Adams

DESIGNING THE FUTURE

Stormwater Management Plan Report for

Vasey RSL Care Pty Ltd

at

McClelland Drive, Overend Court, & Neilson Square, Bell Park, VIC 3215

REVISION HISTORY

Revision Number	Prepared By	Description	Date
1	Jacob Lane	Draft Issue	19/11/2025
2	Jacob Lane	Town Planning Issue	01/12/2025
3	Jacob Lane	Town Planning Issue	26/03/2026

DOCUMENT ACCEPTANCE

Action	Name	Signed	Date
Prepared by	Jacob Lane	JL	26/03/2026
Reviewed by	Chris White	CW	26/03/2026
Approved by	Chris White	CW	26/03/2026
On behalf of	Adams Consulting Engineers Pty Ltd		

This report is of a defined scope and only for this commission. Adams should be consulted where any questions regarding the interpretation or completeness of our report arise.

CONTENTS

1 INTRODUCTION

Adams Consulting Engineers Pty Ltd (Adams) has been engaged by Vasey RSL Care Pty Ltd to prepare a Stormwater Management Report for the proposed development of the new RSL accommodation village at McClelland Drive, Overend Court & Neilson Square, Bell Park, Victoria, hereafter within the report named the "Site". See Figure 1 below for proposed masterplan.

This report will outline the methodology adopted and associated results of:

- Pre and post development stormwater runoff flow from the Site,
- Legal Point of Discharge,
- Requirements and volume of on-site detention (OSD),
- Water Sensitive Urban Design (WSUD),
- Overland flow paths through the site.

It is understood that this report will be utilised in the Town Planning Application and will also support the basis of the design works to ensure continuity through the project.

