1 Design Notes

Carpark:
- Minimum required: 13 staff, 13 children
- 26 total carparks comprising:
  - 13 x full-time staff
  - 13x customer parks of which:
    - 1x PDW
    - 3x pram friendly
    - 1x drop-off or loading bay

Safety:
- All carparks have direct visibility to front entrance.
- No opposite reversing into common aisle
- Emergency vehicle and loading bay allowed
- Two-way traffic possible in carpark if needed, though intended as oneway for safe continuous flow
- Bins at end of carpark

RCP Carpark code:
- 1:6 for children and 1:1 FT employees
- Employee parks 2.4m wide
- High turnover, 2.7m wide
- All 5.4m deep
- Pram and PWD narrower because of shared space

Bins and Store:
- MGBs (mobile garbage bins) on wheels, located at end of carpark and behind walls and landscaping for discrete concealment and smell mitigation.
- Front loading refuse truck drives in to end of carpark, driver wheels bins infront, tips, and exits as usual.
- Grounds store constructed from fire-rated block work on bboundary corner, (is for gardener and site maintenance equipment.) (Out of the way, close to Petbarn corner)

Landscaping:
- Landscaping to carpark and driveway to comply with city Landscape code, including 1.5m buffer landscaping

Total on-property dedicated landscaping area excluding any fenced playareas: 264m²

Outdoor Play Areas:
- Nursery has dedicated play area, located close to toddlers so at discretion of cares some toddlers can play in nursery
- Pre-kindy has option of own play area which is suggested to have permanent motor and balance gym equipment.
- In Summer, in afternoon, option to use Main playground as cooler, and to integrate with kindy kids
- Raised garden and water play area is in blind corner, fenced separately for educational guided classes or allocated water play time - option to close off when not in use

Swing doors:
- all hinged doors are half-panel glass commerical grade
- except laundry door full glass panel, and toilet doors

Unencumbered Space Minimums:

Area	#	Indoor	Outdoor
Nursery	12	39	84
Toddler	18	59	127
Pre-kindy	24	78	168
Kindy	24	78	168
Total	**78**	**254m²**	**547m²**
Actual		**325m²**	**680m²**

Office Area:

Location	Area
Toddler Office & Prep	5m²
Kindy + Pre-kindy Office & Prep	39m²
Reception Office	30m²
Total	**74m²**

Areas

Total land	2363m²
Enclosed floor:	611m²
External floor area:	170m²
Driveway and carpark	820m²
Landscaping	243m² 10.2%
Playground areas	680m2
Site coverage: (Under roof area)	789m² 34%

Circulation:
- 3m minimum one-way circulation roadway width
- Up to 3.9m width at curve
- Outside radius allowed for bin truck: 11.05m
- 6.2m wide parking aisle

Neighbour: Beaumont

Neighbour: Petbarn

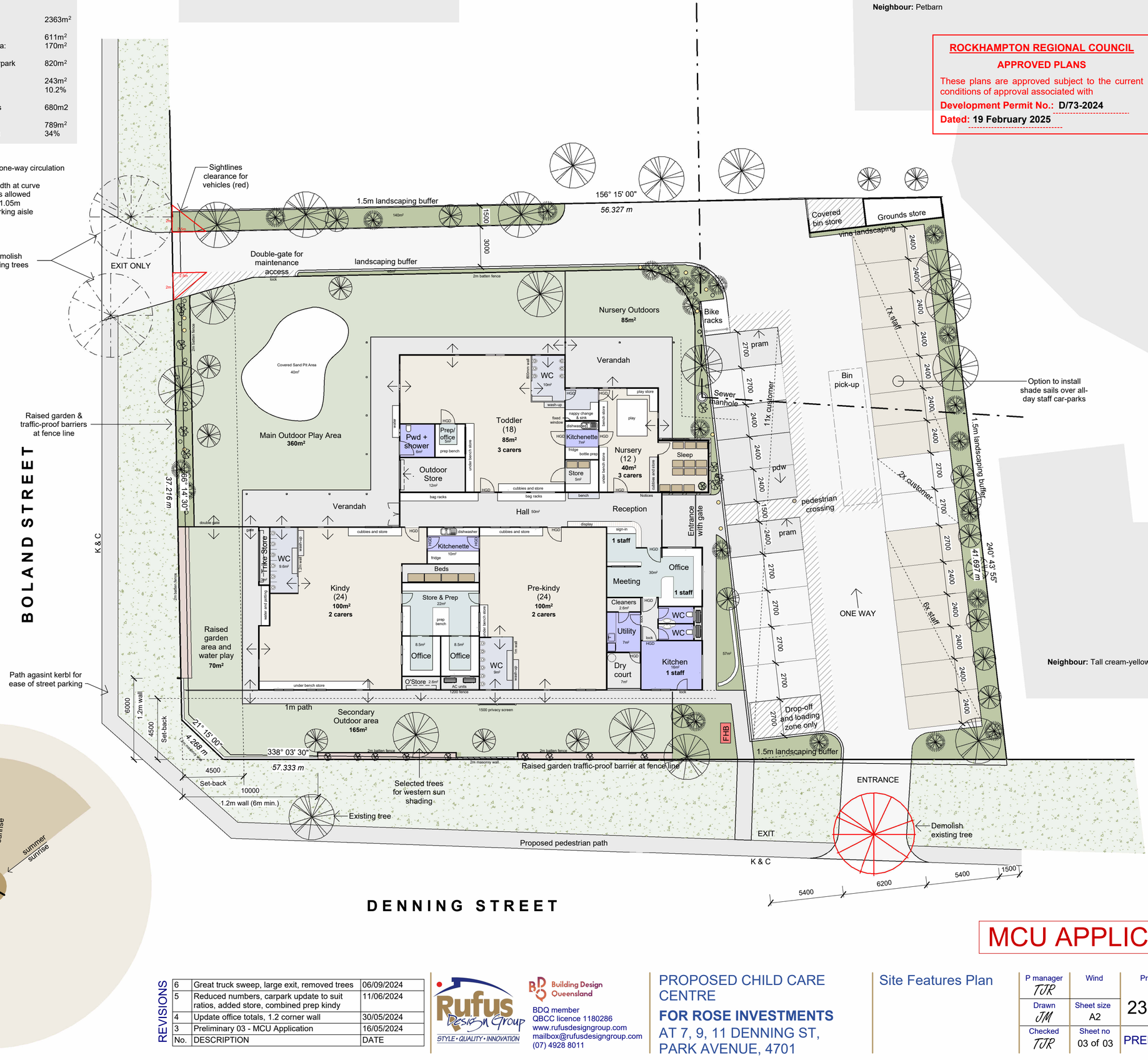
ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

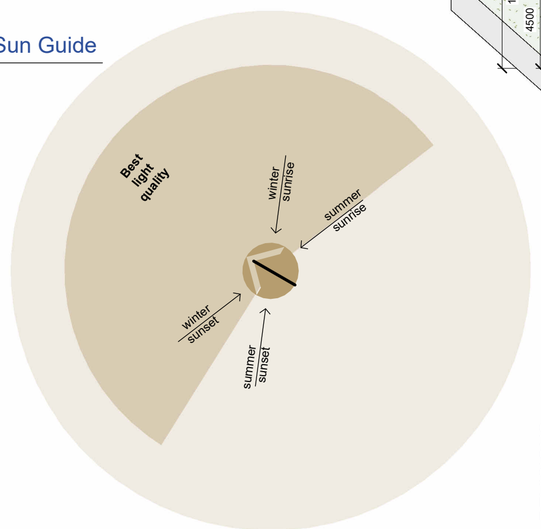
Development Permit No.: D/73-2024

Dated: 19 February 2025



Neighbour: Tall cream-yellow masonry building

Northpoint and Sun Guide



MCU APPLICATION

REVISIONS

6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
4	Update office totals, 1.2 corner wall	30/05/2024
3	Preliminary 03 - MCU Application	16/05/2024
No.	DESCRIPTION	DATE

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mailbox@rufusdesigngroup.com
(07) 4928 8011

PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Site Features Plan

P manager	Wind	Project number - Sheet
TJR		230612 - 03
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 03 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:35:13 PM

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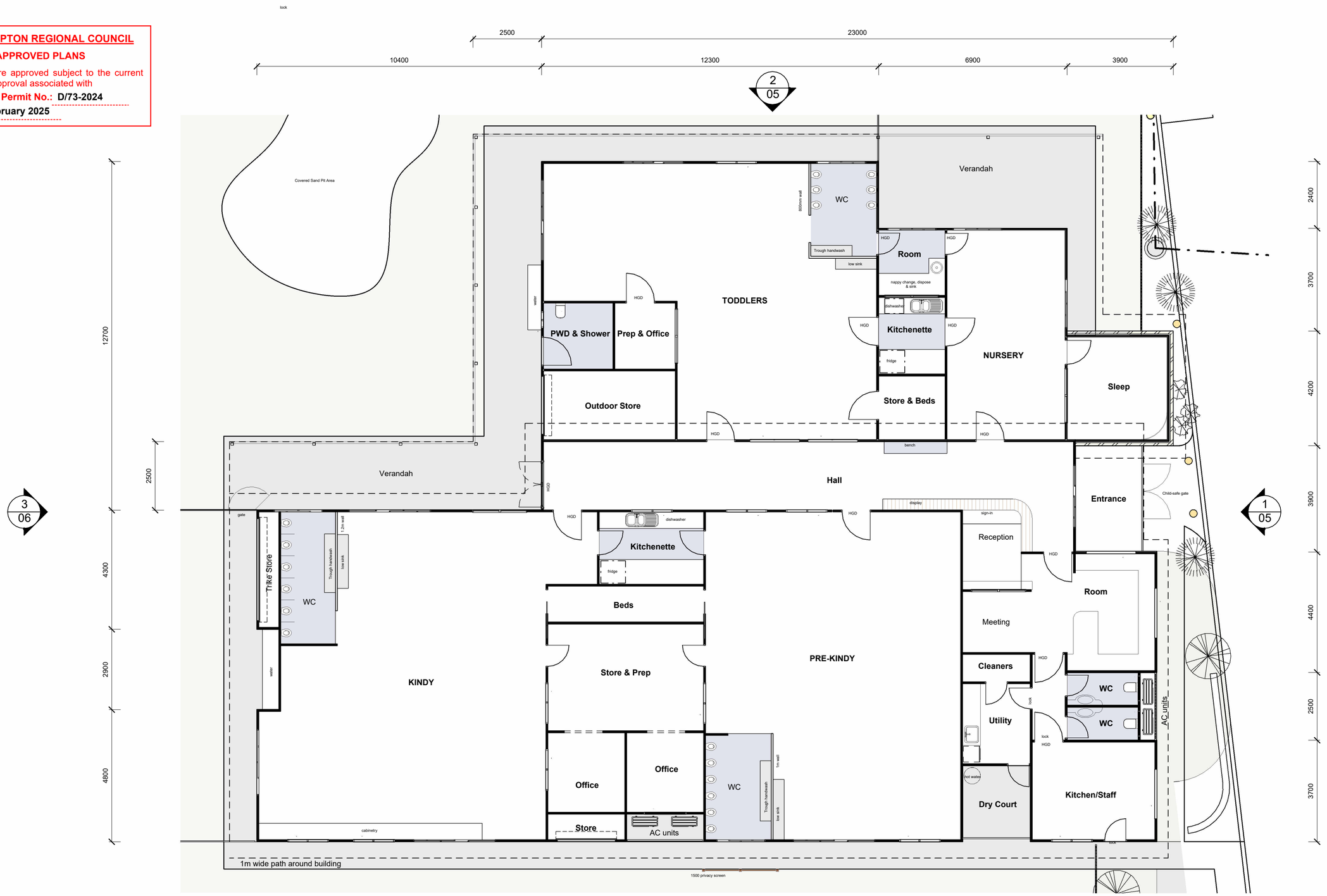

1 Floor Plan

1 : 100

MCU APPLICATION

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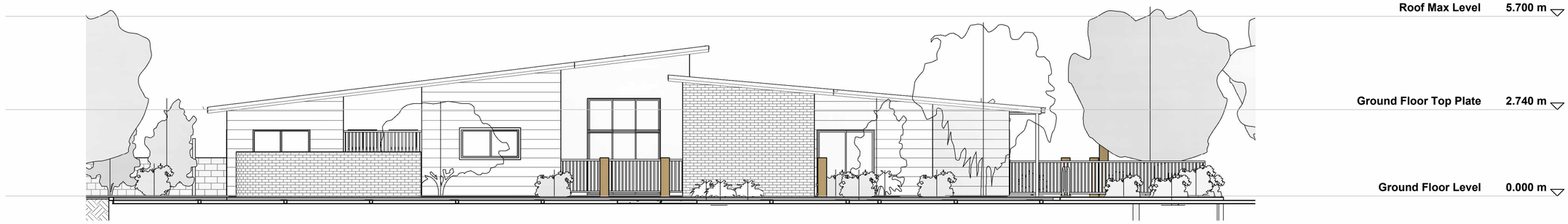
Floor Plan

P manager	Wind	Project number - Sheet
TJR		230612 - 04
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 04 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:34:18 PM



1 South Elevation - Entrance

1 : 100

ROCKHAMPTON REGIONAL COUNCIL

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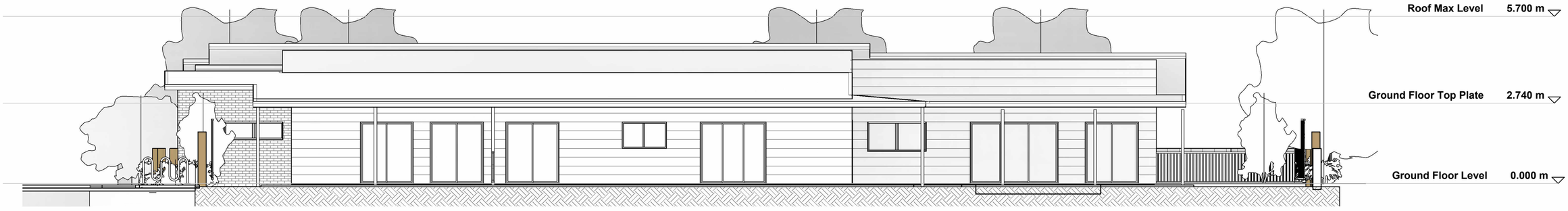

2 East Elevation

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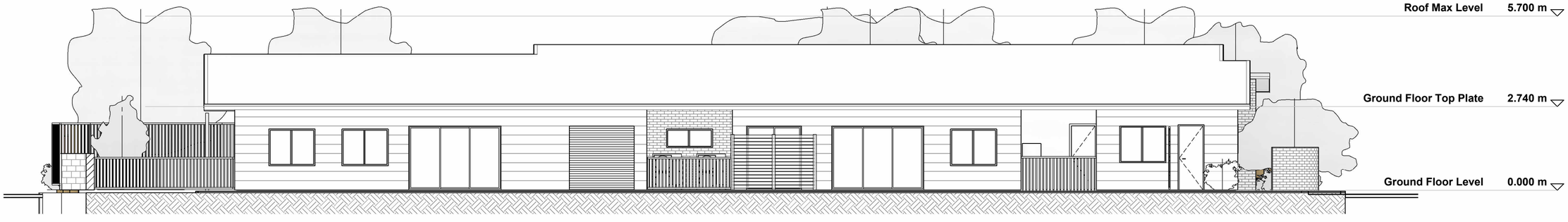

3 West Elevation

1 : 100

MCU APPLICATION

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PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Elevations

P manager	Wind	Project number - Sheet
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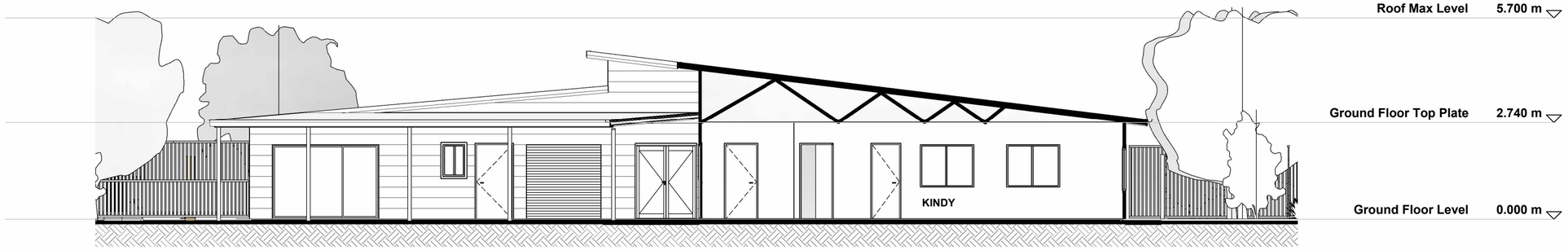
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 05 of 03	PRELIMINARY 06



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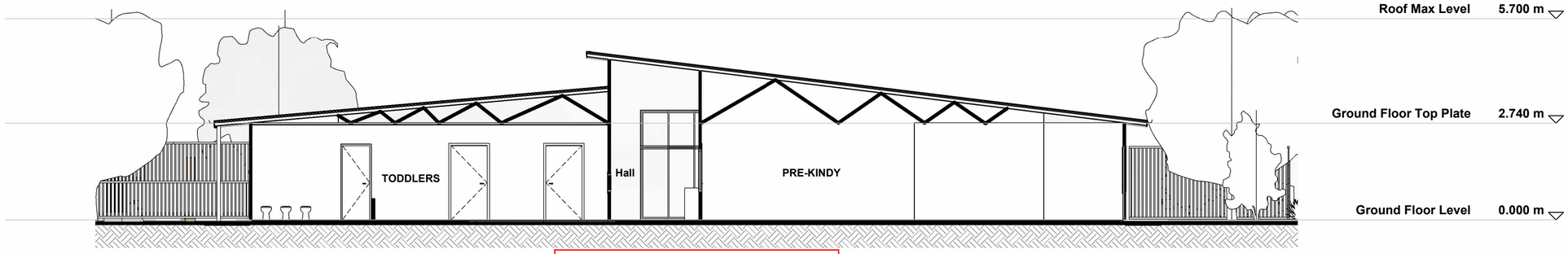

2 Section 3

1 : 100

ROCKHAMPTON REGIONAL COUNCIL

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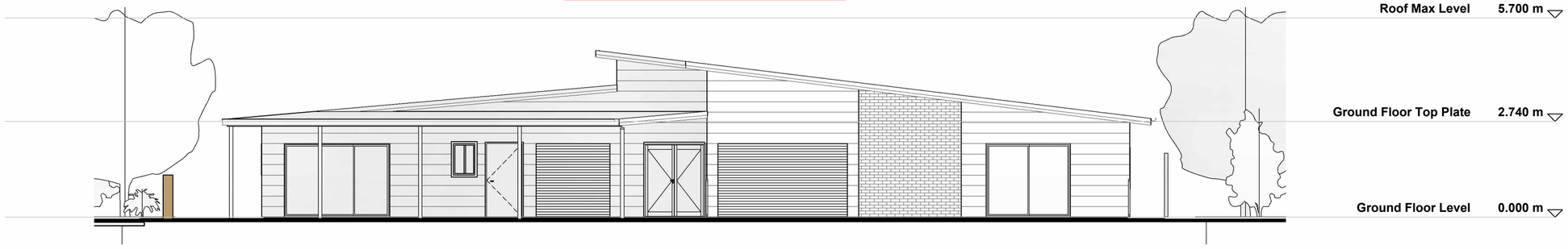
Development Permit No.: D/73-2024

Dated: 19 February 2025



3 North Elevation

1 : 100

MCU APPLICATION

REVISIONS

No.	DESCRIPTION	DATE
6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
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PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Sections & North Elevation

P manager	Wind	Project number - Sheet
TJR		230612 - 06
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 06 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:34:48 PM

Project #: 241263

Version: DA 01

Date: September 2024

Traffic Engineering Report

Proposed Child Care Centre Development

7, 9 and 11 Denning Street, Park Avenue

North Rockhampton

Lot 41, 42 and 43 on RP607265

For

Rose Investments

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/73-2024

Dated: 19 February 2025

Hayes Traffic Engineering

Proposed Child Care Centre
7, 9 and 11 Denning Street, Park Avenue NORTH ROCKHAMPTON
Lot 41 RP607265, Lot 42 RP607265, Lot 43 RP607265

Project	Date	Issue	Dianne Hayes RPEQ 7086
241263	September 2024	DA - V01	D. Hayes

Project No: 241263
September 2024

Status: V01 Issue no: 1

Hayes Traffic Engineering
PO Box 303
Coolum Beach Qld 4573
Phone: 0403 889 039
dianne@hayeste.com.au
Dianne Hayes
RPEQ 7086

Table of Contents

APPENDICES

1. INTRODUCTION

Hayes Traffic Engineering has been commissioned by Rose Investments to provide traffic engineering advice for a proposed child care centre at Denning Street, Park Avenue in North Rockhampton. Drawings of the proposal have been provided by Rufus Design Group and are included in Appendix A. This report assesses the access and parking arrangements and traffic impacts of the proposed development on the surrounding road network.

The objective of this study is to provide sufficient information to the Rockhampton Regional Council and to address item 3.0 outlined in the Information Request dated 9th July 2024.

