	INFO REQUEST 2 RESPONSE

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

TURNING PATH PLAN (SEMI-TRAILER)

DWG No. 22-004/SK03 C

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ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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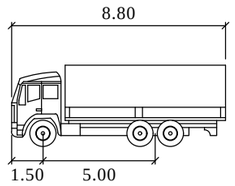
Development Permit No.: D/152-2022

Dated: 23 May 2023



Garbage Truck (m)

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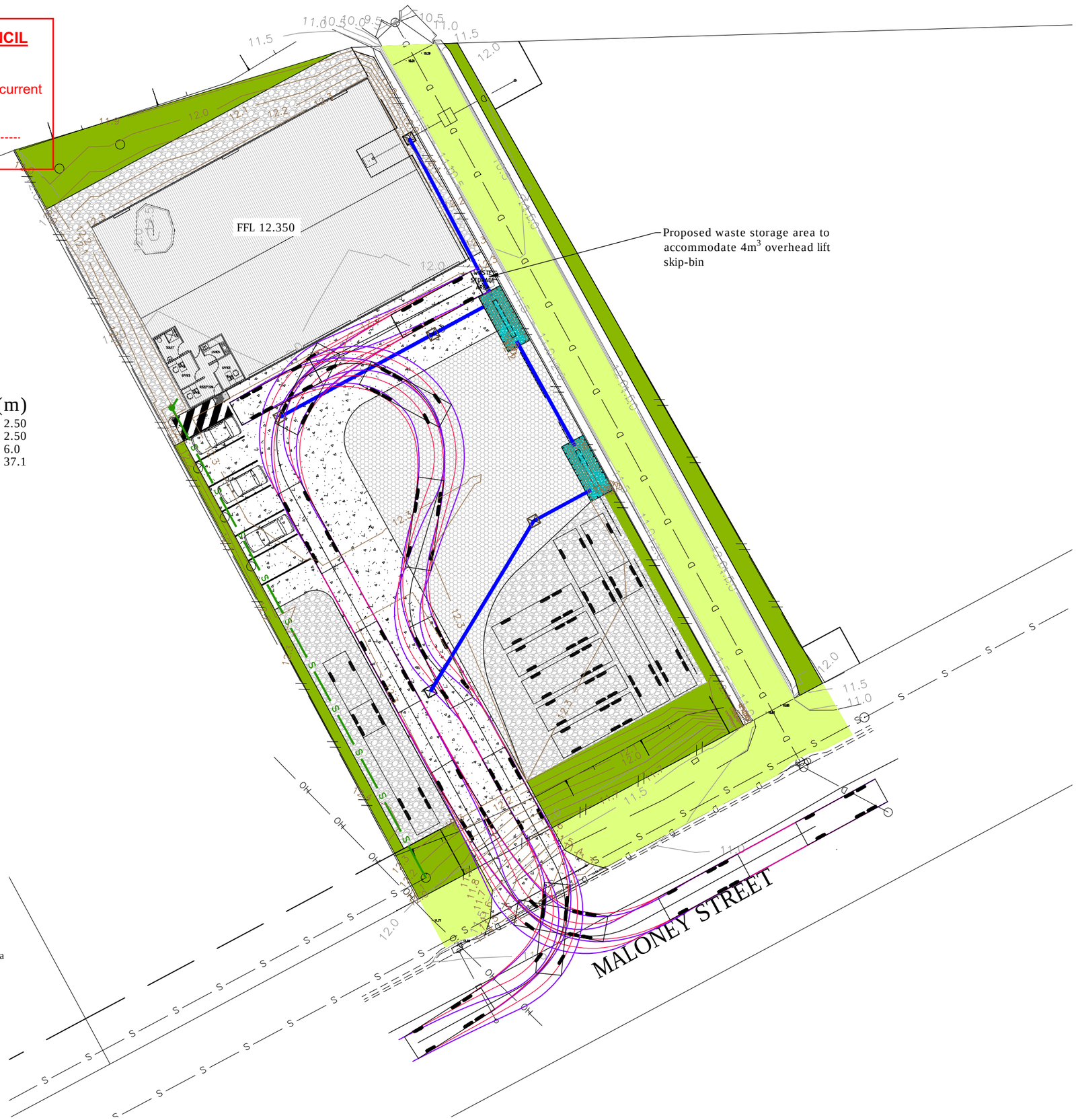
Steering Angle	: 37.1



