Civil Engineering Design Report

Kingscliff Site
Kingscliff, NSW, 2487
Lot 11: DP1269398

Revision B

NSW RAIR PROGRAM

Project Reference #12537-01

JULY 2022

Prepared For:

Health-Infrastructure
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1 Introduction

This report is intended to provide civil engineering design information to Rural Ambulance Infrastructure Program (RAIR II) R25 Kingscliff Site stakeholders.

Civil works will include the construction of proposed buildings and ambulance access driveways to allow access from Turnock Street and Hospital link road into the proposed establishment.

The strategic plan for the management of stormwater drainage is to generally maintain the existing catchment runoff volume and stormwater quality by providing stormwater control devices. On-site detention is proposed, as impervious surface areas is increased.

It is the design intent that all existing overland flow rates and discharge points are preserved.

2 Site Description

The site is situated along of Turnock Street with existing basin and temporary carpark is being observed on the northeast and series of trees in an open area are at the northern and southern side of the site.

The existing site comprised of landscaped areas, pile of rocks and temporary car park. The site is steep and is sloping 10.5% from south to north of the site.

2.1 Existing Services

A site survey has been conducted by B & P Surveys Consulting Surveyors in January 2022 that that shows no existing services were found within the site boundary.

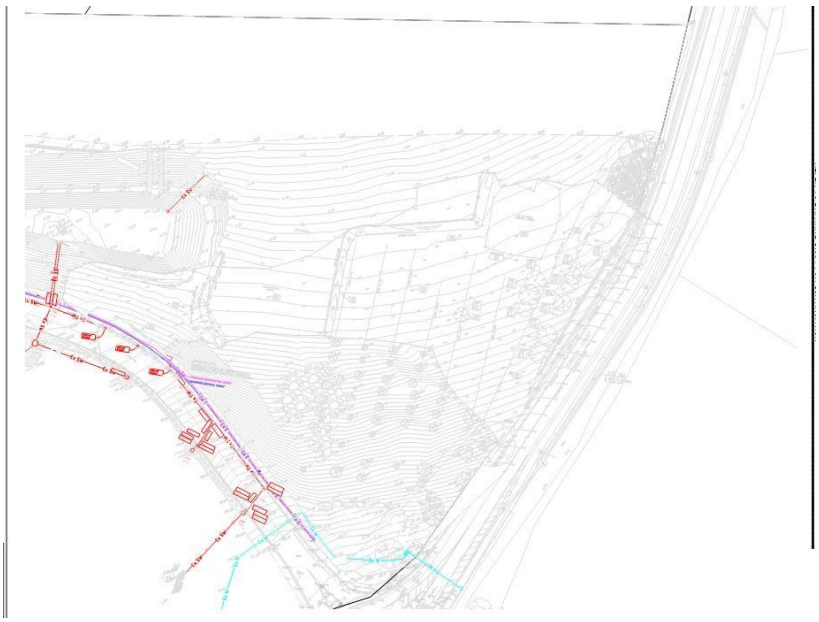

Figure 2-1: Existing Site Survey

2.2 Existing Flooding Conditions

Flood Assessment Summary:

Tweed Shire Council Property Flood Report indicates that the site is outside the flood risk area.

The property flood report and map obtained from Council below provides Planning and Flooding levels for the site location.

The report flood map shows that site location is not a flood prone area.

Planning Levels

Planning Level	Level (m AHD)
Design Flood Level	3.2
Minimum Habitable Floor Level (Flood Planning Level)	3.7
Climate Change Design Flood Level*	3.5
Climate Change Habitable Floor Level*	4.0
High Flow Area	No
High Hazard Area	No

* Climate Change Levels are compulsory in new urban land release subdivision areas

Flooding Levels

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
20% AEP	1.5	1.5
5% AEP	2.3	2.3
1% AEP	3.2	3.2
Climate Change 2100 1% AEP	3.5	3.5
0.2% AEP	4.7	4.7
Probable Maximum Flood (PMF)	8.0	8.0

Figure 2-2: Planning and Flood Levels, Tweed Shire Council Property Flood Report, August 2020

