

Stormwater Management Plan

Mixed Use Development

78 High Street, BERSERKER QLD 4701

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/25-2018

Dated: 13 May 2019



Report Title:	Stormwater Assessment Report, Mixed Use Development, 78 High Street BERSERKER QLD 4701
Client:	LYNP projects and constructions

Report Number: 201801smpA

Revision	Issue Date	Author	Reviewer
А	2 March 2019	RF	SK

For and on behalf of **Samana Blue Engineering Pty Ltd**

SK

Stefan Koebsch Director

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1. INTRODUCTION

1.1. Background

Samana Blue Engineering Pty Ltd have been engaged by Nicolle, Arum & Marguerite Sarafian to provide a suitable stormwater engineered outcome for submission to the Rockhampton Regional Council (RRC) for a proposed mixed-use development located at 78 High Street, Berserker QLD 4701.

1.2. Property Details

The proposed subdivision is located at 78 High Street, Berserker QLD 4701 within the RRC area. The existing land parcel to be developed is currently under review as an MCU application by RRC (D/25-2018). The existing proposed land area and titles are given in Table 1 below.

Title	Lot 8 RP604534
Street Address	78 High Street, Berserker QLD 4701
Total Site Area	1,012m ²
Zoning	Low-Medium Residential

The site location is shown in Figure 1.



Figure 1 - Locality Map (Accessed 08/02/2019 from RRC Infrastructure Maps)



1.3. Existing Site Features

The subject site is currently used for residential purposes and has an existing dwelling and carport. High Street acts as the site frontage to the north, with two crossovers currently servicing the site. The property's east, south and west boundaries are all adjoining residential lots (refer Section 1.4).

The property currently drains away from High Street towards the southwest (SW) corner at an approximate grade of 4%, where it is expected to discharge in a semi-concentrated form. An existing bank in the southeastern (SE) corner directs and concentrates flows towards the SW corner. Likewise, existing fencing and vegetation along the south and eastern boundaries are expected to divert flows to the SW corner.

The site does not have any significant external catchment areas that contribute to its discharge. High St road reserve to the north is expected to facilitate for storm events up to and including the 1% AEP per standard engineering practice and will not discharge flows to the site. The adjoining property to the east has an insignificant catchment area with only a small portion between its dwelling and the boundary flowing towards the site, a portion of which is diverted by the existing bank in the SE where it adjoins. For further information, refer to the civil engineering plans provided in Appendix A.

1.4. Surrounding Land Use

The subject site is surrounded predominately by low-medium density residential housing and low-density residential housing per RRC zoning.



2. PROPOSED DEVELOPMENT

The proposed development is for a mixed-use development, and comprises of:

- Total site area of 1,012m²
- Proposed mixed use building
- Proposed rear carpark and access driveway
- Provision of OSD for a 69.6% increase in total impervious area

For further information, refer to the civil engineering plans provided in Appendix A.

2.1. Stormwater Mitigation

Stormwater runoff within the site will be directed to a proposed detention area, comprising of above ground storage within the carparking area before being discharged to the existing lawful point of discharge. Stormwater flow generated from the new development has been designed to be discharged at flow rates equal to or below predevelopment rates for storm events up to and including the 1% AEP. Further, discharge has been designed to replicate existing conditions as a semi-concentrated form of flow. This is further detailed in Section 3 of this report.

2.2. External Catchments

The site has no external catchments for events below the 1% AEP. The adjoining road reserve (High St) is directly upstream from the site and is expected to contain storms up to and including the 1% AEP.

In accordance with the RRC planning scheme, events up the 1% AEP shall be facilitated by the over-land cross-sectional profile of proposed driveways and landscaping on-site.

Preliminary design indicates that the maximum depths and velocity depths may be maintained on-site within the overland flow paths.

For more information, refer to the civil engineering plans provided in Appendix A.

2.3. Lawful Point of Discharge

Existing conditions show the site discharges lawfully to the southwestern corner, with flows expected to be concentrated towards this location by fencing/vegetation along the sites south and western boundaries and by an existing bank to the SE. Detailed survey and Lidar acquired indicates that discharge flows to a drainage low-point towards the SW, which then continues to drain via a natural gully or swale to Marie St.



The proposed design aims to mitigate flow rates and replicate existing flow conditions (i.e. minor concentration of flows / sheet flow) at the existing point of discharge to ensure no actionable nuisance is caused to the downstream properties. Minor stormwater flows from the adjoining eastern property may be directed around the site via the landscaping strips with no actionable nuisance expected. Per QUDM 2016, no easement is proposed downstream as no change in flow regime is expected.