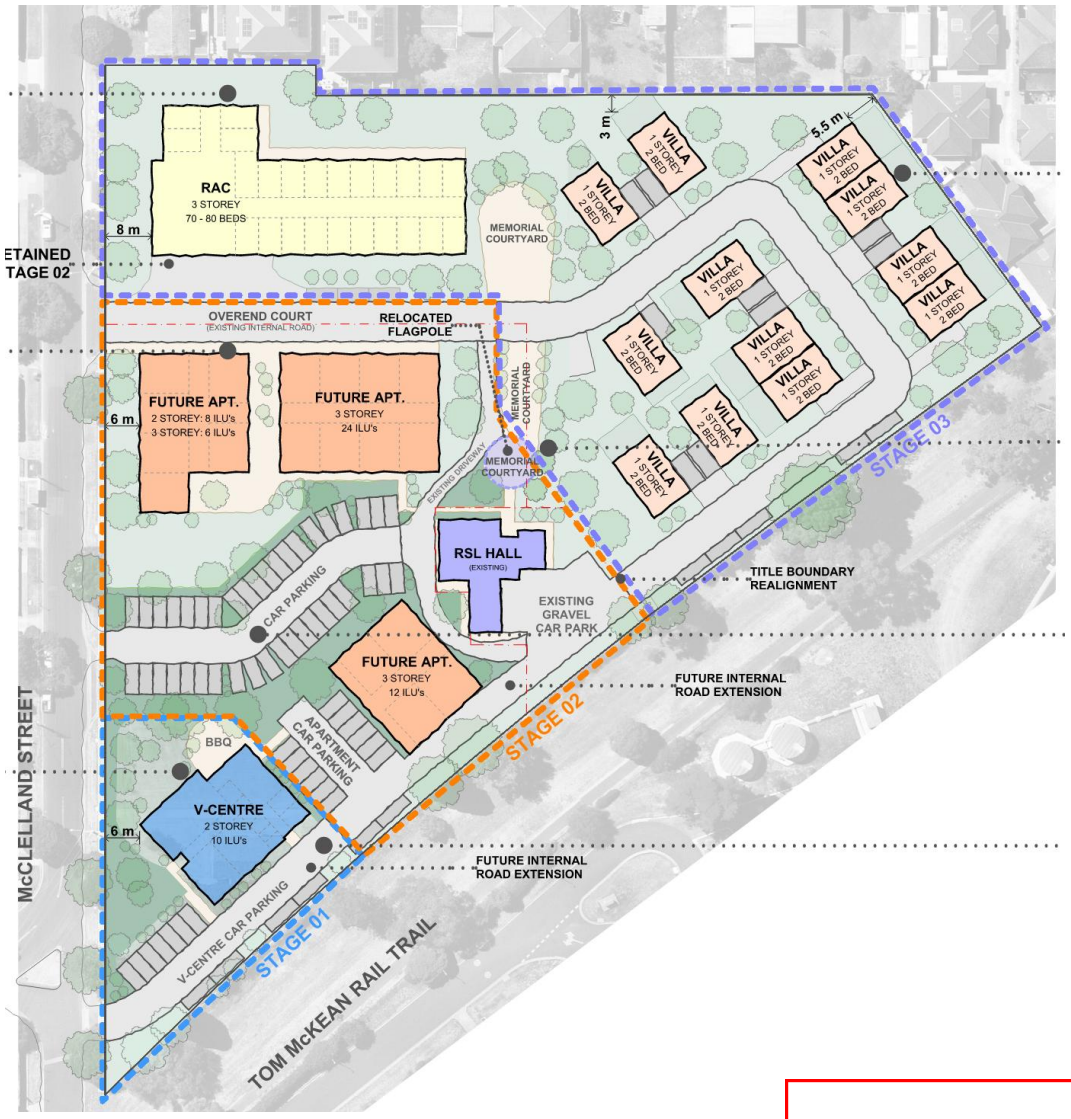


Figure 1 – Masterplan 'Site' (Proposed site plan, Foreground Architecture, November 2025)

2 EXISTING FEATURES

2.1 Existing Site Description

The Site is in Bell Park on McClelland Street and is approximately 4km northwest of Geelong's CBD. The Site has an area of approximately 1.64 hectares and includes 39 single level brick villa and community hall. Along the southern boundary is Tom McKean Rail Trail which also borders The McKellar Centre on the other side of the trail corridor. Along the northern boundary are residential housing of Vistula Avenue. Overend Court is an internal road within the village that services villas and the RSL hall, while Neilson Square is a grassed landscape area facing McClelland Street.

The Site is one large village spanning over two property title lots. Lot 1 is an area of 6965m^2 (6969m^2 on the survey), and Lot 2 is an area of 9365m^2 (9364m^2 on the survey).

A feature survey conducted by Swanson Surveying of the Site on 20/03/2025 and indicates that the natural slope of the land falls from the southwest corner to the northeast corner, at an average gradient of approximately 1:40 to 1:60 fall.

Figure 2 – Existing Site (Google Maps, November 2025)

2.2 Existing Authority Stormwater Pipe Infrastructure

A review of the Before You Dig Australia (BYDA) information indicates that there are no existing Council stormwater assets located near the Site.

There is an existing swale table drain that runs parallel adjacent to the Site boundary line along Tom McKean Rail Trail, flowing towards the northeast to Thompson Road drainage system.

From visual inspection on 5th Nov 2025, it appears that overland flow from the Site and residential housing along Vistula Avenue discharge into the swale.

It is unknown where in-ground drainage discharges to and further investigation is likely required. There does not appear to be any in-ground pipes discharging to the existing swale table drain.

The below Figure 3 is of Tom McKean Rail Trail facing northeast, with Site and the existing swale drain on the left, raised vehicle trail in the middle, and a pedestrian path and The McKellar Centre to the right.

Figure 3 – Tom McKean Rail Trail (November 2025)

2.3 Existing Internal Drainage Infrastructure

The drainage network within the Site consists mainly of three side entry pits at the northeast end of Overend Court, a grated pit (P1) in the northeast 45-degree boundary corner of the site with an outlet flowing towards the Tom McKean Rail Trail and appears to connect to a concrete cover junction pit (P2) in the northeast corner of the site.

Surveyors attended site to investigate pit P2, and confirmed P2 pit as a drainage junction pit with a 375dia pipe outlet pipe from the Site. The existing 375dia pipe runs under the fence to the property of 51 Vistula Avenue. It is unknown where this pipe connects to the Council drainage system downstream of this outlet, and further investigation may be required.