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- Proposed Aggregate Hardstand Area
- Proposed Turf & Hydroseeding areas
- Proposed Garden areas
- Proposed Sewerage Main
- Proposed Stormwater Main

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Rockhampton QLD 4701
Central Queensland

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Email: contour.consulting@bigpond.com

SCALES:

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DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
HARSHA WEERASINGHE	8372

SIGNATURE

Harsha R. Weerasinghe
RPEQ 8372

SIRIS & ASSOCIATES
CONSULTING ENGINEERS
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PHONE: 07 4930 2877 (office), 0407 119 734 (mobile)
ABN:34 481 028 699

REVISION / ISSUE REGISTER

No.	DATE	REMARKS
A	10/22	MCU SUBMISSION
B	01/23	INFO REQUEST RESPONSE
C	02/23	INFO REQUEST 2 RESPONSE

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

TURNING PATH PLAN (GARBAGE TRUCK)

DWG No. 22-004/SK04 C

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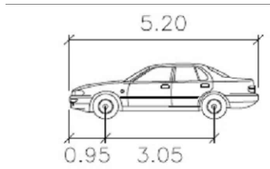

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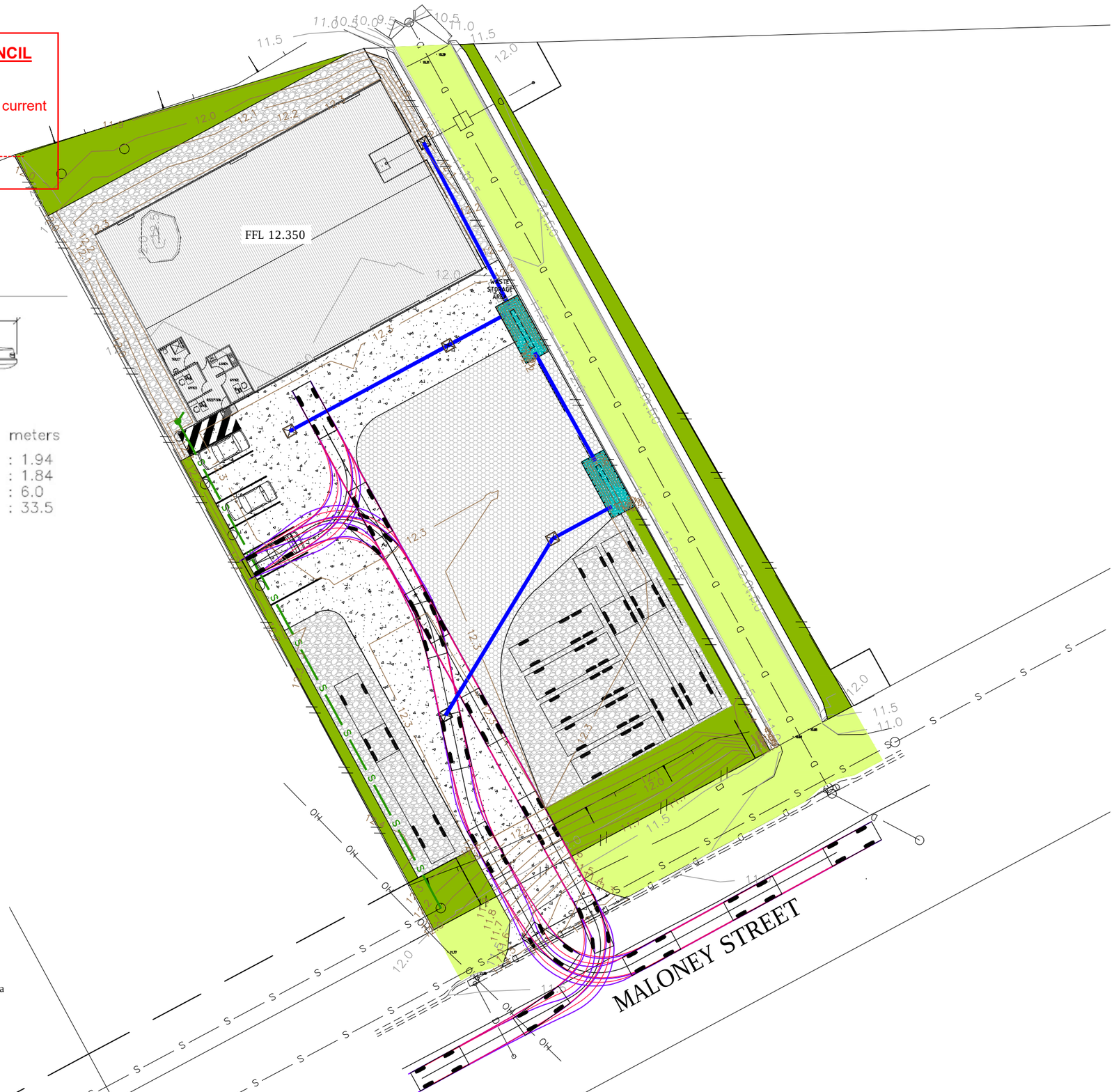
Steering Angle	: 33.5



