

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

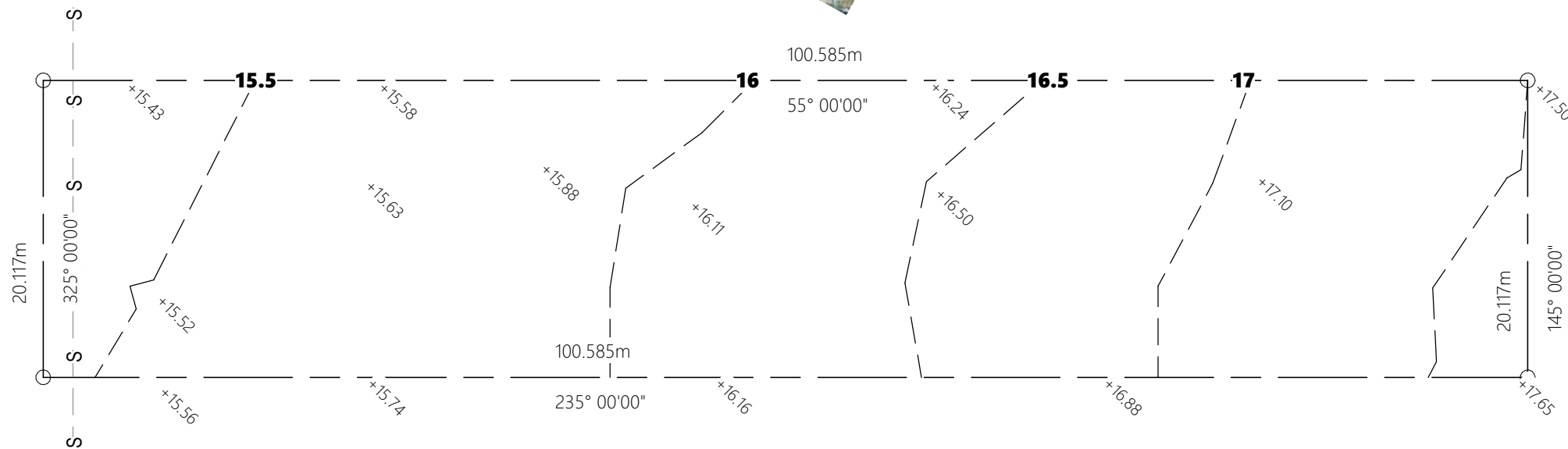
Development Permit No.: D/14-2024

Dated: 31 July 2024



CHAPPELL STREET

+15.23
+15.29



Site Plan - Levels

1 : 400

DO NOT SCALE DRAWING

ALL DIMENSION IN MILLIMETERS

No:	Description:	Date:	REVISIONS
-	-	-	

ISSUED FOR
PRELIMINARY

Project:

PROPOSED
DEVELOPMENT

Address:

10 CHAPPELL STREET,
KAWANA

Drawing Title:

EXISTING SITE PLAN



0407 271 336 M

info@deaignelements.com.au E

QBCC No: 1247120 BDAQ No: 0001677

Scale: 1 : 400	Rev: -
Date: FEB 2024	
Drawn: NJB	

Project No: Drawing No:

24_011 S-03

13/05/2024 4:00:20 PM

AREA LEGEND		2,023 m ²
	BUILDING	776 m ²
	CONCRETE PARKING / DRIVEWAYS	785 m ²
	CONCRETE PATHS	33 m ²
	GRASS / VEGETATION	360 m ²
	PLANTING	69 m ²

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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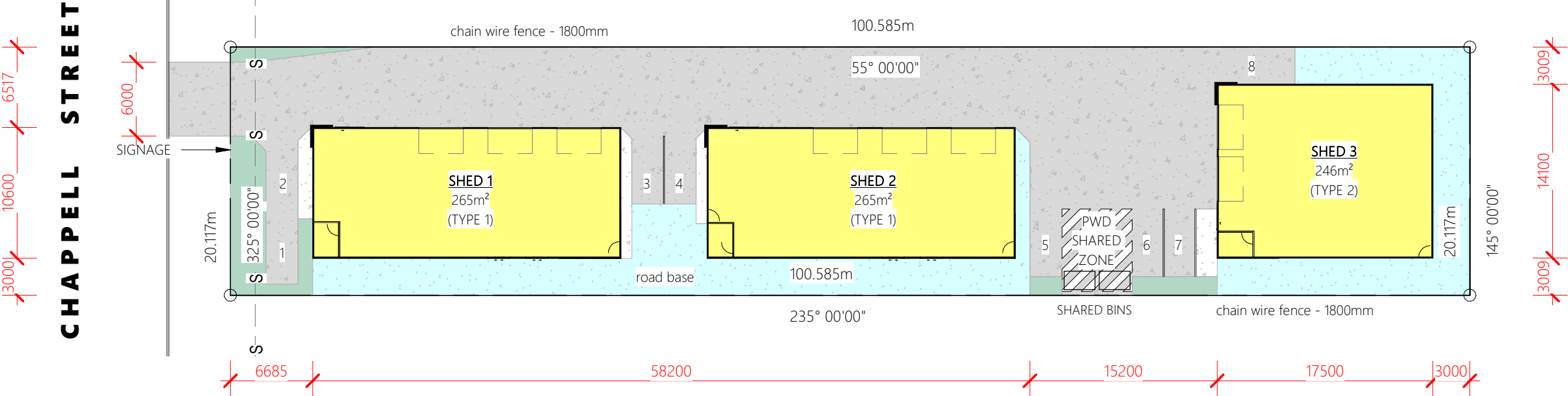
Development Permit No.: D/14-2024

Dated: 31 July 2024

DO NOT SCALE DRAWING

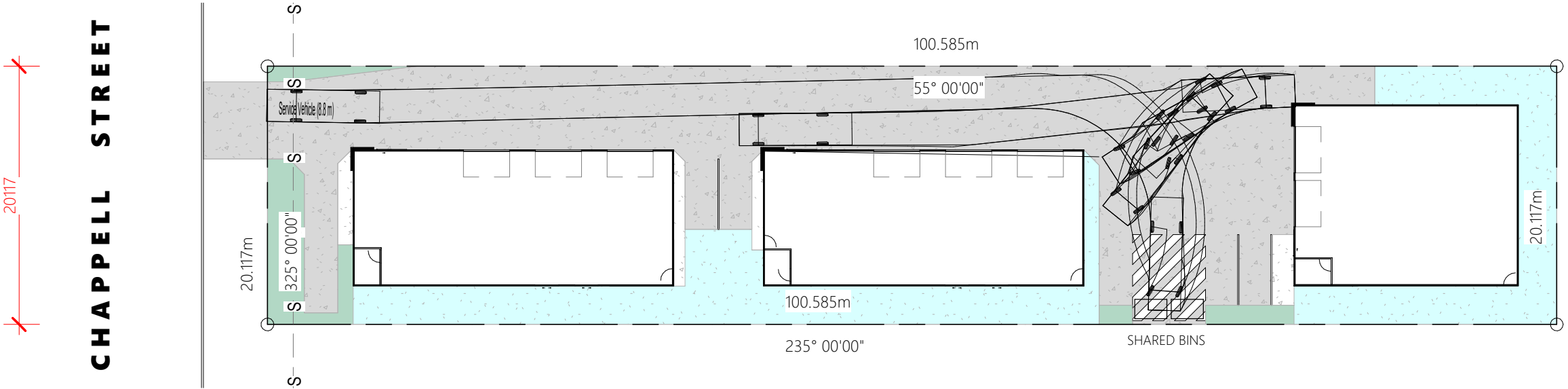
ALL DIMENSION IN MILLIMETERS

No:	Description:	Date:	REVISIONS
-	-	-	



Proposed Site Plan

1 : 400



Proposed Site Plan - Rubbish Collection

1 : 400

ISSUED FOR
PRELIMINARY

Project:	PROPOSED DEVELOPMENT
Address:	10 CHAPPELL STREET, KAWANA
Drawing Title:	PROPOSED SITE PLANS



0407 271 336 M
info@deaignelements.com.au E
QBCC No: 1247120 BDAQ No: 0001677

Scale: 1 : 400	Rev:	13/05/2024 4:00:20 PM
Date: FEB 2024	-	
Drawn: NJB	-	
Project No: 24_011	Drawing No: S-04	