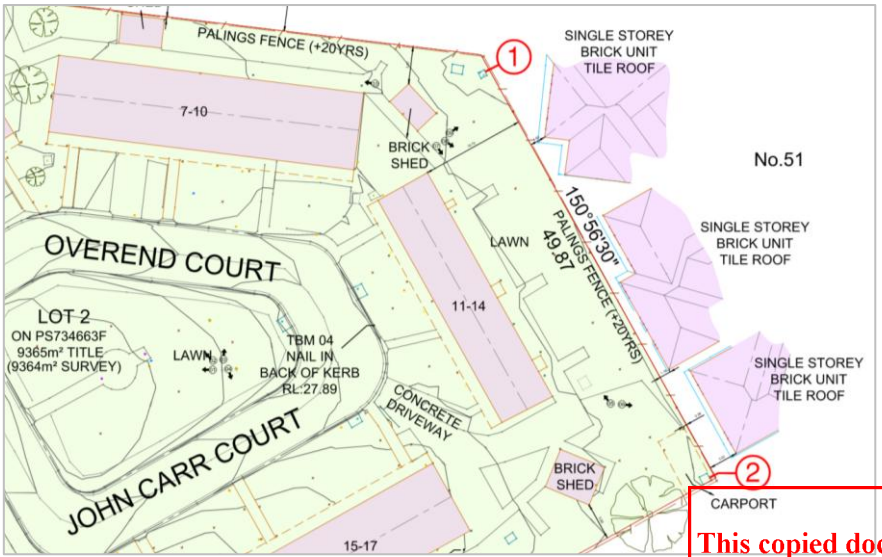


Figure 4 – Location of existing drainage pits (Feature Survey, March 2025)


Figure 5 – Pit 1 and Pit 2 respectively per Fig 4 (November 2025)

Figure 6 – Site Northeast Corner, Tom McKean Rail Trail (November 2025)

Drainage pits are scattered around the site to collect surface drainage; however, it seems that existing surface drainage predominantly flow away from site via overland surface flows.

2.4 Legal Point of Discharge (LPD)

The existing LPD is currently unknown and is to be investigated further on site and downstream. It is expected that Pit 2 as mentioned in section 2.3 is the outlet pit for the site and connects to the Council system downstream of the site.

2.5 Existing Land Flooding Overlays

A review was undertaken of the online planning maps VicPlan provided by the Department of Transport and Planning (DTP) and Corangamite Catchment Management Authority (CCMA) online flood mapping, to determine whether the Site is subject to flooding during a 1% Annual Exceedance Probability (AEP) stormwater event.

There does not appear to be any flooding information on the VicPlan maps per Figure 7, as no overlays are present nearby the Site.

The CCMA mapping (Figure 8) shows that stormwater flooding can be expected for 1% AEP (100-year ARI) storm events within the Site. An application for details of this flooding has been submitted to CCMA and is pending response. Information or requirements from CCMA regarding the flood overlay may dictate finished floor levels of proposed buildings. See Appendix E for enlarged image.

A separate application to City of Greater Geelong for a Property Information Report has also been submitted to determine whether Council also deem if the site liable to flooding.