Figure 1 – Proposed Child Care Centre Site

Source: QLD GLOBE

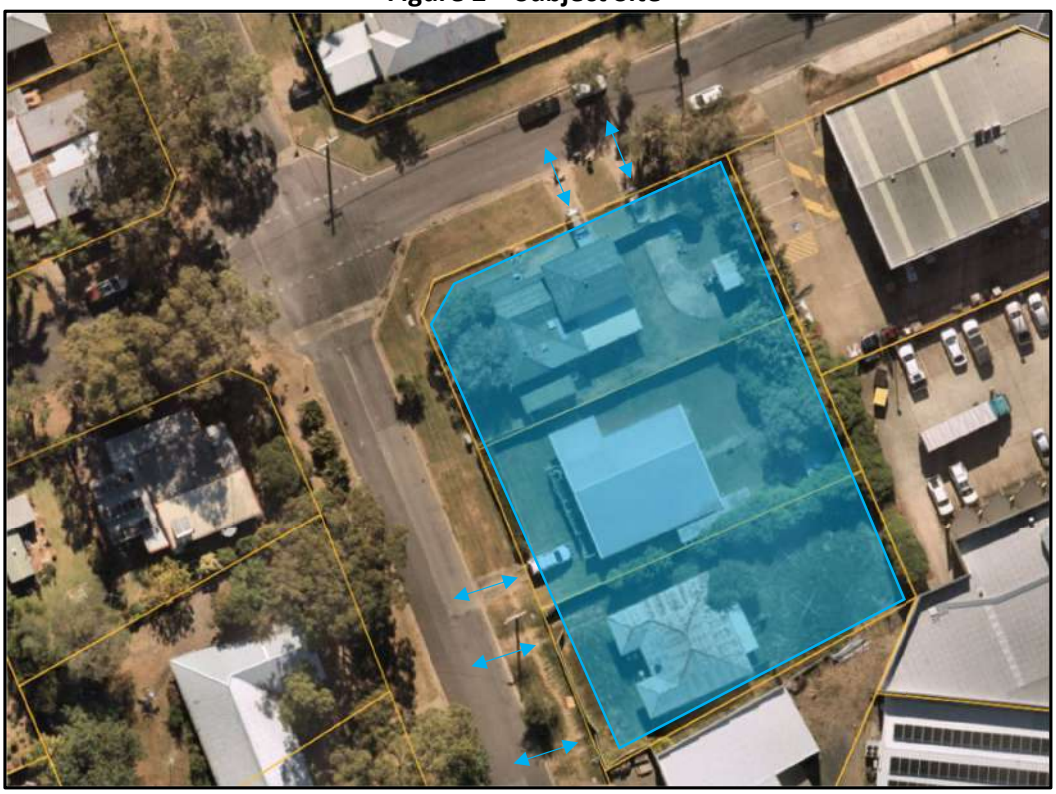
2. EXISTING CONDITIONS

To assess the impact of the proposal it is necessary to establish existing transport conditions within the surrounding area. Existing conditions considered access and parking arrangements, traffic flows and pedestrian and cycle movements and bus services.

2.1 Transport Network

The proposed child care centre is located at 7, 9 and 11 Denning Street. The site is currently occupied by three residential houses. There are currently five driveway crossovers to three residential properties, two via Boland Street and three via Denning Street as shown in Figure 2.

Figure 2 – Subject Site



Source: Near Map

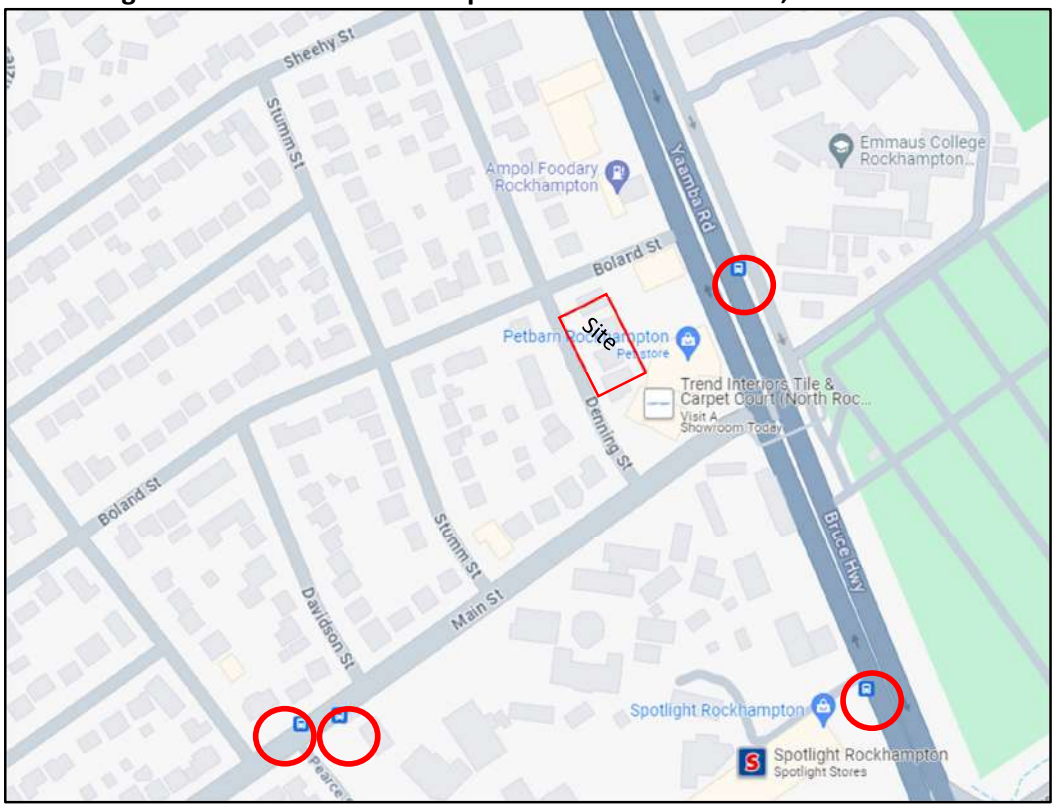
Both Boland Street and Denning Street have an 8m wide carriageway with kerb and channel. There are no footpaths on the site frontages. There are no formal cycling facilities or on-street cycle pavement markings. There is a yellow edge line along the Boland Street frontage that restricts on-street parking. Give Way control and a Give Way sign is provided on Denning Street on approach to Boland Street to give priority to through movements on Boland Street.

Photograph 2- Boland Street (View Westbound)

Photograph 2- Denning Street (View Northbound)

The bus network across the Rockhampton is provided by Translink. The development site has convenient access to public transport. Route 410 provides services between Parkhurst and the city centre. Within 125m walking distance there is a bus stop with a bus shelter located within 300m from the site on Yaamba Road (Bruce Highway). Route 403 and 407 is available from Main Street, approximately 360m walking distance from the proposed development site. Services are provided approximately every 60 minutes on weekdays and less frequently on weekends.

Figure 2 – Location of Bus Stops for Service Routes 410, 403 and 407



Source: Google Maps

Crash data for the past 6 years for the area was reviewed using Qld Globe. Results indicate there were no recorded crashes in the vicinity of the site access driveways or at the intersection of Denning Street and Boland Street in the past 6 years.

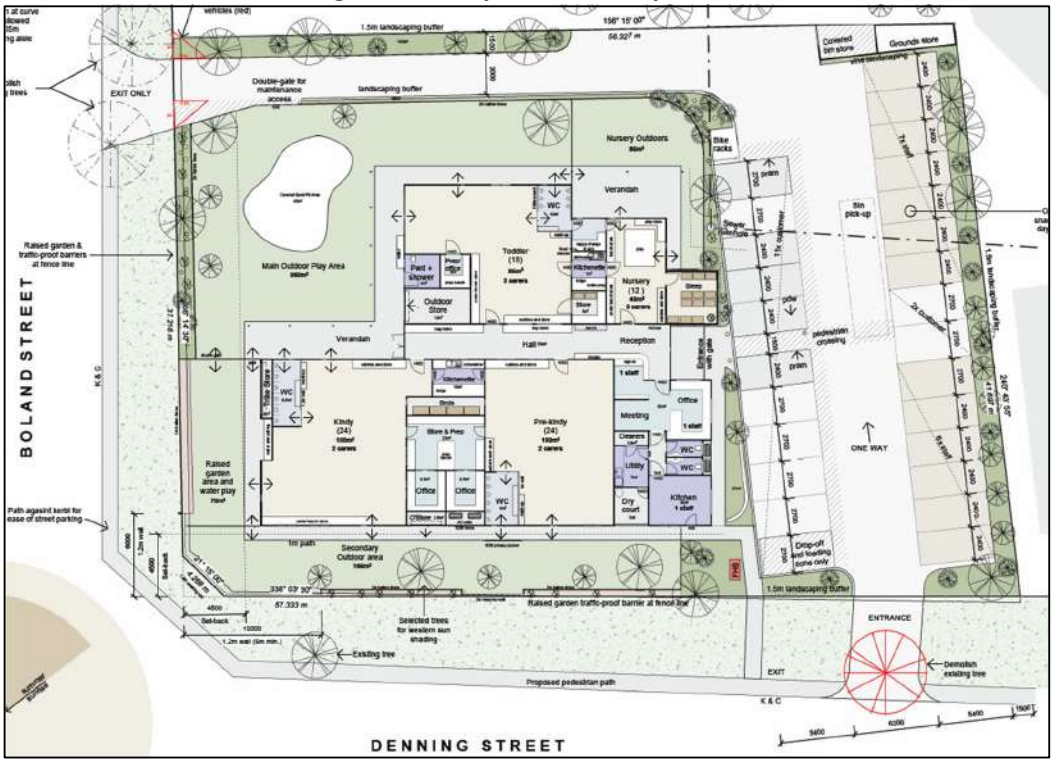
3. DEVELOPMENT PROPOSAL

The Development Proposal is for a child care centre to be constructed on Lot 41, 42 and 43 RP607265 at Denning Street, North Rockhampton. The centre will include 78 children with 13 employees. Please refer to Appendix A for layout plans of the proposed development.

3.1 Access Arrangements

Vehicular access to the site will be provided from one consolidated driveway from Denning Street with egress via one driveway from Boland Street. Pedestrian access into the building is provided from a footpath link from Denning Street. Parking has been provided to accommodate 26 spaces on the site including 3 pram spaces. Up to 13 spaces will be allocated to staff with 13 spaces available for customers. The proposal is shown in Figure 3 with car parking and access shown in Appendix A.

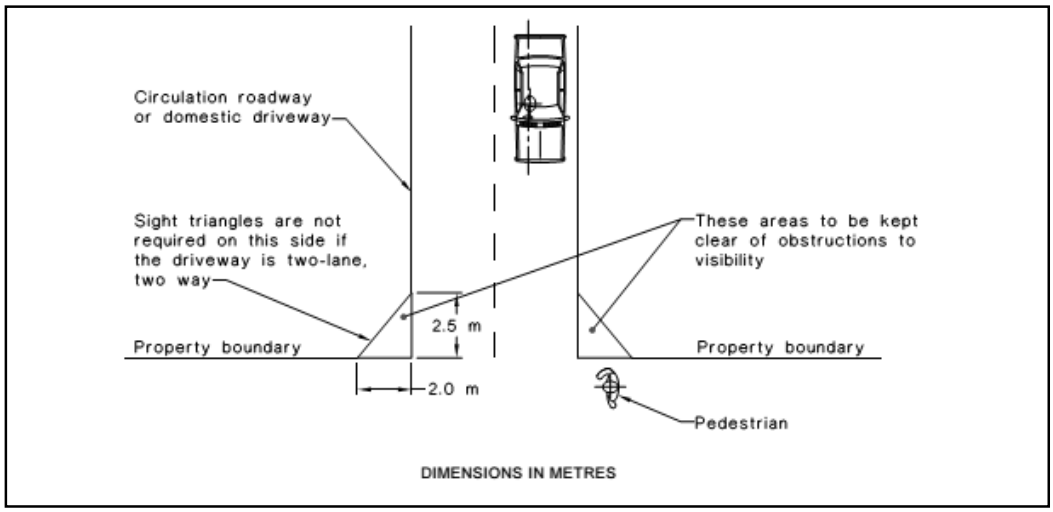
Figure 3 – Proposed Development



Source: Rufus Design Group

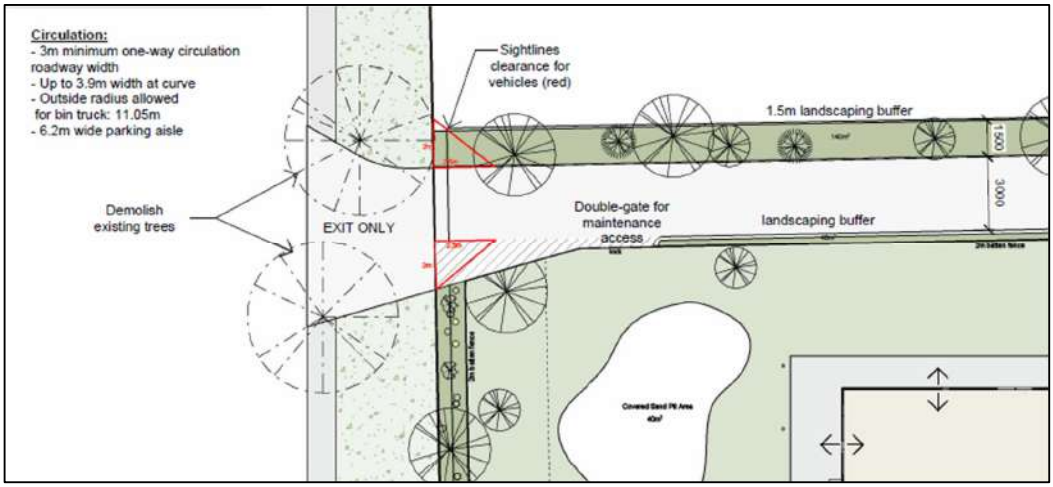
To provide safe passage to pedestrians and cyclists on the pathway, sight lines must be maintained between the property boundary and the driveway as shown in Figure 4. The requirement (extracted from Figure 3.3 of AS2890.1) provides the minimum sight lines for an exiting vehicle to view pedestrians on the footpath.

**Figure 4– Sight Visibility Requirements
For Pedestrians and Cyclists at Driveways**



The proposal has demonstrated compliance with the sight distance requirement at the driveway exit, as shown in Figure 5.

Figure 5 – Compliant Sight Lines at Driveway



4. TRIP GENERATION AND DISTRIBUTION

In order to analyse the impact of the development on the existing transport infrastructure, it is necessary to assess the number of trips likely to be generated to and from the site and where they are likely to travel. To determine an appropriate rate to forecast trip generation information has been sought from the Road Planning and Design Manual: Chapter 3 produced by the Department of Main Roads, Queensland Streets, Austroads and the RTA Guide to Traffic Generating Developments.

4.1 Trip Generation

Estimates for trip generation rates from child care centres are based on the number of children attending the centre. Child care centres include pre-schools, long day care, and before/after school care. Higher trip generation rates occur during the peak hours for pre-schools versus long day care centres and after school care. This facility will operate as a long day care centre for which the following trip generation rates apply;

Table 1 - Vehicle Trips Per Child (RTA)

	Number of Trips (per child)		
Facility	**7:00-9:00am**	**2:30-4:00pm**	**4:00-6:00pm**
Long-day care centre	0.8 trips	0.3 trips	0.7

The child care centre is expected to provide for 78 children and 13 staff. A peak trip rate of 0.8 per child has been adopted for the purpose of traffic analysis.

Table 2 – Development Traffic Generation

Type of Use	No. of Children	Peak Rate / Child	Peak Hour Generation
Child Care Centre	78	0.8	62 trips

The peak hour trip generation estimated for the proposed development is 62 trips during the peak hour. It is important to note that the existing three dwelling generate a peak hour trip rate of up to 3 vehicle tripes per hour. Therefore the new trip generation from the site is actually 59 vehicles per hour. Due to the access arrangements from Denning Street and egress via Boland Street trips will be evenly distributed across the network. Due to the grid street network, the traffic generated from the site is not anticipated to impact on the operational performance of the road network.

In summary the proposed development does not generate a significant volume of traffic to Boland Street and Denning Street and therefore, the impact on the external road network is considered to be insignificant and no mitigation measures are required.

5. CAR PARKING REQUIREMENTS

An assessment of the internal road layout and car parking arrangements has been undertaken in accordance with Australian Standards (AS2890) for Off-street parking facilities and the Rockhampton Regional Council requirements.

5.1 Rockhampton Regional Council Car Parking Requirements

The parking requirements outlined in the Transport, Access, Parking and Servicing Planning Scheme Policy of Rockhampton Regional Council's Planning Scheme require, child care centres to provide car parking on site as follows:

- 1 space per 6 children; and
- 1 space per full time employee;

5.2 Australian Standards AS2890.1 Requirements

The requirements for parking are outlined in AS2890.1:2004 *Off-street car parking* and AS2980.2-2002 *Off-street commercial vehicle facilities*. The proposed development requires facilities for high turnover use identified as User Class 3 and also for staff or User class 1A. Dimensions for car parking are outlined in Figure 2.2 of AS2890.1. Minimum requirements for 90-degree angle parking bays of this class include a minimum width of 2.6m, length of 5.4m and aisle width of 5.8m with a minimum width of 2.4m for staff parking. Parking for disabled must comply with AS2890.6.

On-street parking also aids in the management of speeds within urban area, which is essential to facilitate the safe movement of children walking and cycling to and from school and nearby facilities.

6. PROPOSED CAR PARKING ARRANGEMENTS

Parking spaces within the site are provided on plans by Rufus Design Group as shown in Appendix A.

6.1 Compliance with Brisbane City Council Requirements

An assessment of the required parking spaces has been undertaken in accordance with Planning Scheme. Car parking requirements and provisions are summarised in Table 3.

Table 3 - Summary of Parking

Type of Parking Space	Council Parking Requirements	No. of Units	Parking Required	Parking Provided on site
Child Care	1 space per 6 children	78 children	13	13
Staff	1 space per staff	13	13	13
Total			26	26

The development has provided a total of 26 car parks, and is compliant with the requirements of Council's Planning Scheme. Provision for secure staff bicycle and scooter parking has also been provided within the car park.

Due to the removal of the existing crossover at 9 Denning Street and the consolidation of access to one driveway on Denning Street, an opportunity for one additional on-street car park is possible, however Council may wish to manage parking along Denning Street to ensure two-way access is maintained by restricting parking to one side of the road only.

6.2 Compliance with Australian Standards AS2890.1

A detailed assessment of the car parking arrangements has been undertaken. All customer parking spaces 2.7m wide and 5.4m long with the exception of allocated staff parking spaces which are 2.4m wide. The aisle width is 6.2m. The proposed design complies with the requirements for user Class 3 and Class 1A. A compliant disabled parking space and two pram parking spaces have been provided.

Clause 3.3 of AS2890.1 includes requirements for gradients of access driveways. The grade for the access driveway from the road frontage (kerb) to the property boundary is a maximum of 1 in 20 (5%). The proposed access meets the requirements for access driveways.

Clause 3.2 of AS2890.1 provides a methodology for establishing the appropriate driveway width based on the land use, number of parking spaces and the road hierarchy. For a development of this type, with 1-25 car parks on a local road it is recommended that the driveway be constructed to a width of between 3 and 5.5metres. The proposed driveway is 5.0m wide, complying with current guidelines.

The collection of waste and garbage will be undertaken on site. Swept path analysis has been carried out using auto-turn software to confirm the manoeuvrability of the waste collection vehicle As shown in Figure 6 and Appendix C, the waste collection vehicle (WCV) can manoeuvre adequate on-site. It is likely that collection will occur outside peak operating times.

It is recommended that Council give consideration to restricting on-street parking (during daytime hours) on Denning Street along the property frontage between the driveway access and Boland Street, to ensure clear sight lines and safe access for commercial vehicles.

Figure 6 – Swept Path Analysis for WCV

The proposed parking arrangements within the development site comply with AS2890.1 requirements and are considered adequate and suitable for the intended use.

7. CONCLUSION

This report has assessed the impact of traffic generated by the proposed child care centre on the external transport network. Consideration has been given to operational performance, parking and pedestrian requirements as well as access arrangements.

An assessment was carried out of the trips likely to be generated by the proposed development and the estimated distribution of trips on the existing street network. The location of the child care centre provides excellent opportunity for mixed-use and multi-purpose trips. Therefore, the impact of additional trips on the external network is considered low and the effect on operational performance of the street network is considered to be insignificant.

A review of car parking arrangements has been undertaken to assess the proposal's compliance with the Rockhampton Regional Council Planning Scheme and Australian Standards AS2890.1. The site is required to provide parking for 26 spaces and has provided a total of 26 spaces onsite, including provision for 3 pram parking spaces. The proposed arrangement is deemed suitable for the child care centre.

It is recommended that Council give consideration to restricting on-street parking (during daytime hours) on Denning Street along the property frontage between the driveway access and Boland Street, to ensure clear sight lines and safe access for commercial vehicles.

In conclusion, the proposed child care centre development will not adversely impact on the operational performance of the surrounding road network and is considered adequate for the proposed land use.