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SCALES:

0 2.0 8.0m 1:400

DATUM:

DESIGN		DRAWN	
RS		RS	

NAME	R.P.E.Q.
HARSHA WEERASINGHE	8372

SIGNATURE

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ABN:34 481 028 699

REVISION / ISSUE REGISTER

No.	DATE	REMARKS
A	10/22	MCU SUBMISSION
B	01/23	INFO REQUEST RESPONSE
C	02/23	INFO REQUEST 2 RESPONSE

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

TURNING PATH PLAN (B99 VEHICLE)

DWG No. 22-004/SK05 C

DO NOT SCALE - IF IN DOUBT ASK

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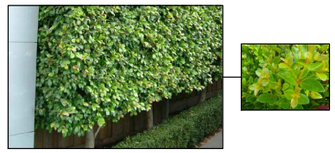


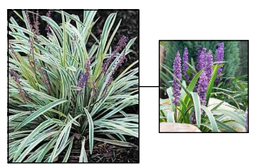
Lily Pily Aussie Southern

Lily Pily Baby Boomer

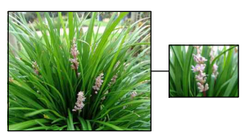
Leucadendron salignum 'Blush'

Dietes Bicolour

Calistemon Little John



Liriope Variegated



Liriope Isabella

Tuckeroo

Ivory Curl

Lomandra Hystrix

Lomandra Longifolia

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/152-2022

Dated: 23 May 2023

Contour Consulting

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Central Queensland

PO Box 5427
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RS		RS	

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

LANDSCAPE OVERALL LAYOUT PLAN

DWG No. 22-004/03 | A

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SCALES

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RS		RS	

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/152-2022

Dated: 23 May 2023

GROUNDCOVER/MULCH LEGEND

- Proposed mulched garden areas (100mm think).
- Proposed turf/grass areas (Wintergreen). placed on 50mm topsoil base layer
- Proposed creek rock mulch areas, 50-100mm dia. stone (100mm dia. min.).

MALONEY STREET

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON
GROUNDCOVER/MULCH LAYOUT PLAN - 1

