

Stormwater Management Strategy

**Friends, Williams, Hoopers and
Willung Roads Rosedale**

Client

Issued

19/02/2026

**APPROVED DEVELOPMENT PLAN
PLANNING AND ENVIRONMENT ACT 1987
WELLINGTON PLANNING SCHEME
Clause 43.04 Schedule 8**

**DP NAME: DP1/2021 - DPO8 - Rural Living
Area Bound By Williams Road, Willung Road,
Hoopers Road And Friends Road, Rosedale**

**DATE: 26 August 2026
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(Page: 1 of 37)

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Client:	Friends, Williams, Hoopers and Willung Roads Rosedale	Surveying
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Revision Table

REV	DESCRIPTION	DATE	AUTHORISED
A	Stormwater Strategy	7/09/21	
B	Stormwater Strategy	11/10/22	
C	Stormwater Strategy	01/08/24	
D	Stormwater Strategy	12/11/2024	
E	Stormwater Strategy	19/02/2026	

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Glossary of terms

Alphabetical list of terms and abbreviations used in report

AHD	Australian Height Datum A common national surface level datum approximately corresponding to mean sea level.
AEP	Annual Exceedance Probability. Probability of a flood event occurring in any year.
Authorities	Organisations responsible for supply and management of sewer, water, gas, electricity and telecommunications, roads and transport
BPEMG	Best Practice Environmental Management Guidelines
BWCo	Beveridge Williams & Co Pty Ltd
Client	Helen McMillan, Noreen Brand, Kelly Callah
Council	Wellington Shire
DSS	Drainage Services Scheme
Q ₁₀	Stormwater flow generated from 10% AEP (1 in 10 year) storm event.
Q ₁₀₀	Stormwater flow generated from 1% AEP (1 in 100 year) storm event.
Q _{gap}	Flow difference between Q ₁₀ and Q ₁₀₀ storm event.

1 INTRODUCTION

Beveridge Williams has been commissioned by [redacted] to prepare a Stormwater Management Strategy (SWMS) for a proposed development located at Friends, Williams, Hoopers and Willung Roads Rosedale. The total site area is approximately 75.84 ha and is proposed to be developed into 85 residential lots.

This SWMS is intended to provide sufficient evidence that the stormwater discharges from the proposed development can meet stormwater Best Practice Environmental Management guidelines (BPEMG) and that stormwater discharging from the proposed development shall be to the satisfaction of West Gippsland Catchment Management Authority (WGCMA), Wellington Shire Council and other stakeholders.

1.1 SITE OVERVIEW

The existing site is a large low-density rural residential area located approximately 1.5 km south of the township of Rosedale. It is bounded by Williams Road to the north, Friends Road to the west, Willung Road to the east and Hoopers Road to the south. Along the eastern boundary, there is a property which is not part of the current site extents (refer to **Figure 1**). The site contains several residential properties and associated driveways as well as various dams, however it is primarily vacant land. Additionally, Blind Joe Creek is located approximately 500 m west of the site. The site locality is displayed in **Figure 1**.

The site is covered by an easement for the regional outfall sewer that crosses the central part of the site, as shown in **Figure 3**.



Figure 1: Site Locality

2 EXISTING CONDITIONS

2.1 TOPOGRAPHY AND DRAINAGE

The site grades in a northerly direction, with a slope of approximately 1 in 80. The site has an external catchment to the south which drains into the site. Site surface water flow follows topographic conditions and is expected to flow from south to north, eventually draining offsite into farmland north of Williams Road.

Site topography and surface water drainage is shown in **Figure 2**.



Figure 2: Surface Water Flow Direction

3 DESIGN INTENT

3.1 PROPOSED DEVELOPMENT

The preliminary proposal of the development site intends to develop the site into 85 lots, with an average size of 8,541 m² and associated internal road network. The indicative development plan is presented in **Figure 3** and **Appendix A**.

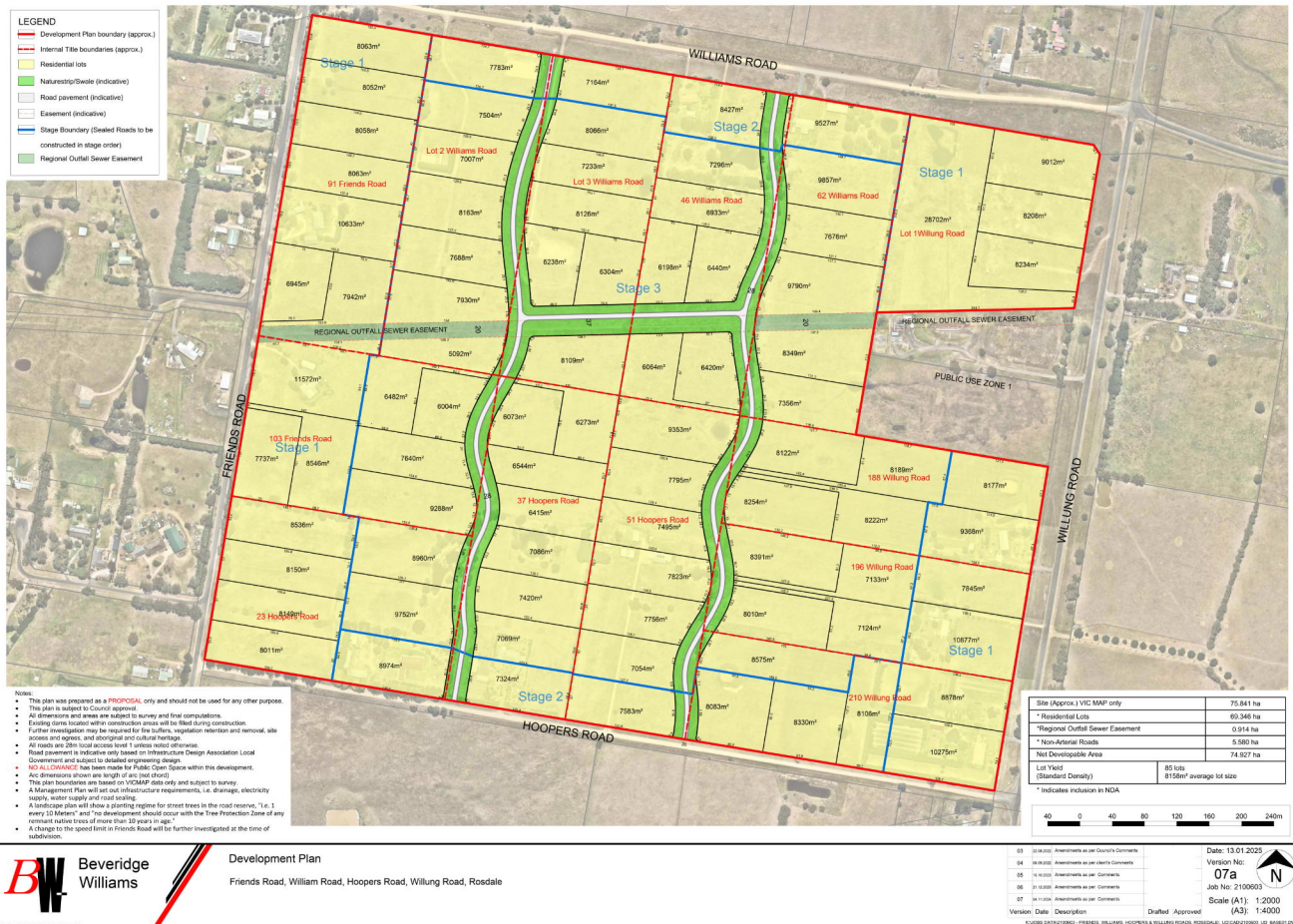


Figure 3: Indicative Development Layout

The area allocation is presented in **Table 1**.

Table 1: Proposed Development Summary

Land Use	Area
Residential Lots	72.600 ha
Roads	3.241 ha
Total	75.841 ha

3.2 PROPOSED STORMWATER MANAGEMENT STRATEGY

The site does not currently fall into any drainage schemes. Once developed, the fall across the site is assumed to follow the existing natural features of the site. To manage stormwater quantity, it is proposed that rainwater tanks are used as storage to cater for the additional flows due to development of the site. Stormwater quantity management is further discussed in **Section 4**. To manage stormwater quality, rainwater tanks and Water Sensitive Urban Design

(WSUD) assets are suggested to be installed at each lot to meet best practice. Stormwater quality management is further discussed in **Section 5**.

4 STORMWATER QUANTITY MANAGEMENT

4.1 CATCHMENT AREAS

4.1.1 PRE-DEVELOPED CATCHMENTS

The pre-developed catchments were delineated using the best available elevation data from the online Elevation Information System (ELVIS). The site has a considerable upstream catchment of approximately 107.2 ha. There appear to be no culverts underneath Hoopers Road apart from a small one downstream of a farm dam, hence the upstream catchment discharges to site predominantly via sheet flow. There are three inferred outlet points along the northern boundary of the site (refer to **Figure 4**).

The pre-developed catchment plan and flow paths are shown below in **Figure 4**.



Figure 4: Pre-Developed Catchment Plan (Not to scale)

The post-developed catchments delineated are based on the indicative subdivision plan (refer to **Figure 3**). It is assumed that the external southern catchments remain unaltered, and that these flows will still enter the site. Given the indicative subdivision plan, there are four outlet points in the post developed scenario (refer to **Figure 5**). Additionally, sub-catchment M has been separated out, as this offsite area is not being altered as part of the development. Catchments F, G, J and K will have flow redirected to the two internal roads, whereas catchments L, M, N, H and I will flow in a northerly direction through each respective sub catchment.

The post-developed catchment plan is shown in **Figure 5**.