Appendix A

Proposed Development Concept Plans

Provided by Rufus Design Group

PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST,
PARK AVENUE, 4701

Project number: 230612
Plan set: Preliminary 06
06/09/2024 MCU APPLICAION

Rufus Design Group
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W rufusdesigngroup.com.au
E mailbox@rufusdesigngroup.com

1 Design Notes

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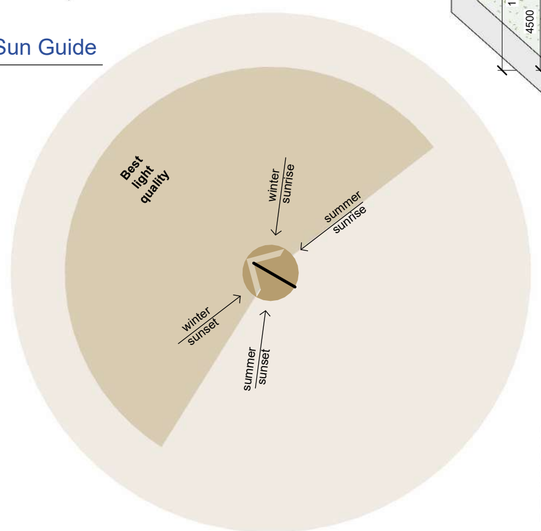
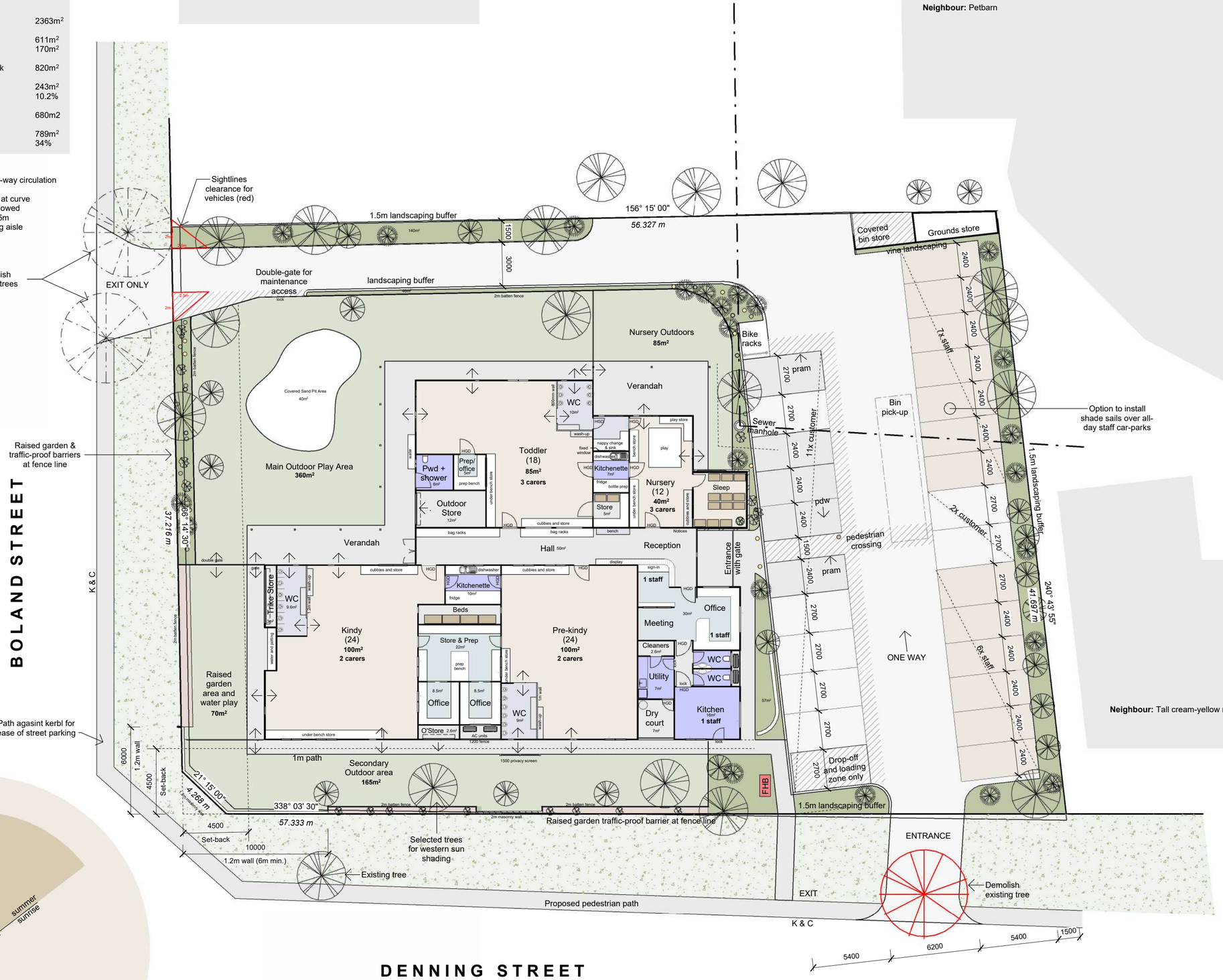
Landscaping	243m^2 10.2%
Playground areas	680m2
Site coverage: (Under roof area)	789m^2 34%

Circulation:
- 3m minimum one-way circulation roadway width
- Up to 3.9m width at curve
- Outside radius allowed for bin truck: 11.05m
- 6.2m wide parking aisle

Northpoint and Sun Guide





MCU APPLICATION

REVISIONS

No.	DESCRIPTION	DATE
6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
4	Update office totals, 1.2 corner wall	30/05/2024
3	Preliminary 03 - MCU Application	16/05/2024

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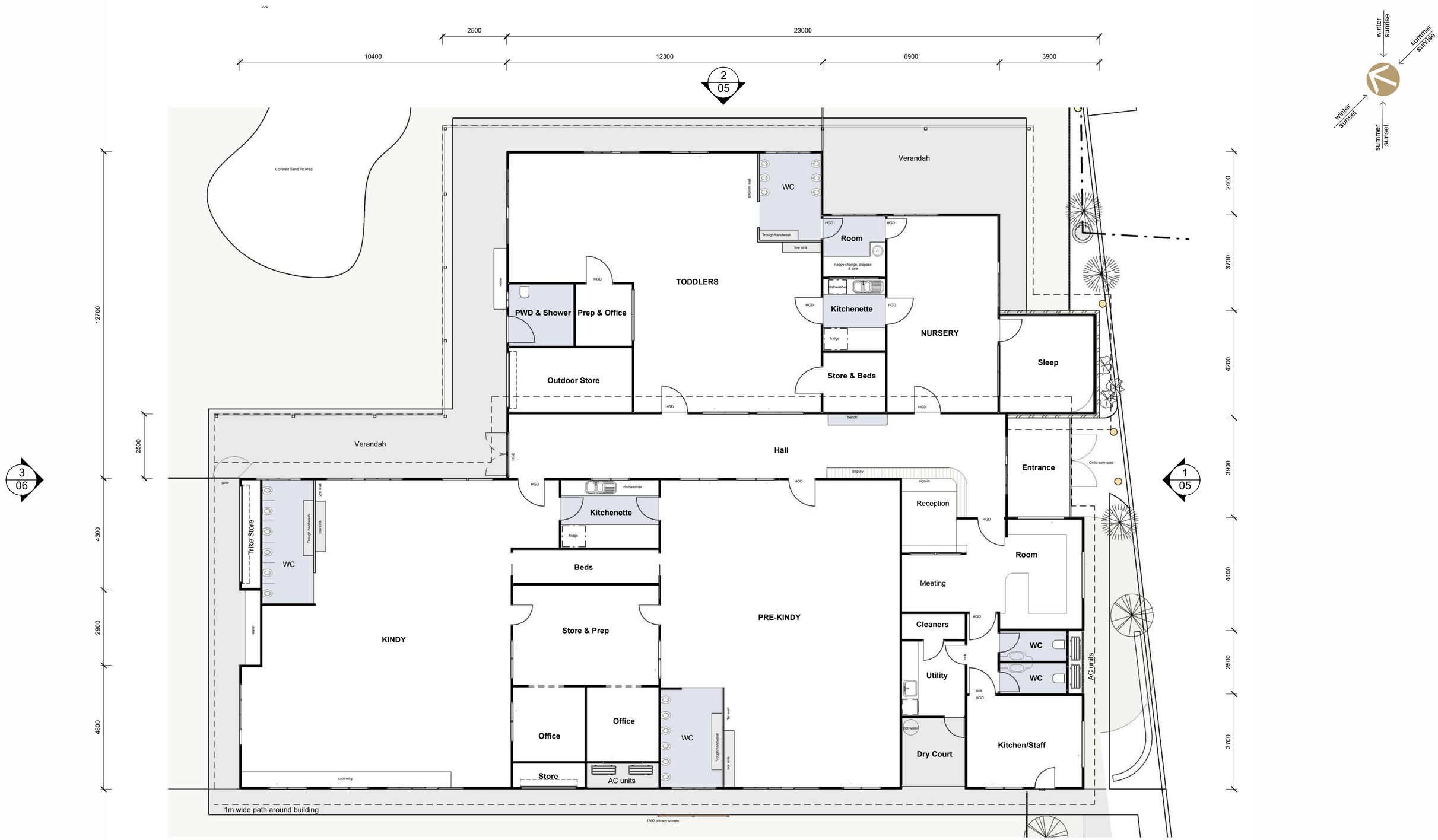
PROPOSED CHILD CARE CENTRE
FOR ROSE INVESTMENTS
AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Site Features Plan

P manager	Wind	Project number - Sheet
TJR		230612 - 03
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 03 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:35:13 PM



1 Floor Plan

1 : 100

MCU APPLICATION

REVISIONS			
6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
4	Update office totals, 1.2 corner wall	30/05/2024
3	Preliminary 03 - MCU Application	16/05/2024
No.	DESCRIPTION	DATE

PRINT DATE : 6/09/2024 5:34:18 PM

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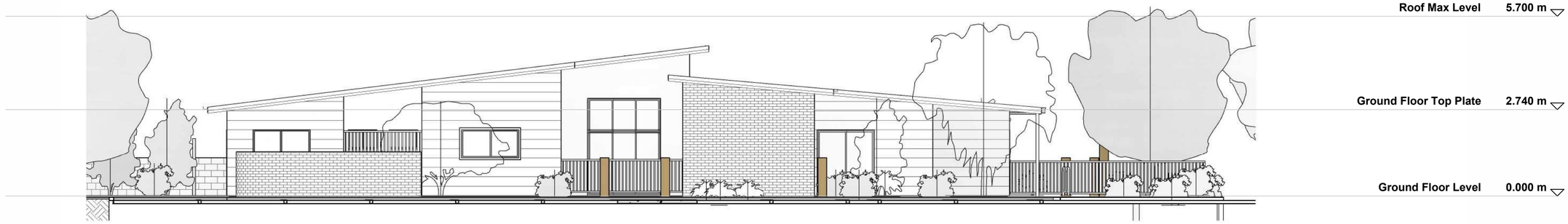
PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

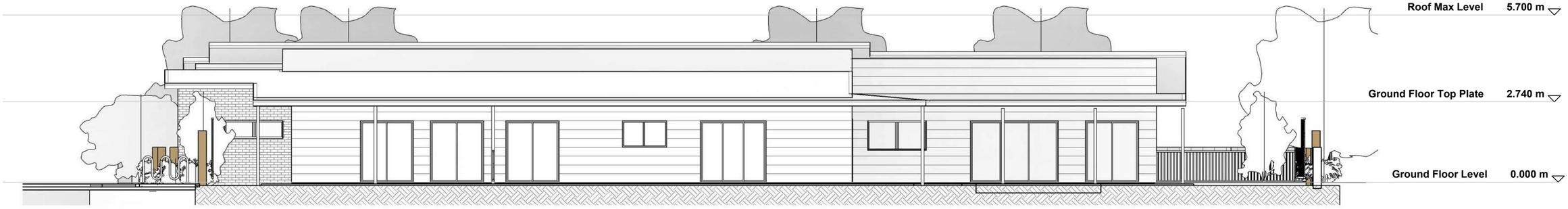
Floor Plan

P manager	Wind	Project number - Sheet
TJR		230612 - 04
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 04 of 03	PRELIMINARY 06



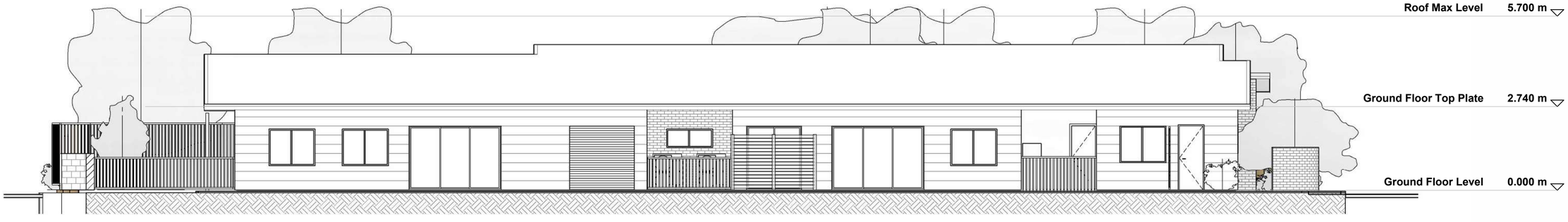
1 South Elevation - Entrance

1 : 100



2 East Elevation

1 : 100



3 West Elevation

1 : 100

MCU APPLICATION

REVISIONS

No.	DESCRIPTION	DATE
6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
4	Update office totals, 1.2 corner wall	30/05/2024
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PROPOSED CHILD CARE CENTRE

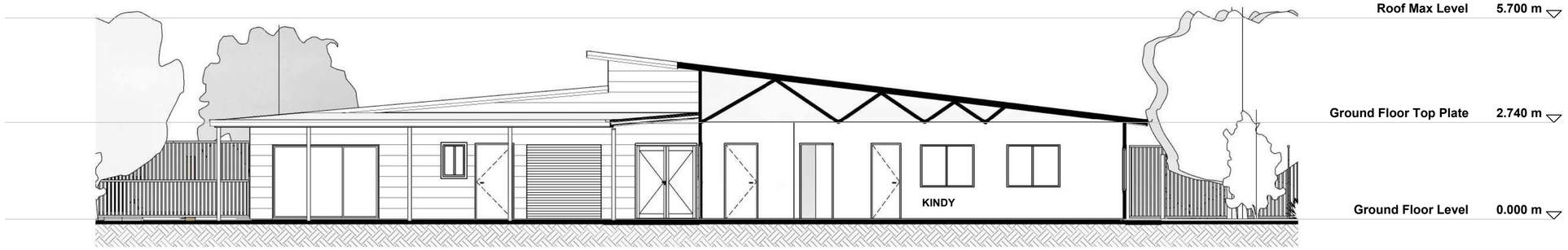
FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Elevations

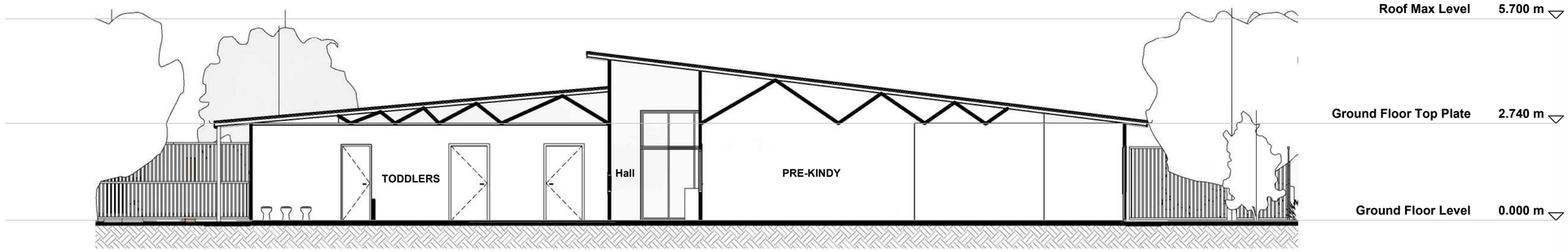
P manager	Wind	Project number - Sheet
TJR		230612 - 05
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 05 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:34:37 PM



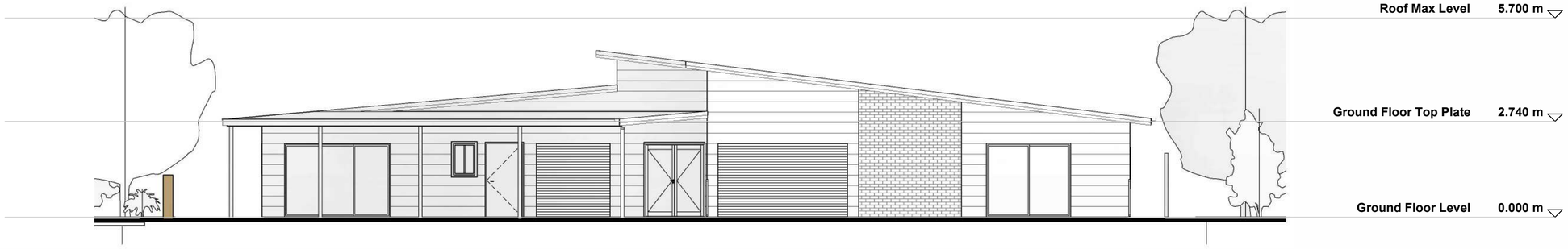
1 Section 2

1 : 100



2 Section 3

1 : 100



3 North Elevation

1 : 100

MCU APPLICATION

REVISIONS

No.	DESCRIPTION	DATE
6	Great truck sweep, large exit, removed trees	06/09/2024
5	Reduced numbers, carpark update to suit ratios, added store, combined prep kindy	11/06/2024
4	Update office totals, 1.2 corner wall	30/05/2024
3	Preliminary 03 - MCU Application	16/05/2024

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PROPOSED CHILD CARE CENTRE

FOR ROSE INVESTMENTS

AT 7, 9, 11 DENNING ST, PARK AVENUE, 4701

Sections & North Elevation

P manager	Wind	Project number - Sheet
TJR		230612 - 06
Drawn: JM	Sheet size: A2	
Checked: TJR	Sheet no: 06 of 03	PRELIMINARY 06

PRINT DATE : 6/09/2024 5:34:48 PM

Appendix B

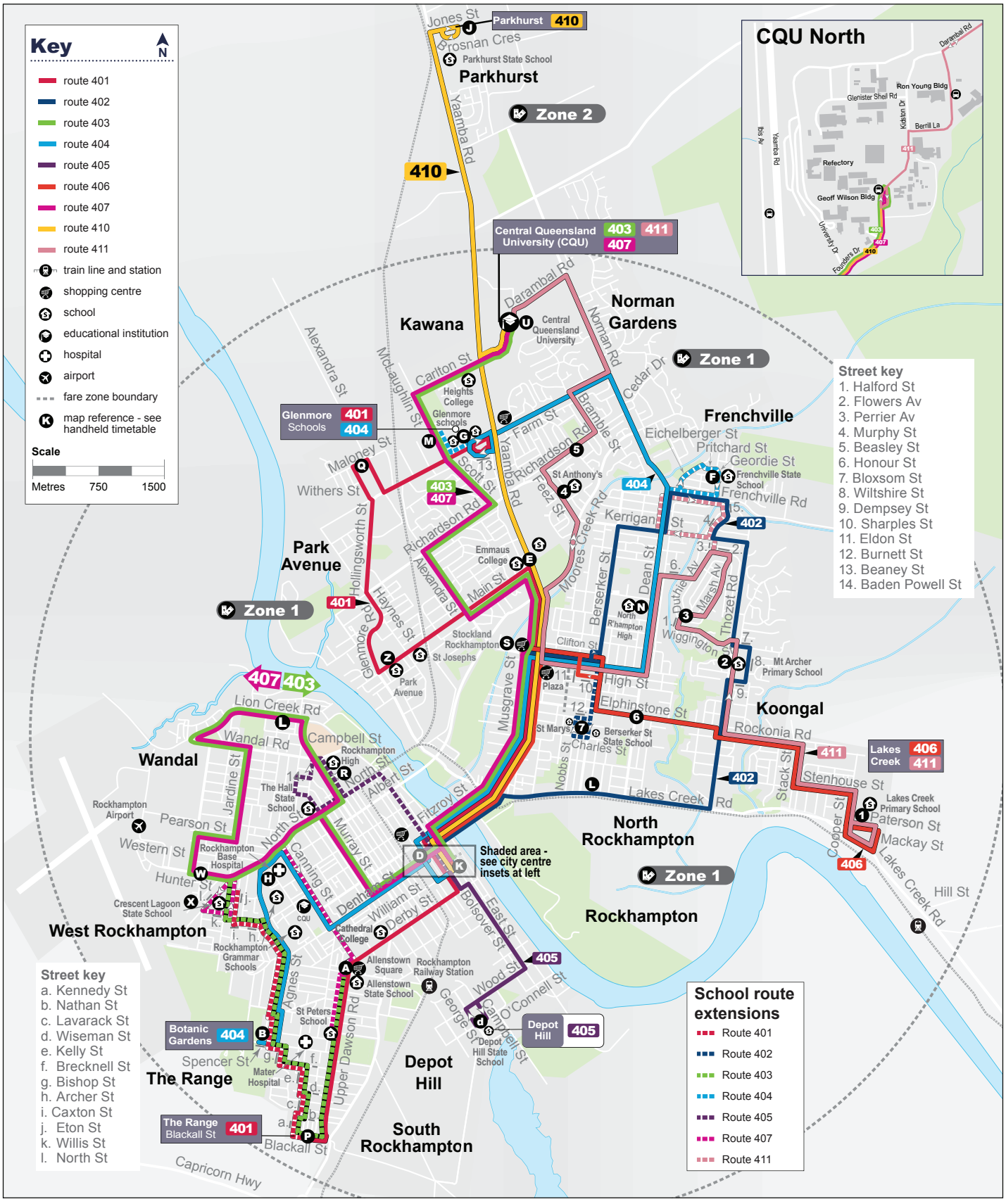
Bus Route Timetable

Provided by Translink

Routes

401, 402, 403, 404, 405, 406, 407, 410, 411

Route map

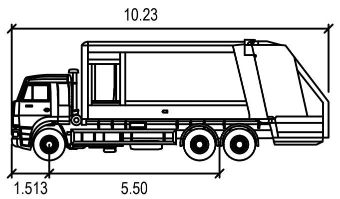


Appendix C

Swept Path Analysis

SWEPT PATH LEGEND

VEHICLE BODY
FRONT TIRES
VEHICLE PATH
VEHICLE CLEARANCE (300mm)
VEHICLE



Standard Rear Lift

	Meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 39.2
Clearance Height	: 3.4
Operating Height	: 3.4

Hayes Traffic Engineering

Project: Denning Street Childcare
Location: Rockhampton
Client: George Henry Rose
Plan Title: WCV Swept Path

Date Drawn: 08/09/2024
Project Number: 241263
Plan Number: SK01 Revision A

0 2 4 6 8 10 12 14 16 18 20m
4 3 2 1
SCALE 1:400 @ A3

Hayes
Traffic Engineering
A • PO Box 303, Coolum Beach Qld, 4573
P • 0403 889 039
E • dianne@hayeste.com.au

6th November 2024

ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/73-2024
Dated: 19 February 2025

Rose Investments
C/- GSPC
PO Box 379
Gracemere Qld 4702

Attention: Sunil Govind

RE: Traffic Engineering Advice for D 73/2024
Proposed Child Care Centre Development
7,9 and 11 Denning Street, Park Avenue ROCKHAMPTON

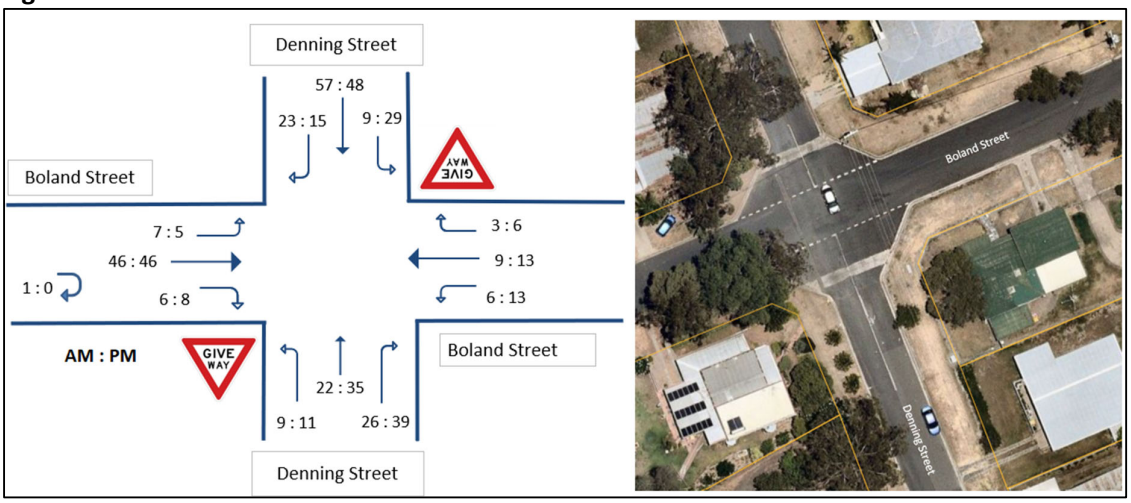
I refer to your recent correspondence requesting further traffic engineering advice for the proposed development at Denning Street, Park Avenue. A review of Council's Further Advice Notice, dated 8th October 2024 has been undertaken and a response is provided below.

