NORTHERN CONSULTING engineers

CIVIL & STRUCTURAL ENGINEERS

SITE BASED STORMWATER MANAGEMENT PLAN

PROPOSED NEW OFFICE BUILDING

FOR
ORANGE HEALTH CARE

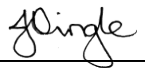
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Phone: 07 4725 5550
Fax: 07 4725 5850
Email: mail@nceng.com.au
50 Punari Street Currajong Qld 4812
Milton Messer & Associates Pty Ltd
ACN 100 817 356 ABN 34 100 817 356

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1.0 INTRODUCTION

1.1 Background

Northern Consulting Engineers (NCE) have been commissioned by NQCC on behalf of Orange Health Care to complete a site-based stormwater management plan (SBSMP) for a proposed development at 719 Ross River Road, Kirwan.

The proposed development comprises a new office building and associated car parking while retaining the existing structures and infrastructure, as shown on the proposal drawings prepared by NQCC.

This report has been prepared to support the development application. The purpose of the report is to demonstrate how stormwater associated with the proposed development can be appropriately managed by addressing:

- Identification of the lawful point of discharge (LPOD);
- Existing and proposed site catchments and overland flow paths;
- Identification of a conceptual stormwater system to collect site runoff and convey it to the LPOD;
- Assessment of pre-development and post-development peak discharges for events up to and including the 1% AEP event;
- Determination of the preliminary stormwater mitigation and detention-storage requirements;
- Demonstration that the proposed development will not result in an adverse stormwater impact on existing infrastructure or adjoining properties;
- Flooding constraints; and
- The extent of any excavation and/or filling required to achieve the applicable flood-immunity requirements.

The assessment and findings of this report are based on the following documentation:

- Proposed Layout Plan provided in **Appendix A**.
- Townsville Flood Depth – 100 Year, provided in **Appendix B**.

1.2 Existing Conditions

The subject site is currently zoned Medium Density Residential under the Townsville City Plan. The adjoining land to the north and east is also predominantly zoned Medium Density Residential. Land across Ross River Road includes land zoned Sport and Recreation, Open Space and Community Facilities, while land west of Thuringowa Drive is zoned Principal Centre (CBD), as shown in **Figure 1-1**.

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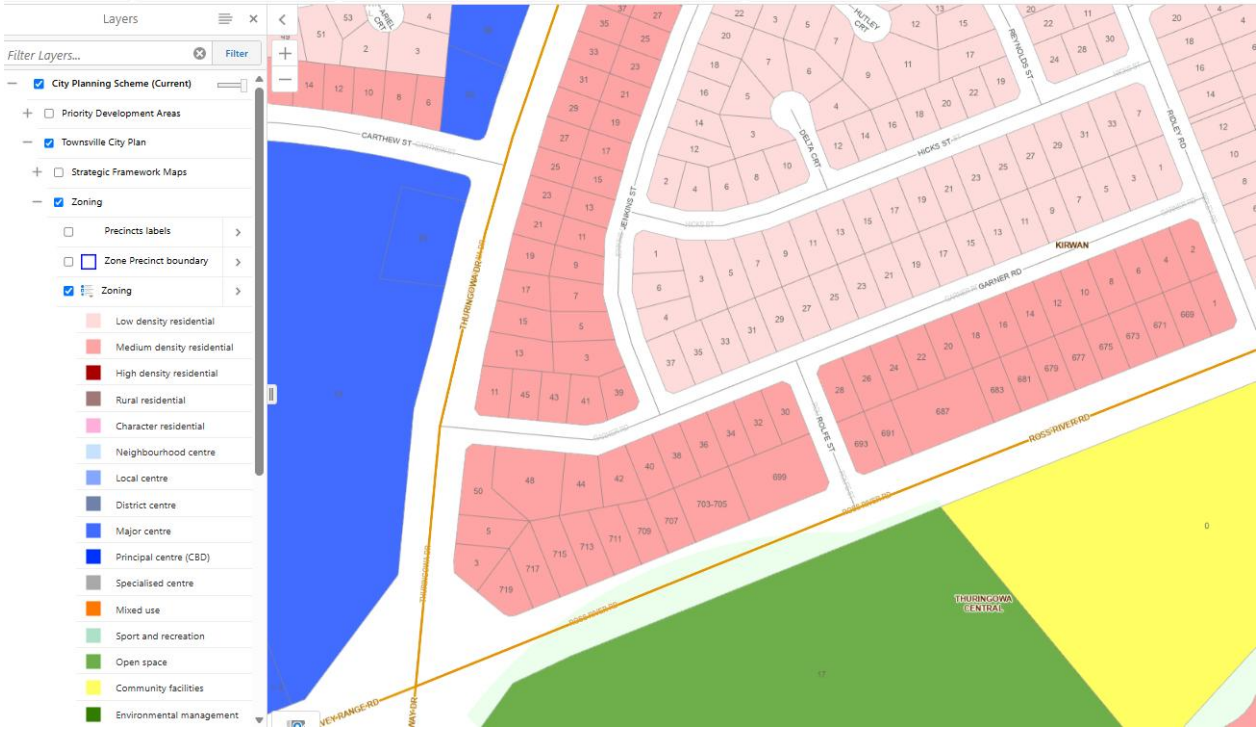