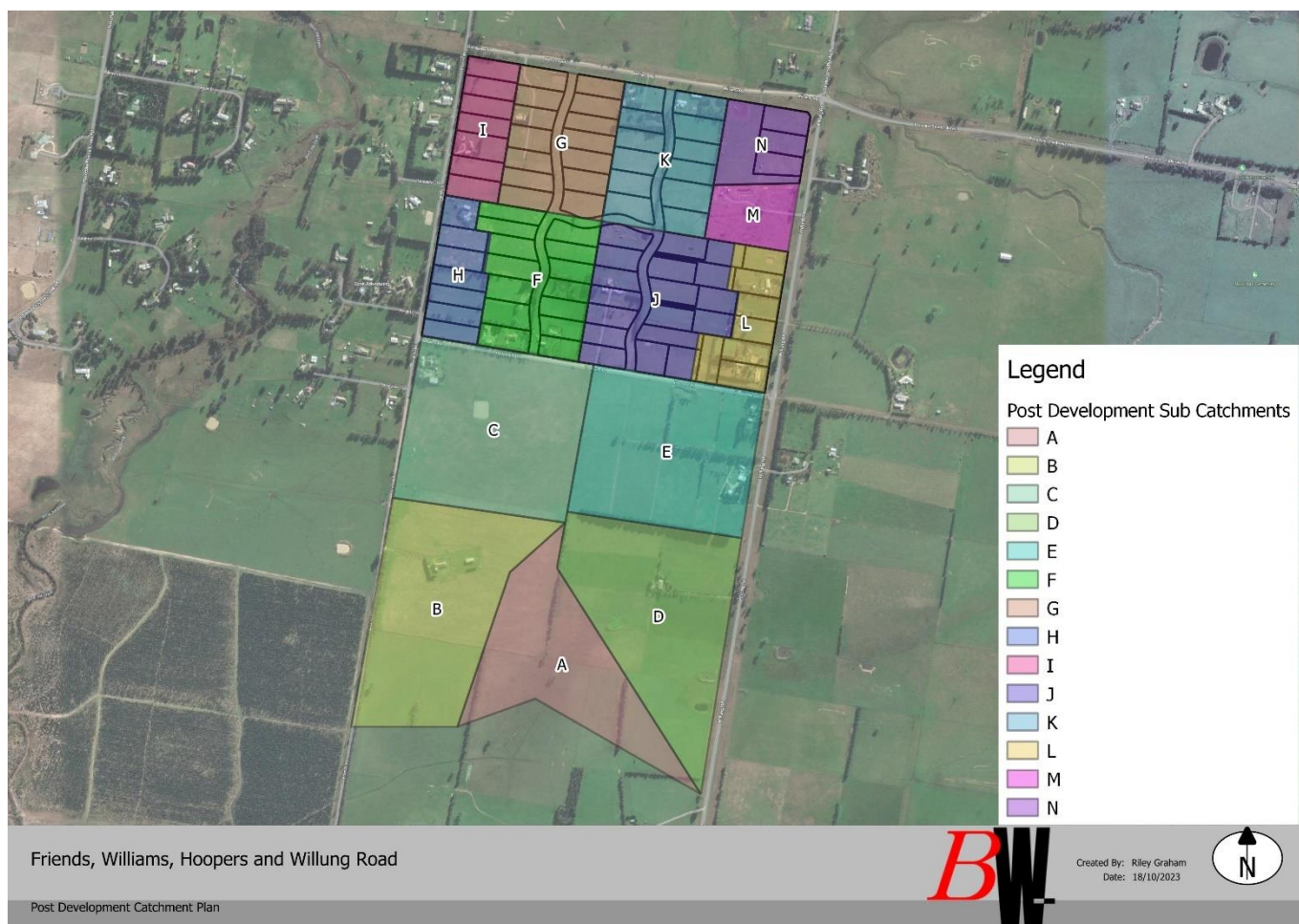


Figure 5: Post-Developed Catchment Plan (Not to scale)

4.2 HYDROLOGY

The RORB runoff-routing model was utilised to calculate the stormwater runoff flows for both the pre- and post-developed conditions using the Australian Rainfall & Runoff 2019 (AR&R) methodology. The runoff routing characteristics of the catchment are represented by the parameter's k_c and m , where k_c represents the delay in runoff response from rainfall and m represents the non-linearity in the storage-discharge relationship for the catchment. Input rainfall data was obtained from the AR&R Data Hub and Bureau of Meteorology (BoM) websites.

Calibration of the predeveloped RORB model (refer to **Figure 4** for catchment plan) was conducted against results obtained using the Regional Flood Frequency Estimation (RFFE) Model and the Rational Method. These results are attached in **Appendix B**. Various k_c estimation methods were trialled and the results of the calibration are presented in **Table 2**. Given the size of the total catchment (1.88 km^2) and to obtain an upper estimate of runoff (greater flows compared to the Rational Method), the pre-developed RORB model was calibrated against the RFFE Model. As such the VIC Mean Annual Rainfall (MAR) $< 800 \text{ mm}$ calculation for k_c was selected, to establish a flow of $16.40 \text{ m}^3/\text{s}$ for the total catchment. This value is within 16% of the RFFE result and therefore deemed suitable and appropriate for the purposes of further modelling.

Table 2: Pre-Developed RORB Model Calibration

Location	Rational	RFFE	RORB (VIC MAR <800 mm)	RORB (Areal Equation)	RORB (Pearse et. al.)
Total catchment	9.62 m³/s	14.2 m³/s	16.40 m³/s	5.04 m³/s	10.81 m³/s
k_c	-	-	0.74	3.01	1.28

The post-developed RORB model was established based on the indicative subdivision plan (refer to **Figure 3**) and the post-development catchment plan (refer to **Figure 5**). The change in sub catchment layout is also accompanied by changes in the fraction impervious (f. imp). Within the predeveloped scenario, all sub catchments were given a f. imp of 0.1 due to the predominantly vacant nature of the land. In the post-developed scenario, external sub- catchments (A-E and M) maintained a f. imp of 0.1, however due to the planned development the internal sub catchments were given a f. imp of 0.15. This assumes that all lots have residential properties of 500 m² and associated driveways and considers the two internal roads traversing the site. This is displayed in **Table 3**.

Table 3: Post Developed Catchment Areas and Corresponding f. imp

Sub Catchment	Area (Ha)	Post Developed – f. imp
A-E	107.14	0.1
F	12.55	0.15
G	12.15	0.15
H	5.84	0.15
I	6.07	0.15
J	16.31	0.15
K	11.97	0.15
L	6.59	0.15
M	4.25	0.15
N	5.42	0.15

To calibrate the post-developed RORB model, the k_c parameter was changed to maintain the k_c/d_{ave} ratio as per the pre-developed model, where d_{ave} is the average flow length through the catchment. The parameters for both models are presented in **Table 4**.

Table 4: RORB Input Parameters

Parameter	Pre-Developed	Post-Developed
d_{ave}	1.02	0.98
k_c	0.74	0.71
m	0.8	0.8
IL (mm)	22	22
CL (mm/hr)	3.6	3.6

The results of the RORB modelling are presented below in **Table 5** and attached in **Appendix C**.

Table 5: 1% AEP Peak Flows

1% AEP Flow	Pre-Developed	Post-Developed (Undetained)
Total Catchment	16.48 m ³ /s (1.5 hr)	16.64 m ³ /s (1.5 hr)

4.3 DETENTION REQUIREMENTS

Boyd's method was used to determine the storage requirement of 864 m³ to detain the 1% AEP peak post-development flow back to pre-development levels (refer to **Table 5**). This total storage volume was then spread out over 85 lots, therefore requiring 10 m³ of storage at each lot. This will be done using rainwater tanks and section 173 agreements will be placed on all lots requiring the connection and maintenance of the proposed rainwater tanks. Detailed calculations are provided in **Appendix D**.

4.4 SUBJECT SITE OVERLAND FLOW

Overland flow from the site will be directed via the roads for the central portion of the site (catchments F, G, J and K) with the outer portions following natural topographical conditions (catchments L, M, N, I and H). Ultimately the site will continue to discharge to the vacant land abutting the northern boundary of the site. The proposed overland flow path is presented in **Figure 6**.

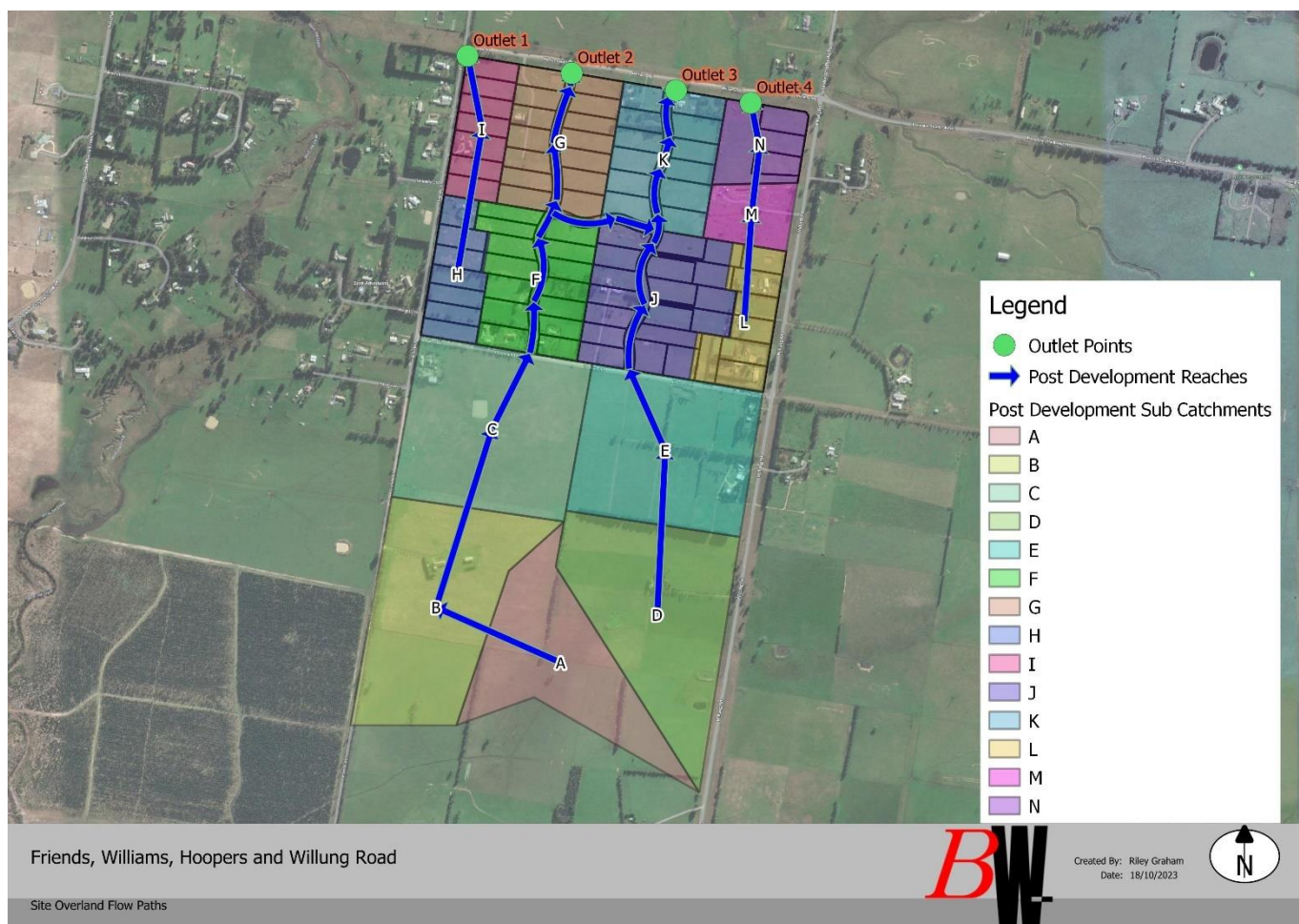


Figure 6: Site Overland Flow Path

4.5 GAP FLOW - PC CONVEY ASSESSMENT

Given that the site will not have any subsurface drainage, and flows are to be conveyed using roadside swales, the gap flow is the same as the 1% AEP flow. The gap flow results at the locations highlighted in **Figure 6** are presented in **Table 6**. Note that Points A and B are equivalent to the flows at Outlets 2 and 3 respectively, this is done to provide an upper estimate of flow depth. The results below are from the original RORB model which includes the external catchments.

Table 6: Gap Flow Results

Location	1% AEP
Point A	7.41 m ³ /s (1.5 hr)
Point B	6.60 m ³ /s (1.5 hr)

The above results (**Given that** the site will not have any subsurface drainage, and flows are to be conveyed using roadside swales, the gap flow is the same as the 1% AEP flow. The gap flow results at the locations highlighted in **Figure 6** are presented in **Table 6**. Note that Points A and B are equivalent to the flows at Outlets 2 and 3 respectively, this is done to provide an upper estimate of flow depth. The results below are from the original RORB model which includes the external catchments.