3. STORMWATER QUANTITY ASSESSMENT

The aim of the stormwater quantity assessment is to ensure that the development proposed shall impose no negative effects (actionable nuisance) on adjacent or downstream properties or to receiving water bodies. Furthermore, this assessment is carried out to ensure that the conveyance of flows will be in a safe manner with minimal risk of human endangerment as well as the following objectives:

- Address the need for stormwater quantity control measures;
- Confirm that there is no increase in peak stormwater discharges from the subject site for events ranging between the 39% Annual Exceedance Probability (AEP) up to 1% AEP;
- Certify that all quantity control measures will detain and convey flows in accordance with QUDM (2016)

3.1. Proposed Development and Associated Issues

This development will result in an increased impervious area on-site. As such, an increase in stormwater runoff will be expected. It is essential that the increased runoff associated with this change is mitigated such that post-developed peak flows shall not be higher than those currently existing.

3.2. Pre-Development Hydrology

Existing conditions and catchments were reviewed for modelling and may be seen in the civil engineering plans provided in Appendix A.

A Watershed Bounded Network Model (WBNM) was used to assess the pre-developed discharge rates in accordance with QUDM (2016). Calculated theoretical peak discharges for storm events ranging from 39% AEP to 1% were derived and may be seen in Table 2.

3.3. Post-Development Hydrology

Accompanying an increase in impervious surface on-site at post development, an increase in peak runoff flows will be evident.

WBNM was used to assess the post-developed discharge rates in accordance with QUDM (2016). Calculated theoretical peak discharges for storm events ranging from 39% AEP to 1% were derived and may be seen in Table 2.

3.4. Stormwater Quantity Modelling

WBNM was used to model both the pre-developed and post-developed site discharge rates using location based IFD data from the Bureau of Meteorology. These general parameters may be seen in Appendix B.

3.4.1. WBNM Parameters

For the pre-developed conditions, a total impervious area of 25.7% was used for calculating the discharge rates. This impervious area was



derived conservatively from aerial photography of the site, as shown in civil engineering plans (Appendix A).

The post-developed conditions were modelled as a singular catchment. Although a small portion of the site (approximately $25m^2$) of pervious landscaping bypasses the OSD area, this was shown to also drain to the OSD area due to the limitations of minimum catchment area size for WBNM. This is considered tolerable as it is a conservative approach and would only serve to increase the OSD storage requirement output by WBNM.

For the post-developed condition, an impervious percentage of 95.3% was nominated, based on the site layout provided (as shown in Appendix A).

Both conditions were modelled for several durations, including 5-, 15and 25-minute durations from the 39% AEP to the 1% AEP. The 5minute duration was found to be the critical duration for each storm, though additional durations were still calculated for comparison.

For further information, WBNM input parameters and non-discussed results are given in Appendix B.

3.4.2. OSD Results

WBNM results showed an evident increase in flow rates for the postdeveloped conditions when no OSD is provided. As such, WBNM was used to size a suitable detention volume that would make these flowrates less than or equal to pre-developed conditions.

To reduce flows to pre-developed conditions, the proposed development will provide 14m³ on-site detention via an above ground storage area within the rear carparking area. Flows will be restricted by a perimeter kerb to act as the high flow discharge weir, and by 12 x 100mm diameter outlets to act as the low flow discharge. The low flow discharge outlets have been designed to be equally spaced and have the same IL to replicate existing flow conditions by spreading the discharge across a greater length. Low flow outlets are expected to provide a semiconcentrated flow similar to existing conditions.



Table 2 below shows the discharge flow rates calculated by WBNM for pre-developed, post-developed and OSD restricted conditions.

AEP Event	39 % 5 Min	39 % 15 Min	10 % 5 Min	10 % 15 Min	5 % 5 Min	5 % 15 Min	2 % 5 Min	2 % 15 Min	1 % 5 Min	1 % 15 Min	1 % 25 Min
Pre-Developed	.023	.032	.041	.05	.05	.059	.063	.067	.073	.077	.076
Post-Developed (Without OSD)	.036	.037	.054	.054	.063	.063	.076	.071	.086	.08	.078
Post-Developed (With OSD)	.024	.03	.036	.044	.042	.052	.051	.06	.057	.067	.068

Table 2 - WBNM Flowrate Results (m³/s)

As seen above, the proposed OSD solution will mitigate discharge flow rates to below or equal to pre-developed conditions for all storm events except the 39% AEP where a 1 L/s increase is expected. The additional 1 L/s for the 39% AEP is considered tolerable as it represents only an increase of 4.3% in the total flowrate.



4. STORMWATER QUALITY ASSESSMENT

This report will not assess nor discuss stormwater quality objectives as the subject site does is not required to provide operational water treatment or stormwater quality treatment devices.

Recommended construction phase water treatment best practice is briefly presented below.

4.1. Construction Phase

There is an increased risk of erosion and sediment movement associated with any area of disturbed land accompanying a projects construction phase. As such, measures should be implemented to mitigate erosion on-site throughout the construction phase. Erosion and Sediment Controls (ESC) shall be designed and further outlined in a construction management plan, or otherwise given by the project's contractor. As a minimum, measures should be adopted throughout the lifecycle of a project as follows:

Pre-construction

• ESC measures are to be implemented prior to any earth disturbing activities take place

Construction

 ESC measures are to be maintained to acceptable standards, as specified by project management and any given drawings

Pre-Operational

- ESC measures may only be removed once approved by project management
- Stabilisation measures should be implemented to disturbed areas to mitigate any further erosion and sediment movement as soon as practicably possible



5. CONCLUSION

As given by section 3, the total detention volume required to match existing runoff conditions up to and including a 1% AEP event is 14m³. The detention volume required may be contained by the above ground storage area located within the carparking to the rear of the site. The suggested preliminary detention location and details may be seen in Appendix A.