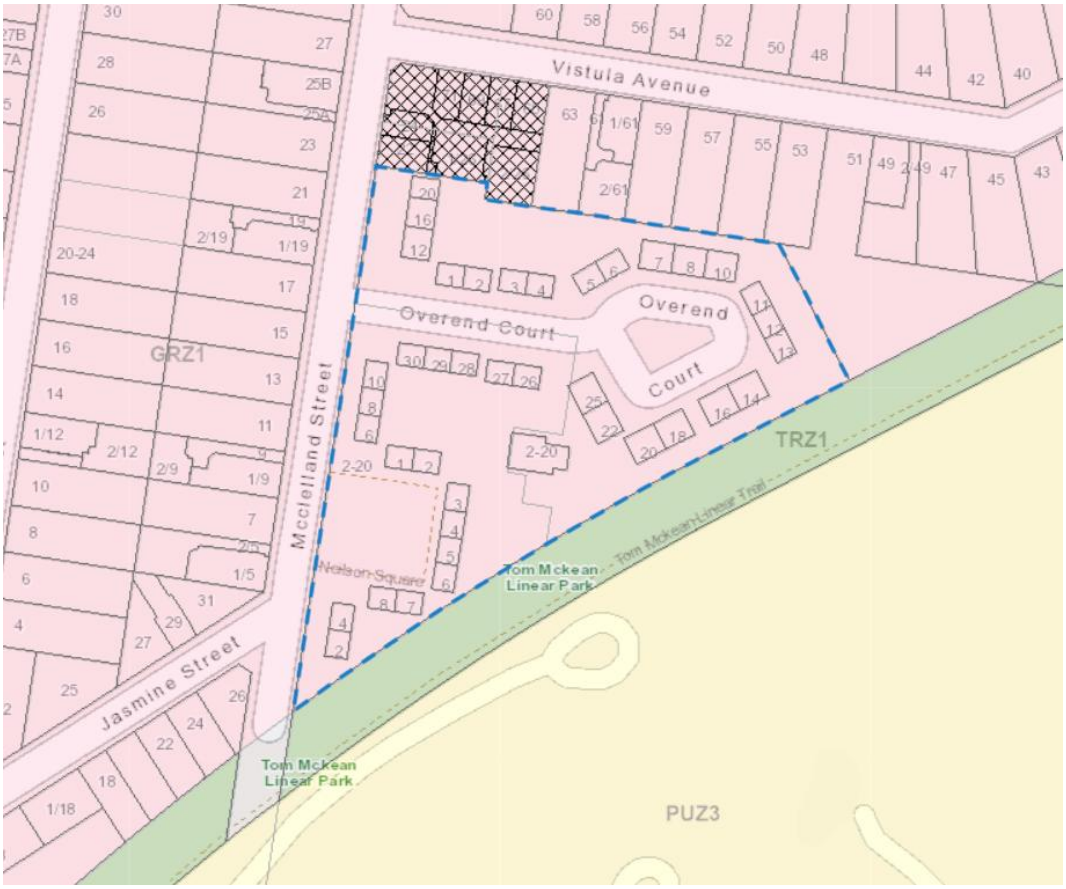


Figure 7 – Planning Flood Overlay – Planning Maps Online (Victoria State Government – Department of Transport and Planning)

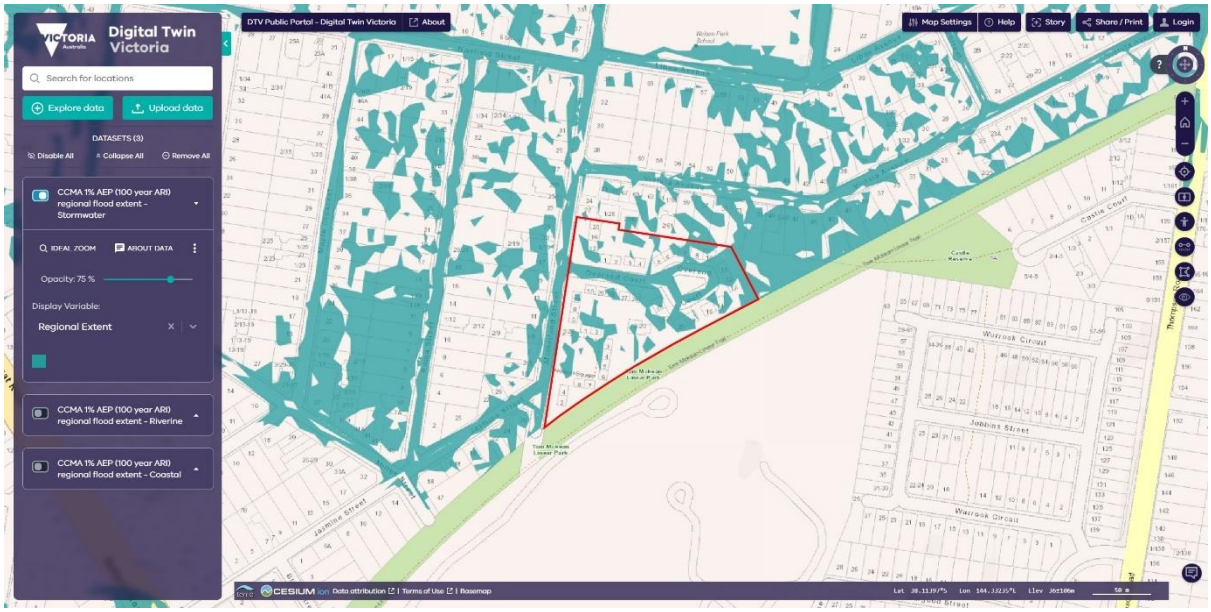


Figure 8 – CCMA 1% Stormwater Flood Overlay (Corangamite Catchment Management Authority, December 2025)

3 PROPOSED DEVELOPMENT

3.1 Proposed Site Description

The proposed development of the Site will consist of a combination of new single storey villas and double storey apartment accommodation, while retaining the RSL hall and part of the Overend Court alignment. A new link road along with southern boundary is proposed to connect with Overend Court with new carparking added to the site and adjacent the RSL hall. Landscaping areas will fill in the surrounds between the new buildings and roads.