Table 6) indicate that Point A would have the highest expected gap flow, therefore a PC convey assessment was completed at this location. As this location has the largest peak gap flow it would also be expected to provide the most conservative results. The PC convey assessment of a 28 m road reserve with a conservative longitudinal slope of 1 in 200, has the capacity to contain a peak gap flow of 7.41 m²/s as well as satisfy the flood safety criteria. A typical cross section is shown below in **Figure 7** and the calculation results is included in **Appendix E**.

For the road pavement area only, the average velocity (v_{av}) $\times$ average depth (d_{av}) is 0.33 m²/s, which is less than 0.35 m²/s, the d_{av} of 0.30 m is not higher than 0.30m and the v_{av} of 1.07 m/s is less than 1.5 m/s. The gap flow is therefore considered to be within flood safety criteria.

The swale provides 180 mm freeboard which is higher than the minimum freeboard of 150 mm. Freeboard requirement of 300mm to floor level of residence to be catered for within individual lots..

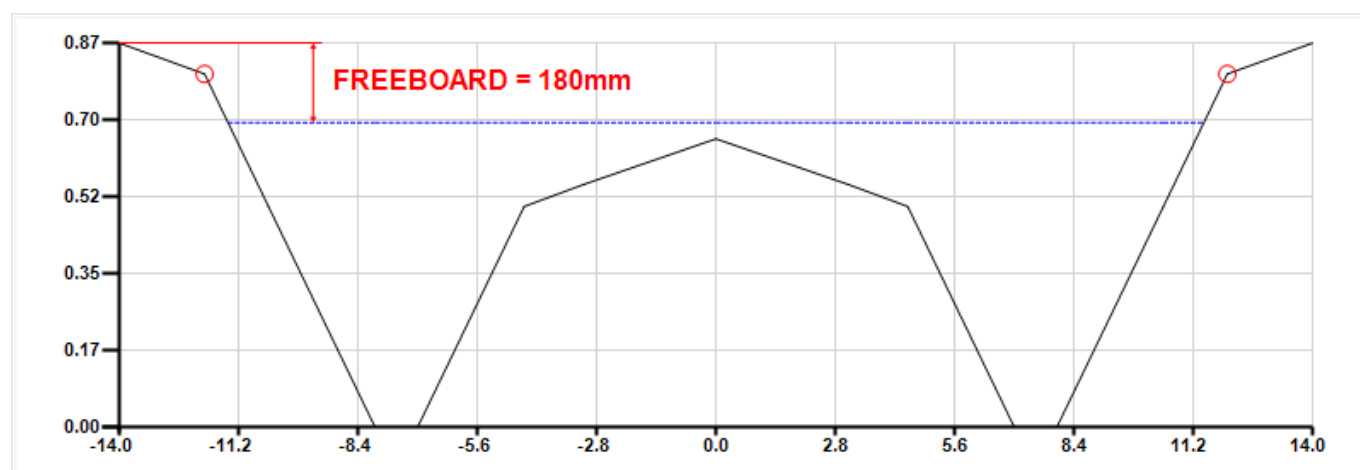


Figure 7: PC Convey Result – Gap Flow at Point A for a 20 m Road Reserve with Swales (Typical Section)

4.6 ONSITE FLOODING

The 'Rosedale Flood Study – Summary Report', confirms that the northeastern corner and other parts of the eastern boundary will be impacted by a 100-year flooding event (**Figure 8**).



Figure 8: 1%AEP Flood Extent

To effectively mitigate this flooding and manage overland flow paths, building envelopes for the entire development will be restricted to areas outside of the flood extent. Therefore, the existing overland flow path on the east side will remain as is, and the buildings within the lots will be restricted to allocated areas outside of the flood extent as shown in **Figure 9**, which includes the predicted additional flood depths in the year 2100.

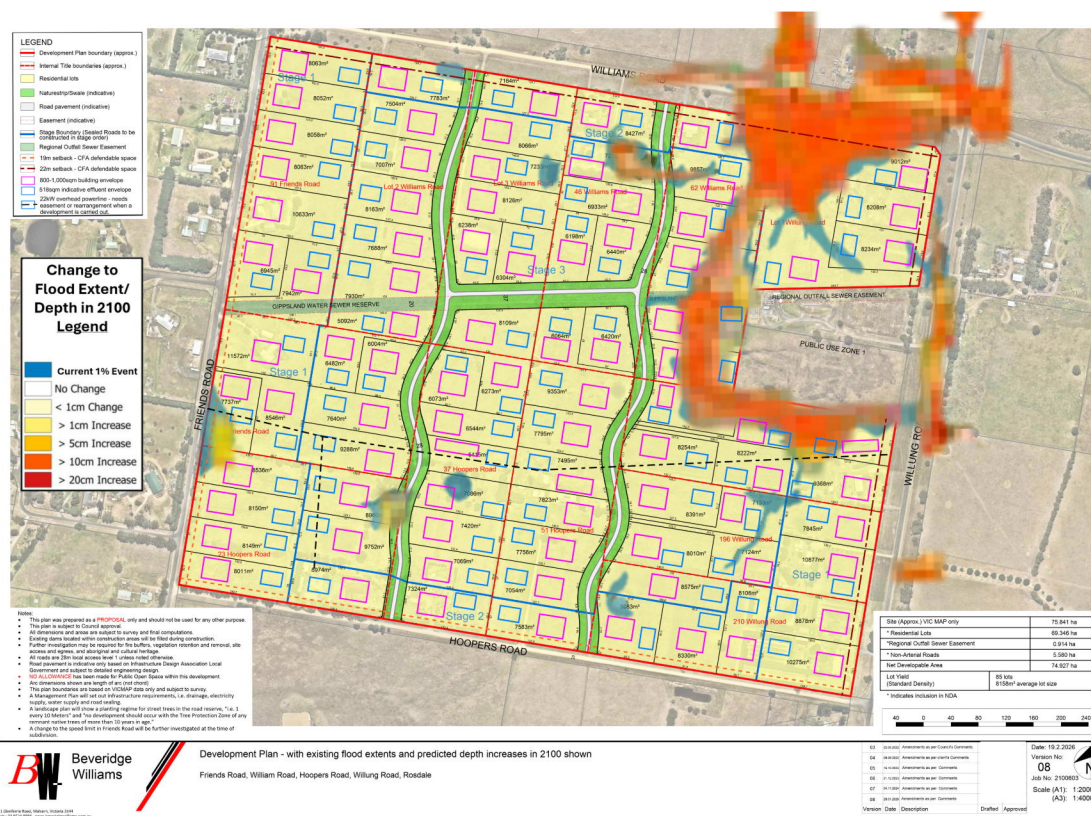


Figure 9: Proposed Building Envelope Plan with existing & year 2100 flood extents/depth changes shown

5 STORMWATER QUALITY MANAGEMENT

5.1 STORMWATER QUALITY MANAGEMENT OBJECTIVES:

It is a Victorian Government requirement that quality of stormwater runoff from the proposed development meets the Urban Stormwater Best Practice Environmental Management Guidelines (BPEMG), which are required under Clause 56 of the Victorian Planning Provisions (VPP). The targets are:

- 70% removal of the Total Gross Pollutant Load (Litter);
- 80% removal of Total Suspended Solids (TSS);
- 45% removal of Total Phosphorous (TP); and
- 45% removal of Total Nitrogen (TN).

This site will meet the water quality treatment requirements through each lot achieving best practice via the use of a rainwater tank and/or proprietary product to meet best practice targets.

5.2 WSUD ASSETS MAINTENANCE

Section 173 agreements will be placed on all lots to ensure they meet best practice stormwater treatment requirements when developed with a dwelling and that the connection and maintenance of rainwater tanks and WSUD assets will be undertaken by property owners.

As for the swales with road reserves, the developer will undertake maintenance during the defect liability period of 24 months prior to handover to Council. A maintenance plan will be provided as part of the detailed design for the Council approval. This maintenance plan will be in accordance with Melbourne Water WSUD Maintenance Guidelines and will address the following:

- Responsibilities, requirements (including frequencies and system performance) and indicative costs;
- Asset Handover Arrangements, including defects liability period and timeframes; and,
- Sufficient access for staff and/or machinery for maintenance requirements.

The design of the swales will include maintenance considerations such as:

- Swale batter shall not be higher than 1 in 5m to allow for mowing;
- Velocity during major events shall not exceed 2m/s;
- Water ponding at entry points to the swale will not occur for longer than 1 hr after the cessation of rainfall as prescribed in Clause 56.07-04 of the Victorian Planning Provisions;
- The gradient of swale batter slopes will follow Council regulations and will relate to traffic access and driveway crossings; and,
- A velocity-depth check should be undertaken to ensure public safety.

The maintenance plan will include the inspection and maintenance schedules and forms in accordance with Melbourne Water WSUD Maintenance Guidelines as provided in **Appendix F**.

6 CONCLUSION

This report has identified an overall drainage management strategy for the proposed development site located at Friends, Williams, Hoopers and Willung Roads Rosedale. The strategy provides a Stormwater Management Strategy that is constructible and implementable. The strategy covers the following investigations:

- The 20% AEP post-developed flow from the site will be detained to pre-developed levels via onsite detention rainwater tanks. 10 m³ of storage within each lot will be required.
- Stormwater quality treatment from the proposed development will be catered for through burdening the developer/owner with a section 173 agreement to install a WSUD treatment/Rainwater tanks to meet BEPM targets and to maintain these assets.
- To manage stormwater quality each lot will require a combined 10 kL of storage within rainwater tanks..
- All lots have building envelopes outside of the 1%AEP flood extent in both existing and year 2100 conditions.

The above strategy can be implemented, and all Council's development requirements can be achieved in line with the regulatory requirements for both Council and CMA.

BEVERIDGE WILLIAMS & CO PTY LTD

Prepared by

Reviewed by

Water Resources Engineer

Senior Water Resources Engineering

Approved for issue by

Project Manager

APPENDIX A: INDICATIVE DEVELOPMENT PLAN

LEGEND

Development Plan boundary (approx.)

Internal Title boundaries (approx.)