Figure 1-1 Townsville City Council - Interactive Mapping

The subject site is partially developed and comprises existing buildings, sealed car parking areas and a grassed area in the northern portion of the site. Available aerial imagery and contour information were reviewed to assess the existing site conditions. The site is relatively flat, with elevations generally ranging between approximately RL15.75m and RL16.00m. The site generally falls towards the south-western corner, and no external catchment was deemed to contribute stormwater runoff to the site. The complete site has been identified as a single hydrologic catchment. Runoff generally travels from the northern grassed area, across the existing car park, and discharges at the existing LPOD located between the Thuringowa Drive and Ross River Road reserves, as illustrated in **Figure 1-2**.



Figure 1-2 Existing conditions – hydrologic catchments and flow paths

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1.3 Proposed Development

The proposed development comprises a new office building and associated car parking while retaining the existing structures and infrastructure. The complete site has been identified as a single post-development catchment. Proposed site grading will direct runoff towards the southern boundary, where it will be conveyed via a proposed landscaped swale to the proposed LPOD at the identified low point along the Ross River Road frontage. The proposed development catchment is illustrated in **Figure 1-3**. A conservative approach has been adopted which assesses the majority of the site as impervious, shown as red in **Figure 1-3**.



Figure 1-3 Proposed Development conditions –hydrologic catchment and flow LPOD

Stormwater mitigation measures will be considered so that peak post-development flows generally do not exceed the allowable pre-development peak flows. Runoff mitigation is discussed further in **Section 2.0**. Flooding considerations are discussed in **Section 3.0**.

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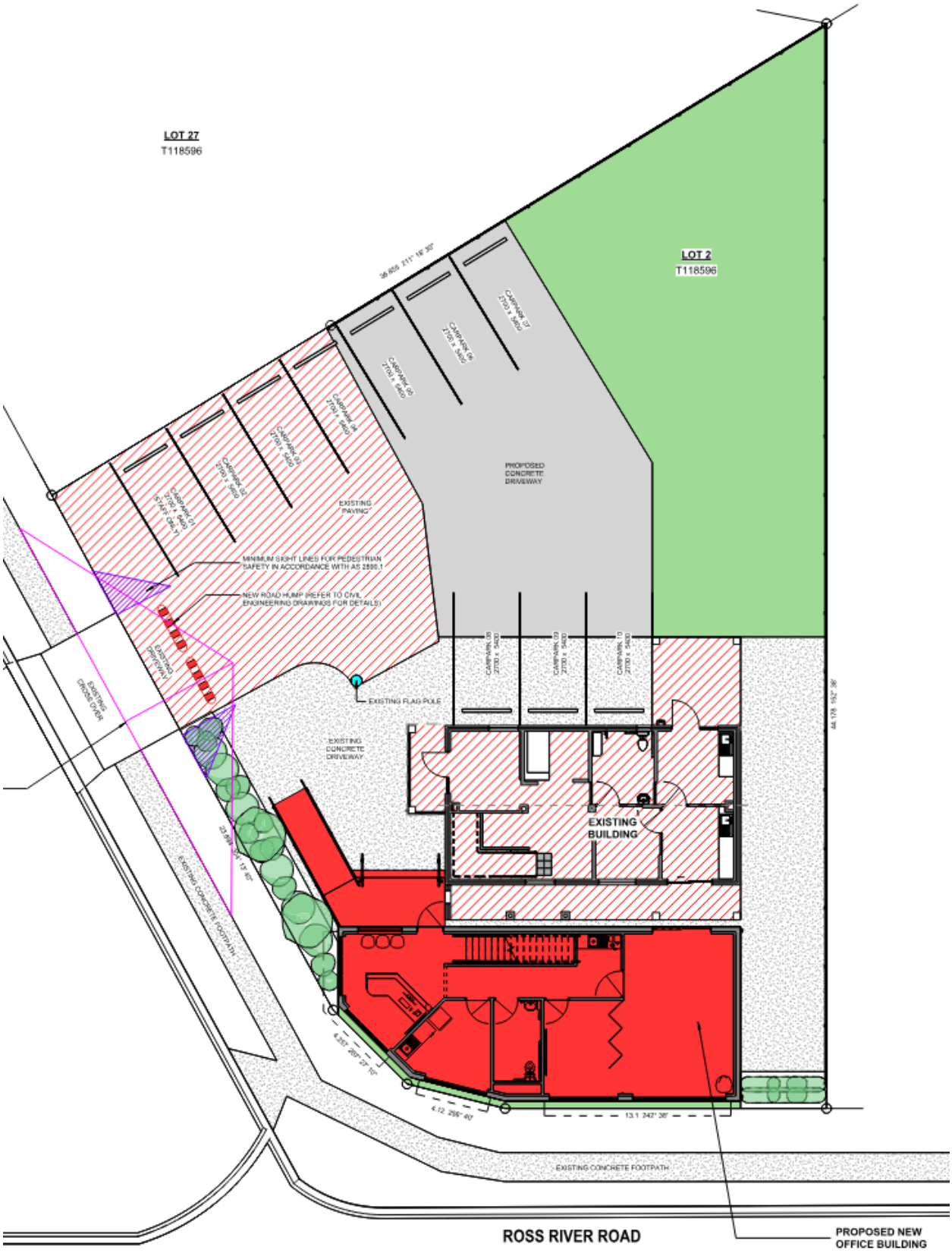