The Site title Lots are to be combined / subdivided to delineate separate stages of development for the project, which will form one large, connected village. Common Property sub-titles will be created for the internal roads and public area infrastructures and maintained under Owner Corporation agreements. Refer to Figure 1 for the proposed Site masterplan.

Stage 1 title will consist of a new double storey apartment building and new carparking. Refer to Figure 9 below for Stage 1 proposed ground floor plan.

Stage 2 title will consist of the rest of the site accommodation, roads, carparking, and the existing RSL Hall. Stage 2 is likely to be subdivided in the future to for Stages 2 and 3, however as this subdivision is still under review / being finalised, for the purpose of this report Stage 2 will be considered as one title lot.

The drainage for all subdivision titles is intended to drain via the Common Properties to the Legal Point of Discharge.

Temporary connections to existing internal drainage systems on site will drain Stage 1 until the Common Property titles of Stage 2 & 3 are formalised and under construction.

The strategy of site drainage and associated requirements (e.g. Legal Point of Discharge, on-site detention, stormwater treatment) is to be combined in one system prior to the Site LPD in Stage 3 area.

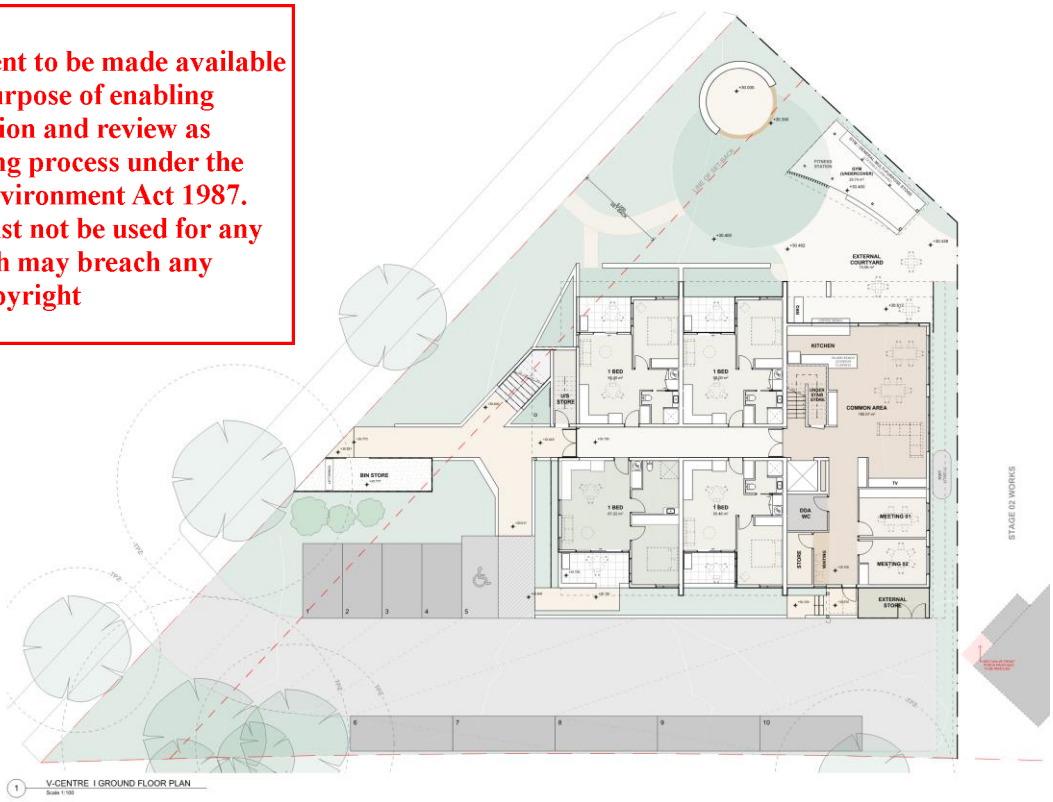


Figure 9 – Proposed Stage 1 – Ground Floor Plan (Foreground Architecture, November 2025)

3.2 Legal Point of Discharge

The Legal Point of Discharge (LPD) report received from City of Greater Geelong Council on 25th November 2025 nominates the site to discharge to the existing swale drain via the existing internal drainage system on site.