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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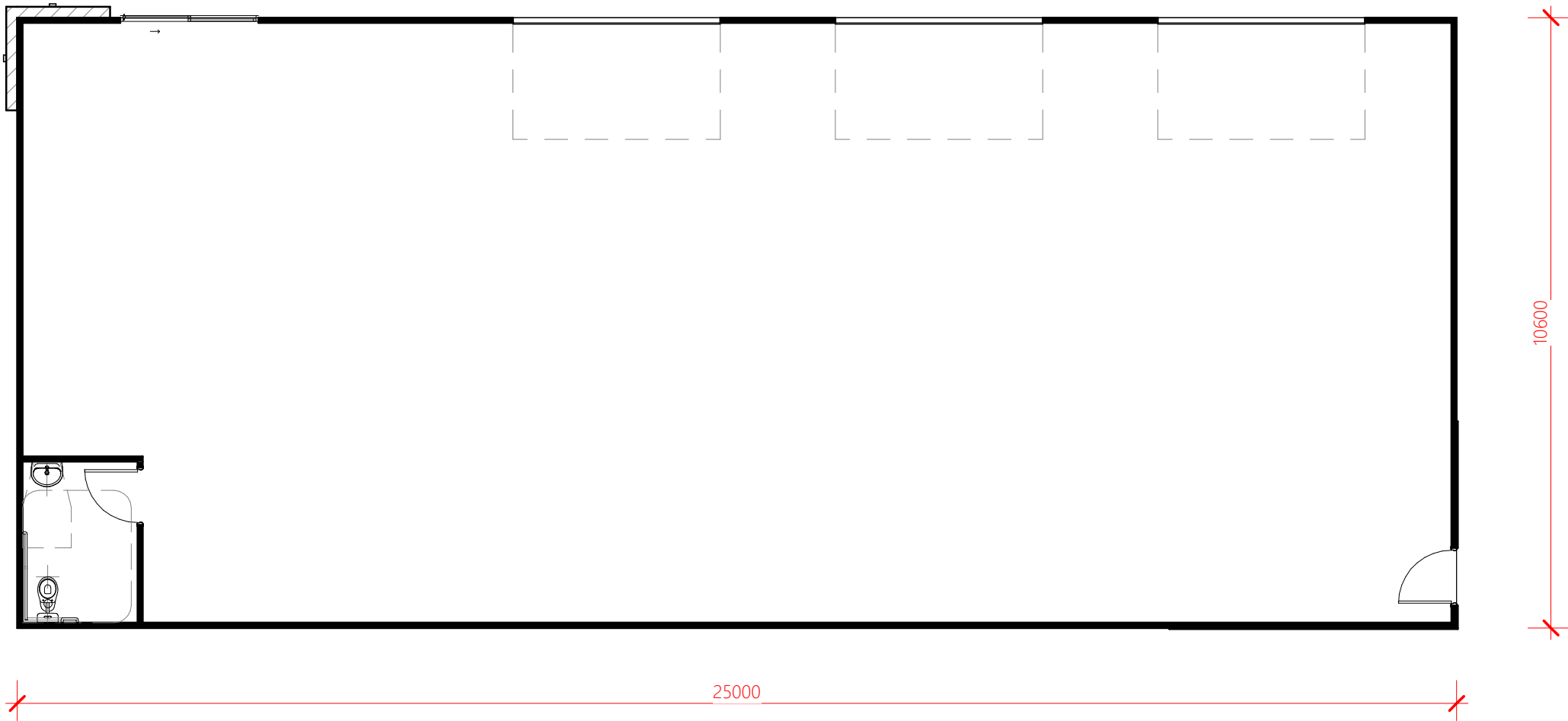
Development Permit No.: D/14-2024

Dated: 31 July 2024

DO NOT SCALE DRAWING

ALL DIMENSION IN MILLIMETERS

No:	Description:	Date:	REVISIONS
-	-	-	



ISSUED FOR
PRELIMINARY

Project:
PROPOSED DEVELOPMENT
Address:
**10 CHAPPELL STREET,
KAWANA**

Drawing Title:
**SHED FLOOR PLAN -
TYPE 1**

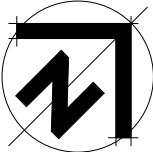


0407 271 336 **M**
info@dezi elements.com.au **E**
QBCC No: 1247120 BDAQ No: 0001677

Scale: 1 : 100	Rev:	13/05/2024 4:00:20 PM
Date: FEB 2024	-	
Drawn: NJB	-	
Project No: 24_011	Drawing No: S-05	

_Proposed Ground Floor - TYPE 1

1 : 100



ROCKHAMPTON REGIONAL COUNCIL

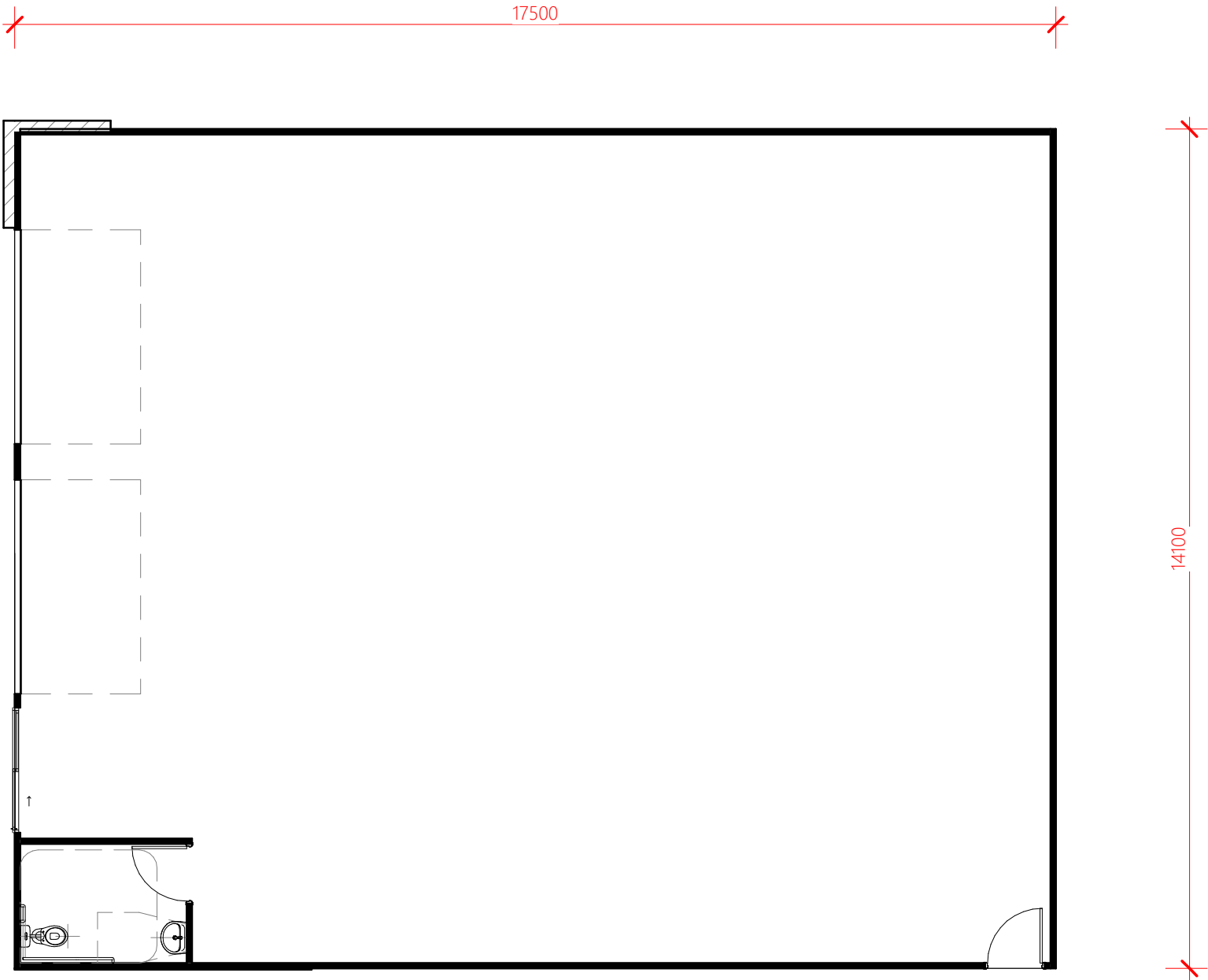
APPROVED PLANS

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DO NOT SCALE DRAWING

ALL DIMENSION IN MILLIMETERS

No:	Description:	Date:	REVISIONS
-	-	-	



ISSUED FOR
PRELIMINARY

Project:
**PROPOSED
DEVELOPMENT**
Address:
**10 CHAPPELL STREET,
KAWANA**

Drawing Title:
**SHED FLOOR PLAN -
TYPE 2**

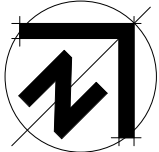


0407 271 336 **M**
info@dezi nelements.com.au **E**
QBCC No: 1247120 BDAQ No: 0001677

Scale: 1 : 100	Rev: -	13/05/2024 4:00:20 PM
Date: FEB 2024		
Drawn: NJB		
Project No: 24_011	Drawing No: S-06	