Figure 1-4 Extract of proposed development layout

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2.0 STORMWATER MANAGEMENT

In accordance with the Queensland Urban Drainage Manual (QUDM) test for determining the lawful point of discharge (LPOD), the indicative existing and proposed LPODs have been identified as:

- Existing LPOD –Thuringowa Drive and Ross River Road reserves.
- Proposed LPOD – Thuringowa Drive and Ross River Road reserves

It is proposed to direct site runoff for the development to the existing LPOD, consistent with the proposed site grading. The development will be designed such that stormwater discharge will not materially worsen the flow characteristics entering the proposed LPOD.

2.1 Quantity

The site is currently partially developed, comprising existing buildings, sealed car parking areas and grassed areas. The existing and proposed impervious areas were calculated from areas aerial imagery and proposal plans. The existing site comprises approximately 519m² of impervious area, equivalent to 57% of the 916m² site. The proposed development will increase the impervious area to approximately 865m², equivalent to 94%. **Figure 1-4**illustrates the proposed development.

As discussed above, the proposed development will direct site runoff towards the existing LPOD at the identified low point along the Ross River Road frontage. Consequently, a stormwater mitigation assessment is required to demonstrate non-worsening of discharge flows. The Rational Method has been adopted to calculate the pre-development and post-development runoff for events up to the 1% AEP event in accordance with QUDM. The existing time of concentration was calculated by applying Friend's equation separately to the grassed and paved portions of the principal flow path, using Horton's roughness coefficients of 0.04 and 0.015, respectively.

2.1.1 Rational Method - Ross River Road LPOD

For the pre-development scenario, single catchment comprises the complete 916 m² site, with a calculated impervious area of approximately 519m², resulting in 57% imperviousness as shown in **Figure 1-2**. The travel times across the grassed and paved portions of the principal flow path were calculated as 16 minutes and 4 minutes, respectively. The combined time of concentration of 20 minutes was adopted.
The post-development scenario, also comprises the complete 916m² site, with a calculated impervious area of approximately 865m², resulting in 94% imperviousness. A conservative time of concentration of 5 minutes was adopted. IFD information was obtained from the Bureau of Meteorology (BOM). Summaries of the pre-development and post-development calculation parameters are provided in **Table 2-1** and **Table 2-2**, respectively.

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Table 2-1 - Pre-Development Rational Method Calculations

PRE-DEVELOPMENT							
Catchment Details							
Area (m2)	Area (ha)	Impervious Area (%)	C10	tc (min)			
916	0.092	57%	0.80	20			
C1	C2	C5	C10	C20	C50	C100	
0.64	0.68	0.76	0.80	0.84	0.92	0.96	
I1	I2	I5	I10	I20	I50	I100	
70	89	111	125	143	164	180	**mm/h**
Q1	Q2	Q5	Q10	Q20	Q50	Q100	
0.011	0.015	0.022	0.026	0.031	0.039	0.044	**m3/s**

Table 2-2 - Post-Development Rational Method Calculations

Catchment Details							
Area (m2)	Area (ha)	Impervious Area (%)	C10	tc (min)			
916	0.092	94%	0.89	5			
C1	C2	C5	C10	C20	C50	C100	
0.71	0.76	0.84	0.89	0.93	1.00	1.00	
I1	I2	I5	I10	I20	I50	I100	
112	141	179	202	231	267	294	**mm/h**
Q1	Q2	Q5	Q10	Q20	Q50	Q100	
0.020	0.027	0.038	0.046	0.055	0.068	0.075	**m3/s**

The calculated post-development runoff is higher than the pre-development runoff for all assessed rainfall events. For the 1% AEP (Q100) event, the peak discharge increases from approximately 0.044m³/s to 0.075m³/s. Stormwater mitigation measures are therefore required.