DWG No. 22-004/04 A

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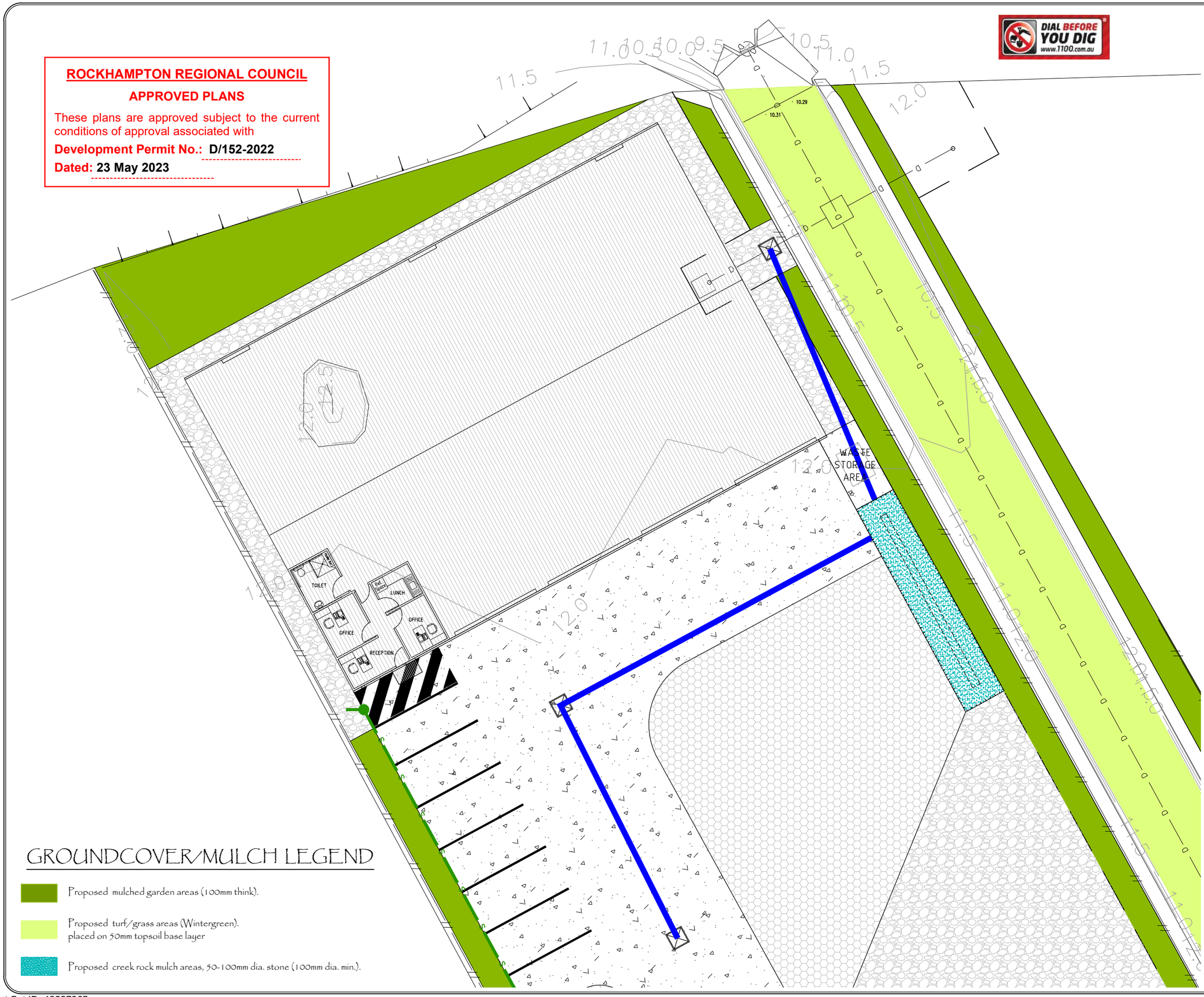

GROUNDCOVER/MULCH LEGEND

Proposed mulched garden areas (100mm think).

Proposed turf/grass areas (Wintergreen). placed on 50mm topsoil base layer

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TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