_Proposed Ground Floor - TYPE 2

1 : 100



ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/14-2024

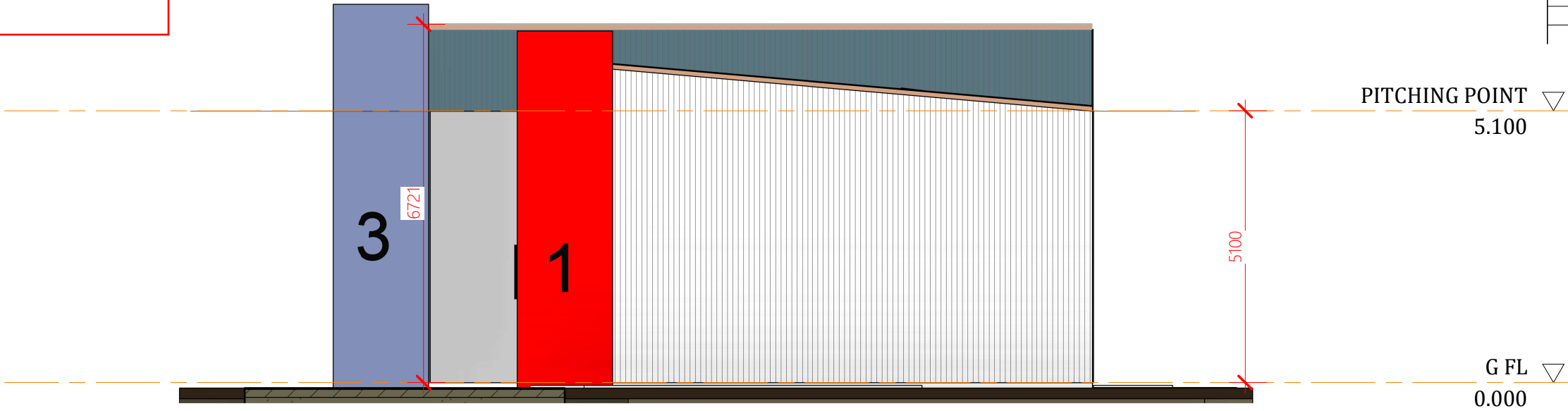
Dated: 31 July 2024

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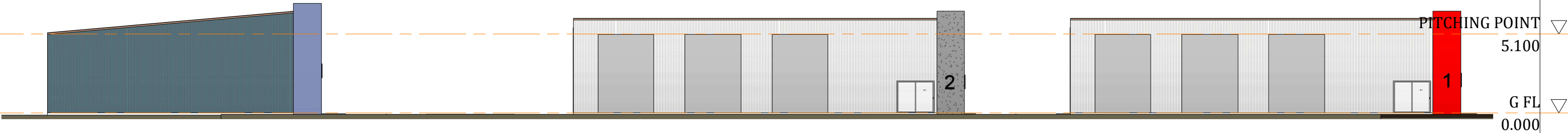
	Description:	Date:
-	-	-

REVISIONS



Elevation 1

1 : 100



Elevation 2

1 : 250

ISSUED FOR
PRELIMINARY

Project:
PROPOSED DEVELOPMENT
Address:
**10 CHAPPELL STREET,
KAWANA**

Drawing Title:
ELEVATIONS



0407 271 336 M
info@deaignelements.com.au E
QBCC No: 1247120 BDAQ No: 0001677

Scale: As indicated	Rev:	13/05/2024 4:00:21 PM
Date: FEB 2024		
Drawn: Author		
Project No: 24_011	Drawing No: S-07	

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

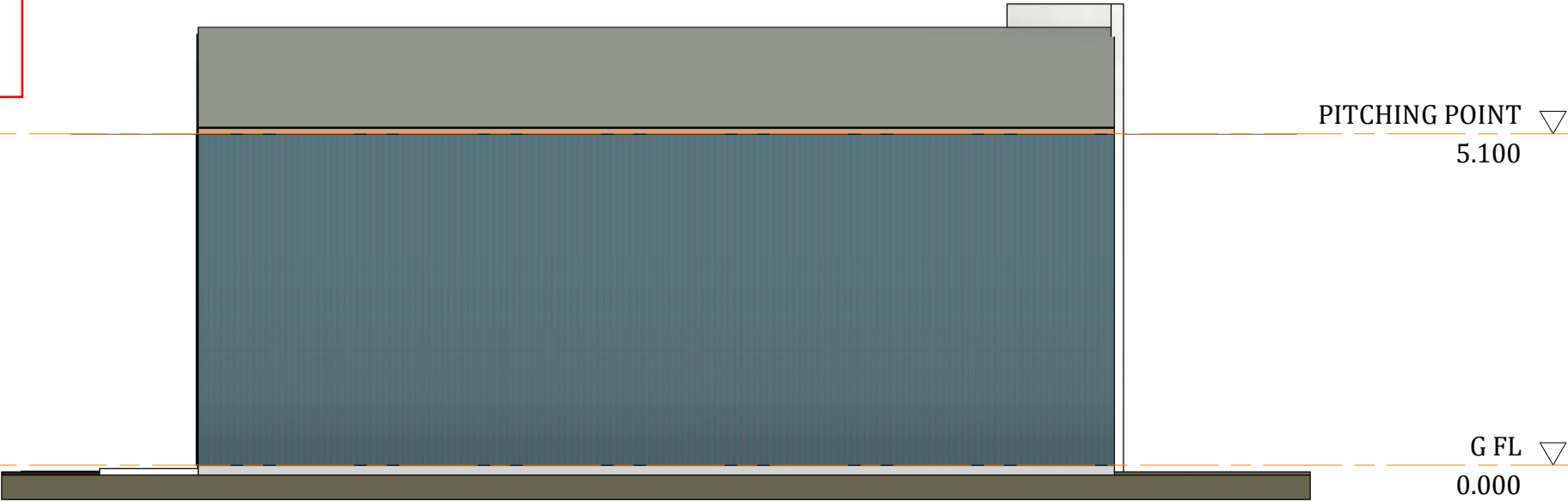
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Dated: 31 July 2024

DO NOT SCALE DRAWING

ALL DIMENSION IN MILLIMETERS

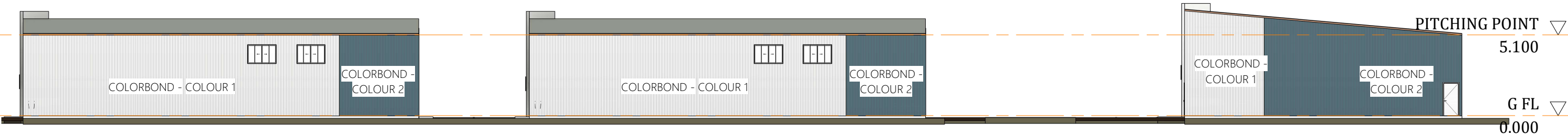
:	Description:	Date:
-	-	-

REVISIONS



Elevation 3

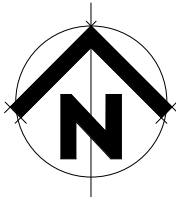
1 : 100



Elevation 4

1 : 250

ISSUED FOR
PRELIMINARY



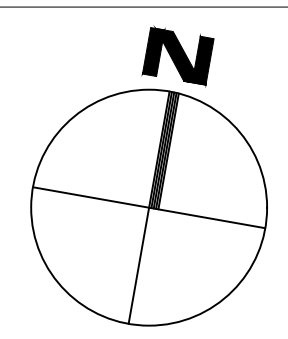
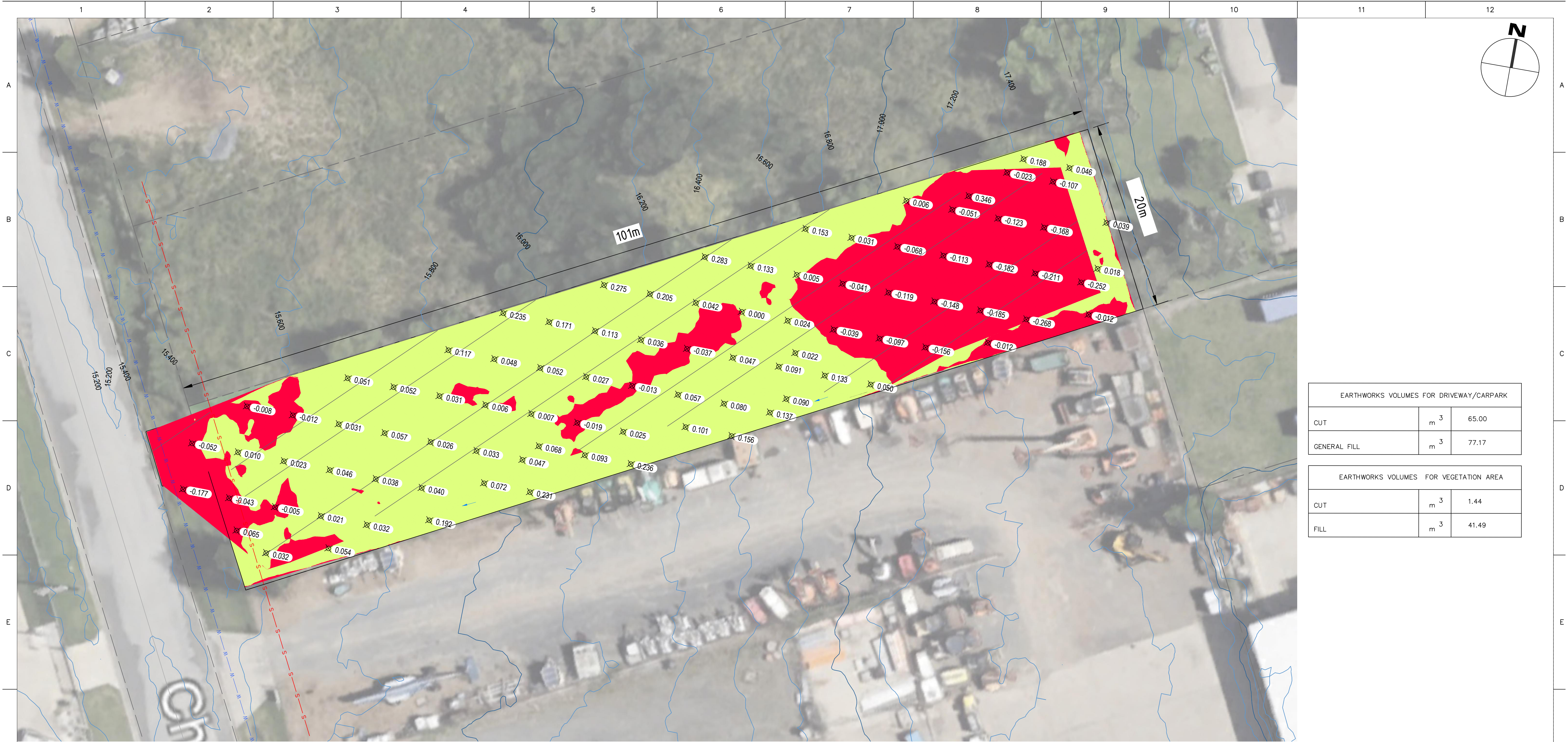
Project:
PROPOSED DEVELOPMENT
Address:
**10 CHAPPELL STREET,
KAWANA**