Individual triangular hydrographs were developed for the pre-development and post-development scenarios to assess the change in peak runoff and associated mitigation requirements, as illustrated in **Figure 2-1**

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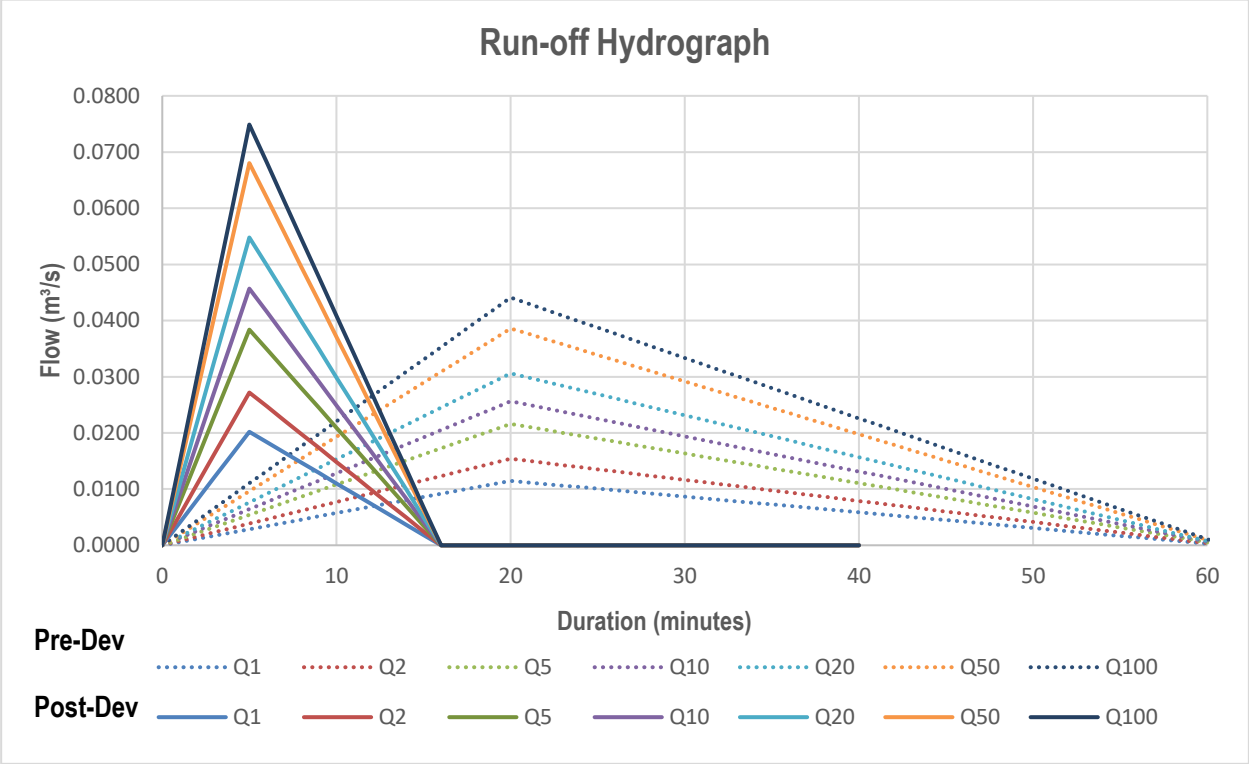


Figure 2-1 Run-off Hydrograph - events from Q1 to Q100

The stormwater detention volume required to mitigate post-development runoff was determined using the Mass Flow Equation outlined in QUDM Section 5.6.2. A supplementary check was undertaken using the existing impervious portion of the site with a 5-minute time of concentration to determine whether its shorter response time would govern. This assessment produced a lower detention requirement; therefore, the complete site assessment was adopted as the governing case. The results are illustrated in **Figure 2-2** and summarised in **Table 2-3**