Council Further Advice Notice - Engineering Requirements:
A recent site investigation conducted by council officers noted considerable traffic movements within Denning Street and Boland Street during the peak hours, given the proximity of a school to the subject site. Council believes that traffic generation from the proposed development will impact peak hour traffic flow within Denning Street, Boland Street and surrounding road network.

Please check the traffic generation from the development site against the existing background traffic within Denning Street, Boland Street and surrounding road network, identify any issues, and provide suitable solutions to mitigate any impacts.

RESPONSE
To understand the traffic movements at the intersection of Denning Street and Boland Street an intersection traffic count survey was carried out on Thursday 31st October 2024. The survey was undertaken in the morning between 7:30am until 9:30am and in the afternoon between 2:30pm and 5:30pm to capture the peak hour traffic flows at the location. The peak hour traffic flows occurred between 7:45 and 8:45am and between 2:45 and 3:45pm as shown in Figure 1.

Figure 1 – AM and PM Traffic Flow Movements at the Intersection



The intersection has been analysed using Traffic Modeling software Sidra 9.1. SIDRA is an industry recognised analysis tool that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's Degree of Saturation (DOS), queues and delays. Simplistically, DOS is a measure of the proportion of traffic entering an intersection relative to the intersection's capacity. For priority-controlled intersections (Give Way and Stop) the threshold limit for DOS is 0.800. A description of the Level of Service (LOS) is described in Figure 2.

Figure 2 – Level of Service Definitions

LOS A

Level of service A is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.

LOS B

Level of service B is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with level of service A.

LOS C

Level of service C is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

LOS D

Level of service D is close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.

LOS E

Level of service E occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select their desired speeds and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause flow breakdown.

LOS F

Level of service F is in the zone of forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

The intersection of Denning Street and Boland Street has been analysed with the traffic count survey data using traffic modelling software Sidra 9.1. Results of analysis are provided in Table 1.

Table 1 – Intersection Performance 2024

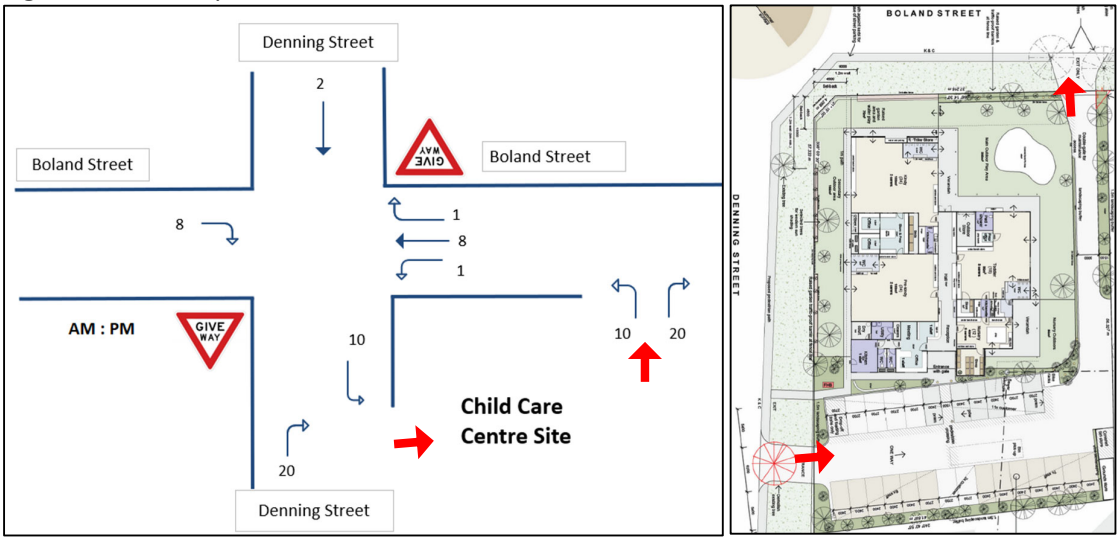
Peak	Approach	LOS	DOS	Delay (sec)	Queue (m)
2024 AM	Denning Street (S)	A	0.053	4.5	1.3
	Boland Street (E)	A	0.010	2.4	0.2
	Denning Street (N)	A	0.079	4.0	2.1
	Boland Street (W)	A	0.033	1.0	0.3
2024 PM	Denning Street (S)	A	0.081	4.5	2.1
	Boland Street (E)	A	0.018	2.8	0.3
	Denning Street (N)	A	0.077	4.2	2.1
	Boland Street (W)	A	0.033	1.0	0.4

*LOS – Level of Service & DOS – Degree of Saturation

As shown in Table 1, the intersection currently operates at an acceptable level of service with minimal delays and queues in the peak periods.

Further analysis has been carried out of the intersection performance with the addition of development traffic generated from the childcare centre. As outlined in the Traffic Report (September 2024) the site is expected to generate up to 59 vehicles per hour with 50% arrivals and 50% departures. The estimated trips entering and exiting the site and travelling on the road network are shown in Figure 3.

Figure 3 – Development Traffic Distribution



The intersection has been re-analysed with the additional development traffic and the results are shown in Table 2.

Table 2 – Intersection Performance with Development

Peak	Approach	LOS	DOS	Delay (sec)	Queue (m)
2024 AM With Development	Denning Street (S)	A	0.054	4.6	1.4
	Boland Street (E)	A	0.016	1.9	0.2
	Denning Street (N)	A	0.082	4.1	2.1
	Boland Street (W)	A	0.038	1.5	0.7
2024 PM With Development	Denning Street (S)	A	0.083	4.6	2.1
	Boland Street (E)	A	0.024	2.4	0.7
	Denning Street (N)	A	0.080	4.2	2.2
	Boland Street (W)	A	0.038	1.5	0.7

*LOS – Level of Service & DOS – Degree of Saturation

The intersection will continue to operate adequately in the peak periods with the additional trips generated from the child care centre development. The limit for acceptable operations and practical capacity (degree of saturation) for priority-controlled intersections is 0.800 and analysis indicates the intersection will operate with spare capacity. There is substantial spare capacity within the local road network to cater for additional traffic in the area or for any changes to traffic distribution patterns or external network growth.

It is understood that there are times where traffic around schools becomes congested. While congestion creates a slower-moving environment, it allows drivers more time to respond to potential conflicts and reduces the risk of high-speed collisions and pedestrian interactions, improving safety.

It has been noted, that at certain times, there is high demand for on-street parking in this area. Parking bays are not line marked or time restricted on Denning Street or Boland Street and can add to road width constraints and sight visibility obstructions. Therefore (as per the Traffic Report), it is recommended that Council give consideration to restricting on-street parking (during daytime hours) on Denning Street along the property frontage between the driveway access and Boland Street, to ensure clear sight lines and safe access for commercial vehicles.

I trust this information assists with your project, however, should you require further information, please don't hesitate to contact me.

Yours faithfully

D. Hayes

Dianne Hayes
B. Eng (Civil) RPEQ 7086

Attachments – Traffic Count Data & Sidra Output

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 2 **Weather:** Fine

Location: Boland Street/Denning Street, Rockhampton

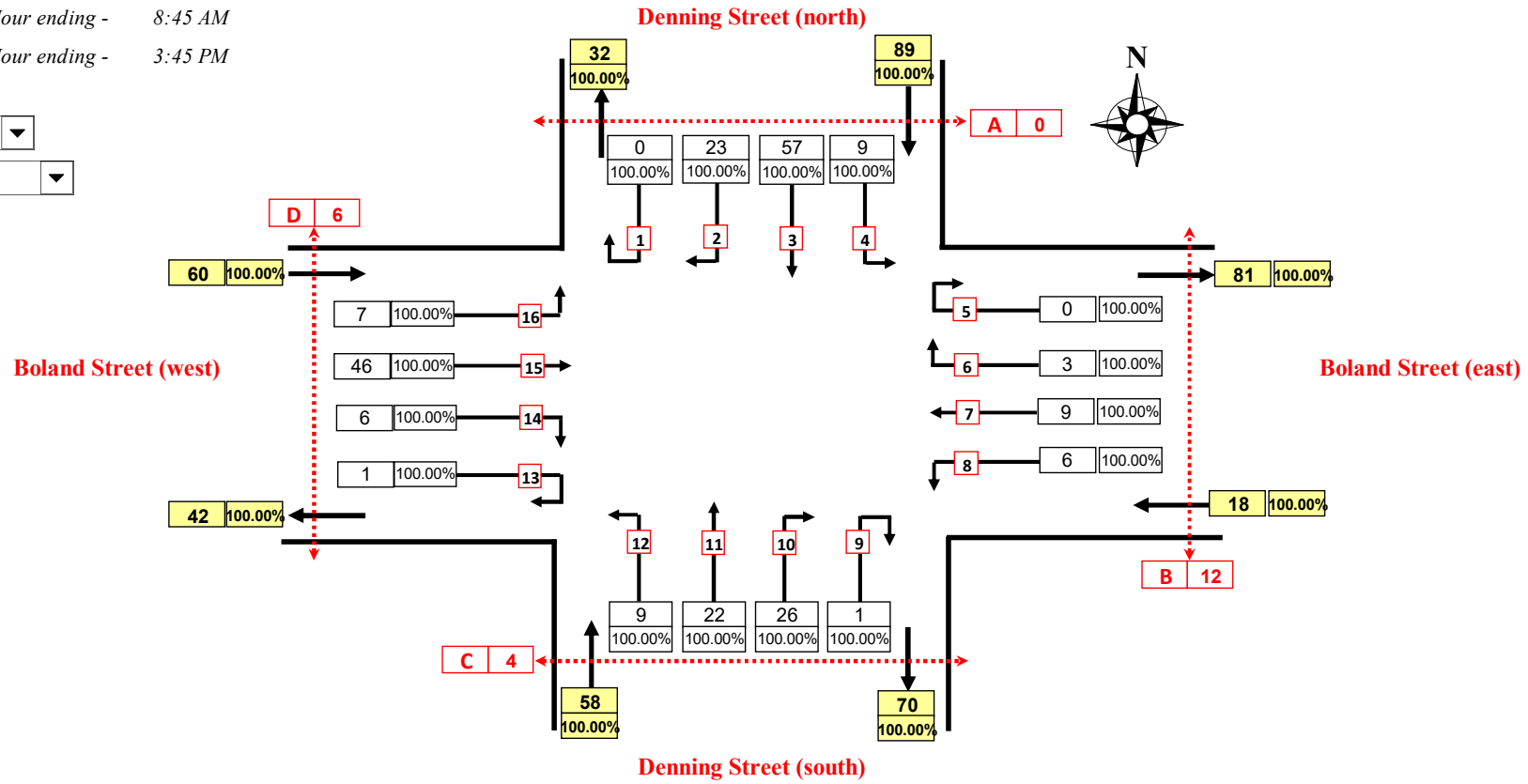
Day/Date: Thursday, 31 October 2024

Summary: AM Peak : *Hour ending - 8:45 AM*

PM Peak : *Hour ending - 3:45 PM*

Hour Ending: 8:45 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 2 **Weather:** Fine