GROUNDCOVER/MULCH LAYOUT PLAN - 2

DWG No. 22-004/05 A

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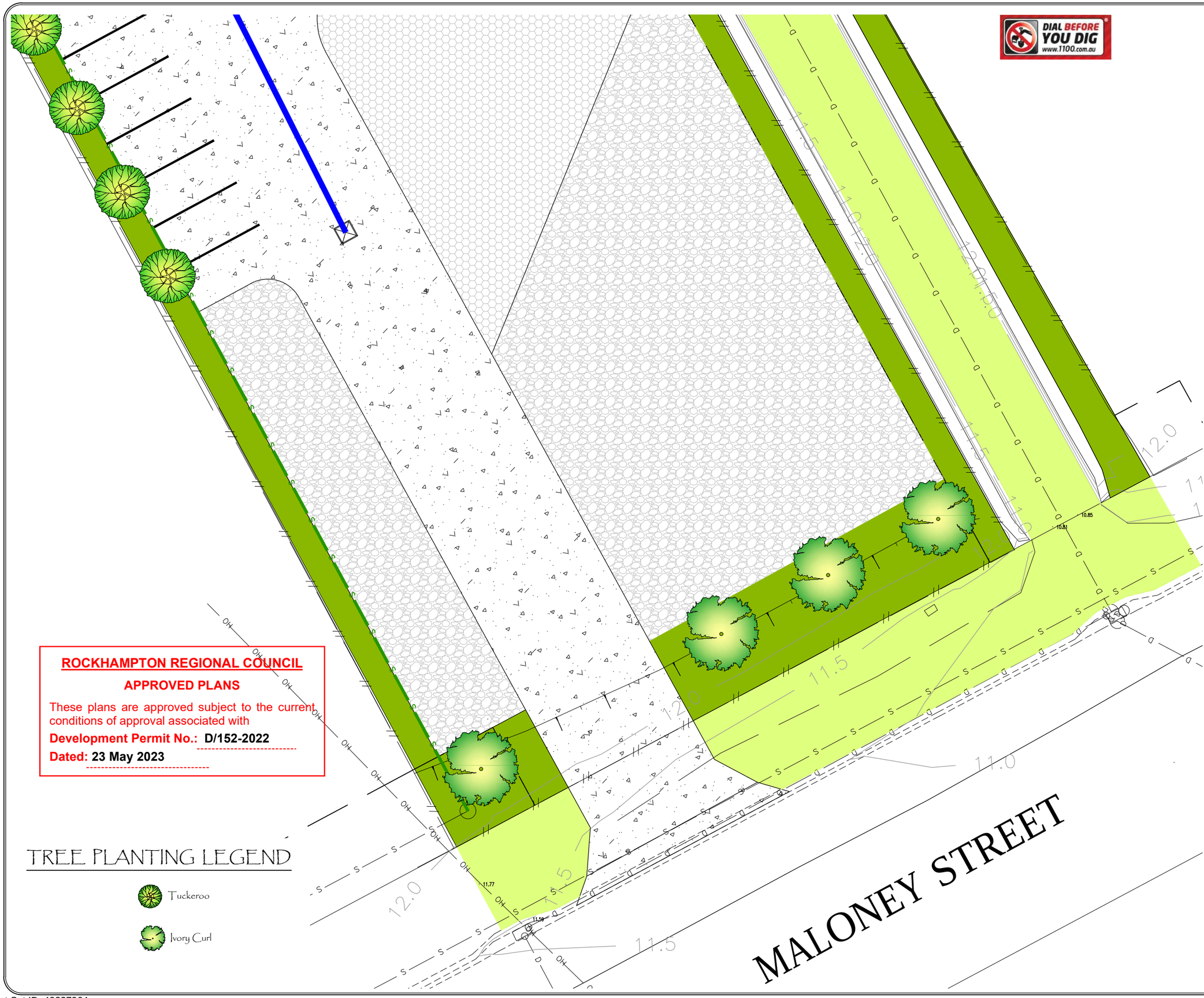

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Dated: 23 May 2023

TREE PLANTING LEGEND

Tuckeroo

Ivory Curl

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON
TREE PLANTING LAYOUT PLAN - 1