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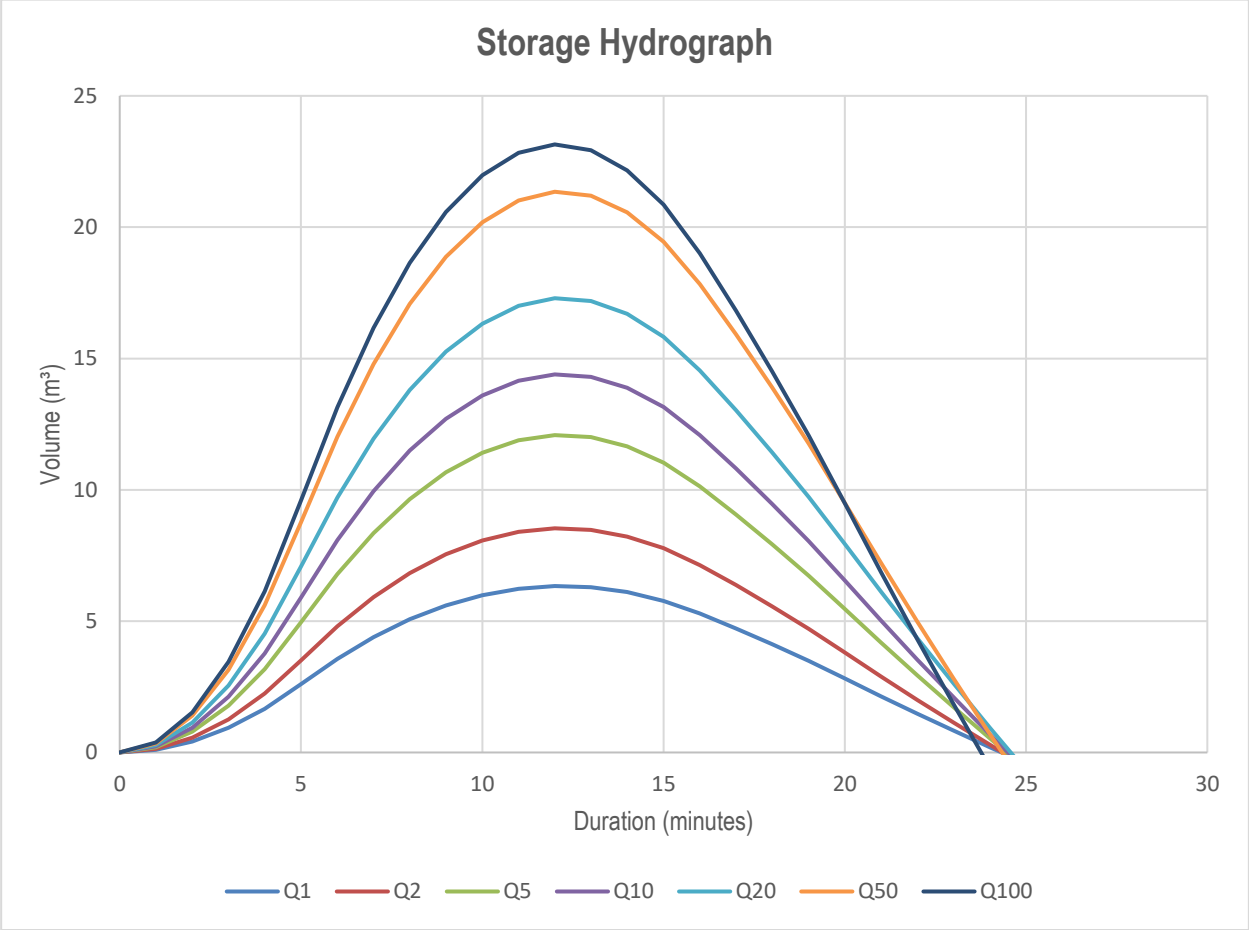


Figure 2-2 Storage Hydrograph

Table 2-3 - Detention Volume

Event	Detention Volume (m³)
Q1	6
Q2	9
Q5	12
Q10	14
Q20	17
Q50	21
Q100	23

The required preliminary detention volume is calculated as 23m³. It is proposed that this volume be provided via the following:

- The proposed open drainage and detention system will provide a minimum effective detention storage volume of approximately 24m³, with the outlet designed to ensure that peak outflow does not exceed the corresponding pre-development peak flows presented in **Table 2-1**.
- Outlet is proposed via a pipe/conduit connected to the existing kerb and channel to ensure the swale and detention system is free draining.

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The proposed open drainage system will collect and convey site runoff while also providing the required detention storage. The system will temporarily store runoff before controlled discharge to the proposed LPOD along the Ross River Road frontage. Its final dimensions, storage configuration and outlet arrangement will be confirmed during detailed design. The indicative stormwater drainage arrangement is shown conceptually in **Appendix A**.

2.2 Quality

In accordance with SC6.4.3.8.3 (6) of the City Plan and Section: State Interest – Water Quality of the State Planning Policy April 2016 (SPP), the development is classified as "low risk" and therefore does not require a formal application / assessment regarding stormwater quality. This "low risk" is defined by the following:

- a material change of use for an urban purpose that involves premises 2500 metres2 or greater in size and;
    - will result in six or more dwellings; or
    - will result in an impervious
    - area greater than 25 per cent of the net developable area.
- Operational works will be undertaken on less than 2,500m^2 of land.

Subsequently environment values (EVs) and water quality objectives (WQOs) have not been identified for receiving waters; however, best practical options will be applied.

3.0 FLOODING

The subject site was assessed against Townsville City Council's Flood Information Portal 1% AEP flood-depth mapping, as shown in **Figure 3-1**.

The mapping indicates that the majority of the subject site, including the proposed development area, is outside the mapped 1% AEP flood extent. Shallow flooding is mapped primarily within the adjoining Thuringowa Drive and Ross River Road road reserves.

