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Prepared for: Smith + Tracey Architects

SPAGS Drouin Campus P-2 and ELC -Stormwater Management Strategy

Author: Tony Spencer Job No: 220065 Reference No: 220065-004-SWMS-APS Revision: B Date: 5 December 2023



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1 Introduction

CREO Consultants (CREO) has been engaged by Smith & Tracey Architects to produce a Stormwater Management Strategy (SWMS) for the proposed school development on the property located at Part Lot 2 McGlone Road, Drouin.

This document will outline the proposed drainage strategy to ensure that 'best practice' guidelines for qualitative and quantitative treatment are met, in accordance with relevant authority requirements.

2 Existing Conditions

2.1 Site Characteristics and Catchments

The proposed redevelopment of the property located at Part Lot 2 McGlone Road, Drouin will involve the construction of a new school over a number of stages. The current land is undeveloped farmland while the proposed development has a site fraction impervious of 10%. Overland flow for larger storm events will be directed around the building via the paved and landscaped areas to along the current flow paths.

The proposed layout can be found in Appendix A.

2.2 Existing Catchment

The existing site at Part Lot 2 McGlone Road, Drouin to be development is approximately 13,970 m2 and is bounded by a proposed residential development on the east and farmland on all other sides.

As indictaed above the exising site is farmland and will be developed as a new school over a number of stages. The site was analysed in its current developed state in order to ascertain the amount of flow that will be generated in its current condition using the AR&R Rational Method. This will set the benchmark in which an increase in flow from the developed scenario will result in a requirement to attenuate back to its pre-developed state. Table 1 below outlines the estimated flows for the 100 year predevlopment flow and the 100 year post development flow for the site.

Table 1 Estimated Peak Flows for the Pre-Developed Site

Paramotor	100-year ARI	
Farameter	Pre-Development	Post Development
Peak Flows	699 l/s	1162 l/s

3 Stormwater Management Strategy

The stormwater management strategy proposed for the development at Part Lot 2 McGlone Road, Drouin has been developed to integrate the management of catchment run-off and the quality of the run-off in accordance with Section 53.18 of the Baw Baw Shire Planning Scheme Provisions. The primary objectives of this section relevant to this development focus on:

- Provide flood protection treatments for public safety and to protect downstream environments by retarding peak developed flows back to existing conditions; and
- Implementation of Water Sensitive Urban Design (WSUD) elements to treat post-developed pollutant-laden run-off to best practice guidelines

The stormwater drainage systems be designed to maximise benefits to the community based upon adequacy of design, the economy of construction and a high level of safety and amenity, including the provision to:

- Ensure hazardous situations do not arise on streets and footpaths;
- Ensure that all buildings in urban areas are protected against floodwaters;
- Limit rubbish and pollutants entering the stormwater drainage system;
- Integrate drainage works into urban planning development.





3.1 Requirements of Clause 56.07-4 Of The VPP

Clause 56.07-04 of the VPP requires urban runoff from new developments to meet best practice water quality and flow requirements. The objectives of Clause 56.07-4 of the VPP are:

- 1. To minimise damage to properties and inconvenience to residents from urban run-off.
- 2. To ensure that the street operates adequately during major storm events and provides for public safety.
- 3. To minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving waters from degradation by urban run-off.

Standard C25 outlines the requirements to meet the Clause 56.07-4 of the VPP objectives and necessitates urban stormwater management systems must be designed and managed to the requirements of the relevant drainage authority.

In addition to other requirements, Standard C25 requires that urban stormwater management systems must be:

- 1. Designed to meet current best practice performance objectives for stormwater quality, as outlined in *Urban Stormwater Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee 1999), as amended. The current water quality objectives are:
 - a. 80 per cent retention of typical urban annual suspended solids load;
 - b. 45 per cent retention of typical urban annual total phosphorus load; and
 - c. 45 per cent retention of typical urban annual total nitrogen load.
- 2. Designed to ensure that flows downstream of the site are restricted to predevelopment levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts.