Drawing Title:
ELEVATIONS



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QBCC No: 1247120 BDAQ No: 0001677

Scale: As indicated	Rev:	13/05/2024 4:00:25 PM
Date: FEB 2024		
Drawn: NJB		
Project No: 24_011	Drawing No: S-08	



EARTHWORKS VOLUMES FOR DRIVEWAY/CARPARK		
CUT	m ³	65.00
GENERAL FILL	m ³	77.17

EARTHWORKS VOLUMES FOR VEGETATION AREA		
CUT	m ³	1.44
FILL	m ³	41.49

- LEGEND:**
- Red box: -0.20m TO 0.0m CUT
 - Yellow box: 0.0m TO 0.40m FILL
 - Blue line: EXISTING CONTOURS 0.2 & 1m
 - Black line: PROPERTY CADASTRE LINE
 - Red dashed line: EXISTING SEWER LINE
 - Blue dashed line: EXISTING WATER LINE 100 DIA ASBESTOS CEMENT PIPE
 - Black dot: EARTHWORKS DEPTH TO SUBGRADE LEVELS
 - Red dashed line: PROPOSED CARPARK

EARTHWORKS PLAN
SCALE 1:200

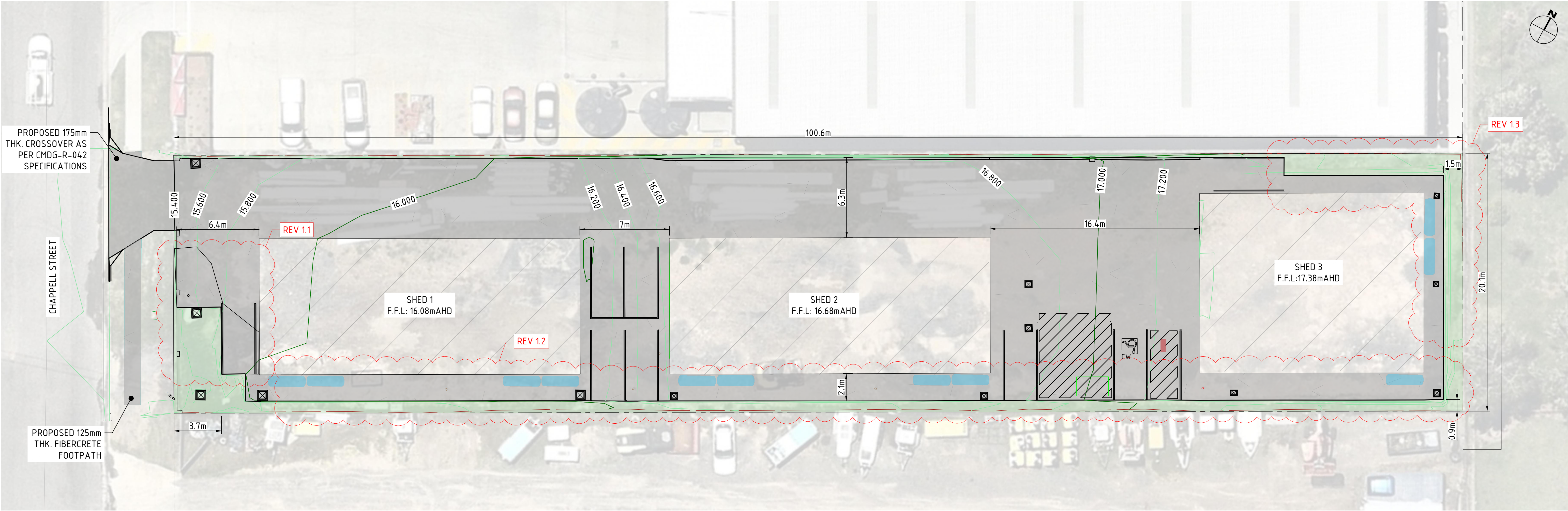
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- NOTES:**
- 150mm TOPSOIL TO BE STRIPPED.
 - 150mm GST SUBGRADE - EXISTING SUBGRADE TO BE SCARIFIED, MOISTURE CONDITIONED & RECOMPACTED TO 95% COMPACTION.
 - ACHIEVE 98% COMPACTION AS PER SUBGRADE NOTE 3.

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GENERAL ARRANGEMENT SITE PLAN - AS BUILD
SCALE 1:150

- LEGEND:
- PLANTING & GRASS (195.80m²) BY OTHERS
 - PARKING / DRIVEWAYS (1053.0m²) BY OTHERS
 - PROPOSED BUILDING (776m²) BY OTHERS
 - PROPOSED CONTOURS (0.2 & 1m)
 - ROAD KERB & CHANNEL
 - PROPOSED STORMWATER PIPES
 - PROPERTY CADASTRE LINE
 - EXISTING SEWER LINE
 - EXISTING WATER LINE Ø100 ASBESTOS CEMENT PIPE

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

2 October 2026

DATE

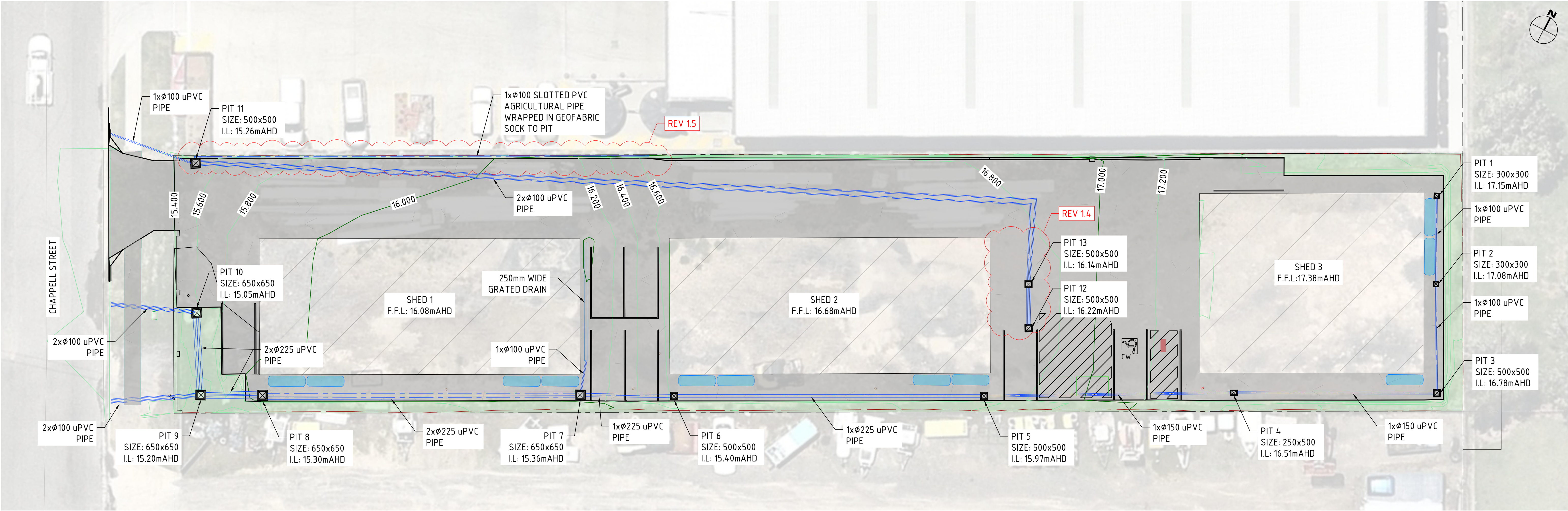
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Development Permit No.: D/14-2024