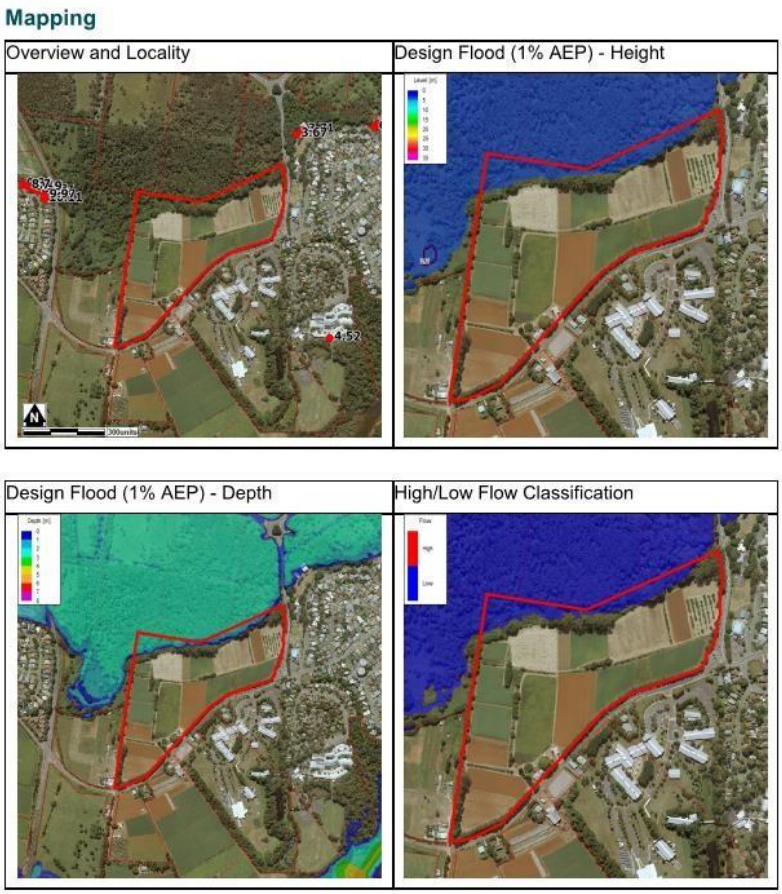

Figure 2-3: Mapping, Tweed Shire Council Property Flood Report, August 2020

3 Proposed Development

The proposed development consists of the construction of new building, carparks, driveways and associated site infrastructure. The development is shown in Figure 3-1 below.

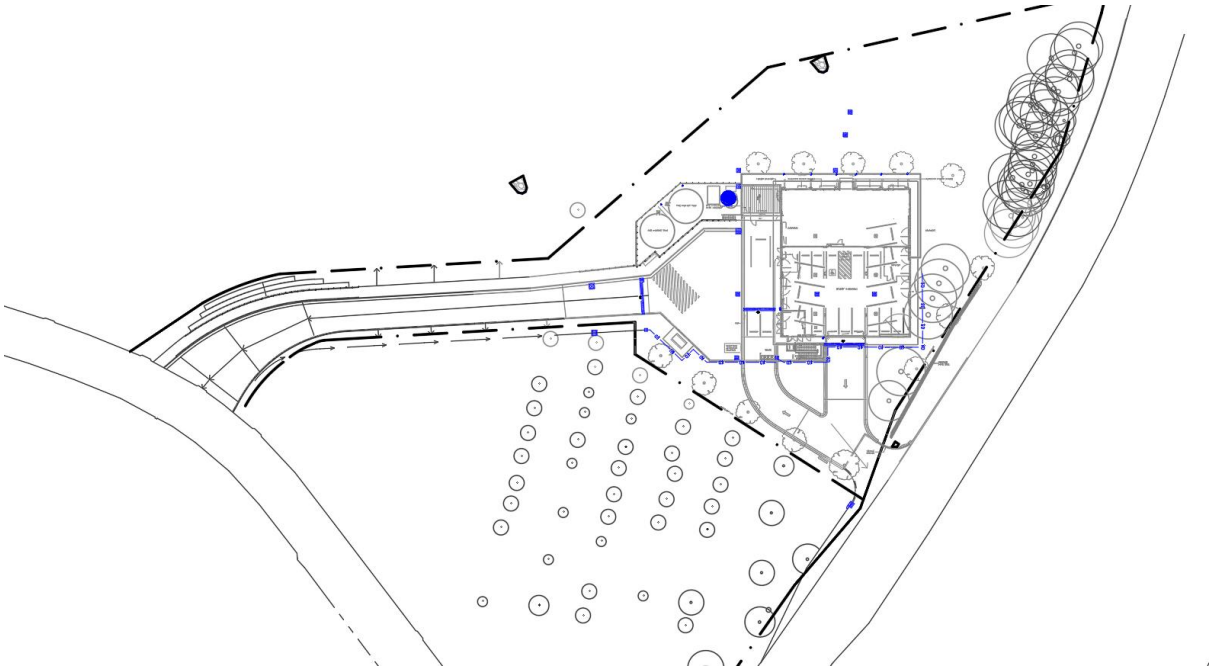

Figure 3-1: Proposed Development

3.1 Earthworks

The earthwork quantities associated with the proposed development are provided in the figures below:

- Cut – 458 m3
- Fill – 4410 m3

Majority of the earthworks involve fill and will require import of approximately 3952 m3 of fill material.