Residential lots

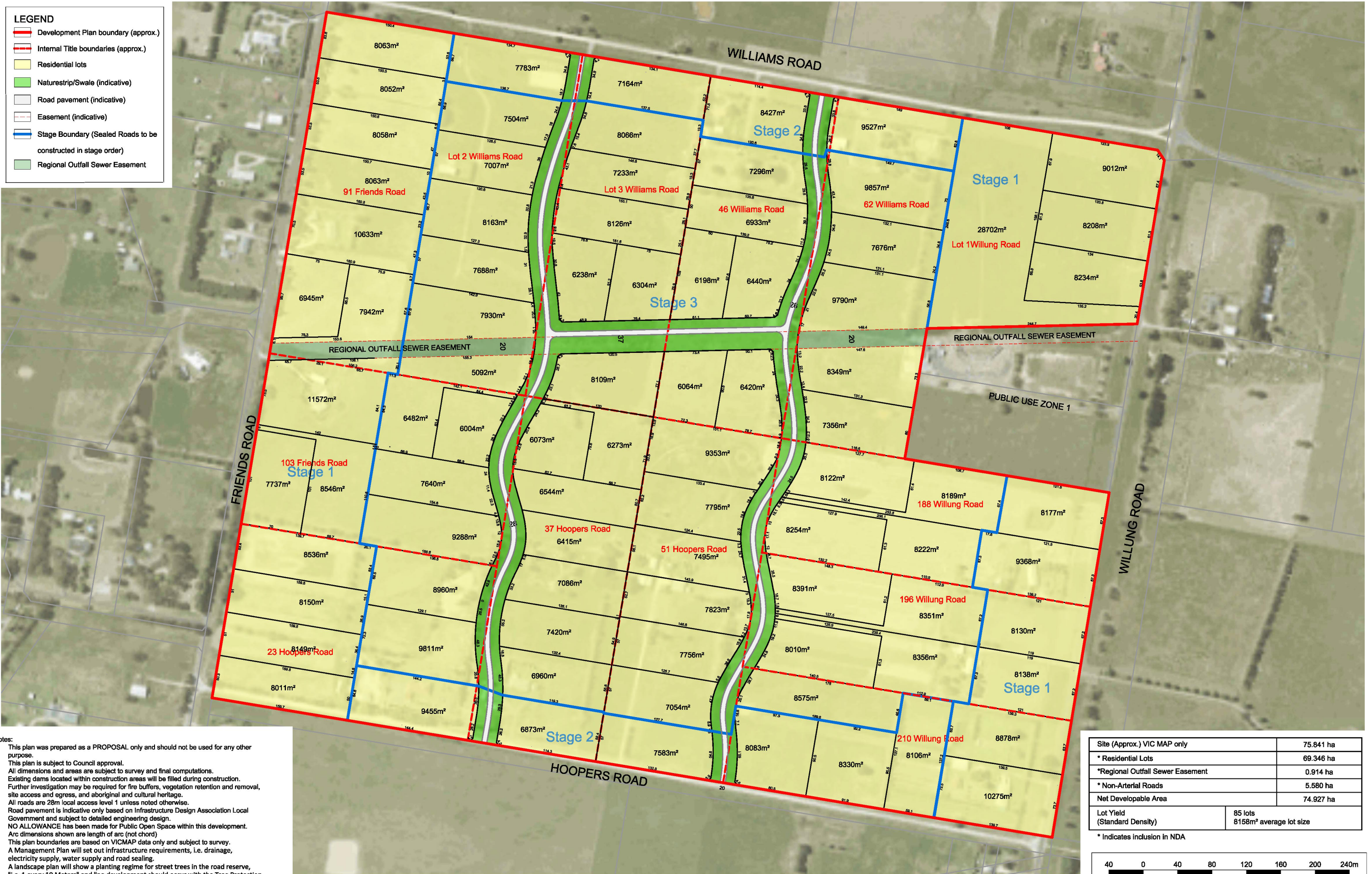
Naturestrip/Swale (indicative)

Road pavement (indicative)

Easement (indicative)

Stage Boundary (Sealed Roads to be constructed in stage order)

Regional Outfall Sewer Easement



Notes:

- This plan was prepared as a PROPOSAL only and should not be used for any other purpose.
- This plan is subject to Council approval.
- All dimensions and areas are subject to survey and final computations.
- Existing dams located within construction areas will be filled during construction.
- Further investigation may be required for fire buffers, vegetation retention and removal, site access and egress, and aboriginal and cultural heritage.
- All roads are 28m local access level 1 unless noted otherwise.
- Road pavement is indicative only based on Infrastructure Design Association Local Government and subject to detailed engineering design.
- NO ALLOWANCE has been made for Public Open Space within this development.
- Arc dimensions shown are length of arc (not chord)
- This plan boundaries are based on VICMAP data only and subject to survey.
- A Management Plan will set out infrastructure requirements, i.e. drainage, electricity supply, water supply and road sealing.
- A landscape plan will show a planting regime for street trees in the road reserve, "i.e. 1 every 10 Meters" and "no development should occur within the Tree Protection Zone of any remnant native trees of more than 10 years in age."

Site (Approx.) VIC MAP only	75.841 ha
* Residential Lots	69.346 ha
*Regional Outfall Sewer Easement	0.914 ha
* Non-Arterial Roads	5.580 ha
Net Developable Area	74.927 ha
Lot Yield (Standard Density)	85 lots 8158m ² average lot size

* Indicates inclusion in NDA

40

0

40

80

120

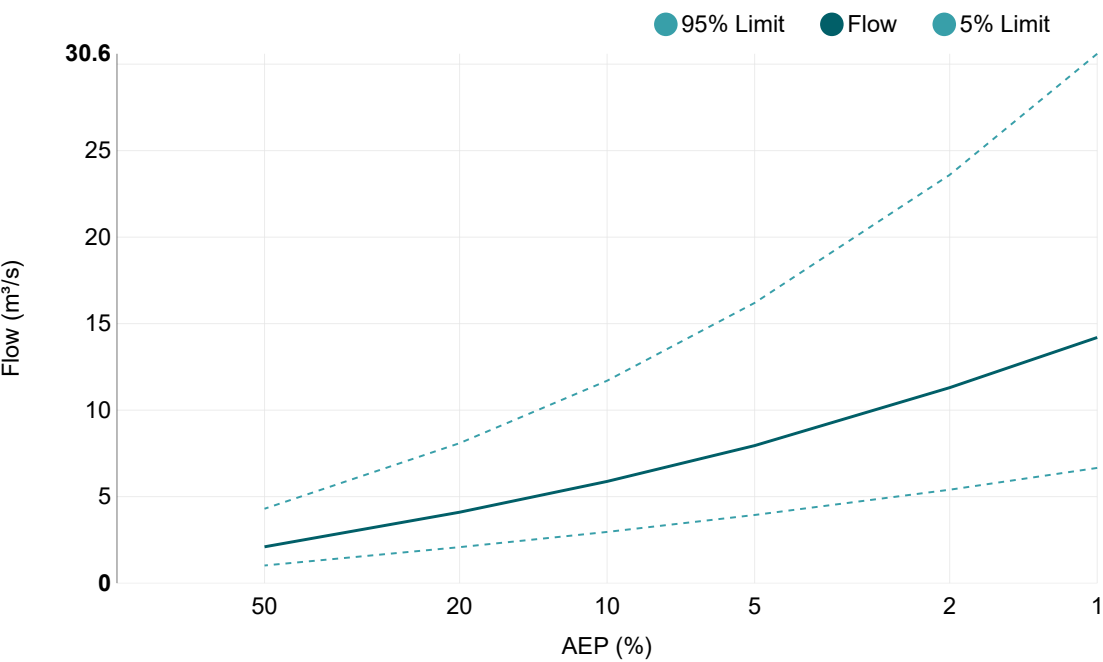
160

200

240m

APPENDIX B: RFFE AND RATIONAL METHOD

Results | Regional Flood Frequency Estimation Model



AEP (%)	Discharge (m³/s)	Lower Confidence Limit (5%) (m³/s)	Upper Confidence Limit (95%) (m³/s)
50	2.10	1.02	4.30
20	4.10	2.08	8.09
10	5.88	2.96	11.7
5	7.95	3.94	16.2
2	11.3	5.40	23.6
1	14.2	6.66	30.6

Statistics

Variable	Value	Standard Dev
Mean	0.443	0.448
Standard Dev	0.760	0.153
Skew	0.103	0.029

Note: These statistics come from the nearest gauged catchment. Details.

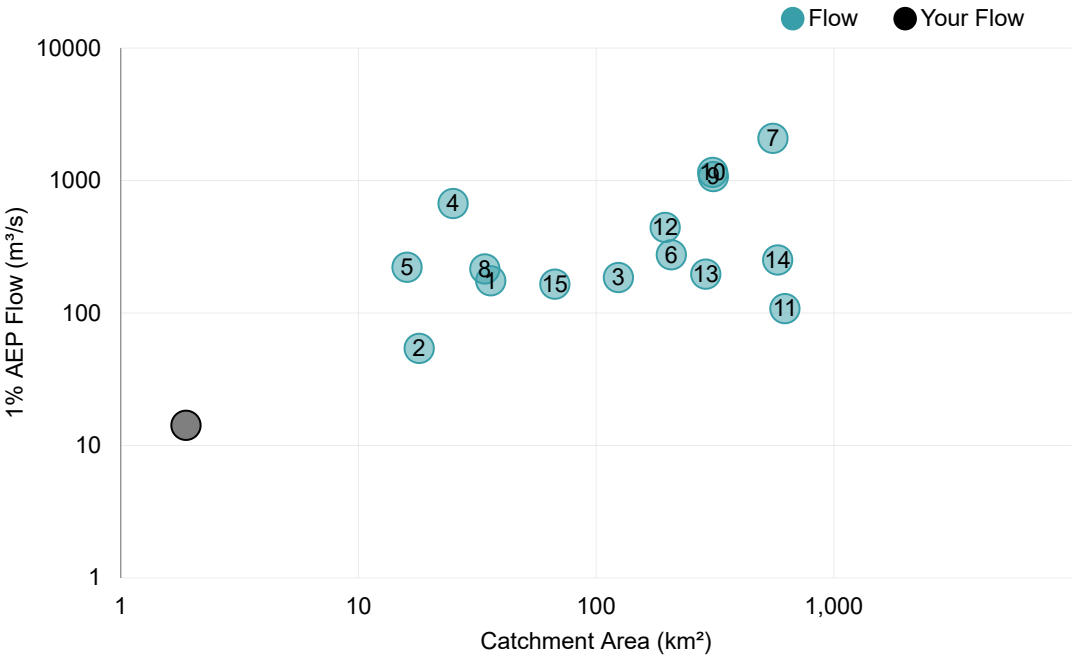
Correlation

Correlation

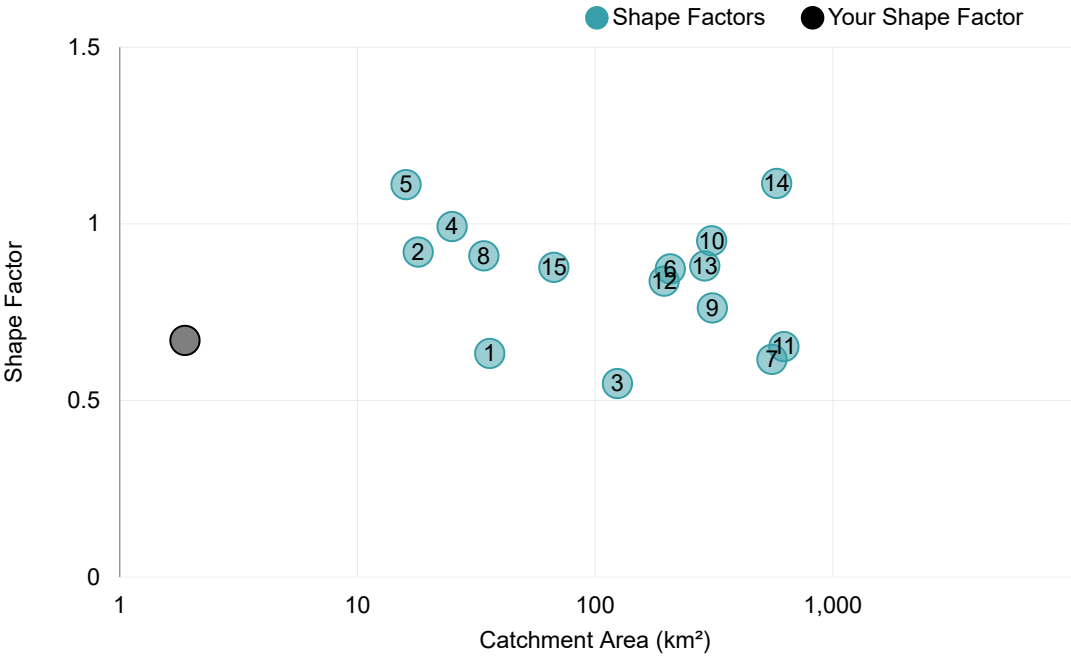
1.000		
-0.330	1.000	
0.170	-0.280	1.000

Note: These statistics are common to each region. Details.