Location: Boland Street/Denning Street, Rockhampton

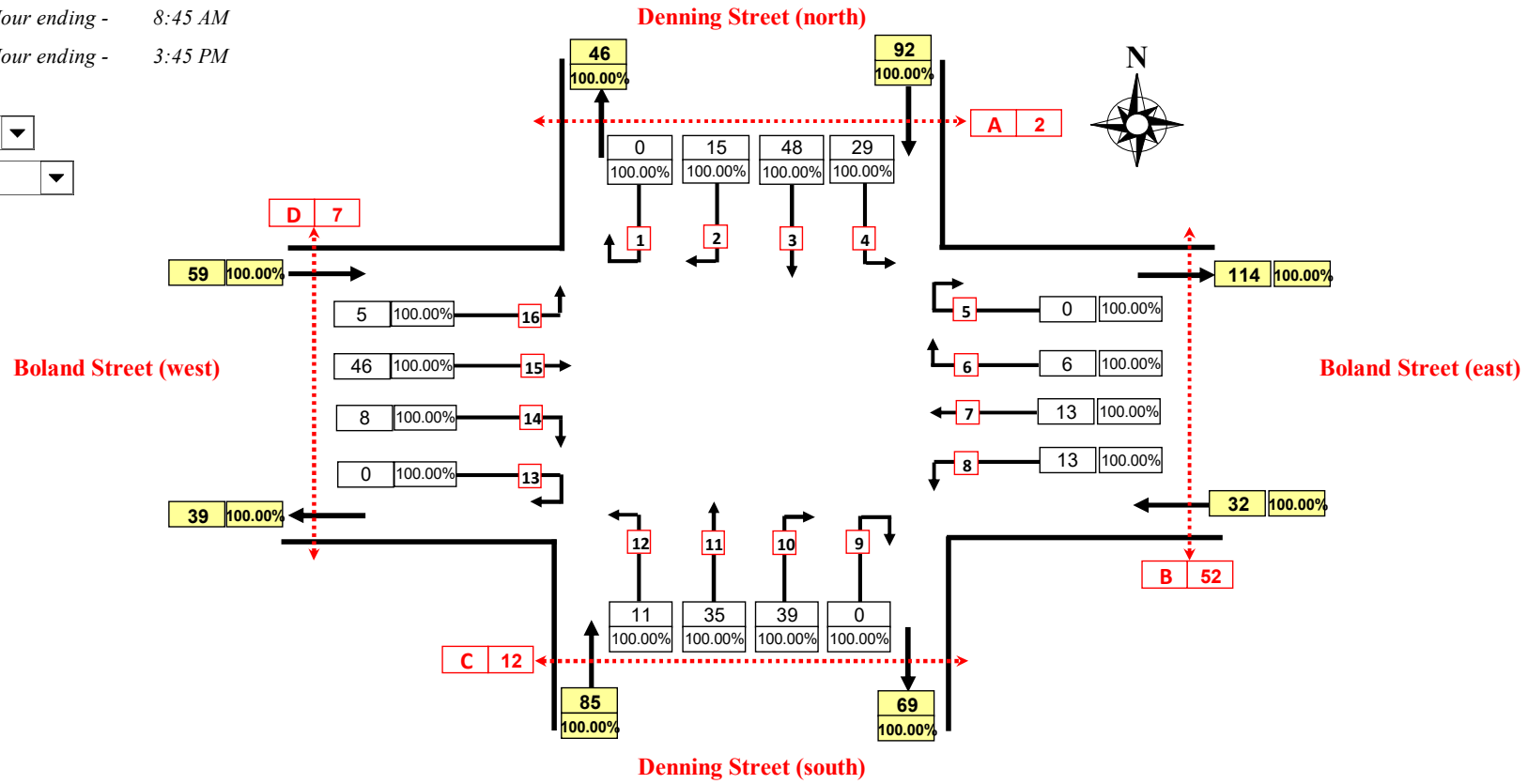
Day/Date: Thursday, 31 October 2024

Summary: AM Peak : *Hour ending - 8:45 AM*

PM Peak : *Hour ending - 3:45 PM*

Hour Ending: 3:45 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

MOVEMENT SUMMARY

Site: 101 [AM 2024 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Denning Street S															
1	L2	All MCs	9	2.0	9	2.0	0.053	4.6	LOS A	0.2	1.3	0.12	0.49	0.12	37.1
2	T1	All MCs	23	2.0	23	2.0	0.053	3.5	LOS A	0.2	1.3	0.12	0.49	0.12	40.3
3	R2	All MCs	27	2.0	27	2.0	0.053	5.3	LOS A	0.2	1.3	0.12	0.49	0.12	35.8
Approach			60	2.0	60	2.0	0.053	4.5	LOS A	0.2	1.3	0.12	0.49	0.12	37.9
East: Boland St E															
4	L2	All MCs	6	2.0	6	2.0	0.010	4.6	LOS A	0.0	0.2	0.07	0.27	0.07	39.5
5	T1	All MCs	9	2.0	9	2.0	0.010	0.0	LOS A	0.0	0.2	0.07	0.27	0.07	42.9
6	R2	All MCs	3	2.0	3	2.0	0.010	4.7	LOS A	0.0	0.2	0.07	0.27	0.07	40.7
Approach			19	2.0	19	2.0	0.010	2.4	NA	0.0	0.2	0.07	0.27	0.07	41.2
North: Denning Street N															
7	L2	All MCs	9	2.0	9	2.0	0.079	4.7	LOS A	0.3	2.1	0.17	0.48	0.17	38.5
8	T1	All MCs	60	2.0	60	2.0	0.079	3.5	LOS A	0.3	2.1	0.17	0.48	0.17	40.3
9	R2	All MCs	24	2.0	24	2.0	0.079	5.1	LOS A	0.3	2.1	0.17	0.48	0.17	38.6
Approach			94	2.0	94	2.0	0.079	4.0	LOS A	0.3	2.1	0.17	0.48	0.17	39.7
West: Boland St W															
10	L2	All MCs	7	2.0	7	2.0	0.033	4.6	LOS A	0.0	0.3	0.02	0.12	0.02	44.1
11	T1	All MCs	48	2.0	48	2.0	0.033	0.0	LOS A	0.0	0.3	0.02	0.12	0.02	46.7
12	R2	All MCs	6	2.0	6	2.0	0.033	4.6	LOS A	0.0	0.3	0.02	0.12	0.02	42.1
Approach			62	2.0	62	2.0	0.033	1.0	NA	0.0	0.3	0.02	0.12	0.02	45.7
All Vehicles			235	2.0	235	2.0	0.079	3.2	NA	0.3	2.1	0.11	0.37	0.11	40.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM 2024 - (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Denning Street S															
1	L2	All MCs	12	2.0	12	2.0	0.081	4.6	LOS A	0.3	2.1	0.16	0.50	0.16	36.9
2	T1	All MCs	37	2.0	37	2.0	0.081	3.5	LOS A	0.3	2.1	0.16	0.50	0.16	40.1
3	R2	All MCs	41	2.0	41	2.0	0.081	5.4	LOS A	0.3	2.1	0.16	0.50	0.16	35.6
Approach			89	2.0	89	2.0	0.081	4.5	LOS A	0.3	2.1	0.16	0.50	0.16	37.9
East: Boland St E															
4	L2	All MCs	14	2.0	14	2.0	0.018	4.6	LOS A	0.0	0.3	0.07	0.32	0.07	38.7
5	T1	All MCs	14	2.0	14	2.0	0.018	0.1	LOS A	0.0	0.3	0.07	0.32	0.07	41.8
6	R2	All MCs	6	2.0	6	2.0	0.018	4.7	LOS A	0.0	0.3	0.07	0.32	0.07	40.0
Approach			34	2.0	34	2.0	0.018	2.8	NA	0.0	0.3	0.07	0.32	0.07	40.1
North: Denning Street N															
7	L2	All MCs	31	2.0	31	2.0	0.077	4.7	LOS A	0.3	2.1	0.17	0.48	0.17	38.3
8	T1	All MCs	51	2.0	51	2.0	0.077	3.6	LOS A	0.3	2.1	0.17	0.48	0.17	40.1
9	R2	All MCs	16	2.0	16	2.0	0.077	5.2	LOS A	0.3	2.1	0.17	0.48	0.17	38.4
Approach			97	2.0	97	2.0	0.077	4.2	LOS A	0.3	2.1	0.17	0.48	0.17	39.3
West: Boland St W															
10	L2	All MCs	5	2.0	5	2.0	0.033	4.6	LOS A	0.1	0.4	0.03	0.12	0.03	44.0
11	T1	All MCs	48	2.0	48	2.0	0.033	0.0	LOS A	0.1	0.4	0.03	0.12	0.03	46.5
12	R2	All MCs	8	2.0	8	2.0	0.033	4.6	LOS A	0.1	0.4	0.03	0.12	0.03	42.0
Approach			62	2.0	62	2.0	0.033	1.0	NA	0.1	0.4	0.03	0.12	0.03	45.4
All Vehicles			282	2.0	282	2.0	0.081	3.4	NA	0.3	2.1	0.12	0.39	0.12	39.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [AM 2024 with DEV (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Denning Street S															
1	L2	All MCs	9	2.0	9	2.0	0.054	4.6	LOS A	0.2	1.4	0.16	0.50	0.16	36.9
2	T1	All MCs	23	2.0	23	2.0	0.054	3.6	LOS A	0.2	1.4	0.16	0.50	0.16	40.1
3	R2	All MCs	27	2.0	27	2.0	0.054	5.4	LOS A	0.2	1.4	0.16	0.50	0.16	35.6
Approach			60	2.0	60	2.0	0.054	4.6	LOS A	0.2	1.4	0.16	0.50	0.16	37.8
East: Boland St E															
4	L2	All MCs	7	2.0	7	2.0	0.016	4.6	LOS A	0.0	0.2	0.06	0.22	0.06	40.4
5	T1	All MCs	18	2.0	18	2.0	0.016	0.0	LOS A	0.0	0.2	0.06	0.22	0.06	44.1
6	R2	All MCs	4	2.0	4	2.0	0.016	4.7	LOS A	0.0	0.2	0.06	0.22	0.06	41.5
Approach			29	2.0	29	2.0	0.016	1.9	NA	0.0	0.2	0.06	0.22	0.06	42.6
North: Denning Street N															
7	L2	All MCs	9	2.0	9	2.0	0.082	4.7	LOS A	0.3	2.1	0.19	0.49	0.19	38.4
8	T1	All MCs	62	2.0	62	2.0	0.082	3.6	LOS A	0.3	2.1	0.19	0.49	0.19	40.2
9	R2	All MCs	24	2.0	24	2.0	0.082	5.2	LOS A	0.3	2.1	0.19	0.49	0.19	38.5
Approach			96	2.0	96	2.0	0.082	4.1	LOS A	0.3	2.1	0.19	0.49	0.19	39.6
West: Boland St W															
10	L2	All MCs	7	2.0	7	2.0	0.038	4.6	LOS A	0.1	0.7	0.05	0.17	0.05	43.2
11	T1	All MCs	48	2.0	48	2.0	0.038	0.0	LOS A	0.1	0.7	0.05	0.17	0.05	45.2
12	R2	All MCs	15	2.0	15	2.0	0.038	4.6	LOS A	0.1	0.7	0.05	0.17	0.05	41.1
Approach			71	2.0	71	2.0	0.038	1.5	NA	0.1	0.7	0.05	0.17	0.05	43.9
All Vehicles			256	2.0	256	2.0	0.082	3.2	NA	0.3	2.1	0.13	0.37	0.13	40.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM 2024 with DEV (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Denning Street S															
1	L2	All MCs	12	2.0	12	2.0	0.083	4.6	LOS A	0.3	2.1	0.19	0.50	0.19	36.7
2	T1	All MCs	37	2.0	37	2.0	0.083	3.6	LOS A	0.3	2.1	0.19	0.50	0.19	40.0
3	R2	All MCs	41	2.0	41	2.0	0.083	5.5	LOS A	0.3	2.1	0.19	0.50	0.19	35.5
Approach			89	2.0	89	2.0	0.083	4.6	LOS A	0.3	2.1	0.19	0.50	0.19	37.7
East: Boland St E															
4	L2	All MCs	15	2.0	15	2.0	0.024	4.6	LOS A	0.1	0.4	0.07	0.27	0.07	39.5
5	T1	All MCs	22	2.0	22	2.0	0.024	0.0	LOS A	0.1	0.4	0.07	0.27	0.07	42.9
6	R2	All MCs	7	2.0	7	2.0	0.024	4.7	LOS A	0.1	0.4	0.07	0.27	0.07	40.7
Approach			44	2.0	44	2.0	0.024	2.4	NA	0.1	0.4	0.07	0.27	0.07	41.2
North: Denning Street N															
7	L2	All MCs	31	2.0	31	2.0	0.080	4.7	LOS A	0.3	2.2	0.18	0.49	0.18	38.3
8	T1	All MCs	53	2.0	53	2.0	0.080	3.6	LOS A	0.3	2.2	0.18	0.49	0.18	40.1
9	R2	All MCs	16	2.0	16	2.0	0.080	5.3	LOS A	0.3	2.2	0.18	0.49	0.18	38.4
Approach			99	2.0	99	2.0	0.080	4.2	LOS A	0.3	2.2	0.18	0.49	0.18	39.3
West: Boland St W															
10	L2	All MCs	5	2.0	5	2.0	0.038	4.7	LOS A	0.1	0.7	0.06	0.18	0.06	43.1
11	T1	All MCs	48	2.0	48	2.0	0.038	0.0	LOS A	0.1	0.7	0.06	0.18	0.06	45.0
12	R2	All MCs	17	2.0	17	2.0	0.038	4.7	LOS A	0.1	0.7	0.06	0.18	0.06	41.0
Approach			71	2.0	71	2.0	0.038	1.5	NA	0.1	0.7	0.06	0.18	0.06	43.7
All Vehicles			303	2.0	303	2.0	0.083	3.4	NA	0.3	2.2	0.14	0.39	0.14	39.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

2024

DILEIGH

CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/73-2024

Dated: 19 February 2025

PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON

STORMWATER MANAGEMENT PLAN

FOR ROSE INVESTMENTS

D24.192-RP01

ROSE INVESTMENTS

STORMWATER MANAGEMENT PLAN

PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON

Document History & Status

REVISION	DATE	ISSUED TO	DESCRIPTION	BY	APPROVED
A	02/08/2024	Sunil Govind	For response to information request	AML	TL
B	19/09/2024	Sunil Govind	Amendment to pipe diameters	AML	TL

Prepared By

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Date: 19/09/2024
Reference: D24.192-RP01

1. Introduction

This report was prepared for Rose Investments in support of a proposed development at 7, 9 & 11 Denning Street, Rockhampton. This report should be read in conjunction with the overall application relating to this project. The proponent is seeking approval to develop the lotS with a proposed childcare centre.

The development site is described as Lots 41, 42 & 43 on RP607265 which have a total area of 2,363m^2.

2. Existing Stormwater Conditions

The site is currently developed with residential dwellings on each lot and generally falls to Denning Street with an average slope of 1%.

Given the site's current approved land use as per Rockhampton Regional Council (RRC) Interactive Mapping, a maximum allowable fraction impervious (Fi) would be 0.55 in accordance with CMDG Table D05.06.1 given an average lot area of greater than 750m^2. This Fi has been adopted for the pre-development case.

Based on the average flow path slope and assumed fraction impervious of the site, an overall time of concentration (Tc) of 17 minutes has been adopted in accordance with QUDM Figure 4.4 with a C_{10} value of 0.790 in accordance with QUDM Table 4.5.3.

Friends Equation (Eq 4.5) - Shallow overland sheet flow				
L	**Surface**	**n**	**S**	**Tc**
m		Manning's	%	minutes
42	Average Grassed	0.045	1	17

Utilising a Tc of 17 minutes and the relevant rainfall intensities, the following discharges for a range of events were calculated using the C_{10} value of 0.733 where Qy=C*I*A/360 for the existing site.

PRE-DEVELOPMENT CASE

Development Area **0.2365** ha

Event AEP	**C**	**I**	**A**	**Q**
%	coefficient	mm/hr	ha	m3/s
63.2	0.632	77.6	0.2363	0.0322
50	0.672	86.3	0.2363	0.0380
20	0.751	114.0	0.2363	0.0562
10	0.790	134.0	0.2363	0.0695
5	0.830	154.0	0.2363	0.0838
2	0.909	182.0	0.2363	0.1085
1	0.948	204.0	0.2363	0.1269

Fi	0.550
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	17
C_{10}	0.790

From QUDM Table 4.5.3

3. Post Developed Site Flows and Management

3.1 Post Developed Flows

The proposed development of the site increases the fraction impervious to a value of 0.681 based on information provided by the applicant. Based on this value, a C_{10} value of 0.820 (From QUDM Table 4.5.3) was adopted.

Assuming the site slope will remain generally in accordance with pre-development conditions, an estimated time of concentration of 6 minutes was applied to post-development calculations.

Friends Equation (Eq 4.5) - Shallow overland sheet flow				
L	**Surface**	**n**	**S**	**Tc**
m		Manning's	%	minutes
42	Paved	0.015	1	6

Utilising the updated coefficients and intensities, the following discharges from site were calculated:

POST-DEVELOPMENT

Development Area **0.2363** ha

Event AEP	**C**	**I**	**A**	**Q**
%	coefficient	mm/hr	ha	m^3/s
63.2	0.656	111.0	0.2363	0.0478
50	0.697	123.0	0.2363	0.0563
20	0.779	164.0	0.2363	0.0839
10	0.820	192.0	0.2363	0.1034
5	0.861	220.0	0.2363	0.1244
2	0.943	259.0	0.2363	0.1604
1	0.984	289.0	0.2363	0.1867

Fi	0.681
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	6
C_{10}	0.820

From QUDM Table 4.5.3

When compared with the pre-developed total site flows, we note an increase in flow for all recurrence intervals. Refer table below:

COMPARISON OF UNTREATED FLOWS			
Event AEP	**Pre-Development (Total)**	**Post-Development**	**Change**
%	**m^3/s**	**m^3/s**	**%**
63.2	0.0322	0.0478	49%
50	0.0380	0.0563	48%
20	0.0562	0.0839	49%
10	0.0695	0.1034	49%
5	0.0838	0.1244	48%
2	0.1085	0.1604	48%
1	0.1269	0.1867	47%

3.2 Discharge Flow Management

3.2.1 Quantity Mitigation

It is proposed to mitigate the increase in site runoff by providing roof water detention tanks and 'oversized' stormwater pipes for carpark runoff.

It is proposed to provide on-site detention in the following manner:

- Two (2) 10,000L slimline tanks, each capturing half roof flows, and;
- A 36m length of 4 x 300mm diameter HDPE or concrete or equivalent, equating to 10,000L storage volume in 'oversized' pipes, capturing carpark runoff.

Outflow from each tank shall discharge to an underground line controlled by a 35mm orifice plate. The 4x300mm pipes shall be controlled by a 100mm diameter outlet pipe installed in the downstream pit. Finished levels must be nominated as such that the pit surface level at the upstream end of the oversized pipes is not higher than the downstream invert level, to prevent surcharge in the pits. The driveway/carpark is to be shaped as a v-drain, ensuring all runoff is directed to the pits.

Additionally, small (nominally 300 x 300mm) pits with finger safe grates shall be provided in the outdoor play spaces in suitable locations. Preliminary pit locations have been nominated as part of this stormwater management plan based on the current proposal. Locations can be altered to best suit the use of the space and to avoid conflict with play equipment and other fixtures.

All piped flows will be directed to a single suitable kerb adaptor in Denning Street.

Overall site runoff is reduced by 33% (18.5 L/s reduction on pre-development flows) for the minor event (20% AEP) and by 10% (13.1 L/s reduction on pre-development flows) for the major event (1% AEP).

	Minor Event (20% AEP)	**Major Event (1% AEP)**
Pre-Development Site Total (m^3/s)	0.0562	0.1269
Post-Development Site Total (m^3/s)	0.0839	0.1867
Flow Reduction from Pipe Detention (m^3/s)	0.0220	0.0352
Flow Reduction from Tanks Detention (m^3/s)	0.0241	0.0377
Treated Post-Development Site Total (m^3/s)	0.0377	0.1138
% Reduction in Flow	**-33%**	**-10%**

Refer drawings in Appendix A for further detail of the detention arrangements and hydrographs showing inflow, outflow and storage for each structure.

3.3 Stormwater Quality Management

Due to the size of the development (<2500m^2), State Planning Policy Healthy Water has not triggered.

Upon direction by RRC, it is necessary to provide gross pollutant control measures. It is proposed to install filter basket gross pollutant traps (GPTs), such as Atlan StormSacks, at all field inlets in the carpark and play areas. Additionally, leaf catchers shall be provided at downpipes discharging to the proposed roof water detention tanks. No additional stormwater quality improvement devices (SQIDs) are proposed at this time.

4. Flood Impact Assessment

4.1 Current Flood Levels and Velocities

A flood report generated by Rockhampton Regional Council on 25th July 2024 indicates that the Moores Creek local catchment 1% AEP flood level and velocity are RL 21.32m and 0.35m/s respectively for the development site. Refer Appendix B for the flood report.

A minimum ground elevation of RL 20.838m was identified from the detailed site survey, located in the west corner. When compared to existing levels across the entire site, flood depths within the property boundary vary between 0.0m and 0.482m.

This represents a very low hazard risk being classified at H1 (dv ≤ 0.3) in accordance with Table 6.10.3.3 3 Combined Hazard Curves – Vulnerability Threshold Classification Limits, as attached in Appendix C.

Refer drawings in Appendix A for the extents of flood inundation and respective depths for the development site.

4.2 Proposed Adjustments to Existing Surface Levels

As part of the design and construction of the proposed childcare centre, the site is expected to be filled. The proposed filling of the site is intended to allow surface runoff to drain freely from site at generally in accordance with existing grades (average 1%), or steeper where required in order to appropriately interface with the building and existing boundary levels. Additionally, filling must be undertaken to ensure minimum cover is achieved over the proposed underground stormwater detention pipes which shall be installed at minimum grades (1 in 200, or 0.5%) where possible.

Given the defined flood level, the building must be constructed with a minimum finished floor level of 21.62m.

Detailed design has not yet been undertaken at the time of this report. However, considering all points above, the average depth of fill is expected to be in the order of 500mm.

4.3 Potential Impact of Development on Flood Depth and Velocity

The proposed development will result in an extremely minor loss of storage capacity within the flood plain.

Given the information and mapping provided within AECOM *Moores Creek Local Catchment Study 2018* and Rockhampton Regional Council infrastructure mapping, it can be deduced that flood waters impacting the development site is backwater from Moores Creek, predominantly due to surcharge from stormwater pits in Yaamba Road.

Mapping of the surrounding areas shows the backwater generally spreading within the road reserve with only minor encroachment on properties. Given the flood levels supplied by council, it can be approximated that the loss of storage would not exceed 100m^3, which, given the immense size of the flood plain to reach this location and nature of the relevant flood water, does not result in any measurable impact to flood heights or actionable nuisances to the surrounding properties.

Given the anticipated filling of the site and noting the lowest existing ground elevation is within a proposed outdoor play space, post-development D * V is expected to be very low and generally in line with existing conditions.

Refer Appendix D and Appendix E for extracts from the flood catchment study and council mapping.

4.4 Evacuation Options

The development will not constrain any of the current evacuation options available to the users of the proposed childcare centre as there will be no effects on the current flood level or increase in population density. Any proposed evacuation strategies for occupants will not be influenced by the filling of the block.

Based on the mapping provided in the *Moores Creek Local Catchment Study 2018,* it appears the site will be surrounded by flood waters during the defined flood event. However, higher ground is present along Denning Street allowing site occupants to exit the site and remain until flood waters recede enough to allow evacuation.

4.5 Effective Warning Times

The proposed development on this allotment will have no effect on warning times as the impact of the development on flooding events are extremely minor and very localised around the site.

5. Conclusion

The proposed development will increase the impervious area of the site. It is proposed to mitigate the increase in runoff by providing a two above-ground detention tanks to capture roofwater flows and underground detention in the form of oversized pipes to capture carpark runoff. Quality improvement is not required under current SPP legislation for the proposed development. This report demonstrates that the construction of the childcare centre will have little to no effect on flooding events in the area. With existing flow paths maintained there will be no adverse impacts to surrounding properties, evacuation times or a shortening of effective warning times and Council can confidently approve the proposed development.

Ashleigh Lucas
For and On Behalf of
Dileigh Consulting Engineers Pty Ltd

Appendix A – Stormwater Management Strategy Drawings

PROPOSED CHILDCARE CENTRE
STORMWATER MANAGEMENT PLAN

7, 9 & 11 DENNING STREET, ROCKHAMPTON

ROSE INVESTMENTS

D24.192

CIVIL DESIGN

LOCALITY PLAN
(Not To Scale)

DESIGN DRAWING LIST INDEX	
SHEET NUMBER	**SHEET TITLE**
CIVIL	
C-00	TITLE PAGE
C-01	EXISTING SITE FEATURES AND HYDROLOGY
C-02	PROPOSED SITE LAYOUT AND HYDROLOGY
C-03	ON-SITE DETENTION HYDROGRAPHS
C-04	STORMWATER DETAILS
C-05	FLOOD LEVELS
CIVIL: ENVIRONMENTAL MANAGEMENT	
C-06	SEDIMENT AND EROSION CONTROL PLAN
C-06	SEDIMENT AND EROSION CONTROL NOTES

DILEIGH
CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

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PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

STORMWATER OUTLET FROM NEIGHBOURING ALLOTMENT

RETAINING WALL IN NEIGHBOURING ALLOTMENT AVERAGE 1.0m HIGH

N

LOT 41 ON RP607265

LOT 42 ON RP607265

LOT 43 ON RP607265

EXISTING RESIDENCE TO BE DEMOLISHED

EXISTING RESIDENCE TO BE DEMOLISHED

EXISTING RESIDENCE TO BE DEMOLISHED

BOLAND STREET

DENNING STREET

EO

LEGEND

- EO — EXISTING OVERHEAD ELECTRICAL
- EXISTING KERB AND CHANNEL
- 21.00 — EXISTING SURFACE CONTOUR
- OVERLAND FLOW DIRECTION

PRE-DEVELOPMENT SITE CONDITIONS

Development Area **0.2363** ha

Event AEP	C	I	A	Q
%	coefficient	mm/hr	ha	m^3/s
63.2	0.632	77.6	0.2363	0.0322
50	0.672	86.3	0.2363	0.0380
20	0.751	114.0	0.2363	0.0562
10	0.790	134.0	0.2363	0.0695
5	0.830	154.0	0.2363	0.0838
2	0.909	182.0	0.2363	0.1085
1	0.948	204.0	0.2363	0.1269

Fi	0.550
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	17
C_{10}	0.790

From QUDM Table 4.5.3

In accordance with QUDM Eqn. 4.3

DATUM: HORIZ. GDA 2020 VERT. AHD

HORIZONTAL 0 1 2 3 4 1:200

VERTICAL 0 1 2 3 4 1:200

SCALES m. FULL SIZE A3

PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DATE
A	RESPONSE TO IR	01/08/2024

DILEIGH
CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

ACN 121 309 171
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DRAFTED	AML
DESIGNED	AML
CHECKED	TL
APPROVED	T LAU
RPEQ 19272	SIGN
02.08.2024	

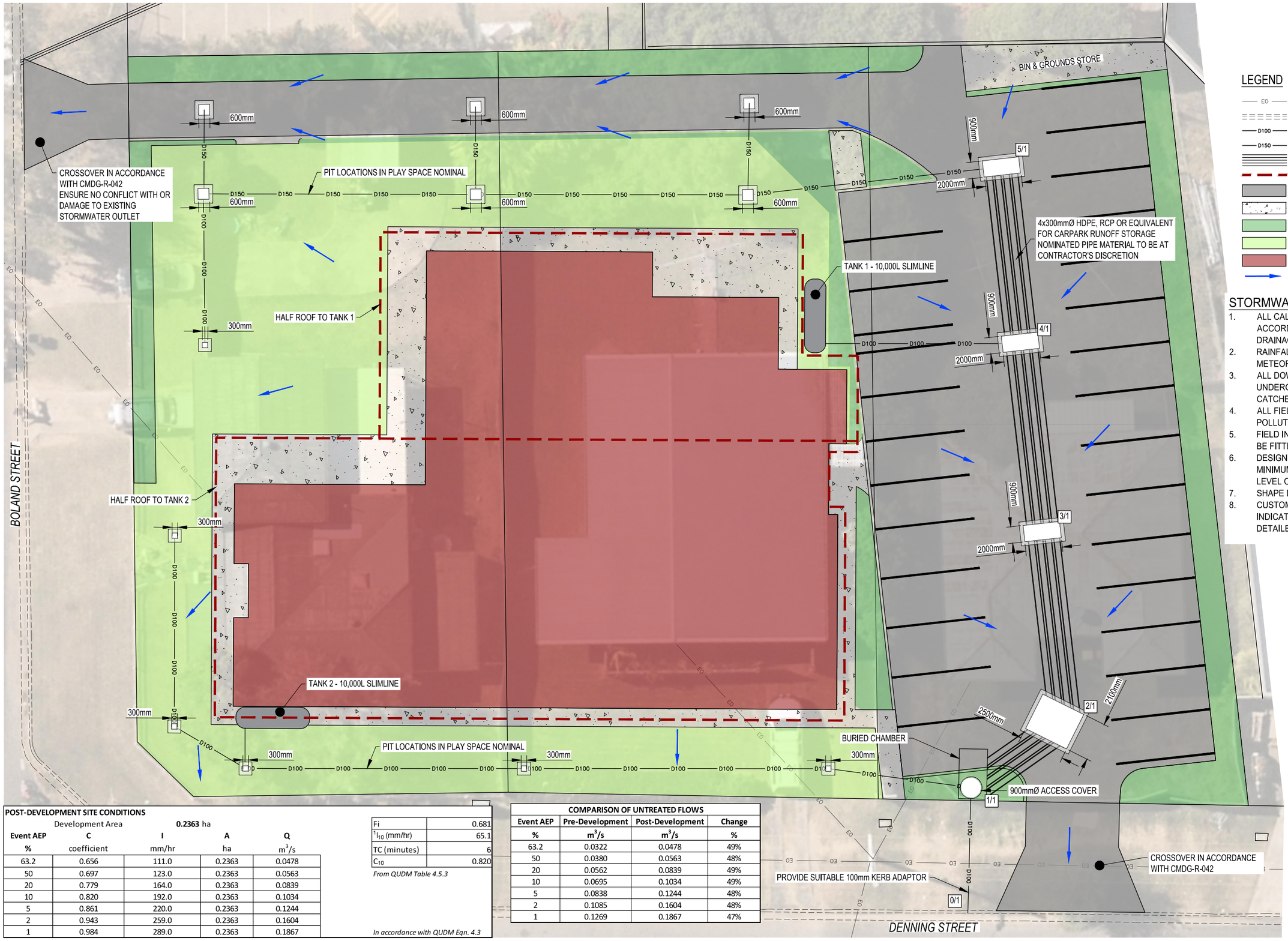
ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
EXISTING SITE FEATURES AND HYDROLOGY