6. **REFERENCES**

Ball, J. et al. eds., 2016. *Australian Rainfall and Runoff: A Guide to Flood Estimation.* s.l.:(C) Commonwealth of Australia (Geoscience Australia).

Capricorn Municipal Development Guidelines, 2017. *D5: Stormwater Drainage Design.* No. 4 ed. s.l.:s.n.

Department of Infrastructure, Local Government and Planning, 2017. *State Planning Policy,* Brisbane: Queensland Government.

Institute of Public Works Engineering Australasia, 2016. *Queensland Urban Drainage Manual*, s.l.: the Institute of Public Works Engineering Australasia, Queensland (IPWEAQ).



1

Appendix A – Concept Civil Engineering Plans

Concept Civil Engineering Plans have been prepared for submission and review with the MCU application. See the plans attached in the following pages.

CONCEPT CIVIL DESIGN

PROJECT: **PROPOSED MIXED-USE DEVELOPMENT**

AT: 78 HIGH ST, BERSERKER QLD 4701

Lot(s): 8 RP604534

PROJECT No: 2018018

	DRAWING SCHEDULE					
DRAWING No.	DRAWING TITLE					
C00	LOCALITY MAP & SCHEDULE OF DRAWINGS					
C01	EXISTING SITE LAYOUT					
C02	PROPOSED CARPARK LAYOUT PLAN					
C03	PROPOSED B85 TURNING PLAN					
C04	PROPOSED WCV TURNING & COLLECTION PLAN					
C05	PROPOSED STORMWATER LAYOUT PLAN					
C06	SIGHT DISTANCES PLAN					
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CIVIL ENGINEERING

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DESIGN: RF DRAWN: RF DATE 22/03/2019 DWG SIZE: A1 SCALE: N.T.S. PROJECT MGR: RF

LOCALITY MAP & SCHEDULE OF DRAWINGS

ROCKHAMPTON REGIONAL COUNCIL

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PROPOSED MIXED-USE DEVELOPMENT 78 HIGH ST. BERSERKER QLD 4701

LOCALITY MAP



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PROJECT MGR: RF

A1

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DWG SIZE:

SCALE:

PROPOSED CARPARK LAYOUT PLAN

PROPOSED MIXED-USE DEVELOPMENT 78 HIGH ST, BERSERKER QLD 4701

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PROPOSED B85 TURNING PLAN

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PROPOSED WCV **TURNING & COLLECTION PLAN**









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APPROX. STORAGE VOLUME = 14.5m³

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DESIGN:

DRAWN:

DATE

SCALE:

PROPOSED **STORMWATER** LAYOUT PLAN

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LEGEND:

- EXISTING KERB & CHANNEL
- 17.2 EXISTING CONTOURS (C.I. = 0.1m)
- PROPERTY BOUNDARY
- PROPOSED CONCRETE/PAVEMENT
- PROPOSED PEDESTRIAN ACCESSWAY \Box
- PROPOSED LINEMARKING

- SIGHT DISTANCE NOTES:
- CROSSOVER TO BE LEFT IN LEFT OUT ONLY
- SIGHT LINE DISTANCE BASED ON MINIMUM SSD FOR 60 KM/H SPEEDS PROVIDED BY FIGURE 3.2 . FROM AS2890.1

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SIGHT DISTANCES PLAN

SCALE: PROJECT MGR: RF

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ROOF PLAN

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	I YNP - Projects & Constructions	Title ROOF PLAN			
	,	40 Technology Drive Warana - OLD 4575	Client Nicolle Sarafian, Ara	am Sarafian and Marguerite	Sarafian
		Address 78 HIGH STREET, I	BERSERKER, ROCKHAMP	TON - QLD 47	
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	I YNP - Projects & Constructions	Title NORTH ELEVATION
,	40 Technology Drive, Warana - QLD 4575	Client Nicolle Sarafian, Aram Sarafian and Marguerite Sarafian
LVND		Address 78 HIGH STREET, BERSERKER, ROCKHAMPTON - QLD 4
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EAST ELEVATION

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	Projects & Constructions	Title EAST ELEVATION			Sheet number 0	6
	$\frac{1}{2}$	Client Nicolle Sarafian, Ara	m Sarafian and Marguerite	Sarafian	Project Levon Y	aghdjian
		Address 78 HIGH STREET, E	BERSERKER, ROCKHAMP	TON - QLD 4701	Job number	18.10
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WEST ELEVATION

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40 Technology Drive Warana - OLD 4575	Client Nicolle Sarafian, Aram Sarafian and Marguerite Sarafian		
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