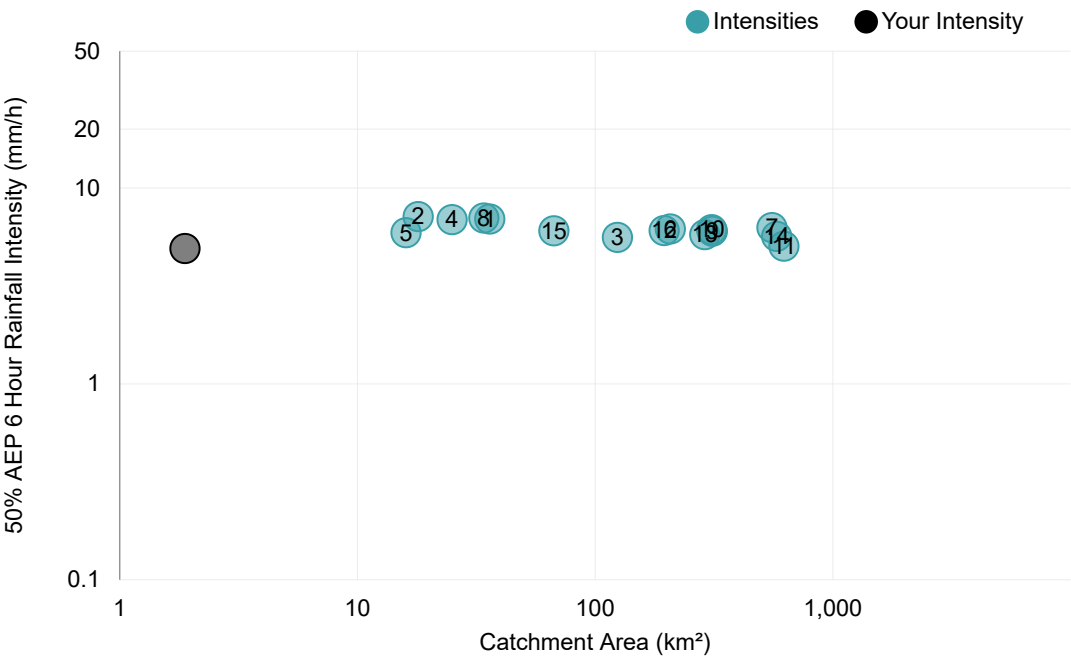
1% AEP Flow vs Catchment Area



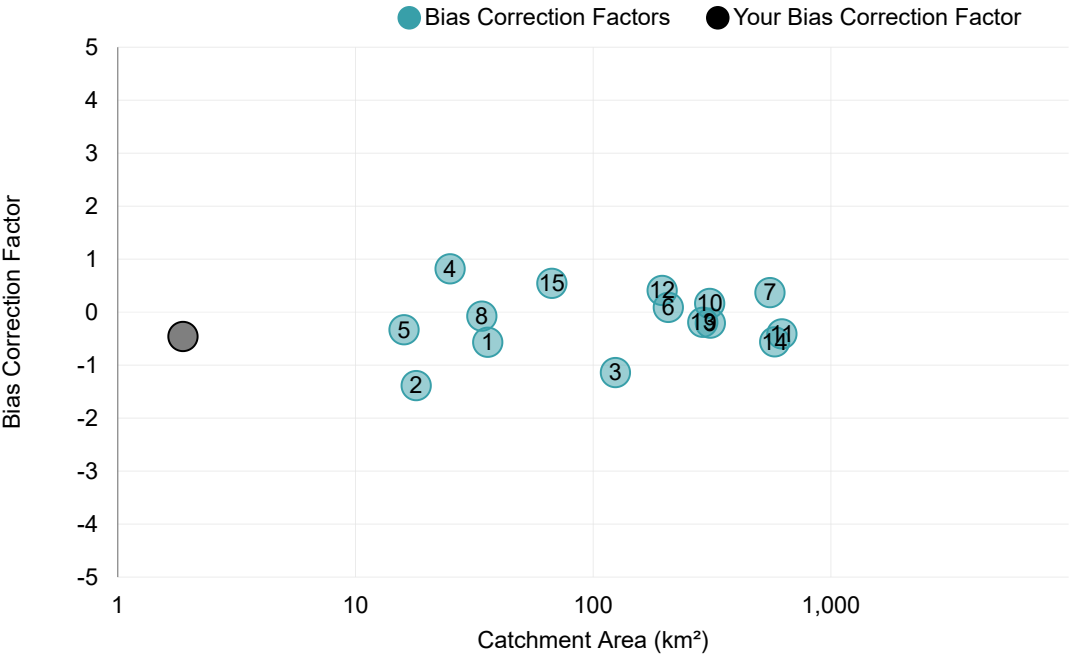
Shape Factor vs Catchment Area



Intensity vs Catchment Area



Bias Correction Factor vs Catchment Area



Download

⬇️ TXT

⬇️ Nearby

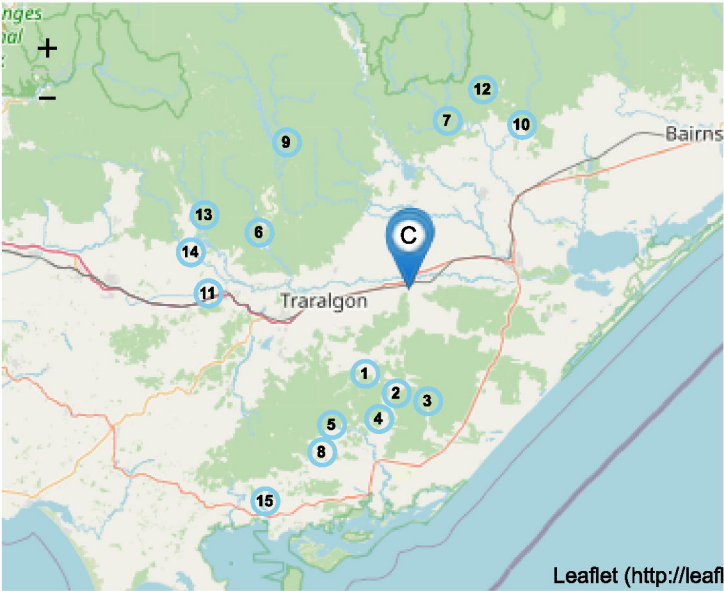
⬇️ JSON

Input Data

Date/Time	2021-08-24 17:04
Catchment Name	Catchment1
Latitude (Outlet)	-38.1651398415
Longitude (Outlet)	146.780424374
Latitude (Centroid)	-38.1733540483
Longitude (Centroid)	146.778734106
Catchment Area (km²)	1.88
Distance to Nearest Gauged Catchment (km)	24.48
50% AEP 6 Hour Rainfall Intensity (mm/h)	4.913284
2% AEP 6 Hour Rainfall Intensity (mm/h)	12.042881
Rainfall Intensity Source (User/Auto)	Auto
Region	East Coast

Input Data

Region Version	RFEE Model 2016 v1
Region Source (User/Auto)	Auto
Shape Factor	0.67
Interpolation Method	Natural Neighbour
Bias Correction Value	-0.459



Method by from Western Sydney University for the Australian Rainfall and Runoff Project. Full description of the project can be found at the project page (<http://arr.ga.gov.au/revision-projects/project-list/projects/project-5>) on the ARR website. Send any questions regarding the method or project here (<mailto:admin@arr-software.org>).



APPENDIX C: RORB CALCULATIONS

RORWin Batch Run Summary 1% PostDev

Program version 6.45 (last updated 20th March 2019)
Copyright Moushaviz University and Hydrology and Consulting
Date run: 7 Sep 2021 9:32
Catchment file : K:\Jobs Data\210X Friends, Williams, Hoopers & Willing Roads, Rosedale\ Dev\2100603 RORWin PostDev.catz
Rainfall location: User defined
Temporal pattern : ARR2016 point temporal patterns
Spatial pattern Uniform
Anal Red Fact. Based on ARI
Loss factors : Constant with ARI

Parameter kc = 0.71 m = 0.8

Loss parameter Initial loss (mm) Cont. loss (mm/hr)
22 3.6

Peak Description
1 Calculated hydrograph AB 2
2 Calculated hydrograph Outlet
3 Calculated hydrograph D
4 Calculated hydrograph Outlet 3
5 Calculated hydrograph Outlet 4
6 Calculated hydrograph Outlet 1
7 Calculated hydrograph Total