A small, isolated area of shallow flooding, with a mapped depth of less than 0.16 m, is shown near the middle of the site. This area overlaps the existing developed portion of the site and is disconnected from the broader mapped flood extent. Based on its isolated nature and the absence of a continuous flood flow path through the site, it is considered likely to represent a localised mapping anomaly rather than a material flood constraint.

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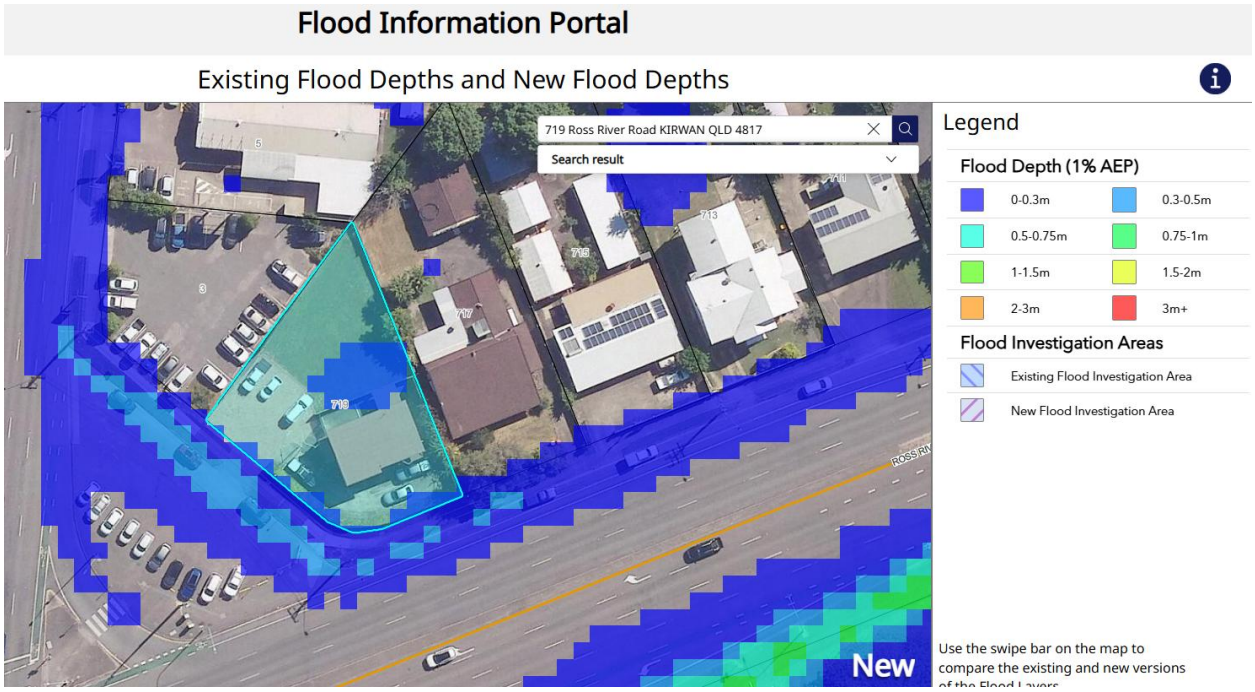


Figure 3-1 Townsville City Council Flood Information Portal – 1% AEP Flood Depth

Based on the available Council mapping and the proposed development layout, the development is not expected to obstruct a mapped flood flow path or materially reduce available flood storage. Detailed site grading should maintain drainage towards the proposed lawful point of discharge and avoid redirecting runoff towards adjoining properties.

The defined flood level (DFL) for the site is defined as 16.1m AHD; therefore, habitable floors are to be 300mm above the DFL while non-habitable floors are to be at or above the DFL. The final floor level will be subject to consultation with the end user and their desired freeboard requirement.

ownsville City Council Flood Information Portal – 1% AEP Flood Depth

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4.0 CONCLUSION

Northern Consulting Engineers (NCE) has completed a Site-Based Stormwater Management Plan for the proposed office development at 719 Ross River Road, Kirwan. The assessment confirms that the development can be achieved while appropriately managing stormwater quantity and flood risk.

Key findings include:

- Lawful Point of Discharge: Site runoff will be directed towards the proposed LPOD at the identified low point along the Ross River Road frontage.
- Stormwater Quantity: Approximately 24 m³ of effective detention storage is required to ensure that post-development peak discharge does not exceed the corresponding pre-development peak flows.
- Flooding: Council's 1% AEP flood mapping indicates that the proposed development area is not materially affected by flooding. The isolated shallow area shown within the site is considered likely to be a local mapping anomaly.