Dated: 31 July 2024

ITEM	DESCRIPTIONS
REV 1.1	26.5m ² PERVIOUS AREA HAS BEEN CONVERTED TO IMPERVIOUS AREA
REV 1.2	175.2m ² PERVIOUS AREA HAS BEEN CONVERTED TO IMPERVIOUS AREA, BIN STORAGE LOCATION AND CARPARK LAYOUT HAS BEEN REVISED
REV 1.3	39.0m ² PERVIOUS AREA HAS BEEN CONVERTED TO IMPERVIOUS AREA

REGISTERED PROFESSIONAL ENGINEER QUEENSLAND						 info@patcol.com.au www.patcol.com.au 186 Denham Street, Rockhampton QLD 4700		DAVID BELL		LOT 69,10 CHAPPELL STREET, KAWANA, QLD	
RPEQ NO: 16203								GENERAL ARRANGEMENT SITE PLAN - AS BUILD			
SCOTT MATTHEW THOMAS											
SIGNATURE: 											
DATE: 04.09.26											



STORMWATER SITE PLAN – AS BUILD
SCALE 1:150

LEGEND:

- PLANTING & GRASS (195.80m²) BY OTHERS
- PARKING / DRIVEWAYS (1053.0m²) BY OTHERS
- PROPOSED BUILDING (776m²) BY OTHERS
- PROPOSED CONTOURS (0.2 & 1m)
- ROAD KERB & CHANNEL
- PROPOSED STORMWATER PIPES
- PROPERTY CADASTRE LINE
- EXISTING SEWER LINE
- EXISTING WATER LINE Ø100 ASBESTOS CEMENT PIPE
- DETENTION POLY TANKS ABOVE GROUND
11 X 3kL (OR APPROVED EQUIVALENT SLIMLINE WATER TANKS)
CONTROLLED OUTLET ORIFICES
Ø100mm @ BASE + 1.85m

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

2 October 2026

DATE

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ITEM	DESCRIPTIONS
REV 1.4	TWO PITS HAS BEEN INSTALLED TO CAPTURE THE RUNOFF FROM THE CARPARK AND FURTHER DISCHARGE TO KERB AT CHAPPELL STREET.
REV 1.5	21.8m ² IMPERVIOUS AREA HAS BEEN CONVERTED TO PERVIOUS AREA, Ø100 AGG. PIPE HAS BEEN INSTALLED TO CAPTURE THE RUNOFF FROM THE DRIVEWAY AND FURTHER DISCHARGE TO KERB.

REGISTERED PROFESSIONAL ENGINEER QUEENSLAND

RPEQ NO: 16203
SCOTT MATTHEW THOMAS

SIGNATURE:  DATE: 04.09.26

REV	DESCRIPTION	DRWN	DSN'D	APP'D	DATE
D	AS CONSTRUCTED - COUNCIL IRs RESPONSE	U.S.	U.S.	S.M.T.	04.09.26
C	ISSUED FOR APPROVAL - COUNCIL IRs RESPONSE	U.S.	U.S.	S.M.T.	14.08.26
REV	DESCRIPTION	DRWN	DSN'D	APP'D	DATE

REVISIONS



info@patcol.com.au
www.patcol.com.au

186 Denham Street,
Rockhampton QLD 4700

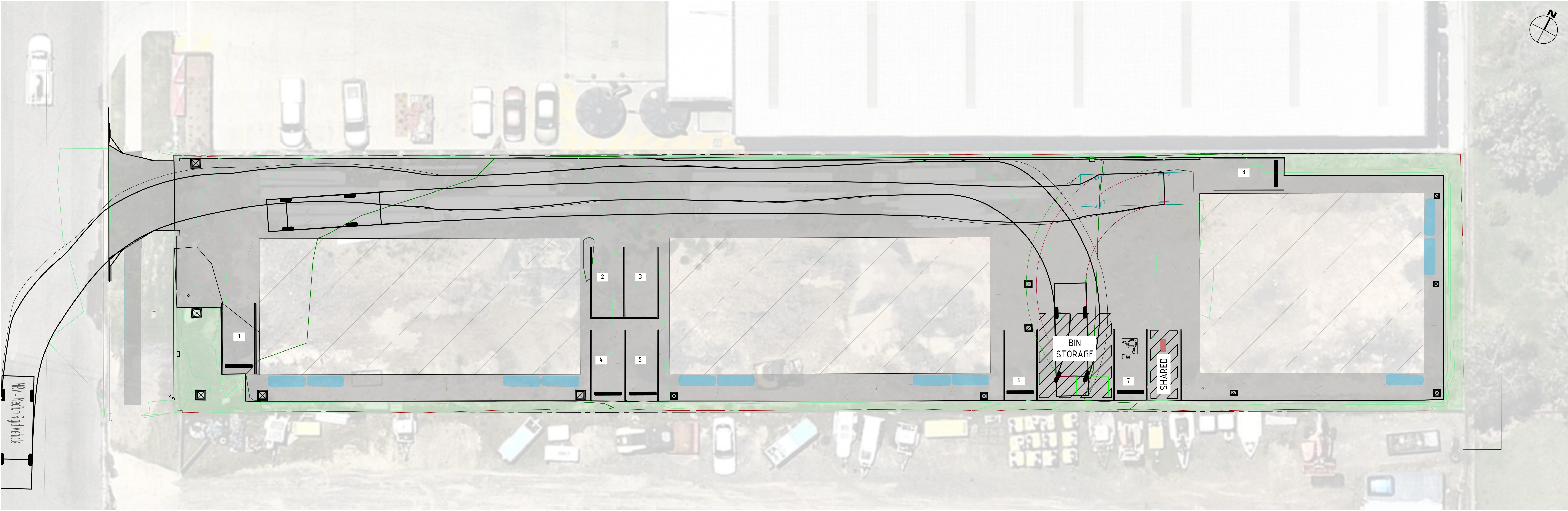
DAVID BELL
LOT 69,10 CHAPPELL STREET, KAWANA, QLD
STORMWATER SITE PLAN – AS BUILD

SCALE: (A1)

DRAWING No.
24-245/SK102

AS – CONSTRUCTED

REV.
D



TRAFFIC SWEEP PATH SITE PLAN – AS BUILD
SCALE 1:150

- LEGEND:
- PROPOSED CONTOURS (0.2 & 1m)
 - ROAD KERB & CHANNEL
 - PROPERTY CADASTRE LINE
 - EXISTING SEWER LINE
 - EXISTING WATER LINE Ø100 ASBESTOS CEMENT PIPE

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

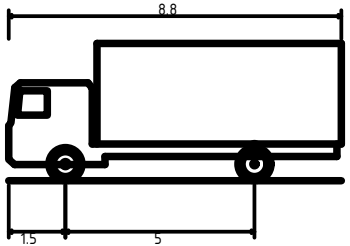
2 October 2026

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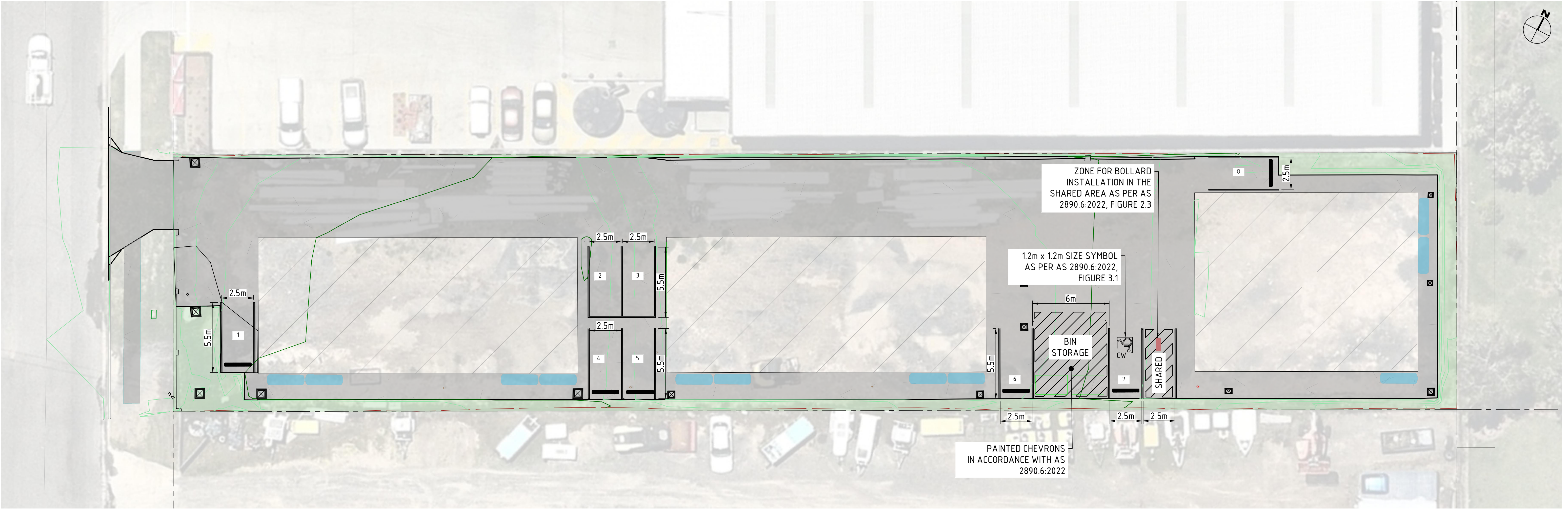
Development Permit No.: D/14-2024