3.2 Stormwater Drainage Strategy

In accordance with Tweed Shire Council (TSC), the design of stormwater drainage systems shall be carried out in accordance with the 2001 Release of Australian Rainfall and Runoff 1987, Australian Standard AS3500.0 – Stormwater Drainage, Australian Rainfall and Runoff 2016 (ARR 2016), and the requirements of TSC Development Design Specification D5 Stormwater V1.4.

An on-site detention (OSD) system is required for any developments with additional impervious surface area to ensure there is no adverse impact from increased stormwater runoff on downstream properties as a result of new developments or redevelopments during all storm events up to and including the 100-year Annual Recurrence Interval (ARI) event. The OSD storages are to be designed to ensure that stormwater targets, as indicated in TSC Development Design Specification D5.16 and NSW Ambulance, Rural Ambulance Station Facilities ESD Design (RASFED) Guideline, Credit 26: Stormwater – Peak Discharge, are achieved.

The existing site is 19% impervious. This will increase to approximately 53% impervious based on the proposed concept design details. A bioretention basin will be required to limit the post-development flows to the pre-development conditions as outlined in TSC Development Design Specification and NSW Ambulance, RASFED Guideline.

The preliminary analysis undertaken using DRAINS computer software indicates a volume of approximately 68m3 of detention storage is required. Please refer Figure 3-3 for the preliminary DRAINS layout and estimated stormwater flows for the site.

Basin is proposed to have an outlet pipe and also allow for infiltration into silty clay subgrade at the rate of 3.3mm/hr based on geotechnical report borehole #2. In large rainfall event, basin could be filled up to embankment level and water will overflow as sheet flow like current condition.

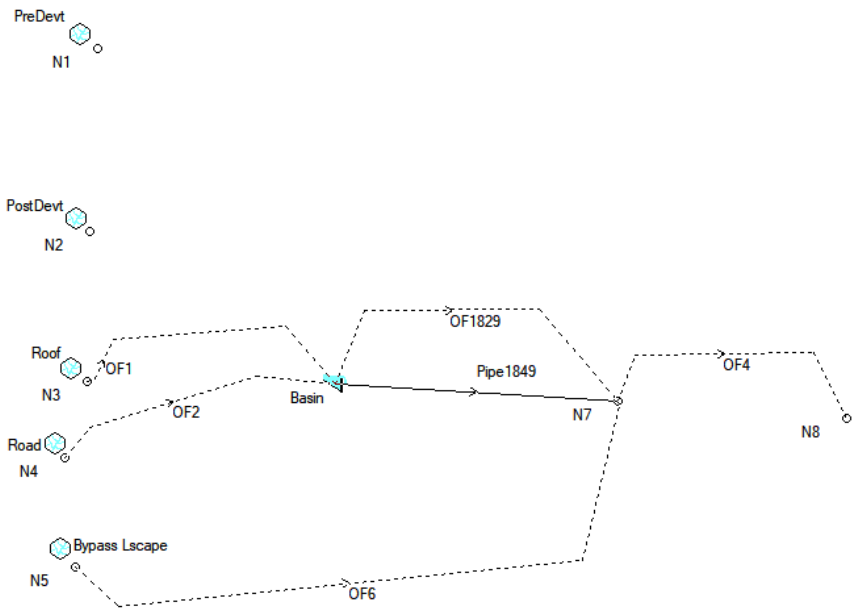

Figure 3-2: Preliminary DRAINS Layout

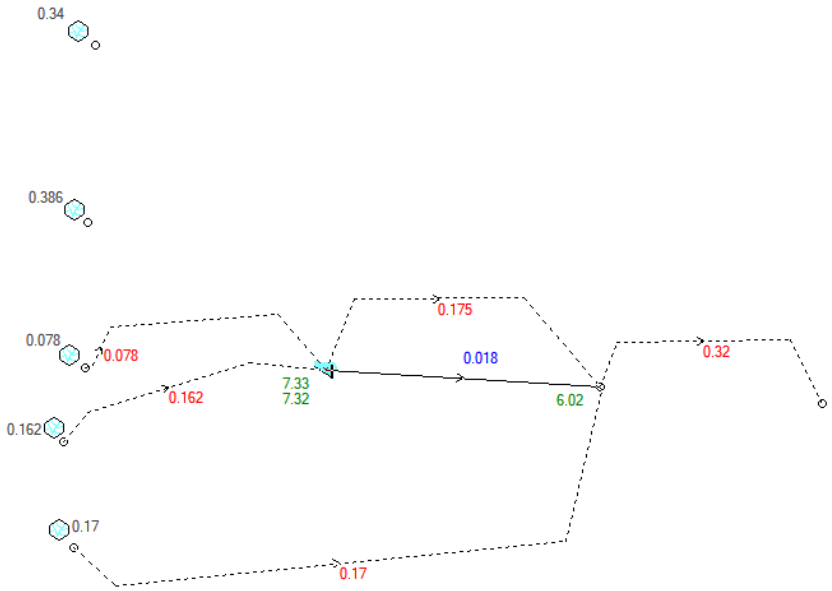

Figure 3-3: DRAINS Result for Q100

The estimated pre-development stormwater flow rate is 0.340m3/s = 340L/s, and the unmitigated post-development is 386L/s for the 1 in 100 years ARI rainfall event (Q100), as shown above. With on-site detention, the post-development stormwater flow rates are smaller than the pre-development flow rates, also, for other rainfall events.