Further correspondence from Council regulating to the "Planning Permit Pre-Application" received on 16th February 2026, states that Council does not support discharging to the existing swale, which is within VicTrack land. Council's Environment team has advised that the VicTrack land is very contaminated.

Council's records do not have any documentation of existing assets within or around the site and are unable to verify any existing underground discharge points. The existing drainage discharge point is to be investigated on site and confirm its suitability for connection – capacity, easements allowing access to the LPD and its quality of condition.

Surveyors attended site to investigate pit P2, as described in section 2.3 of this report, which confirmed P2 pit as a drainage pit with a 375dia pipe exiting the site. The existing 375dia pipe runs under the fence to the property of 51 Vistula Avenue. It is unknown where this pipe connects to the Council drainage system downstream of this outlet, and further investigation may be required.

It is proposed that the existing 375dia pipe outlet from P2 is to be utilised as the Legal Point of Discharge from the site.

The detention system and proprietary treatment unit for the site is proposed to be installed as an end-of-line system prior to the LPD and will cater for all Stages of the Site, including existing buildings, prior to their future reconstruction.

Refer to Appendix D for the original Legal Point of Discharge report received from Council.

3.3 Proposed Overland Flow Path

During storm events that exceeds the 1% AEP (1 in 100-year storm event) storm intensity, overland stormwater flow is to be uninterrupted and unobstructed, falling away from and around any new and existing buildings. It is intended for the overland flow path to follow the natural fall of the land towards the northeast, to the existing swale along Tom McKean Rail Trail.

The main method for creating overland flow paths will be with pavements and general landscaping falling away from or between buildings. Drainage pits and pipes will be placed around new buildings to capture runoff and assist in reducing overland flow.

Surface flows following the natural topography of the land will then either seep into the natural vegetation and soil or make its way down to the existing swale adjacent the Site.

Figure 10 represents an illustration of the intended overland flow path.

Figure 10 – Proposed Overland Flow Path – Masterplan (Foreground Architecture, November 2025)

4 DESIGN CRITERIA

4.1 Hydraulic Modelling Methodology

This section will outline the analysis methods of determining the appropriate runoff calculations, detention volume and stormwater quality targets.

It is proposed that the rational method is used to meet City of Greater Geelong Council design requirements of analysis for determining runoff for the proposed development.

The rational method is shown in the below equation.

$$Q = \frac{CIA}{3600}$$

Where: *Q = Stormwater flow (L/s);*

C = Coefficient of impervious area;

I = Rainfall Intensity (mm/hr); and

A = Area (m^2).

4.2 IFD Data

2016 rainfall intensity data was obtained from the Bureau of Meteorology website (accessed November 2025) and is presented in the below table.

Table 1 - Annual Exceedance Probability (AEP) – Rainfall Intensity (mm/hr)

Duration	Duration in min	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	65.7	76.3	111	137	164	201	232
2 min	2	53.5	62.1	90.2	110	129	155	176
3 min	3	48.6	56.3	81.6	99.4	117	141	161
4 min	4	44.9	52	75.4	92.1	109	132	151
5 min	5	41.9	48.5	70.3	86.1	102	125	143
10 min	10	31.4	36.4	53.2	65.6	78.5	97	112
15 min	15	25.3	29.4	43.2	53.4	64	79.3	91.8
20 min	20	21.4	24.9	36.6	45.3	54.3	67.2	77.8
25 min	25	18.7	21.7	31.9	39.4	47.3	58.4	67.6
30 min	30	16.6	19.3	28.4	35.1	42	51.8	59.8
45 min	45	12.8	14.8	21.7	26.7	31.8	39	44.9
1 hour	60	10.6	12.3	17.8	21.8	25.9	31.7	36.3
1.5 hour	90	8.19	9.42	13.5	16.4	19.4	23.5	26.8
2 hour	120	6.85	7.83	11.1	13.4	15.8	19.1	21.7
3 hour	180	5.38	6.1	8.46	10.2	11.9	14.3	16.2
4.5 hour	270	4.26	4.79	6.53	7.79	9.07	10.9	12.3
6 hour	360	3.63	4.06	5.47	6.5	7.55	9.04	10.2
12 hour	720	2.46	2.74	3.64	4.3	4.97	5.96	6.76
24 hour	1440	1.61	1.81	2.43	2.88	3.33	4.01	4.55

4.3 Site Areas

4.3.1 Total Site areas

Approximately 16,338m^2, consisting of roof (4,600m^2), paving (5,700m^2), and landscaping (6,038m^2).