Dated: 31 July 2024



SERVICE VEHICLE (8.8m) – MANDATORY STOP
OVERALL LENGTH 8.800m
OVERALL WIDTH 2.500m
OVERALL BODY WIDTH 3.632m
MIN BODY GROUND CLEARANCE 0.427m
TRACK WIDTH 2.500m
LOCK-TO-LOCK TIME 4.00s
CURB TO CURB TURNING RADIUS 9.000m

REGISTERED PROFESSIONAL ENGINEER QUEENSLAND						 info@patcol.com.au www.patcol.com.au 186 Denham Street, Rockhampton QLD 4700				DAVID BELL			
RPEQ NO:	16203 SCOTT MATTHEW THOMAS									LOT 69,10 CHAPPELL STREET, KAWANA, QLD			
SIGNATURE:										TRAFFIC SWEEP PATH SITE PLAN – AS BUILD			
DATE:	04.09.26									SCALE: (A1)		DRAWING No. 24-245/SK102	
		REV	DESCRIPTION	DRWN	DSN'D	APP'D	DATE						
		REVISIONS											
		D	AS CONSTRUCTED- COUNCIL IRs RESPONSE	U.S.	U.S.	S.M.T.	04.09.26						
		C	ISSUED FOR APPROVAL- COUNCIL IRs RESPONSE	U.S.	U.S.	S.M.T.	14.08.26						



PARKING LAYOUT SITE PLAN
SCALE 1:150

- LEGEND:
- PROPOSED CONTOURS (0.2 & 1m)
 - ROAD KERB & CHANNEL
 - VEHICLE WHEEL STOPPER
 - PROPERTY CADASTRE LINE
 - EXISTING SEWER LINE
 - EXISTING WATER LINE Ø100 ASBESTOS CEMENT PIPE

ROCKHAMPTON REGIONAL COUNCIL
AMENDED PLANS APPROVED
2 October 2026
DATE
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/14-2024
Dated: 31 July 2024

NOTES:
1. ALL LINE MARKINGS ARE 100mm WIDE
2. 4 AND 5 NO. CARPARKS ARE ONLY FOR STAFF

STORMWATER REPORT – Proposed Site

Development Stormwater Management Report

Project Number: 24-245

Client: David Bell

Site: 10 Chappell Street, Kawana QLD

Scope: Stormwater Management Plan

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

2 October 2026

DATE

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

Development Permit No.: D/14-2024

Dated: 31 July 2024

Rev No.	Revision	Author	RPEQ	Issue Date
A	Original Issue	Utkarsh Singh	Scott Thomas	13.05.2024
B	Revised Issue	Utkarsh Singh	Scott Thomas	31.05.2024
C	Council Revision	Utkarsh Singh	Scott Thomas	08.07.2024
D	Council Revision	Utkarsh Singh	Scott Thomas	17.08.2026



Figure 1: Location of the Study Area at 10 Chappell Street Kawana QLD, Coordinates: 245345.33 m E, 7416787.71 m S, Zone- 56K

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Patcol Group Pty Ltd. has been engaged by Pavscorp to undertake a site-based Stormwater Management Plan (SMP) for a proposed shed. The site is located at 10 Chappell Street, Kawana QLD on Lot 69 on RP603516.

The aim of this SMP is to demonstrate that the proposed development will comply with Capricorn Municipal Development Guidelines (CMDG), Queensland Urban Drainage Manual (QUDM 2016), Australian Rainfall and Runoff 2016 (ARR'16) and State Planning Policy (SPP 2017).

1.2 METHODOLOGY

The assessment methodology adopted for this SMP is summarised below.

- Identify Lawful Point of Discharge (LPOD) for the site stormwater runoff.
- Identify the critical storm events.
- Estimate peak discharge runoff for pre-development and post-development scenarios.
- Identify potential mitigation and management strategies to ensure no worsening to downstream catchments and infrastructure.
- Assess the stormwater quality treatment requirements for the project.

1.3 DATA SOURCES

The background data used to undertake this assessment were collected from the following sources:

- ARR'16 data hub
 - Rainfall data
 - Design storm ensemble temporal patterns
- Rockhampton Council GIS data
 - 2016 LiDAR
 - Infrastructure GIS mapping
- Preliminary overall layout plan (completed by Deziign Elements)

2 SITE CHARACTERISTICS

2.1 LOCATION AND SITE TOPOGRAPHY

The site is located at 10 Chappell Street, Kawana QLD, described as Lot 31 RP812632, which falls under the medium impact industry and is bounded by Chappell Street to the southwest and existing industry lot to the southern side and eastern side and an empty parcel to the north, as shown in Figure 2.



Figure 2: Site Plan Showing Existing Site Conditions

Figure 2 shows the existing site having a major part as a grass cover. The existing grassed area is mostly sloped, generally falling from the northeastern corner to the southwestern corner at approximately 2.3%, and approximately levels ranging from RL17.5m to RL15.52m. The site is approximately 0.202 ha or 2023m² in size.

2.2 CURRENT LAND USE AND STORMWATER DISCHARGE

The development site is currently unoccupied and consists of vegetation and open space grassed areas. According to the detailed survey, stormwater runoff sheet flows across the site and discharges to Chappell Street. Based on the Council records and detailed survey, there is stormwater kerb infrastructure located within Chappell Street.

The current land use catchment area consists of the following areas (Refer to the table below);

Table 1 : Pre-Development Catchment Details

Pre- Development Areas (2,023 m ²)		
Impervious Area	0	0 %
Pervious Area	2,023 m ²	100 %

2.3 PROPOSED LAND USE

The project consists of a warehouse development with associated hardstand and landscape areas. Refer to Appendix A of this report for the Architectural Layout. For catchment properties refer to the table below.

Table 2 : Post-Development Catchment Details

Post- Development Areas (2,023 m ²)		
Impervious Area	1,829.0 m ²	90 %
Pervious Area	195.80 m ²	10 %

2.4 PROPOSED STORMWATER DISCHARGE

It is proposed that development is split into two sub-catchments as shown in the Concept Stormwater Drainage Catchment Plan in Appendix C.

Catchment 1/A

Catchment 1/A consists of the warehouse roof area. The proposed roof area is to be captured by a series of gutters and downpipes and directed to the proposed above-ground detention tanks. Flows over from the detention tanks will be conveyed to the kerb in Chappell Street.

Catchment 2/A

Catchment 2/A consists of the carpark, external upstream catchment, landscaping and concrete paths access around the warehouse. Flows from the catchment will be directed to a series of field inlet pits. All field inlets located on the site are to be fitted with SPEL Storm sack trash bag pre-treatment devices. The carpark area will act as a sheet flow overland to the kerb in Chappell Street.

Due to the absence of subsurface stormwater infrastructure, flows from both catchments will ultimately discharge to the site's lawful point of discharge, which is the kerb on Chappell Street as per the existing condition. Two discharge points are proposed within the kerb and channel to reduce the concentration of flows.

Refer to Appendix C for the Concept Stormwater Drainage Plan and Concept Stormwater Catchment Plan.

The stormwater management plan involves using ø100, ø150, and ø225 stormwater pipes to gather overflow from the above-ground detention tanks and sheet flow from the vegetation cover. The collected water will then be directed to the existing kerb (LPOD) separately located in a group of three 150mm x 100mm Rectangular Hollow Section (RHS) stormwater pipes from the stormwater pits 9,10 and 11. Refer to Appendix C.

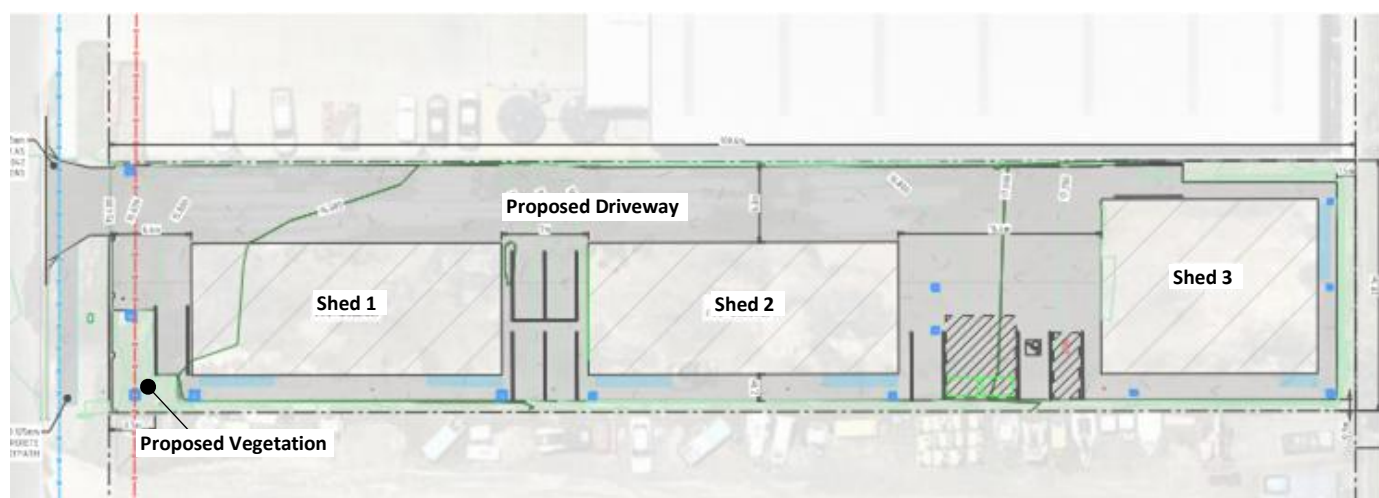


Figure 3: Proposed Development Plan & External Catchment Inflow

2.5 TOPOGRAPHY

Site survey data has been taken from the ELVIS website with existing contours of 0.2m & 1m.