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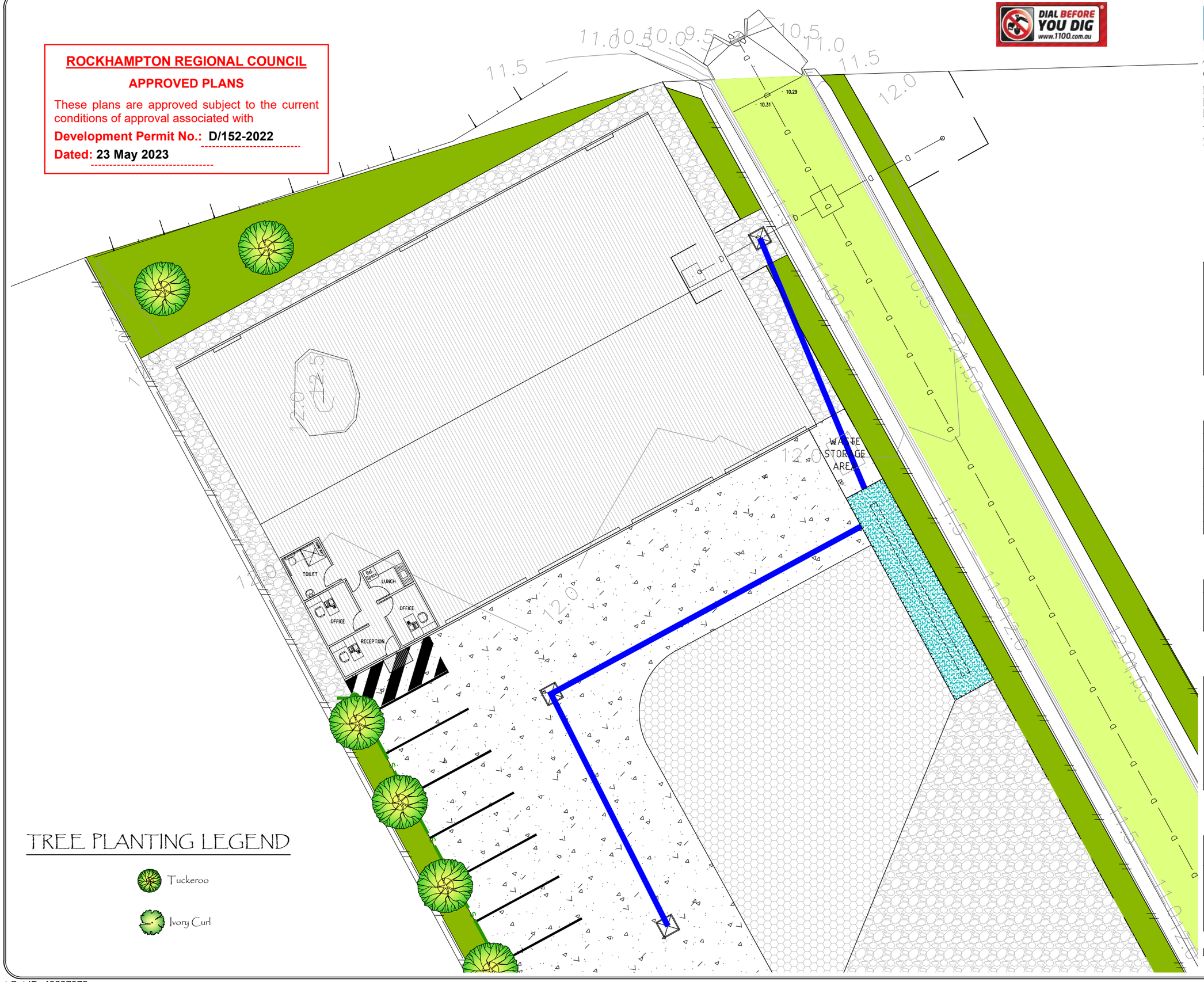

TREE PLANTING LEGEND

- Tuckeroo
- Ivory Curl

SCALES

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TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

TREE PLANTING LAYOUT PLAN - 2

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APPROVED PLANS

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Development Permit No.: D/152-2022

Dated: 23 May 2023

SHRUB PLANTING LEGEND

- Lily Pily Aussie Southern
- Lily Pily Baby Boomer
- Leucadendron salignum 'Blush'
- Dietes Bicolour
- Calistemon Little John
- Liriope Variegated
- Liriope Isabella
- Lomandra Hystrix
- Lomandra Longifolia

MALONEY STREET

SCALES

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TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON
SHRUB PLANTING LAYOUT PLAN - 1

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SHRUB PLANTING LEGEND

- Lily Pily Aussie Southern
- Lily Pily Baby Boomer
- Leucadendron salignum 'Blush'
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- Calistemon Little John
- Liriope Variegated
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- Lomandra Hystrix
- Lomandra Longifolia

SCALES

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No.	DATE	REMARKS
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DESIGN		DRAWN	
RS		RS	

TERRY BROSNAN

SHED DEVELOPMENT
159 MALONEY STREET
KAWANA, ROCKHAMPTON

SHRUB PLANTING LAYOUT PLAN - 2

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