Run	Duration	Unit	AEP	TPat	Rain(mm)	ARF	Peak0001	Peak0002	Peak0003	Peak0004	Peak0005	Peak0007	Peak0008
1	0.166667	hour	1%	21	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	22	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	23	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	24	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	25	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	26	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	27	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	28	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	29	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
1	0.166667	hour	1%	30	25.3	0.96	0.6258	0.9711	0.5872	1.0722	0.5768	0.3927	3.0128
2	0.25	hour	1%	21	31.1	0.97	1.0742	2.0374	1.0472	2.2054	1.0585	0.7812	3.1035
2	0.25	hour	1%	22	31.1	0.97	1.0757	2.0403	1.0493	2.2091	1.0886	0.7829	3.1221
2	0.25	hour	1%	23	31.1	0.97	1.0752	2.1144	1.0752	2.3189	1.1399	0.8432	3.1818
2	0.25	hour	1%	24	31.1	0.97	1.0991	2.1048	1.1474	2.2943	1.1505	0.8226	3.0638
2	0.25	hour	1%	25	31.1	0.97	1.1789	2.2208	1.2288	2.3162	1.3087	0.8843	3.1643
2	0.25	hour	1%	26	31.1	0.97	1.0953	2.0948	1.1462	2.2796	1.1456	0.8157	3.0642
2	0.25	hour	1%	27	31.1	0.97	1.0953	2.0948	1.1462	2.2796	1.156	0.8157	3.0642
2	0.25	hour	1%	28	31.1	0.97	1.1902	2.1206	1.1488	2.3125	1.2077	0.8607	3.1247
2	0.25	hour	1%	29	31.1	0.97	1.1789	2.1338	1.1632	2.2653	1.1377	0.827	3.0214
2	0.25	hour	1%	30	31.1	0.97	1.1789	2.1338	1.1632	2.2653	1.3771	0.927	3.2004
3	0.333333	hour	1%	21	35.5	0.97	2.4572	3.855	2.0877	3.4732	1.511	1.011	8.1889
3	0.333333	hour	1%	22	35.5	0.97	2.4455	3.8394	1.8227	2.9879	1.3474	0.9688	8.15
3	0.333333	hour	1%	23	35.5	0.97	2.4408	3.855	2.0877	3.4732	1.511	1.011	8.1889
3	0.333333	hour	1%	24	35.5	0.97	2.6913	3.4024	2.3279	3.2377	1.8178	1.0272	8.8456
3	0.333333	hour	1%	25	35.5	0.97	2.5996	3.0378	2.0890	2.5756	1.5911	1.1238	8.6997
3	0.333333	hour	1%	26	35.5	0.97	2.3391	2.555	1.8752	2.4242	1.4127	0.9127	8.1518
3	0.333333	hour	1%	27	35.5	0.97	2.6003	3.0395	2.0887	3.2925	1.5981	1.1248	8.9861
3	0.333333	hour	1%	28	35.5	0.97	2.5952	3.0224	2.0878	3.2371	1.6133	1.1331	8.9136
3	0.333333	hour	1%	29	35.5	0.97	2.6662	3.384	2.2688	3.4487	1.6473	1.2188	9.5054
3	0.333333	hour	1%	30	35.5	0.97	2.6664	3.384	2.2688	3.4487	1.6473	1.2188	9.5054
4	0.416667	hour	1%	21	38.9	0.97	2.1407	3.6776	2.4211	3.7863	1.911	1.3065	10.2438
4	0.416667	hour	1%	22	38.9	0.97	2.0936	3.5653	2.1854	3.5677	1.6641	1.1573	9.9475
4	0.416667	hour	1%	23	38.9	0.97	3.2216	3.7248	2.4811	3.9424	1.8034	1.3001	10.7087
4	0.416667	hour	1%	24	38.9	0.97	3.0294	3.5812	2.3812	3.6713	1.8221	1.2437	10.2438
4	0.416667	hour	1%	25	38.9	0.97	3.1517	3.6667	2.35	3.7999	1.7188	1.2135	10.3043
4	0.416667	hour	1%	26	38.9	0.97	3.0506	3.7017	2.4083	3.7051	1.8552	1.2941	10.2875
4	0.416667	hour	1%	27	38.9	0.97	2.9552	3.6359	2.3812	3.6462	1.979	1.2479	10.1473
4	0.416667	hour	1%	28	38.9	0.97	3.0995	3.6776	2.455	3.745	1.9353	1.321	10.4044
4	0.416667	hour	1%	29	38.9	0.97	3.1713	3.8915	2.4912	3.7517	1.9512	1.3487	10.5897
4	0.416667	hour	1%	30	38.9	0.97	3.3924	3.9205	2.7182	4.2	2.032	1.4395	11.5791
5	0.5	hour	1%	21	41.7	0.98	3.4873	4.2807	2.8368	4.2462	1.9986	1.3877	11.4945
5	0.5	hour	1%	22	41.7	0.98	3.3237	4.2813	2.8368	4.2462	1.9986	1.3877	11.4945
5	0.5	hour	1%	23	41.7	0.98	3.2291	4.2677	2.2386	4.1462	1.7083	1.2077	10.996
5	0.5	hour	1%	24	41.7	0.98	3.3167	4.2816	2.7222	4.1379	1.9199	1.240	11.2747
5	0.5	hour	1%	25	41.7	0.98	3.447	4.2807	2.4662	4.2462	1.979	1.2479	11.4731
5	0.5	hour	1%	26	41.7	0.98	3.1549	4.3136	2.7715	4.3177	2.1666	1.400	11.704
5	0.5	hour	1%	27	41.7	0.98	3.2647	4.3136	2.7715	4.3177	2.1666	1.400	11.704
5	0.5	hour	1%	28	41.7	0.98	3.4113	4.2944	2.5584	4.2143	1.8988	1.335	11.477
5	0.5	hour	1%	29	41.7	0.98	3.3753	4.4166	2.8296	4.3208	1.9128	1.5128	12.2486
5	0.5	hour	1%	30	41.7	0.98	3.1824	4.4807	2.8296	4.3208	1.9128	1.5128	12.2486
6	0.75	hour	1%	21	47.8	0.98	4.5174	5.9383	3.3116	5.5909	2.499	1.693	14.981
6	0.75	hour	1%	22	47.8	0.98	3.386	5.8022	3.044	5.5207	2.2678	1.7398	14.7128
6	0.75	hour	1%	23	47.8	0.98	3.7779	5.811	3.044	5.5207	2.2678	1.7398	14.7128
6	0.75	hour	1%	24	47.8	0.98	3.9888	5.9051	2.877	5.4179	2.2111	1.4836	14.4454
6	0.75	hour	1%	25	47.8	0.98	3.7328	5.6038	2.877	5.4179	2.2111	1.4836	14.4454
6	0.75	hour	1%	26	47.8	0.98	4.3253	5.824	3.1598	5.7302	2.4604	1.821	15.0588
6	0.75	hour	1%	27	47.8	0.98	3.9589	5.6039	2.6664	5.1588	2.902	1.733	14.762
6	0.75	hour	1%	28	47.8	0.98	4.3134	5.754	3.1598	5.7302	2.4604	1.821	15.0588
6	0.75	hour	1%	29	47.8	0.98	4.61	5.9515	3.3051	5.7432	2.5461	1.7333	15.2835
6	0.75	hour	1%	30	47.8	0.98	4.7568	5.8633	3.5737	5.8802	2.7265	1.8515	15.6385
7	1	hour	1%	21	52.1	0.98	5.7711	10.067	5.1867	7.71	2.845	1.7472	17.882
7	1	hour	1%	22	52.1	0.98	5.3228	6.124	2.2145	5.8089	2.665	1.447	13.6628
7	1	hour	1%	23	52.1	0.98	4.4256	6.6399	2.665	5.8089	2.665	1.447	13.6628
7	1	hour	1%	24	52.1	0.98	3.9636	6.4103	2.9948	5.9283	1.8973	1.3272	13.5153
7	1	hour	1%	25	52.1	0.98	4.055	6.3366	2.8087	5.855	2.0993	1.434	15.306
7	1	hour	1%	26	52.1	0.98	4.25	6.2756	2.8087	5.855	2.0993	1.434	15.306
7	1	hour	1%	27	52.1	0.98	4.2713	6.5998	2.9356	5.9927	2.2323	1.5224	15.571
7	1	hour	1%	28	52.1	0.98	4.5558	6.6039	2.9356	5.9927	2.2323	1.5224	15.571
7	1	hour	1%	29	52.1	0.98	4.3497	6.8816	2.8277	6.3942	2.1738	1.474	16.3643
7	1	hour	1%	30	52.1	0.98	5.5151	6.9394	3.8265	6.9155	2.8297	1.9603	17.3646
8	1.5	hour	1%	21	58.2	0.98	6.7284	6.4642	3.8265	6.9155	2.8297	1.9603	17.3646
8	1.5	hour	1%	22	58.2	0.98	4.76	7.9205	3.9149	7.2467	2.125	1.4986	18.086
8	1.5	hour	1%	23	58.2	0.98	3.5651	6.4939	2.2632	5.8893	3.6369	1.547	15.009
8	1.5	hour	1%	24	58.2	0.98	4.2276	6.4752	2.2632	5.8893	3.6369	1.547	15.009
8	1.5	hour	1%	25	58.2	0.98	3.4815	5.4638	2.385	6.8477	1.968	1.3663	10.077
8	1.5	hour	1%	26	58.2	0.98	4.4961	7.5624	3.4815	6.8477	1.968	1.3663	10.077
8	1.5	hour	1%	27	58.2	0.98	4.2765	5.6464	2.4634	6.7643	1.8883	1.3771	13.3531
8	1.5	hour	1%	28	58.2	0.98	4.3524	7.4066	3.8268	6.7711	2.1183	1.444	17.0801
8	1.5	hour	1%	29	58.2	0.98	4.7469	7.5075	3.8268	6.7711	2.1183	1.444	17.0801
8	1.5	hour	1%	30	58.2	0.98	5.8002	8.9399	3.9568	7.8178	2.8778	1.99	20.1147
9	2	hour	1%	21	62.7	0.98	8.4847	15.912	10.0626	10.118	4.5908	3.3456	25.6487
9	2	hour	1%	22	62.7	0.98	8.1854	16.054	8.4301	8.1854	4.255	3.3456	25.6487
9	2	hour	1%	23	62.7	0.98	3.6887	8.484	7.2715	4.9495	2.0409	1.4189	12.2033
9	2	hour	1%	24	62.7	0.98	3.6424	8.484	7.2715	4.9495	2.0409	1.4189	12.2033
9	2	hour	1%	25	62.7	0.98	4.7474	8.6025	8.8959	4.7354	2.1647	1.7749	15.7103
9	2	hour	1%	26	62.7	0.98	2.9486	9.5399	3.7504	5.0334	2.2605	1.902	13.1259
9	2	hour	1%	27	62.7	0.98	3.9044	7.6278	3.7504	5.0334	2.2605	1.902	13.1259
9	2	hour	1%	28									

ROBWin Batch Run Summary

Program version : 6.45 (not updated) 20th March 2019
Coordinate : Monash University and
Date : run : 26 Aug 2022 9:42
Catchment file : K:\Jobs\2022\100 - Friends, Williams, Hoopers & Willing Roads, Rosedale\Dev1100003-ROB-PreDev.cfg
Spatial pattern : AR2016 point temporal patterns
Areal fact. : uniform
Lois factors : 1 Constant with AR

Parameter kc = 0.74 m = 0.8

Lois parameter initial loss (mm) Cont. loss (mm/h)

22 3.6

Peak Description

1 Calculated hydrograph AB
2 Calculated hydrograph Outlet
3 Calculated hydrograph D
4 Calculated hydrograph Outlet
5 Calculated hydrograph Outlet
6 Calculated hydrograph Total