2.6 EXTERNAL CATCHMENT

Based on the analysis of the surrounding area, it has been determined that there is an external catchment affecting the proposed development site. The external catchment only receives water from the existing grass cover at the back of the commercial building, as shown in Figure 3. The external catchment covers an area of approximately 0.032 hectares (ha) and is fed by overland flow along the eastern boundary of the site. However, there is a spoon drain in between the proposed site and the upstream catchment. This design has been taken considering the upstream catchment flow to the proposed site.

3 HYDROLOGY ASSESSMENT

3.1 LAWFUL POINT OF DISCHARGE (LPOD)

The proposed LPOD for the lot is to the existing kerb located at the front side of the property, with all discharge to the front of the lot into the kerb, which is under the lawful control of the local government and satisfies the requirements in accordance with QUDM.

3.2 HYDROLOGIC MODELLING APPROACH

Hydrologic calculations have been undertaken using EPASWMM 5.2 for pre- and post-development scenarios. The modelling within the EPASWMM has been undertaken to estimate the peak discharge for storms up to 1% AEP with a 15% climate change factor. Hydrologic modelling has been undertaken using the Laurensen Runoff Routing Method. Laurensen's Method is a widely used hydrologic routing method that can be used for catchments ranging between 10m² up to 20,000km². The information required to apply Laurensen's Method includes:

- Rainfall Intensity Data (obtained from the Bureau of Meteorology 2016 IFD utility)
- Rainfall Temporal Patterns (obtained from the ARR'16 Data Hub)
- Catchment Area (ha)
- Catchment Slope
- Initial and Continuing Infiltration Data
- Catchment Roughness (Manning's Coefficient)

Given the relatively limited scope of this hydraulic impact assessment, a lumped catchment approach as defined by ARR'16 and shown in Figure 4 below, was applied to the hydrologic review of the site. The lumped approach is suitable for this site given the relative consistency in land use and the ultimate purpose of the model.

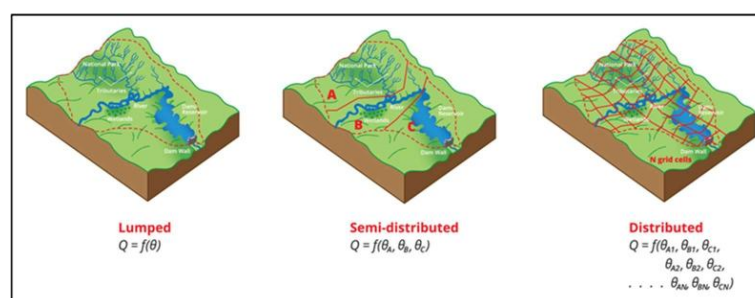


Figure 4: Lumped vs distributed catchment analysis options

Table 3 and Table 4 present the input data for the development site in pre-development and post-development conditions.

Table 3: Pre-development model parameters (EPA SWMM)

Pre-development sub-catchment parameters			
		Pervious	Impervious
Area (ha)		0.202	0
Percentage Impervious (%)		0	100
Manning's Coefficient		0.025	0.016
Paved area and Depression storage (mm)		0	1
Grassed area and Depression Storage (mm)		5	0
Storm Losses	Initial Losses (mm/hr)	5	0
	Continuing Losses (mm/hr)	0	0

Table 4: Post-development model parameters (EPA SWMM)

Post-development sub-catchment parameters			
		Pervious	Impervious
Area (ha)		0.0195	0.1828
Total Roof Area (ha)		0	0.0776
Concrete Driveway / Carpark + Concrete Path		0	0.1053
Percentage Impervious (%)		0	100
Manning's Coefficient		0.025	0.016
Paved area and Depression storage (mm)		0	1
Grassed area and Depression Storage (mm)		5	0
Storm Losses	Initial Losses (mm/hr)	5	0
	Continuing Losses (mm/hr)	0	0

3.3 MODEL CALIBRATION

Rational Method calculations (refer to Appendix D) have been undertaken to provide peak flow rates to compare against the EPASWMM model which has been utilised to calculate the unmitigated post-development peak flow rates for the catchment.

The unmitigated post-development peak flows for the Catchments for both EPASWMM and the Rational Method are summarised in Table 3 following.

Table 5: Comparison between EPASWMM and Rational Method

Comparison between EPASWMM Model and Rational Method peak discharges			
	EPASWMM 15 minutes Flow (m3/s)	Rational Method 15 minutes Flow (m3/s)	Change (m3/s)
10% AEP (m3/s)	0.095	0.097	-0.002
1% AEP (m3/s)	0.178	0.177	+0.001

As demonstrated by Table 5 above, the Rational Method calculations and EPASWMM model yield net similar values and are considered comparable. As such, the EPASWMM values shall be adopted as the peak flow rates for the undeveloped site condition for the purposes of the subsequent analysis.

3.4 PRE-DEVELOPMENT INFORMATION

Sub-catchment area (ha):	0.202
Hydrological Model:	Horton
Time of Concentration (Impervious)	15 mins. (QUDM – Section 4.6)
Time of Concentration (Pervious)	15 mins. (QUDM – Section 4.6)

Table 6: Pre-Development Hydrological Model

	Paved	Grassed
Percentage of area (%)	0	100
Time of Concentration (mins)	15	15

3.5 POST-DEVELOPMENT INFORMATION

Sub-catchment area (ha):	0.202
Hydrological Model:	Horton
Time of Concentration (Impervious)	6 mins. (QUDM – Section 4.6)
Time of Concentration (Pervious)	6 mins. (QUDM – Section 4.6)

Table 7 : Post-Development Hydrological Model

	Paved	Grassed
Percentage of area (%)	90	10
Time of Concentration (mins)	6	10

3.6 PRE VS POST-DEVELOPMENT UNMITIGATED DISCHARGE

The pre-development and post-development results produced within “EPASWMM” using the Horton hydrological model have been compared in the table below:

Table 8: Pre vs Post-Development Unmitigated Discharge

Storm Event ARI (AEP)	Pre-Development Runoff (m ³ /s)	Post-Development Unmitigated Runoff (m ³ /s)	Peak Discharge Difference (m ³ /s)
Q10 (10%) 10 min	0.031	0.094	+0.063
Q20 (5%) 10 min	0.037	0.110	+0.073
Q50 (2%) 10 min	0.051	0.130	+0.079
Q100 (1%) 10 min	0.058	0.149	+0.091

The above table demonstrates an increase in post-development peak discharge. A detention tank will be required to mitigate flows.

3.7 PRE VS POST-DEVELOPMENT MITIGATED DISCHARGE

Storm Event ARI (AEP)	Pre-Development Runoff (m ³ /s)	Total Post-Development Mitigated Runoff (m ³ /s) – including external catchment	Peak Discharge Difference – Mitigated vs Pre-Development (m ³ /s)	Peak Discharge Difference- Unmitigated (m ³ /s)	Post Development Unmitigated Flow Reduction
Q10 (10%) 10 min	0.0311	0.0530	+0.0219	-0.041	77.35%
Q20 (5%) 10 min	0.0371	0.0640	+0.0269	-0.046	71.9%
Q50 (2%) 10 min	0.0511	0.0740	+0.0229	-0.056	75.7%
Q100 (1%) 10 min	0.0583	0.0830	+0.0247	-0.066	79.5%

As demonstrated in the above table, flows have been reduced in the post-development scenario. Whilst there is an increase in post-development, the absence of Council underground infrastructure makes it difficult to capture and mitigate the ground level. Therefore, the implementation of the above-ground tank to mitigate flows from the roof is proposed to provide some reduction in the vicinity of 71-79%. The above table is based on a detention tank with the following characteristics to achieve the reduction of discharge.

Table 9: Detention Tank Parameters

Detention Tank Parameters	
Volume	33m ³ (11 x 3m ³ Above Ground Tanks)
Outlet 1	100mm PVC Orifice IL = Base + 1850mm

4 HYDRAULICS

4.1 HYDRAULIC MODELLING APPROACH

The hydraulic assessment for the site has been carried out using EPASWMM 5.2. The aim of the hydraulic modelling is to demonstrate the post-development minor and major storm peak discharge at the LPOD.