DWG No. D24.192-01

CIVIL

REVISION A

C:\OneDrive - DILEIGH CONSULTING ENGINEERS PTY LTD\Data\2024\D24.192_ GSPC - MCU for Childcare Centre - 7-11 Denning Street\C DrawCivil\D24.192_SW.dwg, 01, 2/08/2024 2:41:40 PM, Ashleigh, ISO full bleed A3 (420.00 x 297.00 MM), 1:1



LEGEND

- EXISTING OVERHEAD ELECTRICAL
- EXISTING KERB AND CHANNEL
- PROPOSED 100Ø STORMWATER PIPE
- PROPOSED 150Ø STORMWATER PIPE
- PROPOSED 4x150Ø DETENTION PIPES
- PROPOSED ROOF OUTLINE
- PROPOSED CONCRETE CARPARK PAVEMENT
- PROPOSED CONCRETE PATHS / SLABS
- PROPOSED LANDSCAPING
- PROPOSED OUTDOOR PLAY SPACE
- PROPOSED BUILDING FOOTPRINT
- OVERLAND FLOW DIRECTION

STORMWATER MANAGEMENT NOTES:

1. ALL CALCULATIONS CARRIED OUT IN ACCORDANCE WITH THE QUEENSLAND URBAN DRAINAGE MANUAL
2. RAINFALL INTENSITIES TAKEN FROM BUREAU OF METEOROLOGY RAINFALL IFD DATA SYSTEM
3. ALL DOWNPIPES DISCHARGING TO UNDERGROUND LINE TO BE FITTED WITH LEAF CATCHER
4. ALL FIELD INLETS TO BE FITTED WITH A GROSS POLLUTANT TRAP
5. FIELD INLETS WITHIN OUTDOOR PLAY SPACE TO BE FITTED WITH FINGER-SAFE GRATES
6. DESIGN SURFACE LEVEL OF PIT 5/1 TO BE MINIMUM 150mm HIGHER THAN DESIGN INVERT LEVEL OF PIT 1/1 TO PREVENT SURCHARGE
7. SHAPE DRIVEWAY TO FALL TO STORMWATER LINE
8. CUSTOM GRATED PIT SIZES FOR PITS 5/1 TO 2/1 INDICATIVE ONLY, AND TO BE DETERMINED A DETAILED DESIGN

POST-DEVELOPMENT SITE CONDITIONS

Development Area **0.2363** ha

Event AEP	C	I	A	Q
%	coefficient	mm/hr	ha	m^3/s
63.2	0.656	111.0	0.2363	0.0478
50	0.697	123.0	0.2363	0.0563
20	0.779	164.0	0.2363	0.0839
10	0.820	192.0	0.2363	0.1034
5	0.861	220.0	0.2363	0.1244
2	0.943	259.0	0.2363	0.1604
1	0.984	289.0	0.2363	0.1867

Fi	0.681
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	6
C_{10}	0.820

From QUDM Table 4.5.3

In accordance with QUDM Eqn. 4.3

COMPARISON OF UNTREATED FLOWS

Event AEP	Pre-Development	Post-Development	Change
%	m^3/s	m^3/s	%
63.2	0.0322	0.0478	49%
50	0.0380	0.0563	48%
20	0.0562	0.0839	49%
10	0.0695	0.1034	49%
5	0.0838	0.1244	48%
2	0.1085	0.1604	48%
1	0.1269	0.1867	47%

DATUM: HORIZ. GDA 2020 VERT. AHD

HORIZONTAL 1:200

VERTICAL 1:200

SCALES m. FULL SIZE A3

PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DATE
A	RESPONSE TO IR	01/08/2024
B	AMENDED S/W PIPE AND PITS LINE 5/1 TO 2/1	19/09/2024

DILEIGH CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

ACN 121 309 171
47 Normanby Street
Yeppoon, Queensland 4703

Phone: 07 49112553
Fax: 07 49383660
Email: admin@dileigh.com.au

DRAFTED	AML
DESIGNED	AML
CHECKED	TL
APPROVED	T LAU
RPEQ 19272	SIGN
19.09.2024	

ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
PROPOSED SITE LAYOUT AND HYDROLOGY

DWG No. D24.192-02

CIVIL

REVISION B

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RUNOFF FROM CARPARK

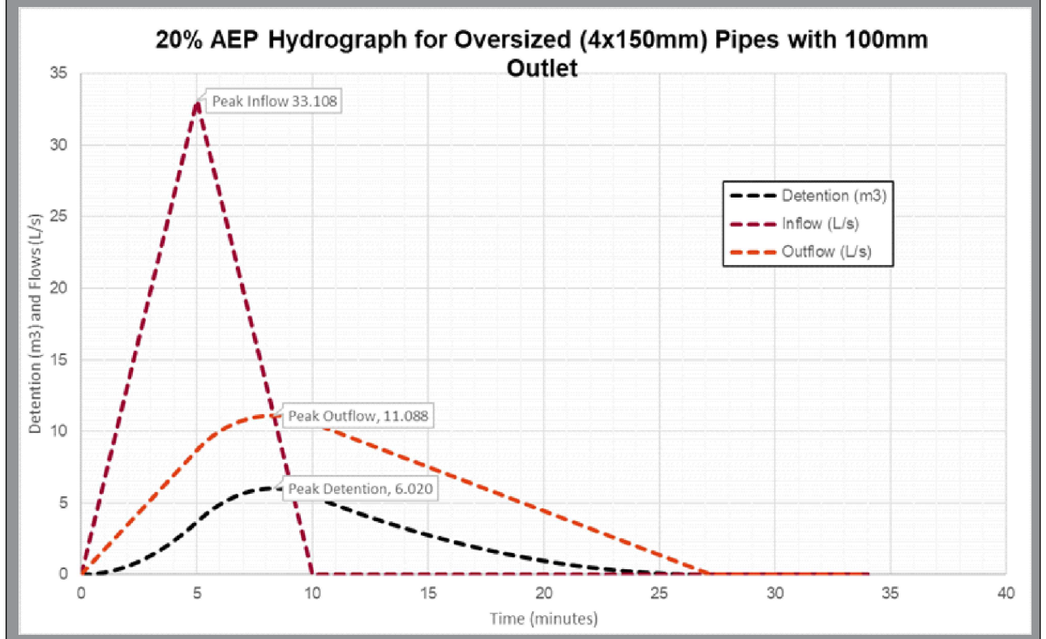
Development Area **0.082** ha

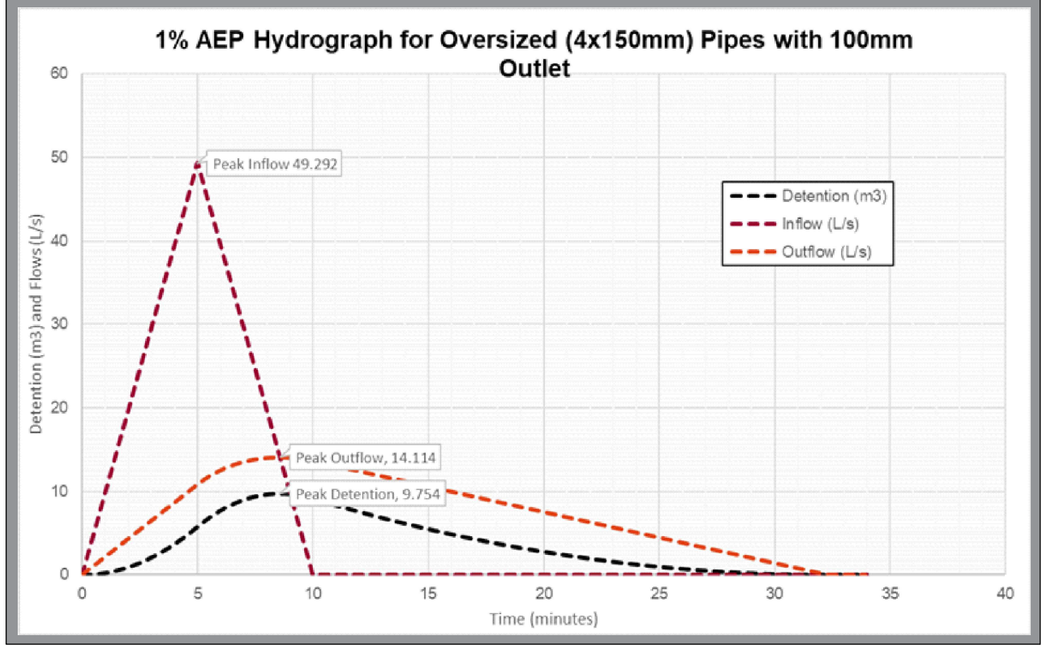
Event AEP %	C coefficient	I mm/hr	A ha	Q m^3/s
63.2	0.720	115.0	0.082	0.0189
50	0.765	128.0	0.082	0.0223
20	0.855	170.0	0.082	0.0331
10	0.900	200.0	0.082	0.0410
5	0.945	229.0	0.082	0.0493
2	1.000	268.0	0.082	0.0610
1	1.000	300.0	0.082	0.0683

Fi	1.0
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	5
C_{10}	0.900

From QUDM Table 4.5.3

In accordance with QUDM Eqn. 4.3





RUNOFF FROM ROOF

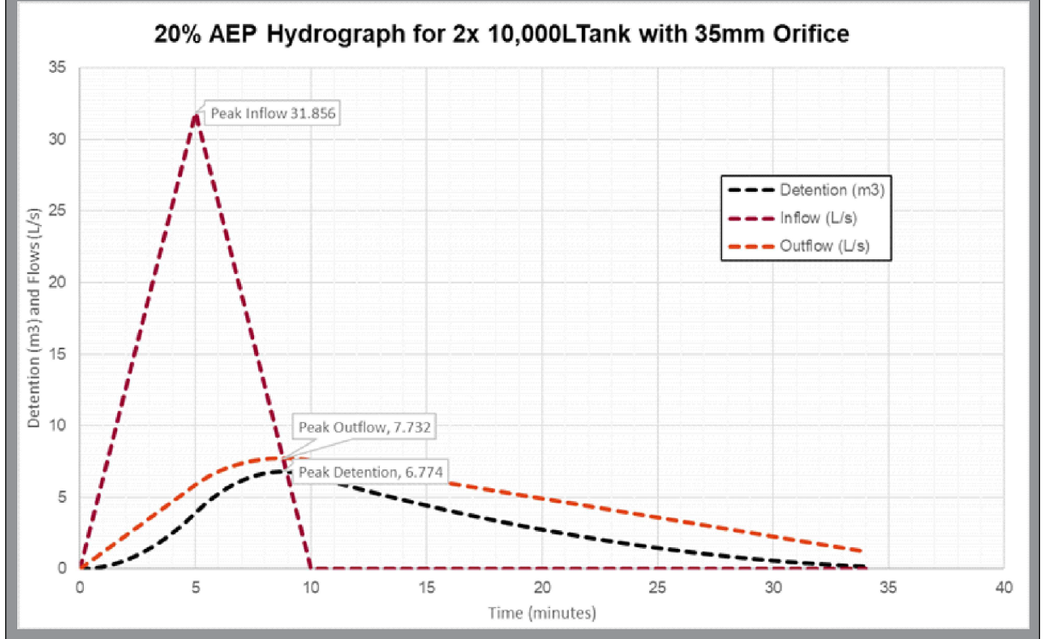
Development Area **0.0789** ha

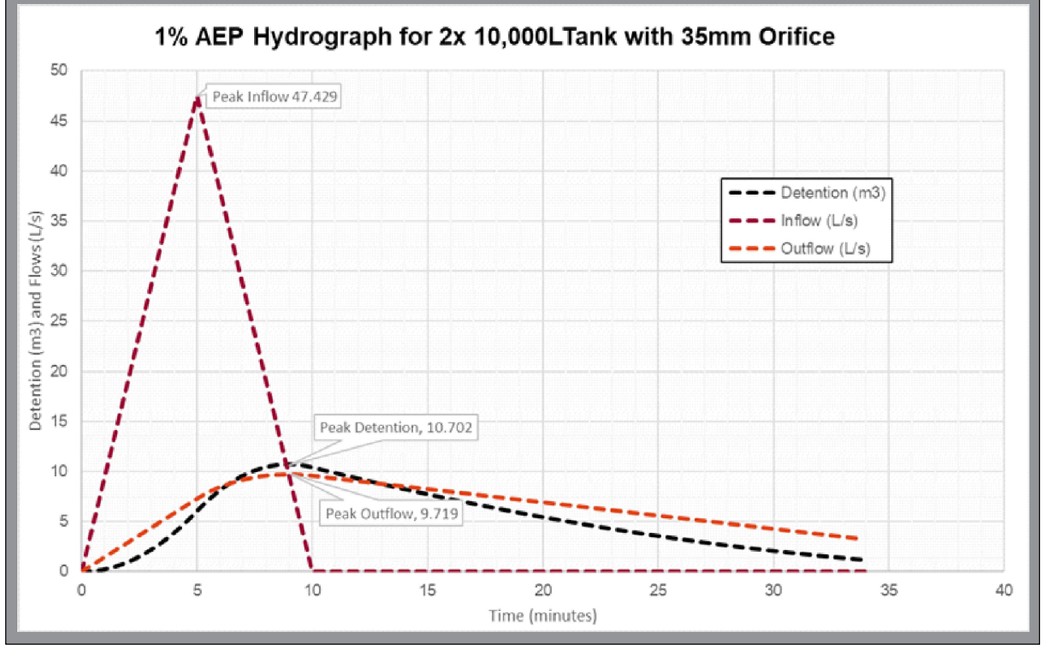
Event AEP %	C coefficient	I mm/hr	A ha	Q m^3/s
63.2	0.720	115.0	0.0789	0.0181
50	0.765	128.0	0.0789	0.0215
20	0.855	170.0	0.0789	0.0319
10	0.900	200.0	0.0789	0.0395
5	0.945	229.0	0.0789	0.0474
2	1.000	268.0	0.0789	0.0587
1	1.000	300.0	0.0789	0.0658

Fi	1.0
$^1I_{10}$ (mm/hr)	65.1
TC (minutes)	5
C_{10}	0.900

From QUDM Table 4.5.3

In accordance with QUDM Eqn. 4.3





DATUM: HORIZ. GDA 2020 VERT. AHD

SCALES m. FULL SIZE A3

PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DATE
A	RESPONSE TO IR	01/08/2024

DILEIGH
CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

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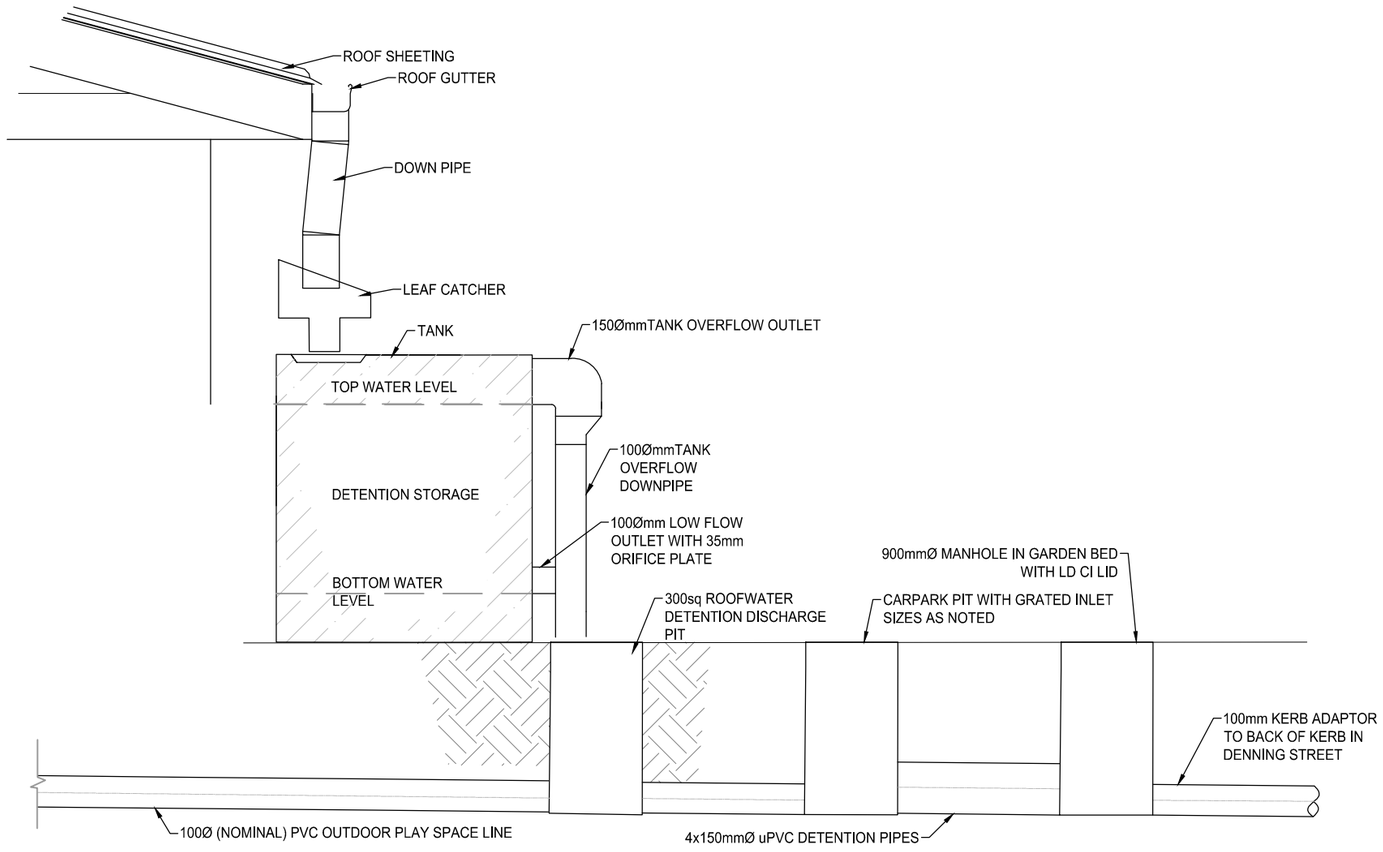
DESIGNED	AML
CHECKED	TL
APPROVED	T LAU
RPEQ 19272	SIGN
02.08.2024	

ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
ON-SITE DETENTION HYDROGRAPHS

DWG No. D24.192-03

CIVIL

REVISION A



DATUM: HORIZ. GDA 2020 VERT. AHD

SCALES m. FULL SIZE A3

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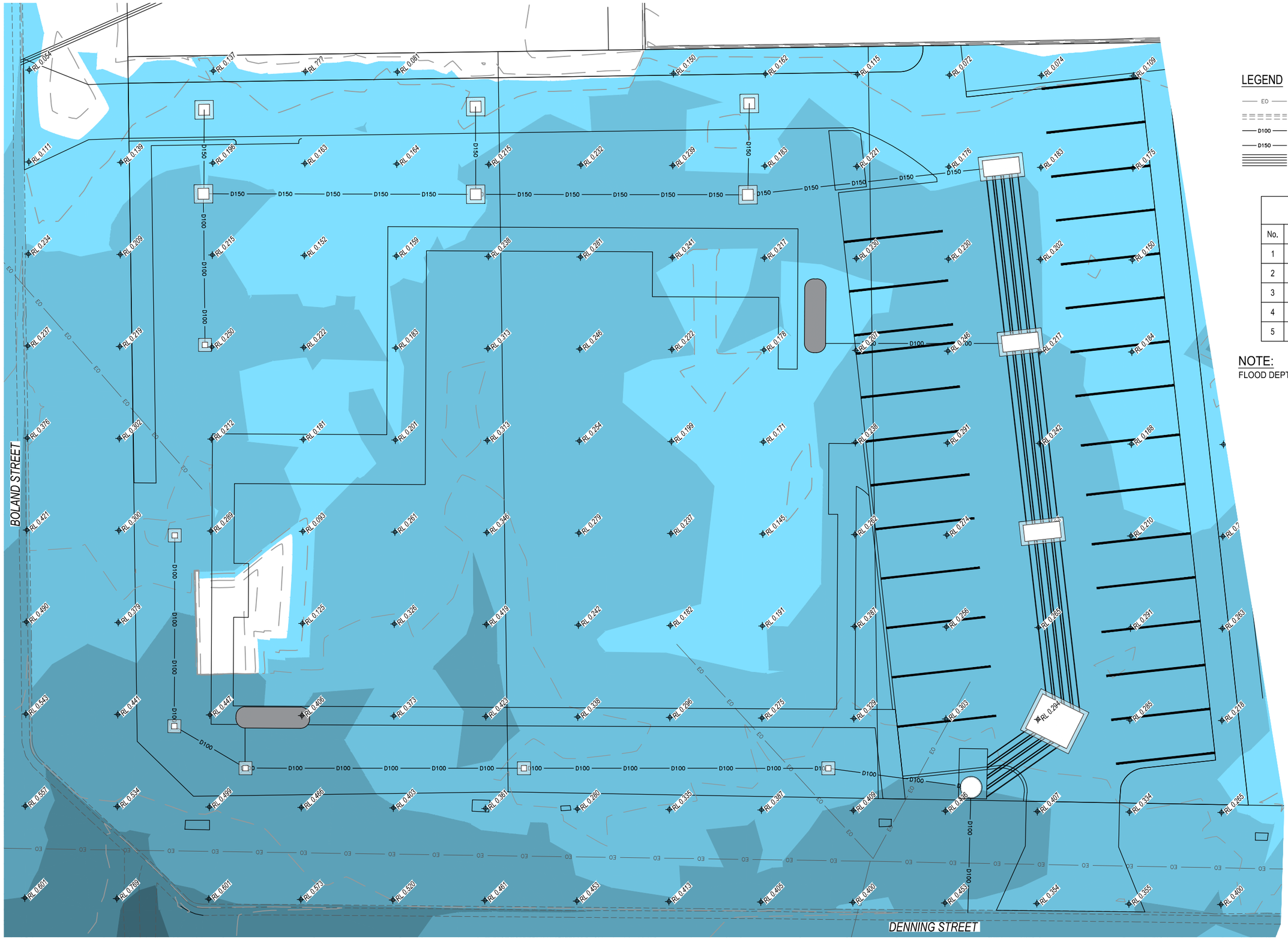
ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
STORMWATER DETAILS