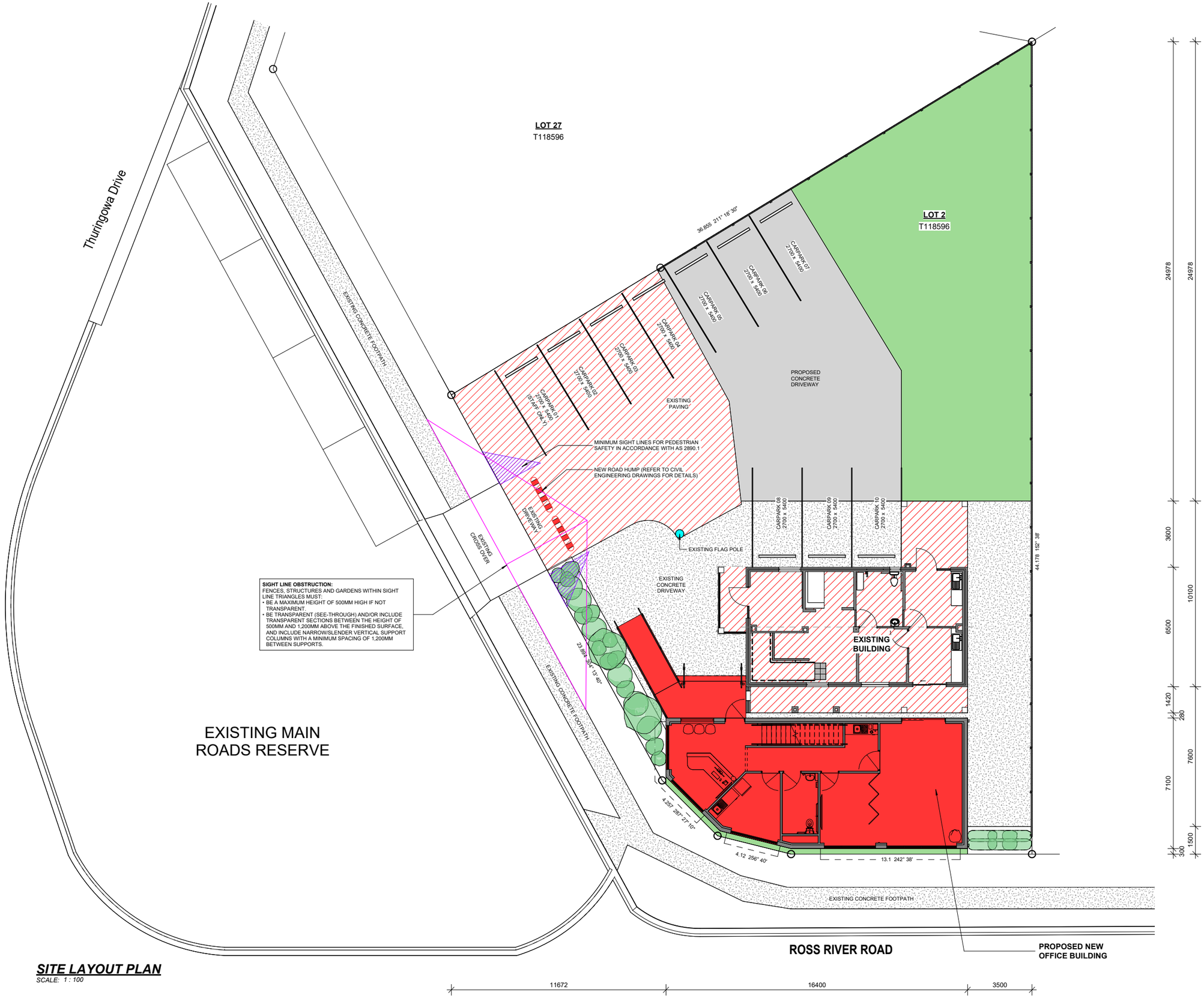
In summary, the proposed stormwater management strategy is considered suitable to support the proposed development, subject to confirmation and refinement during detailed design.

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APPENDIX A

Proposed Layout Plan

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SITE LAYOUT PLAN

SCALE: 1 : 100

PROPERTY DESCRIPTION
LOT 2 ON T118596
AREA OF LAND - 916 m²

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

AMENDMENTS

DATE	NO.	DESCRIPTION
18.06.2026	A	FOR CLIENT REVIEW
18.06.2026	B	MEETING ROOM 2 REMOVED, LUNCH ROOM RELOCATED, AND TRAINING ROOM MADE LARGER
08.09.2026	C	BUILDING MOVED TO FRONT OF SITE
16.10.2026	D	SIGHT LINES ADDED

ORANGE HEALTH CARE
Enhancing Life

NTH QLD Construction Consulting Pty Ltd
Unit 1, 9 Civil Road, GARBUTT QLD 4814
P.O. Box 21, AITKENVALE QLD 4814
P | (07) 4828 2339 M | 0429 001 726
E | bswitzer@nqcc.biz
W | https://www.nqconstructionconsulting.com.au/

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BUILDING DESIGN DRAFTING
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CONTRACTOR LICENCE NUMBER - 1117428

VERIFY ALL DIMENSION ON SITE BEFORE COMMENCING ANY BUILDING WORKS.