3.2 **Proposed Concept**

3.2.1 Catchment

The development will be served by an underground stormwater system that will be designed for the 1% storm event. This system will contain an underground detention system that will manage and limit the flow from the 1% storm event to the pre-development flows. The total detention system volume is to be 185m3.

The new underground stormwater system will be connected to the LPOD as nominated by the Developer of the adjoining residential land. The underground stormwater system will be designed to service the planned development on the site. Due to site spatial constraints both the detention and proposed water treatment system will be inline underground systems. The external pavements will be designed to convey the 1% storm event to the LPOD as overland flow.





4 Stormwater Quality

4.1 Release Criteria

The objectives for on-site treatment relating to urban stormwater quality identify the best practice as the removal of Total Suspended Solids (TSS), Total Phosphorus (TP), Total Nitrogen (TN) and Gross Pollutants (GP). The values are set out in the Victorian Stormwater Committee (1999) *Urban Stormwater Best Practice Environmental Management Guidelines* and have been reproduced in Table 2. These stormwater quality objectives reflect the level of stormwater management necessary to meet the SEPP (Waters of Victoria) (EPA Victoria, 2003) requirements and have been adopted as the design criteria for WSUD treatments.

Table 2 Objectives for Environmental Management of Stormwater

Pollutant	Receiving Water Objective	Current Best Practice Performance Objective
Total Suspended Solids (TSS)	Comply with SEPP (e.g. not to exceed the 90 th percentile of 80mg/L)	80% retention of the typical urban annual load
Total Phosphorus (TP)	Comply with SEPP (e.g. base flow concentration not to exceed 0.08mg/L)	45% retention of the typical urban annual load
Total Nitrogen (TN)	Comply with SEPP (e.g. base flow concentration to not exceed 0.09 mg/L)	45% retention of the typical urban annual load
Gross Pollutants (GP)	Comply with SEPP (e.g. no litter in waterways)	70% retention of the typical urban annual load

4.2 Stormwater Quality Strategy

To achieve the best practice objectives shown in the above table, and underground water treatment system will be installed on the outlet discharge pipe from the site.

4.3 Modelling Results

For the proposed design of the underground water treatment system, a MUSIC model has been designed which incorporates the entire catchment.

Pollutant	Source Load (kg/yr)	Residual Load (kg/yr)	Load Removed (kg/yr)	% Reduction
Total Suspended Solids (TSS)	3750	749	3001	80
Total Phosphorus (TP)	6.03	1.49	4.54	75.2
Total Nitrogen (TN)	25.4	11	14.4	56.6
Gross Pollutants (GP)	379	17.2	361.8	95.5

Table 3 Source, Residual and Removal Loads for Catchment





5 Conclusions and Recommendations

This document provides a holistic approach to managing the stormwater infrastructure to be implemented for the proposed redevelopment of the mixed-use development located at Part Lot 2 McGlone Road, Drouin.

The report addresses the following key aspects:

- Retardation of 1% AEP storm events exiting the site to match the existing pre-developed conditions.
- Compliance with best practice stormwater quality treatment requirements for discharge to the existing drainage.
- For the catchment, it is recommended that the following infrastructure is implemented:
 - Installation of an underground detention systems totalling 185m3.
 - o Installation of a Altan Hydrosystem SHS.400/3 combined with a Altan Ecocepter Series 1500.

6 References

IEAust (2003), Australian Rainfall and Runoff Volume 2. Institute of Engineers Australia.

Melbourne Water Corporation (2010), MUSIC Guidelines: Recommended Input Parameters and modelling approaches for MUSIC Users.

Victorian Stormwater Committee (1999) Urban Stormwater Best Practice Environmental Management Guidelines.