4.3.2 Stage 1 areas

Approximately 1,736m^2, consisting of roof (540m^2), paving (600m^2), and landscaping (596m^2).

4.3.3 Stage 2 areas

Approximately 14,602m^2, consisting of roof (4,060m^2), paving (5,100m^2), and landscaping (5,442m^2).

4.4 Detention

4.4.1 Requirements

It is assumed that detention will be required for both Stage 1 and the following stages to restrict post-development flows to that of pre-development flows to satisfy Council's requirements, due to the increased in impervious areas of the proposed development.

The City of Greater Geelong Planning Scheme contains the policy 'Integrated water management' at Clause 19.03-3S and the policy 'Stormwater Management in Urban Development' at Clause 53.18 which include strategies for new development to provide stormwater management infrastructure, and for stormwater and drainage systems to protect downstream environments, waterways and bays, minimise stormwater quantity related impacts and minimise flood risks, among other strategies. On-site detention is the primary method of satisfying these policies relating stormwater quantity impacts.

As City of Greater of Geelong utilises the Infrastructure Design Manual, therefore the detention design parameters will be based on the below from Section 19.3.4:

- Detention of flows up to and including the 20% AEP post-development flow is reduced back to the pre-development 1EY event (63.20% AEP) flow.

Table 13 Storage Volumes and Discharge Rates for Small Detention Systems

TYPE OF DEVELOPMENT	ORIGINAL AND REQUIRED DESIGN PARAMETERS	ALLOWABLE DISCHARGE RATE (litres/sec/ha)	STORAGE REQUIRED (litres/ m^2)	
			VERTICAL (Tank/ Basin)	HORIZONTAL (Pipe)
Multi-unit development (newer residential areas)	C=0.5 for a 20% **AEP** to C=0.8 for a 20% **AEP**	65	8	10
Multi-unit development (older residential areas)	C=0.5 for a 1EY event to C=0.8 for a 20% **AEP**	37	12	14
Industrial development (older areas)	C=0.5 for a 1EY event to C=0.9 for a 10% **AEP**	37	16	18
Industrial development (newer areas)	C=0.9 for a 1EY event to C=0.9 for a 10% **AEP**	65	12	14
Commercial development	C=0.9 for a 1EY event to C=0.9 for a 5% **AEP**	65	15	17

Figure 11 – Infrastructure Design Manual, Section 19.3.4 (Version 5.30)

4.4.2 Methodology

The analysis method proposed is the use of the software OSD4W. This software takes into account a range of storm durations and rainfall intensities to determine the "worst-case-scenario" (i.e. largest expected flows) to be detained based on the input parameters such as impervious and pervious areas, coefficients of runoff, and time of concentration.

It is proposed that additional detention volume from collection of stormwater runoff from the proposed development will be captured in either underground pipes or tanks.

4.5 Water Sensitive Urban Design (WSUD)

The City of Greater Geelong Planning Scheme contains the policy 'Permeability and stormwater management objective' at Clause 55.05-1, the policy 'Integrated water management' at Clause 19.03-3S, and the policy 'Stormwater Management in Urban Development' at Clause 53.18. All three policies include strategies for new development and subdivisions to provide stormwater management infrastructure, and for stormwater and drainage systems to protect and improve the health of downstream environments and water sources, minimise stormwater quality related impacts by filtering sediment, litter, and waste from stormwater prior to discharge to site, and facilitate use of alternative water sources such as rainwater reuse systems, among other strategies.

The solutions put forward in this stormwater management report seek to address relevant strategies within the above policies and uses the BPEM Guidelines as the framework to demonstrate suitable stormwater management outcomes.

The requirements of the Best Practice Environmental Management Guidelines are as follows:

- 80% retention of total suspended solids (TSS)
- 45% retention of phosphorus
- 45% retention of nitrogen
- 70% retention of gross pollutants.