Run	Duration	Unit	AEP	Thal	Rain(mm)	AB	Peak0001	Peak0002	Peak0003	Peak0004	Peak0005	Peak0006	
1	1.6667 hour	1%	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615			
1	1.6667 hour	1%	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615			
1	1.6667 hour	1%	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615			
1	1.6667 hour	1%	24.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615			
1	1.6667 hour	1%	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615			
1	1.6667 hour	1%	26	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615		
1	1.6667 hour	1%	27	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615		
1	1.6667 hour	1%	28	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615		
1	1.6667 hour	1%	29	25.3	0.96	0.632	0.7402	0.592	1.1734	0.3479	2.2615		
1	1.6667 hour	1%	30	35.5	0.97	1.6081	1.4127	2.9324	0.8663	6.3551			
2	0.25 hour	1%	31.1	0.97	1.6088	1.9809	1.4105	2.9148	0.8515	5.7472			
2	0.25 hour	1%	31.1	0.97	1.6088	1.9809	1.4105	2.9148	0.8515	5.7472			
2	0.25 hour	1%	31.1	0.97	1.7119	2.0105	1.4933	3.0349	0.8925	5.9379			
2	0.25 hour	1%	34	31.1	0.97	1.7149	2.0072	1.4838	3.0209	0.8883	5.9164		
2	0.25 hour	1%	35.5	0.97	1.8061	2.1133	1.6306	3.2714	0.9663	6.3551			
2	0.25 hour	1%	36	31.1	0.97	1.8061	2.1133	1.6306	3.2714	0.9663	6.3551		
3	0.33333 hour	1%	35.5	0.97	2.4793	2.9846	1.8847	4.3134	1.5116	8.2776			
3	0.33333 hour	1%	35.5	0.97	2.4793	2.9846	1.8847	4.3134	1.5116	8.2776			
3	0.33333 hour	1%	35.5	0.97	2.4632	2.9787	1.8684	4.095	1.4549	8.2196			
3	0.33333 hour	1%	34	35.5	0.97	2.7184	3.1909	2.3461	4.7946	1.405	9.3904		
3	0.33333 hour	1%	35.5	0.97	2.6244	3.1049	2.1011	4.4447	1.2811	8.8307			
3	0.33333 hour	1%	36	35.5	0.97	2.5622	3.0537	2.076	4.2273	1.2254	8.4834		
3	0.33333 hour	1%	37	35.5	0.97	2.6251	3.1055	2.1029	4.4473	1.282	8.8347		
3	0.33333 hour	1%	38	35.5	0.97	2.6168	3.0985	2.0818	4.4164	1.2712	8.7861		
3	0.33333 hour	1%	39	35.5	0.97	2.6926	3.1654	2.2779	4.6936	1.3706	9.2295		
3	0.33333 hour	1%	40	35.5	0.97	2.6927	3.1647	2.2758	4.6905	1.3695	9.2247		
4	0.41667 hour	1%	38.9	0.97	3.1651	3.8844	2.4384	5.2407	1.4579	10.566			
4	0.41667 hour	1%	38.9	0.97	3.2915	3.758	2.1963	4.8543	1.3407	9.9733			
4	0.41667 hour	1%	38.9	0.97	3.2479	3.9319	2.4946	5.4689	1.5138	10.9356			
4	0.41667 hour	1%	38.9	0.97	3.0524	3.8145	2.2425	5.1399	1.3913	10.347			
4	0.41667 hour	1%	38.9	0.97	3.1765	3.9021	2.3618	5.3151	1.4636	10.6798			
4	0.41667 hour	1%	38.9	0.97	3.0729	3.8484	2.424	5.0648	1.4837	10.2737			
4	0.41667 hour	1%	38.9	0.97	3.0805	3.8117	2.3671	5.0519	1.4452	10.0459			
4	0.41667 hour	1%	38.9	0.97	3.1229	3.8649	2.4716	5.1487	1.4838	10.4143			
4	0.41667 hour	1%	38.9	0.97	3.4001	4.0443	2.687	5.7383	1.6429	11.4255			
4	0.41667 hour	1%	38.9	0.97	3.4217	4.0807	2.7347	5.8641	1.6474	11.5133			
5	0.5 hour	1%	41.7	0.98	3.513	4.5444	2.6539	5.862	1.6148	11.9275			
5	0.5 hour	1%	41.7	0.98	3.2562	4.4614	2.341	5.4078	1.4112	11.163			
5	0.5 hour	1%	41.7	0.98	3.2542	4.4616	2.307	5.4547	1.4425	11.1014			
5	0.5 hour	1%	41.7	0.98	3.3454	4.4682	2.4548	5.6311	1.5129	11.3428			
5	0.5 hour	1%	41.7	0.98	3.4749	4.6236	2.6829	5.7292	1.6391	11.7626			
5	0.5 hour	1%	41.7	0.98	3.6023	4.5594	2.7909	5.9663	1.6884	12.1083			
5	0.5 hour	1%	41.7	0.98	3.337	4.4964	2.5402	5.6267	1.5487	11.7112			
5	0.5 hour	1%	41.7	0.98	3.4996	4.473	2.5727	5.8161	1.5897	11.6634			
5	0.5 hour	1%	41.7	0.98	3.7881	4.8827	2.8511	6.2904	1.7372	12.6093			
5	0.5 hour	1%	41.7	0.98	3.9009	4.7445	2.9697	6.5402	1.8395	13.1132			
6	0.75 hour	1%	41.7	0.98	4.5495	6.1103	3.2252	7.6548	2.016	15.4666			
6	0.75 hour	1%	47.8	0.98	4.2123	6.0336	3.0561	7.0652	1.902	14.4022			
6	0.75 hour	1%	47.8	0.98	3.9971	6.0519	2.6899	7.0712	1.6854	14.738			
6	0.75 hour	1%	47.8	0.98	3.9641	6.8156	2.8903	7.0979	1.7866	14.3899			
6	0.75 hour	1%	47.8	0.98	3.752	5.722	2.4745	6.6578	1.5488	13.7917			
6	0.75 hour	1%	47.8	0.98	4.3566	6.1519	3.2112	7.5422	1.9861	15.37			
6	0.75 hour	1%	47.8	0.98	3.9824	5.9609	2.6754	6.9259	1.6658	14.6598			
6	0.75 hour	1%	47.8	0.98	4.1559	5.9109	2.7903	7.2225	1.7595	14.7854			
6	0.75 hour	1%	47.8	0.98	4.6438	6.2212	3.3636	7.8215	2.0394	15.7692			
6	0.75 hour	1%	47.8	0.98	4.7621	6.2526	3.5974	7.9976	2.1889	16.3076			
7	1 hour	1%	52.1	0.98	5.3029	7.2443	3.9892	8.9676	2.4745	18.4116			
7	1 hour	1%	52.1	0.98	3.3683	6.0644	2.221	6.128	1.3995	13.212			
7	1 hour	1%	52.1	0.98	4.657	6.6466	3.2604	7.9263	2.0403	16.0882			
7	1 hour	1%	54	52.1	0.98	3.979	6.4709	2.6022	7.1559	1.6463	15.2408		
7	1 hour	1%	52.1	0.98	4.3079	6.585	2.8158	7.438	1.774	14.473			
7	1 hour	1%	52.1	0.98	4.2718	6.6271	2.9987	7.5926	1.8777	16.002			
7	1 hour	1%	52.1	0.98	4.2974	6.5907	2.9505	7.4597	1.8484	15.2033			
7	1 hour	1%	52.1	0.98	4.5831	7.0638	3.1672	8.1309	1.9791	17.0123			
7	1 hour	1%	52.1	0.98	4.3717	6.9912	2.8817	7.8905	1.8164	16.2975			
7	1 hour	1%	52.1	0.98	4.1817	7.0152	3.8464	8.781	2.3708	18.0158			
8	1.5 hour	1%	58.2	0.98	1.7502	6.4803	2.6683	4.2313	1.6515	13.3665			
8	1.5 hour	1%	58.2	0.98	4.6993	6.0123	2.9236	8.154	1.8608	16.741			
8	1.5 hour	1%	58.2	0.98	3.6273	6.7058	2.2341	6.8773	1.4238	14.8231			
8	1.5 hour	1%	58.2	0.98	4.2471	6.9941	2.8311	7.7461	1.7796	16.7472			
8	1.5 hour	1%	58.2	0.98	1.5028	5.3152	2.449	5.9468	1.4091	12.1002			
8	1.5 hour	1%	58.2	0.98	4.4261	7.5426	2.8513	7.965	1.789	16.8188			
8	1.5 hour	1%	58.2	0.98	4.2925	7.0383	2.6861	7.9162	1.7026	17.1176			
8	1.5 hour	1%	58.2	0.98	4.3675	7.5542	2.8349	8.1073	1.7773	17.3889			
8	1.5 hour	1%	58.2	0.98	4.7758	7.2913	3.393	8.1496	2.0897	16.6999			
8	1.5 hour	1%	58.2	0.98	4.8328	8.6211	3.9751	10.0516	2.4672	20.7099			
9	2 hour	1%	62.7	0.98	1.6647	6.2985	2.805	6.286	1.6139	13.0655			
9	2 hour	1%	62.7	0.98	3.8231	6.9523	2.4435	7.074	1.5451	15.2099			
9	2 hour	1%	62.7	0.98	3.7163	5.2709	2.7348	6.221	1.6969	12.5177			
9	2 hour	1%	64	62.7	0.98	3.6562	6.6509	2.5238	7.0867	1.5658	15.1923		
9	2 hour	1%	62.7	0.98	4.4909	7.7761	3.9036	8.2687	1.8174	17.3404			
9	2 hour	1%	62.7	0.98	2.953	6.0955	1.7626	5.7812	1.1208	12.9353			
9	2 hour	1%	62.7	0.98	3.9124	7.6995	2.4021	7.5259	1.116	16.6109			
9	2 hour	1%	62.7	0.98	4.2711	6.7486	3.2645	7.7278	2.0073	14.6486			
9	2 hour	1%	62.7	0.98	4.4849	7.9895	2.7096	8.303	1.7681	17.6191			
9	2 hour	1%	62.7	0.98	4.0951	6.1055	3.1899	8.5128	2.034	20.5633			
10	3 hour	1%	69.5	0.98	4.8771	8.8143	2.9528	9.1906	1.8893	19.8943			
10	3 hour	1%	69.5	0.98	2.8849	6.9729	1.7151	5.5292	1.1093	12.8024			
10	3 hour	1%	69.5	0.98	2.1657	4.3654	1.3101	4.049	0.8398	9.155			
10	3 hour	1%	64	69.5	0.98	2.7641	5.227	1.6708	3.2807	1.0688	11.5765		
10	3 hour	1%	69.5	0.98	3.8123	4.9412	1.8012	5.3485	1.1184	11.9781			
10	3 hour	1%	69.5	0.98	1.5037	4.2902	2.3908	4.6029	1.4822	14.0664			
10	3 hour	1%	69.5	0.98	4.6798	3.3933	1.7283	5.8488	1.0888	11.6329			
10	3 hour	1%	69.5	0.98	3.081	6.1896	1.877	5.8363	1.1994	13.0138			
10	3 hour	1%	69.5	0.98	2.9995	5.4762	1.9398	5.578	1.2253	12.2795			
10	3 hour	1%	69.5	0.98	4.5647	8.2425	2.862	8.5441	1.877	17.5535			
11	4.5 hour	1%	71.1	0.99	1.4798	2.9845	0.8958	2.8751	0.5073	6.3815			
11	4.5 hour	1%	71.1	0.99	4.9551	4.9513	1.595	4.7621	1.0081	10.7216			
11	4.5 hour	1%	71.1	0.99	2.0564	3.5199	1.4024	3.5957	0.8808	7.3887			
11	4.5 hour	1%	74	71.1	0.99	2.0564	3.5199	1.4024	3.5957	0.8808	7.3887		

APPENDIX D: DETENTION CALCULATION



Pre-Developed Flow Calculations

Client:	0.00	Date:	30.08.2021
Project:	Friends Road Rosedale		
Subject:	PRE-DEVELOPMENT FLOW CALCULATIONS		
Job No:	2100603	By:	RR

Location : Traralgon

ARI Year : 100

Coefficients						
a	b	c	d	e	f	g
4.03822	-0.68446	-0.06823	0.00755	0.00428	-0.00008	-0.00014