CLIENT
ORANGE HEALTH CARE
PROJECT
NEW OFFICE BUILDING

LOCATION
719 ROSS RIVER ROAD, KIRWAN QLD 4817

DATE
JANUARY 2026

PROJECT NO	REVISION
26-8351-OHC	D
SCALE: AS SHOWN	DRAWN
CHECKED BY: B. J. SWITZER	SHEET NO: 15 - A1

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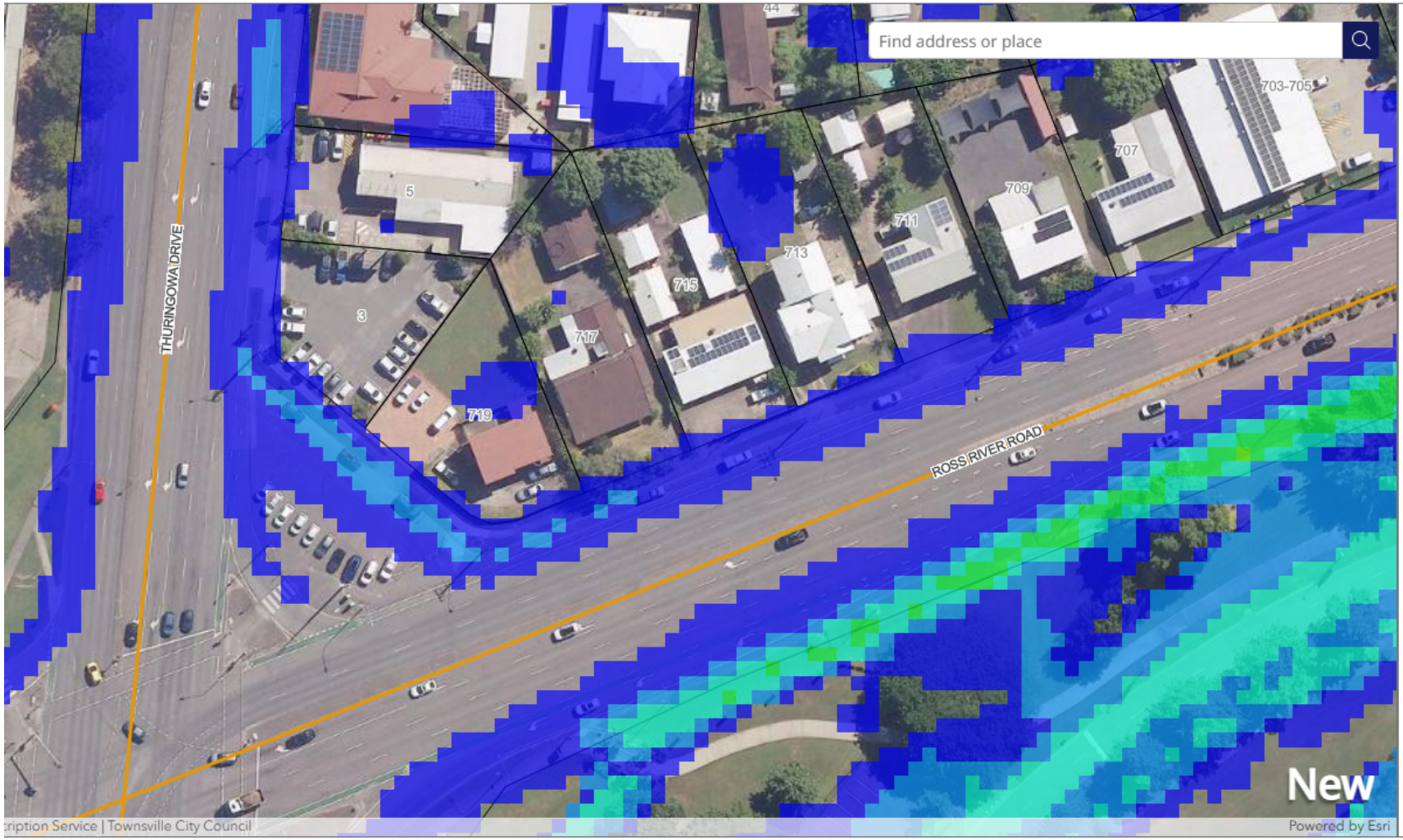
APPENDIX B

Townsville City Council Depth Mapping

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Flood Information Portal

Existing Flood Depths and New Flood Depths



Legend

Flood Depth (1% AEP)

- 0-0.3m
- 0.3-0.5m
- 0.5-0.75m
- 0.75-1m
- 1-1.5m
- 1.5-2m
- 2-3m
- 3m+

Flood Investigation Areas

- Existing Flood Investigation Area
- New Flood Investigation Area

Use the swipe bar on the map to compare the existing and new versions of the Flood Layers

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