Appendix A Plans

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Appendix B Detention Calculation

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STORMWATER DETENTION CALCULATOR

CREO CONSULTANTS PTY LTD

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oject:	SPAGS Drouin				COEFFICIENTS IMPORTED CORRECTLY		JOD	Number:	220	JU65		x o o
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edeveloped Condi	ions:											
			Fraction Imperv	ious Calculator				Annu	al Exceedence Pro	obability		
tchment Area (ha)	13.97		Impervious Area (m ²)	10		63.2%	50.0%	20.0%	10.0%	5.0%	2.0%	1.0%
ne of Concentration (min)	7		Pervious Area (m ²)	13740	Intensity (mm/hr)	46.45	52.60	72.32	86.10	99.88	118.64	133.41
ction Impervious	0%		Total Area (m ²)	13750	Coefficient of Runoff	0.090	0.096	0.107	0.113	0.118	0.129	0.135
			Fraction Impervious	0%	Q (m3/s)	0.162	0.195	0.300	0.376	0.458	0.596	0.699
eveloped Condition	<u>s:</u>		Fraction Impen	ious Calculator	-			Annu	al Exceedence Pr	abability		
tchment Area (ha)	13.97	1	Impervious Area (m ²)	13300	_	63 2%	50.0%	20.0%	10.0%	5.0%	2.0%	1.0%
ne of Concentration (min)	7	1	Pervious Area (m²)	126450	Intensity (mm/br)	46.45	52.60	72.32	86.10	99.88	118 64	133.41
ction Impervious	10%		Total Area (m²)	139750	Coefficient of Runoff	0.150	0 159	0 178	0.187	0.196	0.215	0.224
	10/0		Fraction Imponious	10%		0.100	0.100	0.400	0.625	0.761	0.000	1 160
			r laction impervious	10%	G (III3/S)	0.210	0.024	0.433	0.020	0.701	0.330	1.102
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STC Retar Flows Predeveloped <u>OR</u> Restrict flov FROM TABLE BELC Storm Duration (min) 1 2 3 4 5 10 15 20 25 30 45 5 60 90 120 180 180 270	Figure 3 Figure 3	AEP m ³ /s SEQUIRED (m³): Volume In (m ³) 123.301 192.266 263.320 263.320 263.320 389.233 606.055 741.372 74.841 1123.814 1123.814 1123.814 1123.814 1123.814 1123.814 1125.699 1410.645 1554.844 1556.825 2130.073	Volume Out (m*) 41.960 83.920 125.880 167.841 209.801 419.601 629.402 839.203 1049.003 1258.804 1882.206 2587.706 3776.413 5035.217 7552.825 11329.238	Using the Storage Required (m ²) 81.341 108.345 137.440 162.355 179.433 186.453 111.970 0.914 -132.084 -279.190 -764.393 -1282.511 -2365.768 -3480.373 -5747.200 -9199.164	Boyd's Method			This c pa Pla The	opied d for the s its cons rt of a p inning a docume	ocumen sole pur ideratic planning nd Env ent mus	t to be pose of on and g proce ironme t not be may be	made avai f enabling review as ss under th ent Act 198 e used for a

540

720

1080

1440

1800

2160 2880

4320

5760

7200

8640

10080

89.689

76.889

61.650

52.333

45.715

40.665

33.438

24.556

19.157

15.674

13.149

11.320

2905.928

3321.598

3994.946

4521.586

4937.256

5270.169

5778.001

6364.829

6620.626

6771.095

6816.235

6846.329

22658.475

30211.300

45316.951

60422.601

75528.251

90633.901

120845.202

181267.803

241690.404

302113.005

362535.606

422958.207

-19752.547

-26889.702

-41322.005

-55901.015

-70590.995

-85363.733

-115067.201

-174902.974

-235069.778

-295341.910

-355719.371

-416111.878

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Appendix C MUSIC Model

ADVERTISED PLAN



This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright Treatment Train Effectiveness - LPOD Flow (ML/yr) Total Suspended Solids (kg/yr) Total Phosphorus (kg/yr) Total Nitrogen (kg/yr) Gross Pollutants (kg/yr)

ADVERTISED PLAN

ources	Residual Load	% Reduction
10.4	10.4	0
3730	625	83.2
6.05	1.05	82.6
25.6	10.6	58.7
379	0	100