The suggested stormwater management approach involves the implementation of a 4 x Ø 100 stormwater pipe, 2 x Ø 150 and 4x Ø 225 stormwater pipes that collect the shed's roof and proposed vegetation that also includes the external catchment runoff and deliver it to the LPOD. Refer to Appendix C for the site's general arrangement, which displays the planned strategy for stormwater management on the site.

The proposed uPVC stormwater pipes shall be installed at a minimum grade of 1% towards the kerb invert. The hydraulic assessment has been undertaken to convey a maximum discharge of 0.014m³/s (14 L/s) at an average flow velocity of approximately 0.50m/s, comprising flows from the tanks overflow and impervious areas along the southern boundary. The runoff will be conveyed via 150 mm x 100 mm RHS stormwater pipes and discharged to the kerb during the 1% AEP event.

The runoff from the driveway and carpark area will discharge to the existing kerb (I.L 15.25mAHD) as an overland sheet flow with a maximum discharge of 0.069CMS at an average velocity of 1.0m/s and depth of 20mm in a 1% AEP event.

The remaining grass cover area at the front of the property will drain into the existing kerb through 150mm x 100mm RHS stormwater pipes.

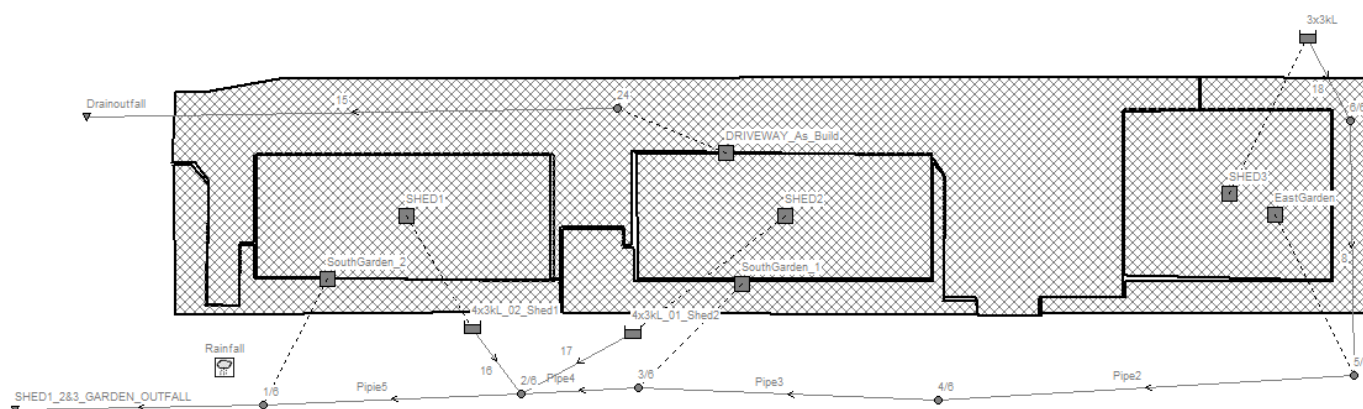


Figure 5: Stormwater management plan layout in EPA_SWMM_5.2

The following figures show the performance of the proposed stormwater management strategy relative to the post-development cases.

The proposed system results in a net increase of minor and major flows of 24.7L/s, effectively of stormwater quantity discharge from the site.

Furthermore, the proposed discharge from the kerb weir does not present any actionable nuisance with regards to velocity criteria. Due to being discharged over the kerb through RHS pipes with approximately 1.01m/s velocity in the major 1% AEP event and depth of 0.1m, which is the equivalent depth/velocity product rating of H1 per the Australian Emergency Management Institute guidelines which is generally safe for people, vehicles and buildings.

5 STORMWATER QUALITY

5.1 SCOPE

The development being not bigger than 2500m² does not trigger the need to address the stormwater quality provisions of the State Planning Policy 2017 (SPP 2017). This section aims to provide a high-level guide on measures to address the potential for an increase in pollutant loads during operational works.

5.2 DURING OPERATIONAL WORKS

The main risk of increased pollutant loads during construction is likely to be from erosion and sediment loss from disturbing the site. The following are the key pollutants that must be addressed during construction.

Table 10: Key Pollutants During Construction

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material offcuts etc.
Sediment	Exposed soil and stockpiled soil/gravel.
Hydrocarbons	Fuel and oils.
Toxic Materials	Cement, asphaltic materials, solvents, cleaning agents etc.
Acids or Alkaline Materials	Acid sulphate soils, cement.

Erosion and sediment control devices will be the main hard controls to lower pollutant loads during construction. At the operational works design stage an Erosion & Sediment Control Plan (ESCP) will be provided detailing the controls required, however, the below provides high-level measures that will be implemented.

Pre-Construction:

- Site personnel are to be informed and made aware of the ESCP and its implementation, maintenance, and decommissioning requirements.
- Sediment fences to be located along the contour lines downstream of disturbed areas.
- Educate site personnel on the requirements of the Sediment and Erosion Control Plan.
- Diversion drains to divert clean runoff around the construction site.
- Sediment fences in all areas requiring bulk earthworks will be installed.
- Major flow paths (kerb and channel, formalised drains etc.) will have erosion & sediment control devices installed upstream.
- The site access/s will have rumble pads installed to limit soil material tracked off-site by vehicles.
- Topsoil (if any) will be stripped and stockpiled to be reinstated after construction. Stockpiled topsoil will be bundled off.

During Construction:

- All bulk earthworks must be maintained in a tidy manner, with slopes and stockpiles levelled to reduce erosion caused by wind and rain.
- Areas of bulk filling to be bunded off during construction.
- Erosion and sediment control devices are to be monitored and maintained for the duration of construction.

- Appropriate waste disposal facilities are to be provided onsite – e.g., skip bins.

Post-Construction:

- Areas to be revegetated to have topsoil reinstated prior to placement of turf or hydro mulching.
- Sediment fencing to remain in place until revegetation has occurred.

6 CONCLUSION

This report aimed to identify a suitable strategy to facilitate the development of 10 Chappell Street, Kawana QLD from an existing vacant block to a proposed commercial complex, with regard to providing acceptable stormwater management post-development outcomes.

The development plan includes the proposed development as per Appendix B, and the impact of development on stormwater runoff was modelled for a range of events. It was found that the post-development discharge is greater than the existing stormwater discharge.

Stormwater flows from the development will discharge to the site's lawful point of discharge, being the kerb and channel in Chappell Street as per existing conditions. Three discharge points are proposed within the kerb and site to reduce the concentration of flows.

An assessment of the pre vs post-development flows has been undertaken and it is determined that on-site detention is required to mitigate the post-development flows from the development. Stormwater detention is provided by an above-ground detention tank with a volume of 33kL. Whilst there is an increase post-development, the absence of Council underground infrastructure makes it difficult to capture and mitigate the ground level. Therefore, the implementation of the above-ground tank to mitigate flows from the roof is proposed to provide some reduction.

Under the as-built site conditions, the discharge from the existing site has increased by 2.1L/s, from the previously assessed discharge rate of 22.6L/s documented in Revision C. The updated discharge rate is therefore approximately 24.7L/s.

APPENDIX A – EXISTING SITE PLAN

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Figure 6: Existing Site

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 Rational Method Calculation																	1	of	2	
																	By			U.S
																	Date			7/05/2024
Project	Pavscorp - 10 Chappell Street, Kawana							Project No.	24-245											
Description								Revision	A											
Catchment	Description	Catchment Characteristics			Time of Concentration															
					T (Standard Inlet)		T (Overland Sheet)				T (Pipe Channel)				T (Velocity Based)				Tc (min)	
		Area (Ha)	fi	C10	Slope (%)	T(SI)	Horton's 'n'	L(m)	Slope(%)	T (OSI)	Fall (m)	L (m)	Δ	T (P/C) (mins)	Avg. V (m/s)	L (m)	T (VB) (mins)			
EX1	Pre-development Case	0.201	0	0.6			0.053	100.585	2.3	15.00										

 Rational Method Calculation										2	of	2					
										By		U.S					
										Date		7/05/2024					
Project	Pavscorp - 10 Chappell Street, Kawana							Project No.	24-245								
Description								Revision	A								
Catchment	Description	Peak Flow Rates by Average Recurrence Interval (ARI)															
		Area (ha)	63% AEP/1yr ARI			10% AEP/10yr ARI			5% AEP/20yr ARI			2% AEP/50yr ARI			1% AEP/100yr ARI		
			C1	I (mm/hr)	Q1 (m3/s)	C10	I (mm/hr)	Q10 (m3/s)	C20	I (mm/hr)	Q20 (m3/s)	C50	I (mm/hr)	Q50 (m3/s)	C100	I (mm/hr)	Q100 (m3/s)
EX1	Pre Development Case	0.405	0.480	82.5	0.045	0.6	143	0.097	0.630	165	0.117	0.690	195	0.151	0.720	218	0.177