DWG No. D24.192-04

CIVIL

REVISION A



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LEGEND

- EO — EXISTING OVERHEAD ELECTRICAL
- EXISTING KERB AND CHANNEL
- D100 — PROPOSED 100Ø STORMWATER PIPE
- D150 — PROPOSED 150Ø STORMWATER PIPE
- PROPOSED 4x150Ø DETENTION PIPES

FLOOD DEPTHS			
No.	From Level	To Level	Colour
1	0.000	0.200	
2	0.200	0.400	
3	0.400	0.600	
4	0.600	0.800	
5	0.800	1.000	

NOTE:
FLOOD DEPTHS FOR EXISTING SURFACE LEVELS

DATUM: HORIZ. GDA 2020 VERT. AHD

0 1 2 3 4 HORIZONTAL 1:200

0 1 2 3 4 VERTICAL 1:200

SCALES m. FULL SIZE A3

PRELIMINARY ISSUE

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ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
FLOOD DEPTHS

DWG No. D24.192-05
CIVIL
REVISION B

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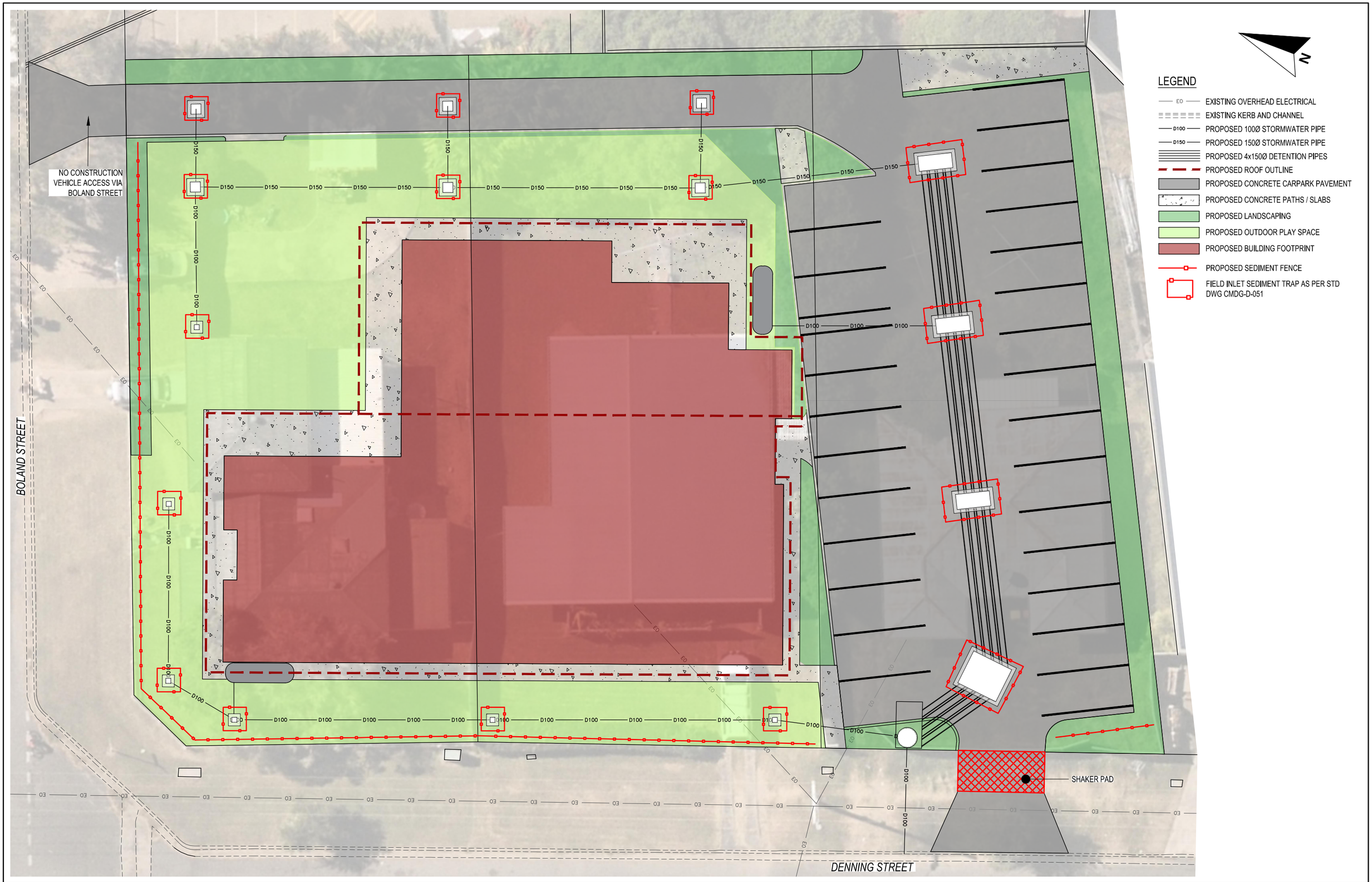

DATUM: HORIZ. GDA 2020 VERT. AHD

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0 1 2 3 4 VERTICAL 1:200

SCALES m. FULL SIZE A3

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ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
PROPOSED SITE LAYOUT AND HYDROLOGY

DWG No. D24.192-06

CIVIL

REVISION B

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ENVIRONMENTAL MANAGEMENT NOTES:

1. PRIOR TO THE COMMENCEMENT OF EARTHWORKS, TOPSOIL SHALL BE STRIPPED AND STOCKPILED FROM SELECT AREAS ONLY FOR RE-SPREADING OVER DISTURBED AREAS PRIOR TO REVEGETATION AND LANDSCAPING.
2. PRIOR TO THE COMMENCEMENT OF ANY EARTHWORKS ALL SEDIMENT CONTROL DEVICES WILL BE ERECTED WHERE SHOWN ON THE DRAWINGS OR OTHERWISE DIRECTED BY THE ENGINEER.
3. ALL DISTURBED AREAS ON-SITE AND IN ROAD RESERVE WILL BE RE-TOPSOILED, TURFED OR LANDSCAPED.
4. ALL SOIL CONSERVATION AND ENVIRONMENTAL PROTECTION MEASURES SHALL BE MONITORED BY THE CONTRACTOR AT REGULAR INTERVALS DURING CONSTRUCTION. SEDIMENT CONTROL DEVICES WILL BE MONITORED AFTER RAIN EVENTS AND MADE GOOD WHERE NECESSARY. THIS WILL ALSO BE CARRIED OUT DURING THE DEFECTS LIABILITY PERIOD.
5. SILT FENCES SHALL BE INSTALLED ON THE LOW SIDE OF ALL STOCKPILES WHERE REQUIRED.
6. SILT FENCES SHALL REMAIN ON SITE UNTIL ALL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THERE IS 90% VEGETATION COVERAGE OF PROPOSED LANDSCAPED AREAS.

NOISE MANAGEMENT:

1. WORKING HOURS - WORKING HOURS FOR THE SITE ARE TO BE 6.30am TO 6.30pm MONDAY TO SATURDAY. NO WORK TO BE UNDERTAKEN OUTSIDE OF TIMES SPECIFIED UNDER ANY CIRCUMSTANCES.
2. NOISE MINIMISATION METHODS - NOISE WILL BE MINIMISED USING THE FOLLOWING METHODS:-
   - 2.1. RESTRICTED WORKING HOURS AS DETAILED ABOVE
   - 2.2. NOISE GENERATING MACHINERY TO OPERATED ONLY WHEN NECESSARY TO UNDERTAKE WORKS - VEHICLES AND MACHINERY ARE NOT TO BE LEFT 'IDLING' WHEN NOT IN USE.
   - 2.3. NOISE SHIELDING ON PLANT TO BE INSPECTED PRIOR TO COMMENCEMENT OF WORKS AND MADE GOOD WHERE FOUND TO BE FAULTY.
   - 2.4. VEHICLES AND MACHINERY TO BE REGULARLY MAINTAINED TO REDUCE ENGINE NOISE THROUGH INFREQUENT MAINTENANCE.

DUST MANAGEMENT:

1. MINIMISING DUST GENERATION - THE FOLLOWING WORK PRACTICES WILL BE USED TO MINIMISE DUST GENERATION:-
   - 1.1. WIND CONDITIONS ON SITE ARE TO BE MONITORED AND SITE WORKS STOPPED IF WIND STRENGTH IS SUCH THAT EFFORTS TO MINIMISE AND/OR SUPPRESS DUST ARE INEFFECTIVE.
   - 1.2. SOIL STABILISATION OF BATTERS (THROUGH TOPSOILING AND REVEGETATION) TO BE UNDERTAKEN IMMEDIATELY AFTER FINAL TRIM TO MINIMISE EXPOSURE OF BARE EARTH.
   - 1.3. STOCKPILES INTENDING TO BE LEFT IN PLACE FOR 28 DAYS OR GREATER SHALL BE GRASS SEEDED.
2. DUST SUPPRESSION -
   - 2.1. WET DOWN DUST GENERATING SURFACES DAILY PRIOR TO COMMENCEMENT OF WORK USING WATER TRUCKS, SPRINKLERS AND HOSE WATERING BY HAND.
   - 2.2. ADDITIONAL WETTING DOWN OF SITE AREAS IS TO BE UNDERTAKEN AS NEEDED DURING THE COURSE OF THE DAY WHERE WORK AREAS HAVE DRIED AND ARE GENERATING DUST.

WEED MANAGEMENT:

1. MOVEMENT OF SOIL - EXISTING TOP SOIL IS TO BE STOCKPILED AND RE-USED ON SITE AFTER SITE WORKS ARE COMPLETE, ANY ADDITIONAL TOP SOIL REQUIRED IS TO BE FREE OF PLANT SEEDS PRIOR TO SPREADING ON SITE.
2. FILL MATERIAL - FILL MATERIAL TO BE IMPORTED ON SITE IS TO BE 'CLEAN FILL' AND FREE FROM ANY ORGANIC MATTER OR MATERIALS.

EMERGENCY VEHICLE ACCESS:

1. MAINTAIN CLEAR ACCESS TO SITE FOR EMERGENCY VEHICLES AT ALL TIMES

WASTE MANAGEMENT:

1. ALL LITTER AND WASTE TO BE CONTAINED ON SITE IN CONTAINERS PROVIDED FOR THAT PURPOSE.
2. ALL WASTE TO BE FURTHER DISPOSED OFF SITE IN A RESPONSIBLE MANNER.
3. WHERE POSSIBLE MINIMISE WASTE THROUGH WASTE MINIMIZATION AND RE-USE.

EROSION AND SEDIMENT MANAGEMENT:

DRAINAGE MANAGEMENT - WHERE POSSIBLE, RAINWATER DISCHARGE FROM UPSTREAM PROPERTIES IS TO BE DIRECTED AWAY FROM WORKS THROUGH TEMPORARY BUNDING.

1. SOIL STABILISATION -
   - 1.1. EXPOSED EARTH SHALL BE TOPSOILED, VEGETATED, AND LANDSCAPED AS SOON AS POSSIBLE AFTER TRIMMING.
   - 1.2. RE-VEGETATED AND LANDSCAPED AREAS SHALL BE REGULARLY WATERED TO ASSIST ESTABLISHMENT OF COVER.
   - 1.3. ALL BANKS AND BATTERS ARE TO BE REGULARLY INSPECTED TO IDENTIFY AREAS OF EROSION AND RESHAPED TO PREVENT FURTHER EROSION IF NECESSARY - RECTIFICATION WORKS ARE TO BE RE-VEGETATED IMMEDIATELY.
2. STOCKPILE PROTECTION -
   - 2.1. STOCKPILES ARE TO BE SITUATED SUCH THAT THEY ARE NOT IN ANY STORMWATER FLOW PATHS.
   - 2.2. SILT FENCING IS TO BE INSTALLED TO DOWNSTREAM SIDE OF STOCKPILE AREAS PRIOR TO THEIR USE.
   - 2.3. STOCKPILES INTENDING TO BE LEFT IN PLACE FOR 28 DAYS OR GREATER SHALL BE GRASS SEEDED.
   - 2.4. STOCKPILES TO HAVE A MAXIMUM SLOPE OF 2H:1V.
3. SEDIMENT TRAPS -
   - 3.1. SILT FENCING & SEDIMENT TRAPS TO BE INSTALLED AT AREAS OF SITE DISCHARGE AS SHOWN ON PLAN.
   - 3.2. SILT FENCING TO BE INSTALLED TO DOWNSTREAM SIDE OF STOCKPILE AREAS, STRIPPED AREAS, AND ANY OTHER AREAS OF BARE EARTH WHERE SILT LADEN RUNOFF CAN BE GENERATED.
   - 3.3. SEDIMENT FENCING TO BE INSTALLED IN ACCORDANCE WITH SEDIMENT FENCE DETAILS ON THIS SHEET.
   - 3.4. SEDIMENT FENCE LAYOUT SHALL CONFORM TO "TYPICAL LAYOUT ACROSS GRADE" AS DETAILED ON STANDARD DRAWING CMDG-D-050.
   - 3.5. SILT FENCES AND SEDIMENT TRAPS SHALL REMAIN ON SITE UNTIL ALL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THERE IS 90% VEGETATION COVERAGE OF PROPOSED LANDSCAPED AREAS.
4. VEHICLE AND ROAD MANAGEMENT:-
   - 4.1. VEHICLES AND PLANT ARE TO ONLY ACCESS THE SITE FROM DENNING STREET SITE ACCESS TO BE OVER A SHAKER ACCESS PAD OR RUMBLE GRID IN ACCORDANCE WITH STANDARD DWG CMDG-D-050.
   - 4.2. VEHICLE OPERATOR TO ASSESS MATERIAL ON VEHICLE PRIOR TO EXITING SITE AND REMOVE EXCESS WITH SHOVEL OR BRUSH.
   - 4.3. DENNING STREET TO BE INSPECTED AT END OF EACH DAY AND ANY DEPOSITED MATERIAL IS TO BE REMOVED.

ACID SULFATE SOILS:

1. DUE TO THE ELEVATION AND SITE GEOLOGY IT IS UNLIKELY THAT A.S.S. WILL BE ENCOUNTERED ON THIS SITE.
2. IF A.S.S. ARE ENCOUNTERED ON THE SITE DURING CONSTRUCTION ENGAGE A SUITABLY QUALIFIED ENVIRONMENTAL CONSULTANT TO PRODUCE AN A.S.S. MANAGEMENT PLAN FOR IT.

FAUNA MANAGEMENT:

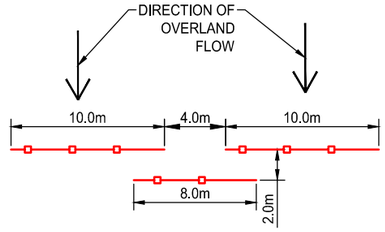
1. ANY CLEARING OF REMNANT VEGETATION WILL REQUIRE A FAUNA SPOTTER / CATCHER TO BE IN ATTENDANCE.

VEGETATION MANAGEMENT:

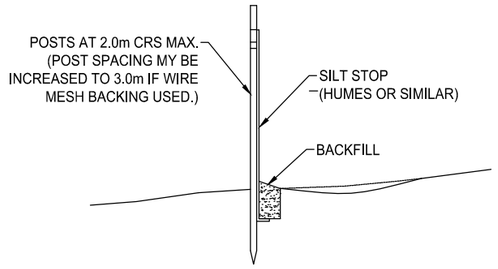
1. WHERE VEGETATION COVENANT EXISTS ON SITE. THIS AREA TO BE CLEARLY PEGGED AND FLAGGED OR FENCED PRIOR TO WORK COMMENCING ON SITE TO PREVENT ANY CLEARING IN THIS AREA.

BUSH FIRE MANAGEMENT:

1. THE SITE IS PREDOMINANTLY CLEARED AND NOT IN A BUSH FIRE HAZARD ZONE (BUT STILL MAY BE SUBJECT TO BUSH FIRES)
2. ANY CLEARED VEGETATION TO BE MULCHED AND USED ON SITE.
3. MULCHED STOCK PILES TO BE NO MORE THAN 2.0m HIGH AND WET DOWN DAILY.
4. REMOVE MULCH FROM SITE IF SAFE TO DO SO SHOULD BUSHFIRES THREATEN THE AREA.



SEDIMENT FENCE ARRANGEMENT
N.T.S



SEDIMENT FENCE DETAIL
N.T.S

DATUM: HORIZ. GDA 2020 VERT. AHD

HORIZONTAL 0 1 2 3 4 1:200

VERTICAL 0 1 2 3 4 1:200

SCALES m. FULL SIZE A3

PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

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A	RESPONSE TO IR	01/08/2024

DILEIGH CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

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ROSE INVESTMENTS
PROPOSED CHILDCARE CENTRE
7, 9 & 11 DENNING STREET, ROCKHAMPTON
STORMWATER MANAGEMENT PLAN
PROPOSED SITE LAYOUT AND HYDROLOGY

DWG No. D24.192-07

CIVIL

REVISION A

Appendix B – Council Flood Report

Rockhampton Office
232 Bolsover St, Rockhampton
Gracemere Office
1 Ranger St, Gracemere
Mount Morgan Office
32 Hall St, Mount Morgan

25 July 2024

Your Ref: N/A
Telephone: 07 4936 8099
Email: developmentadvice@rrc.qld.gov.au

Dileigh Consulting Engineers Pty Ltd
47 Normanby Street
YEPPOON QLD 4703

Dear Sir / Madam

FLOOD INFORMATION REQUEST FOR 9 DENNING STREET, PARK AVENUE QLD 4701 DESCRIBED AS LOT 42 ON RP607265

Council is in receipt of your application dated 18 July 2024 requesting flood information for 9 Denning Street, Park Avenue QLD 4701, and more properly described as Lot 42 on RP607265.

Please find attached a Flood Search Property Report for your reference. The purpose of this report is to provide flood level information to support the application of Council's planning scheme Flood Hazard overlay code, floodplain planning provisions, and applicable flood planning levels.

Council records show that the abovementioned property parcel is identified as being at risk of flood in a 1% AEP Local Storm Event / Overland flooding event. Annual Exceedance Probability (AEP) is the probability of a flood event of a given magnitude being equalled or exceeded in any one year. A 1% AEP event means there is statistically a 1% (or 1 in 100) probability that an event of that magnitude will occur or be exceeded in any year.

The design flood level information contained within this report provide water surface levels for a range of typical planning and development design standards. The flood planning level for most development in the Flood Hazard overlay area is the Defined Flood Event (DFE). Council has adopted a DFE of 1% AEP as a planning standard for the management of development in Rockhampton Region. As such, for most development types - the floodplain planning provisions of Council's planning scheme apply relative to the 1% AEP defined flood event. Exceptions apply for critical infrastructure. The Defined flood event may change as Council undertakes further flood risk analysis and profiling as part of its long-term floodplain management planning for the catchment.

The flood levels contained within this flood search report have been sourced from Council's adopted flood modelling and flood study at this location and are based on the best available information at the time of completing the study. The flood levels are measured in metres Australian Height Datum (mAHD), where mean sea level is approximately zero (0) mAHD.

Council is committed to providing residents with the most up to date flood risk information. The current flood study for this catchment area has assessed flood risk for a number of flood events including rare flood events greater than the 1%AEP flood, to provide a better understanding of the flood behaviour in the catchment. As such, the flood search report contains flood levels for flood events such as the 0.2%AEP (1 in 500-year AEP), 0.05% AEP (1 in 2000-year flood event), and the PMF (probable maximum flood). This information is being provided for completeness and may not be applicable for development assessment purposes.

Please note: All reasonable steps have been undertaken to ensure the information presented in this report is accurate at the time of generation. Changes to the topography and condition of the local creeks and waterways may have an impact on flooding. Over time, Council may also undertake further technical studies to maintain the understanding of flooding across the city and update the information available.

Should you have any queries regarding this information please contact Council's Development Engineering section using the contact information above.

Yours faithfully

Patricia Farrow
Senior Development Engineer
Planning and Regulatory Services

Enc Flood Search Property Report and Flood Property Map

Rockhampton Regional Council Flood Search Property Report

Property Address:	**9 Denning Street, Park Avenue QLD 4701**
Lot Details:	**Lot 42 on RP607265**
Date of Issue:	**25 July 2024**

Rockhampton Regional Council

Flood Search Property Report Overview

It is possible for one or more sources of flooding to occur, especially where a property is near a creek or waterway. These flooding sources can include riverine, creek and overland flow flooding which can each behave differently and impact how a building or development is designed. All flood hazard triggers should be considered when designing and planning with flooding in mind.