INPUT 1 2 3 4A 5A 6

Catchment	Area	Catchment Category	Catchment Type (For Fp)	Calculated Tc	Manual Input Tc	Selected Tc	Selected f _p	Weighted f _p	Calculated C	Manual Input C	Selected C	Ae	ΣAe	I ₁₀₀	Q ₁₀₀
	ha			mins	mins	mins			100	100	ha	ha	mm/hr	m ³ /s	
Total Site	187.290	RURAL1	Rural - Environmental	57.88		57.88	0.1	0.100	0.318		0.318	59.58	59.578	58.14	9.621
TOTAL	187.290	RURAL1		57.88		57.88		0.100	0.318				59.578	58.14	9.621

Tc Calculated using :

$$t_c = 0.76 \times A^{0.38}$$

Equation 5.4 AR&R

Weighted Frac Imperv using :

$$f = \sum \left(f_{area1} \times \frac{A_{area1}}{A_{total}} \right) + \left(f_{area2} \times \frac{A_{area2}}{A_{total}} \right)$$

C10 Calculated using :

$$C_{10} = 0.1 + 0.0133(I_1 - 25)$$

$$C_{10} = 0.9 \times f + C_{10} \times (1 - f)$$

Equation 14.11 and 14.12 AR&R

Q Calculated using :

$$Q = \frac{A_e \times i}{360}$$

Rational Method



Client:	0.00	Date:	07.09.2021
Project:	0.00		
Subject:	Friends, Williams, Hoopers and Willung Roads Rosedale 1% AEP Detention		
Job No:	2100603.00	By:	RR

Storm Duration	I	Sum CA	Peak Inflow	Inflow Volume V _I	Peak Allowable	1-Qp/Ip	Smax
			Ip		Qp		(m ³)
min	mm/hr	(ha)	(m ³ /s)	(m ³)	(m ³ /s)		
90			16.640	89856.00	16.480	0.01	864.00

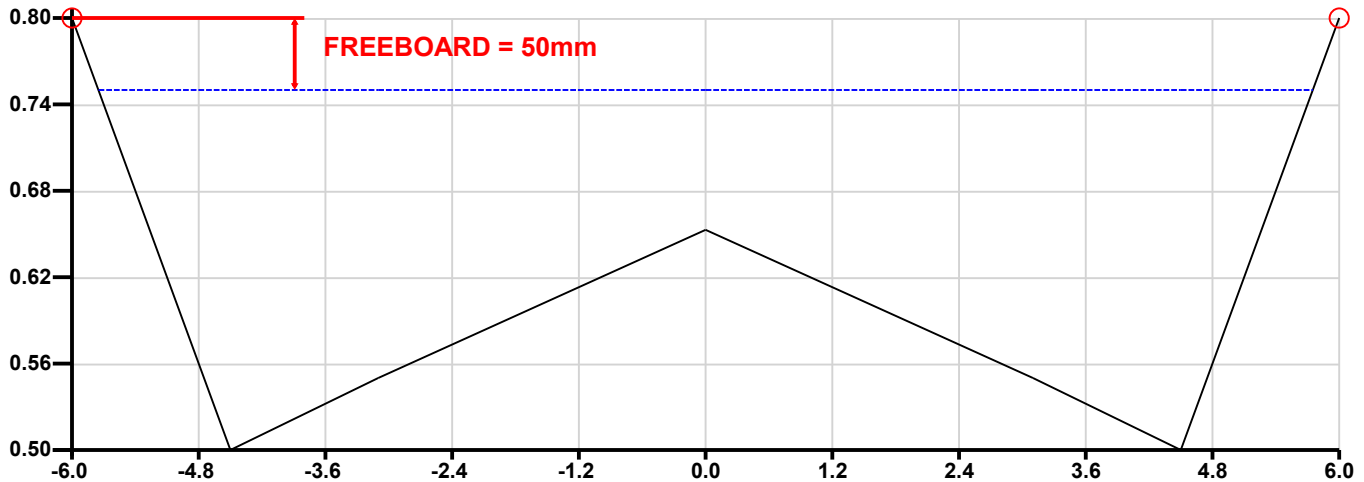
Required Detention, m ³	864.00
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Boyd's Formula

$$Q_P = I_P \left[1 - \frac{S_{\max}}{V_I} \right]$$

Inflow volume is determined from simplified triangular hydrograph

APPENDIX E: PC CONVEY ASSESSMENT

1. CROSS-SECTION:2. DISCHARGE INFORMATION:

100 year (1%) storm event

Total discharge = 1.8 cumecs

There is no pipe discharge

Overland / Channel / Watercourse discharge = 1.800 cumecs

3. RESULTS: Water surface elevation = 0.750m

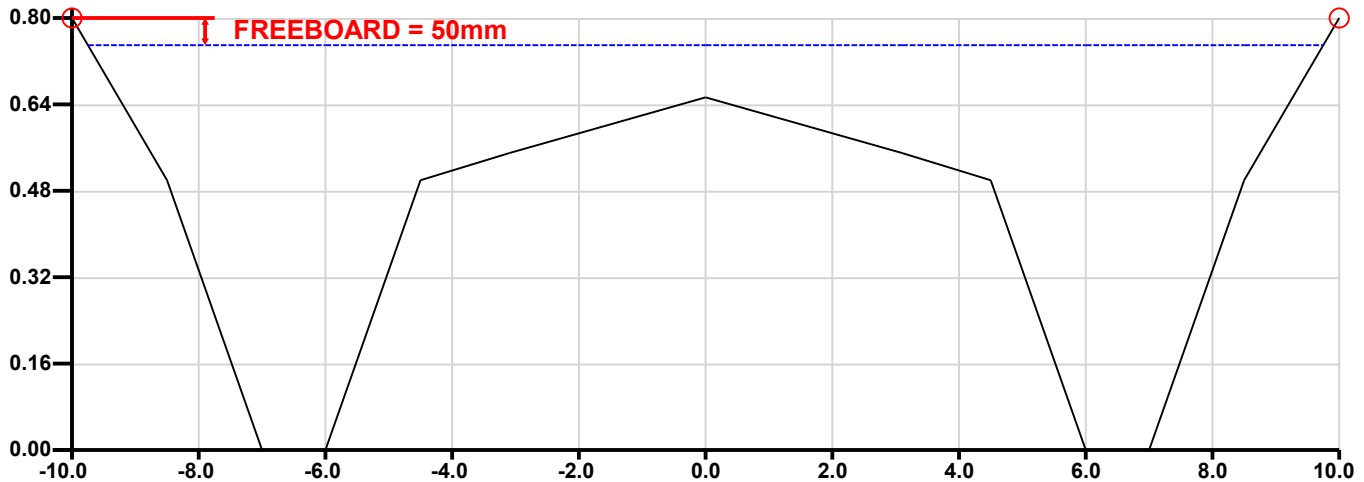
High Flow Channel grade = 1 in 80, Main Channel / Low Flow Channel grade = 1 in 200.

	<u>LEFT OVERBANK</u>	<u>MAIN CHANNEL</u>	<u>RIGHT OVERBANK</u>	<u>TOTAL CROSS-SECTION</u>
Discharge (cumecs):	0.00	1.85	0.00	1.85
D(Max) = Max. Depth (m):	0.00	0.25	0.00	0.25
D(Ave) = Ave. Depth (m):	0.00	0.16	0.00	0.16
V = Ave. Velocity (m/s):	0.00	0.99	0.00	0.99
D(Max) x V (cumecs/m):	0.00	0.25	0.00	0.25
D(Ave) x V (cumecs/m):	0.00	0.16	0.00	0.16
Froude Number:	0.00	0.79	0.00	0.79
Area (m ²):	0.00	1.86	0.00	1.86
Wetted Perimeter (m):	0.00	11.55	0.00	11.55
Flow Width (m):	0.00	11.50	0.00	11.50
Hydraulic Radius (m):	0.00	0.16	0.00	0.16
Composite Manning's n:	0.000	0.021	0.000	0.021
Split Flow?	-	-	-	No

4. CROSS-SECTION DATA:

<u>SEGMENT NO.</u>	<u>LEFT HAND POINT</u>		<u>RIGHT HAND POINT</u>		<u>MANNING'S N</u>
	<u>CHAINAGE (m)</u>	<u>R.L. (m)</u>	<u>CHAINAGE (m)</u>	<u>R.L. (m)</u>	
1	-6.000	0.800	-4.500	0.500	0.035
2	-4.500	0.500	-3.100	0.550	0.015
3	-3.100	0.550	0.000	0.653	0.015
4	0.000	0.653	3.100	0.550	0.015
5	3.100	0.550	4.500	0.500	0.015
6	4.500	0.500	6.000	0.800	0.035

APPENDIX F: PC CONVEY ASSESSMENT (PROPOSED CHANNEL)

1. CROSS-SECTION:2. DISCHARGE INFORMATION:

100 year (1%) storm event

Total discharge = 7.41 cumecs

There is no pipe discharge

Overland / Channel / Watercourse discharge = 7.410 cumecs

3. RESULTS: Water surface elevation = 0.750m

High Flow Channel grade = 1 in 80, Main Channel / Low Flow Channel grade = 1 in 200.

	<u>LEFT</u> <u>OVERBANK</u>	<u>MAIN</u> <u>CHANNEL</u>	<u>RIGHT</u> <u>OVERBANK</u>	<u>TOTAL</u> <u>CROSS-SECTION</u>
Discharge (cumecs):	0.00	7.71	0.00	7.71
D(Max) = Max. Depth (m):	0.00	0.75	0.00	0.75
D(Ave) = Ave. Depth (m):	0.00	0.33	0.00	0.33
V = Ave. Velocity (m/s):	0.00	1.21	0.00	1.21
D(Max) x V (cumecs/m):	0.00	0.91	0.00	0.91
D(Ave) x V (cumecs/m):	0.00	0.40	0.00	0.40
Froude Number:	0.00	0.68	0.00	0.68
Area (m ²):	0.00	6.36	0.00	6.36
Wetted Perimeter (m):	0.00	19.88	0.00	19.88
Flow Width (m):	0.00	19.50	0.00	19.50
Hydraulic Radius (m):	0.00	0.32	0.00	0.32
Composite Manning's n:	0.000	0.027	0.000	0.027
Split Flow?	-	-	-	No

4. CROSS-SECTION DATA:

<u>SEGMENT NO.</u>	<u>LEFT HAND POINT</u>		<u>RIGHT HAND POINT</u>		<u>MANNING'S N</u>
	<u>CHAINAGE (m)</u>	<u>R.L. (m)</u>	<u>CHAINAGE (m)</u>	<u>R.L. (m)</u>	
1	-10.000	0.800	-8.500	0.500	0.035
2	-8.500	0.500	-7.000	0.000	0.035
3	-7.000	0.000	-6.000	0.000	0.035
4	-6.000	0.000	-4.500	0.500	0.035
5	-4.500	0.500	-3.100	0.550	0.013
6	-3.100	0.550	0.000	0.653	0.013
7	0.000	0.653	3.100	0.550	0.013
8	3.100	0.550	4.500	0.500	0.013
9	4.500	0.500	6.000	0.000	0.035
10	6.000	0.000	7.000	0.000	0.035
11	7.000	0.000	8.500	0.500	0.035
12	8.500	0.500	10.000	0.800	0.035