A major system is also required for the proposed development in the form of overland flow paths. The major system should be designed to convey flows surcharged from the underground drainage system for storm events up to 100-year ARI. The overland flow is to be directed away from the buildings and carparks and towards north where forest is located.

3.3 Stormwater Quality Management Strategy

To protect the existing ecology, the development will be required to satisfy the water quality requirements over the full range of rainfall events to maintain the long-term protection of the pre-determined Environmental Values. The Council's Design Development Specification D7 – Stormwater Quality, demonstrate that the development will achieve the post development pollutant load standards indicated in Figure 3-4 below.

Treatments were determined in accordance with which is more conservative between TSC Table D7, Water Quality Objectives, D7 Stormwater Quality (Figure 3-4) and NSW Ambulance Water Quality Set B Targets (Figure 3-5).

Table D7.07-WQO - Tweed Shire Council Water Quality Objectives

Pollutant	Minimum reductions in mean annual load from unmitigated development (%)
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	90%

Figure 3-4: TSC Water Quality Objectives, D7 Stormwater Quality V1.4

Table 11 Pollution Reduction Targets from Green Star Design & As Built v1.3 Submission Guidelines

POLLUTANT	REDUCTION TARGET (% OF THE TYPICAL URBAN ANNUAL LOAD)		
	A	B	C
Total Suspended Solids (TSS)[1]	80%	80%	90%
Gross Pollutants	85%	90%	95%
Total Nitrogen (TN)[2]	30%	45%	60%
Total Phosphorus (TP)[2]	30%	60%	70%
Total Petroleum Hydrocarbons[3]	60%	90%	90%
Free Oils[3]	90%	90%	98%

Figure 3-5: NSW Ambulance Water Quality Targets (Sept 2021)

A bioretention for water quality treatment is proposed. For the benefit of reducing the demand on water supply, a rainwater harvesting system can be proposed onsite via the provision of a rainwater tank, subject to confirmation by the Project Manager. See Figure 3-6 below for Music Analysis result.

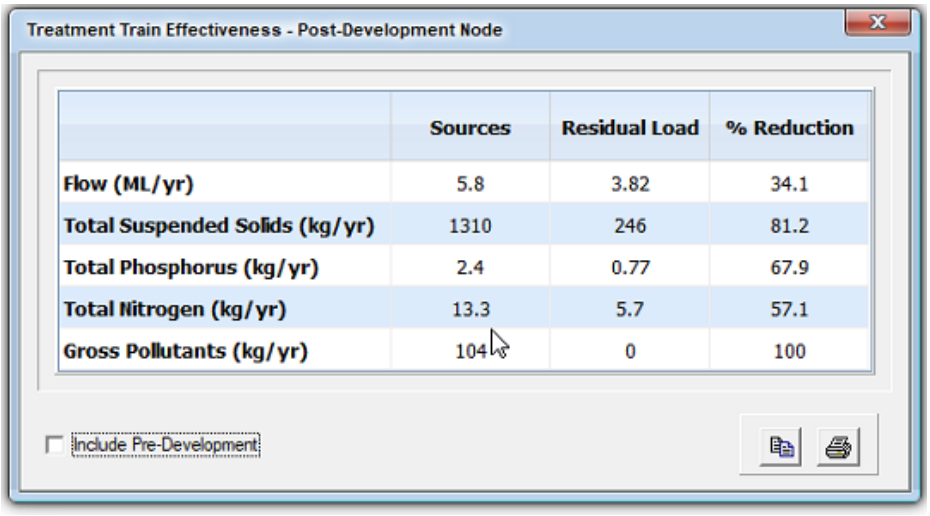

Figure 3-6: MUSIC Analysis Result

4 Erosion & Sediment Control (During Construction)

The erosion and sediment control measures for the site will be implemented during construction. The design of these measures is to be in accordance with the Landcom “Blue Book”. These will include:

- *A sediment fence*
- *Temporary access to site with shaker pad*
- *An indicative stockpile area with sediment fence around it during construction.*
- *Geotextile inlet pit filters or sandbags to be placed around existing stormwater pits.*