The Rockhampton Regional Council Flood Search Report is provided to support planning and development, in accordance with the current version of the Rockhampton Region Planning Scheme 2015.

This report summaries flood information for this property to inform and supplement the application of the Council's planning scheme Flood Hazard overlay code, floodplain planning provisions, and the applicable flood planning levels. The contents of this report have been derived from Council's flood studies and flood modelling and should be considered along with all other applicable planning and development requirements. Flood studies and associated modelling assist Council to better understand flooding in the Rockhampton region and implement plans to avoid and mitigate its impacts on the community.

Flood modelling of the Fitzroy River has been progressively refined over a long period of time. The flood modelling addresses riverine impacts on Rockhampton City and surrounding areas, including Alton Downs, Pink Lily, Nine Mile, Fairy Bower, Midgee and Port Curtis. Local Creek and Catchment Flood Studies provide Council with information on flood behaviour of the creeks, and how they are expected to respond during varying intensities and durations of rainfall events.

Understanding your flood risk can help you prepare for flooding at your home or business. The information provided in this report utilises information from the most up to date flood studies available to Council at the date of issue of this report. All reasonable steps have been undertaken to ensure the information presented in this report is accurate at the time of generation. Changes to the topography and condition of the local creeks and waterways may have an impact on flooding. Over time, Council may undertake further technical studies to maintain the understanding of flooding across the city and update the information available.

Copies of Council's current Flood Studies are available on Council's website at www.rrc.qld.gov.au

What is flood modelling?

Flood modelling uses sophisticated computer software to estimate how rainfall of various intensities and duration produce stormwater flows along creek and river catchments.

Flood modelling is used to estimate:

- The inundation extents of the areas that may be flooded,
- The peak depths of flood waters, and
- The hazard related to the depth of water or how quickly the water flows (velocity).

Flood modelling estimates a range of design floods based on a statistical analysis of rainfall information provided by the Bureau of Meteorology. This information is used to establish the likelihood of a rainfall or flood event.

When reading this report, please consider:

- If a property is identified as being at risk of being affected by Fitzroy River and/ or Local Creek Catchment flooding, the highest maximum flood heights should be used to establish minimum building and development levels. For large property parcels - there may be a significant difference between the minimum and maximum flood heights for a particular flood type. In these situations, you may need to seek further advice from Council regarding the flood height that is appropriate for the exact location of the proposed building or development.
- The flood maps included with this report display the flood inundation extent only. All maps generated from the Flood Studies are available on Council's website.
- The flood maps provided depict the flood inundation extents under existing climate and catchment conditions.
- If preparing a new building and/or development application, it is recommended that you confirm all flood related provisions within Council's Planning Scheme relevant to the property.

Property Details

Address: **9 Denning Street, Park Avenue QLD 4701**
Lot and plan: Lot 42 on RP607265

Property Ground Levels:

Property ground levels can be found on the attached property flood report. The ground level data has been sourced from Aerial LiDAR survey, and as such, these levels are approximate.

Should the extent of flooding at a property need to be more accurately predicted, then individual property level information (e.g. surveyed site levels, and building floor levels) could be utilised in conjunction with Council's flood information. Council does not undertake this level of investigation or survey on behalf of property owners.

For your information:
AHD (Australian Height Datum) is the National Mapping Datum used throughout Australia. The level of 0.0m AHD is approximately mean sea level.
Elevation Data Source: The digital elevation model used in the flood modelling is generated on a regional scale and utilises ground level elevations from aerial laser surveys performed in2016. The survey data used to determine the extent and depth of potential inundation is captured and updated periodically and may not reflect inundation of land that has recently been modified, such as a new subdivision that has changed the existing landform.

Flood Information

Riverine Flood: Not Affected

Creek Catchment Flood: Not Affected

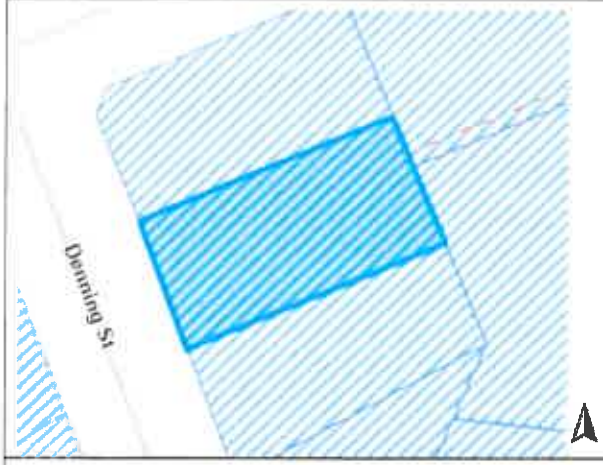
Local Storm Event /Overland Flood: Affected

The property is identified as being at risk of flooding from Local Storm Events / Overland Flow flooding. The attached map displays the 1% AEP flood extent on the property due to the Local Storm Event / Overland Flow Flooding. Planning and development must consider risk to people and property, natural floodplain characteristics, and flood free/low flood hazard access outcomes during local storm and overland flow flood events.

For your information:
AEP (Annual Exceedance Probability) is the probability of a flood event of a given size occurring or being exceeded in any one year. Information in relation to more or less likely floods and the full flood plain extent can be accessed on Council's website.

Flood Report

RP607265/42 - 9 Denning Street Park Avenue QLD 4701



REPORT DATE **25 July 2024**

PROPERTY DETAILS			
Address	9 Denning Street Park Avenue QLD 4701		
Parcel ID	RP607265/42	**Assessment**	118602
Land use	Single Dwelling		
Riverine catchment	Fitzroy River Flood Study		
Creek Catchment	Moores Creek Local Catchment Study 2018		
Mitigation Area	N/A		
Horizontal Datum	MGA Z56, GDA 2020		
Elevation / WSL	mAHD		
Velocity	m/sec		
Ground elevation (min)	20.97		
Ground Elevation (max)	22.18		
No additional comments for this property.			

	RIVERINE	
	WATER SURFACE LEVEL	VELOCITY
LEVELS	**MAX**	**MAX**
5% (Q5)	*N/A*	*N/A*
10% (Q10)	*N/A*	*N/A*
1% (Q100)	*N/A*	*N/A*

	CREEK \ LOCAL CATCHMENT	
	WATER SURFACE LEVEL	VELOCITY
LEVELS	**MAX**	**MAX**
5% (Q5)	*N/A*	*N/A*
10% (Q10)	*N/A*	*N/A*
1% (Q100)	*21.32*	*0.35*

Appendix C – Flood Hazard Curves

4 Indexing to flood hazard vulnerability curves

Once the flood hazard has been quantified and the timing aspects of flood hazard understood, the potential of the flood flows to cause damage or danger can be indexed against vulnerability curves linked to meaningful hazard thresholds.

The vulnerability of the community and its assets can be described by using thresholds related to the stability of people as they walk or drive through flood waters, or shelter in a building during a flood. The vulnerability to hazard will also be influenced by whether the primary consideration is, for example, strategic land-use planning, which is aimed at ensuring land use is compatible with the flood risk, or assessing development proposals or emergency management planning, which is aimed at addressing residual flood risks.

4.1 General flood hazard classification

A flood hazard assessment conducted as part of a flood study often provides baseline information for general consideration as part of an initial scoping exercise for a floodplain management study. In such a preliminary assessment of risks or as part of a constraints analysis for strategic land-use planning, a combined set of hazard vulnerability curves such as those presented in Figure 6 can be used as a general classification of flood hazard on a floodplain. Further information on the source of the hazard vulnerability curves presented in Figure 6 is available in Smith et al. (2014).

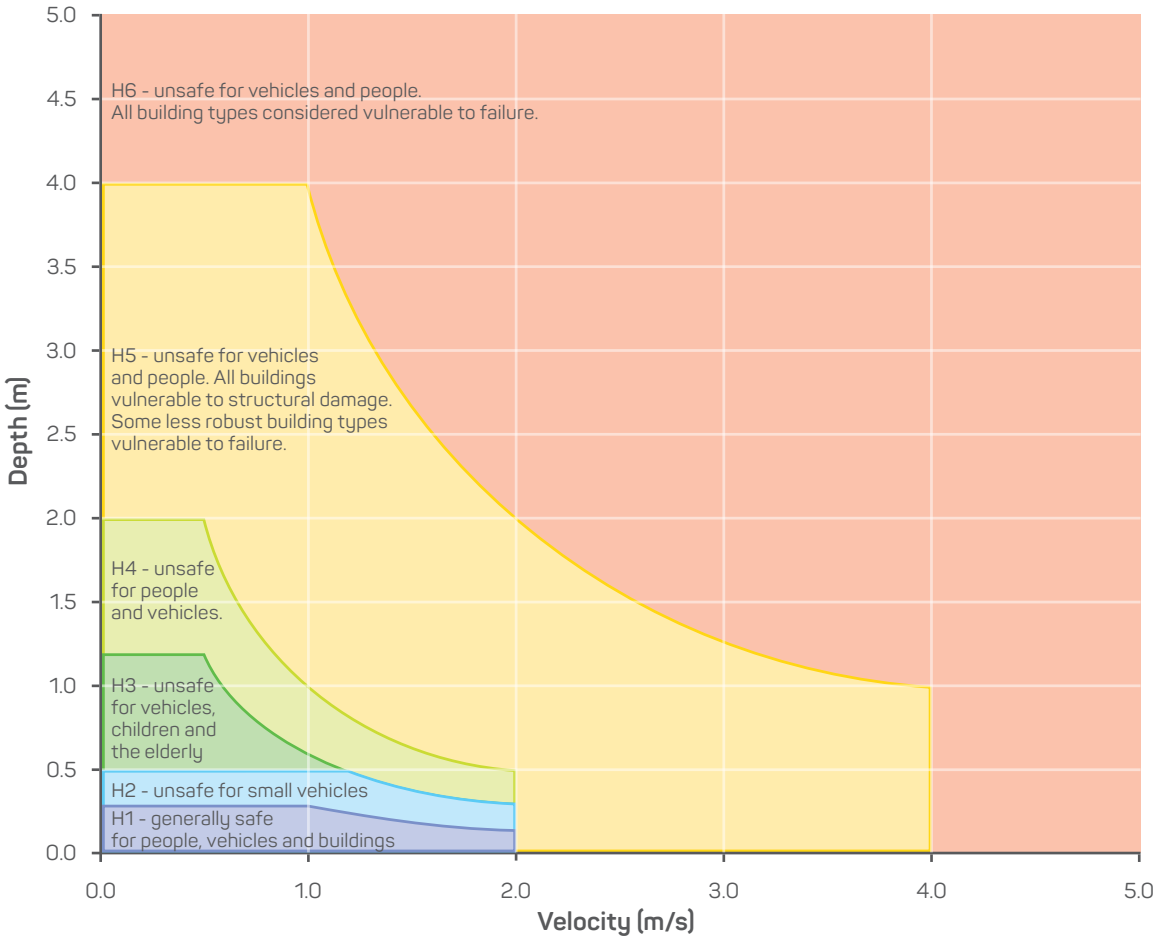


Figure 6: General flood hazard vulnerability curves

The combined flood hazard curves presented in Figure 6 set hazard thresholds that relate to the vulnerability of the community when interacting with floodwaters. The combined curves are divided into hazard classifications that relate to specific vulnerability thresholds as described in Table 1. Table 2 provides the limits for the classifications provided in Table 1.

A flood hazard map classified against these general vulnerability thresholds based on the flood behaviour derived using flow modelling for the example floodplain presented in Figure 3 is shown in Figure 7. Additional examples are provided in the appendix.

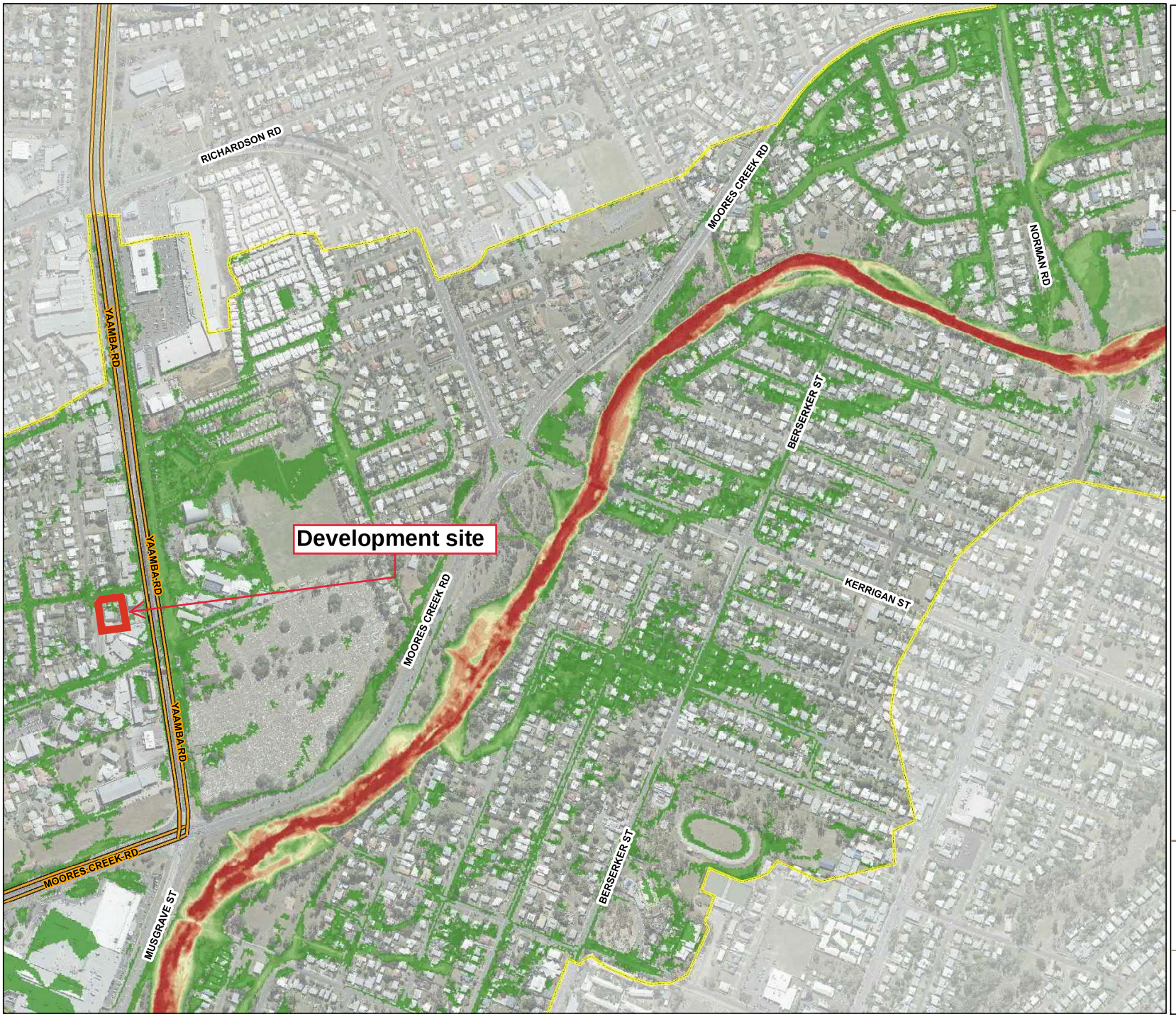
Table 1: Combined hazard curves – vulnerability thresholds

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 2: Combined hazard curves – vulnerability thresholds classification limits

Hazard Vulnerability Classification	Classification limit (D and V in combination) m^2/s	Limiting still water depth (D) m	Limiting velocity (V) m/s
H1	$D^*V \leq 0.3$	0.3	2.0
H2	$D^*V \leq 0.6$	0.5	2.0
H3	$D^*V \leq 0.6$	1.2	2.0
H4	$D^*V \leq 1.0$	2.0	2.0
H5	$D^*V \leq 4.0$	4.0	4.0
H6	$D^*V > 4.0$	-	-

Appendix D – Moores Creek Local Catchment Study 2018 (extract)



N

Rockhampton Regional Council

DATUM GDA 1994, PROJECTION MGA ZONE 56

0 100 200 300 400

Metres

1:6,500
(when printed at A3)

AECOM
www.aecom.com

LEGEND

- Highways
- Railway Lines
- Hydraulic Model Extent

Peak Flood Depth (m)

- < 0.3
- 0.3 - 0.6
- 0.6 - 0.9
- 0.9 - 1.2
- 1.2 - 1.5
- 1.5 - 1.8
- 1.8 - 2.1
- 2.1 - 2.4
- 2.4 - 2.7
- 2.7 - 3
- > 3.0

Flood results are based on local catchment events

Data Sources:
DCDB (c) 2016 QLD Government
Imagery (c) 2016 RRC

Results Filtering:
75mm Min. Depth
100m² Min. Area

Moores Creek Model
Peak Flood Depths - Area 2

1% AEP (across multiple storm durations)

PROJECT ID	60534898
CREATED BY	maultbyj
LAST MODIFIED	28/08/2017
VERSION:	1

Map MC-33

Filename: P:\605x\60534898\4, Tech Work Area\4.99 GIS\3, MXDs\Moores Creek Publishing\Final Mapping Rev2 (E3)\MC-33_1p00AEP_Depth_Area2.mxd

Appendix E – Rockhampton Regional Council Stormwater Infrastructure (extract)

7, 9 & 11 Denning Street - Surrounding Area Stormwater Infrastructure

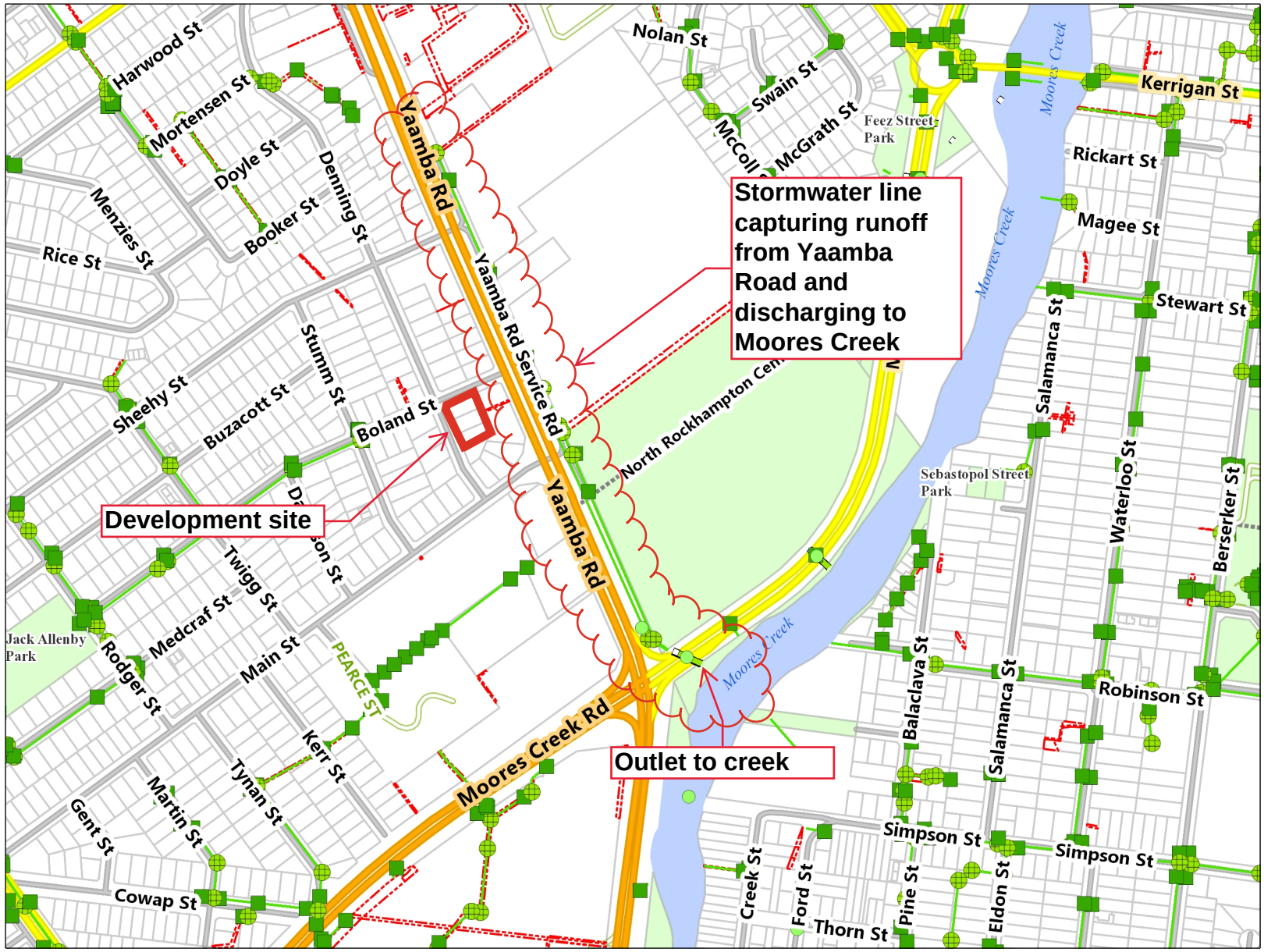
Spatial reference

GDA2020_MGA_Zone_56

N

A4 Page scale at 1: 7,886.25

Date printed 01/08/24



Legend

- Culverts
- Stormwater Junctions
  - Inlets
  - Access Chambers
- Stormwater Pipes
  - Open Channel
  - Mains
  - Culvert Pipes
  - Inter-allotment
  - Other
- Easements
- Property Parcels
- Council Boundary
- Roads2
  - Main roads
  - Major council roads
  - Standard council roads
  - Access roads
  - Private roads
- Reserves and Forests
  - National Park
  - Reserves
  - State Forest
- Rivers
- DCDB Water Areas

GDA 2020

Rockhampton Regional Council