A certificate generated from either a MUSIC model or Blue Factor to demonstrate that the above targets for stormwater quality are met is provided.

The solutions proposed in this report are derived from Water Sensitive Urban Design (WSUD) principles achieve the required targets. Refer to section 5.3 for the results output.

5 ANALYSIS RESULTS

5.1 Hydrologic Runoff

For detailed computations of hydrologic runoff refer to Appendix A.

5.1.1 Pre-development Runoff Calculations – 1:5yr (20% AEP) Storm

Total Site area	186	L/s
Stage 1	16	L/s
Stage 2	171	L/s

5.1.2 Pre-development Runoff Calculations – 1:100yr (1% AEP) Storm

Total Site area	379	L/s
Stage 1	32	L/s
Stage 2	347	L/s

5.1.3 Post-development Runoff Calculations – 1:5yr (20% AEP) Storm

Total Site area	216	L/s
Stage 1	24	L/s
Stage 2	193	L/s

5.1.4 Post-development Runoff Calculations – 1:100yr (1% AEP) Storm

Total Site area	440	L/s
Stage 1	48	L/s
Stage 2	392	L/s

5.2 Detention Calculation

Stage 1 OSD volume required is 6.27m3.

Stage 2 OSD volume required is 68.89m3.

Refer to Appendix B for details OSD computations and output results.

The final detention volume will need to be completed once detailed design phase is near completion, when catchment areas and runoff surfaces areas are finalised.

5.3 Water Sensitive Urban Design Implementation

As outlined in Section 4.5, the proposed development is being designed to comply with the requirements of the Best Practice Environmental Management Guidelines.

The Site has been modelled via the MUSIC software.

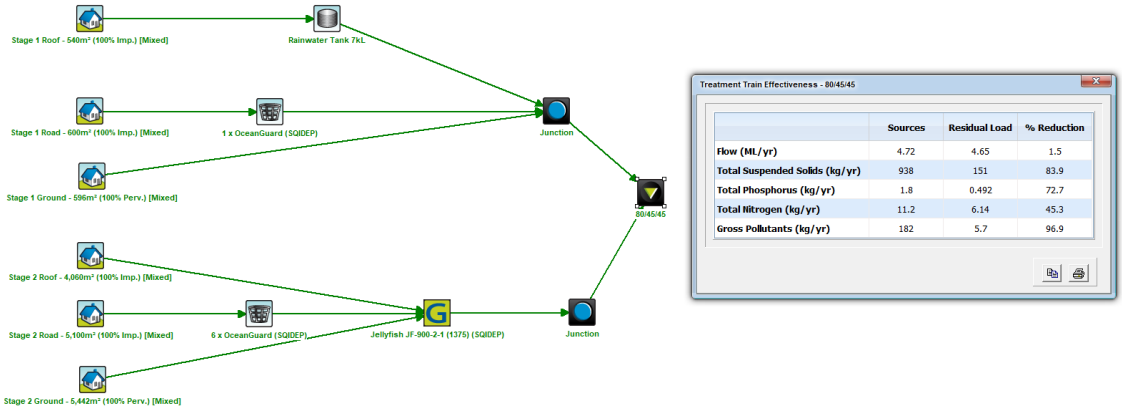


Figure 12 – MUSIC Modelling output

Enlarged in Appendix C.

The strategy for stormwater treatment is to use a combination of measures to achieve the required targets. These include rainwater reuse tanks to collect and reticulate roof drainage to toilet flushing, baskets within stormwater pits to capture litter and rubbish, and an end-of-line treatment unit for stage 2. It is anticipated that stage 2 will also incorporate rainwater reuse tanks, however the size and location of these will be determined during the detailed design phase.

6 CONCLUSION

Adams Consulting Engineers Pty Ltd (Adams) has been engaged by Vasey RSL Care Pty Ltd to prepare a Stormwater Management Report for the proposed Site at McClelland Drive, Overend Court & Neilson Square, Bell Park, Victoria. This report outlined the methodology adopted and associated results of:

- Pre and post development stormwater runoff flow from the Site,
- Legal Point of Discharge,
- Requirements and volume of on-site detention (OSD),
- Water Sensitive Urban Design (WSUD),
- Overland flow paths through the site.

As outlined in this report, the following key items have been identified:

- The existing overall site area generates approximately 186L/s & 379L/s for 20% & 1% AEP storms respectively.
- The existing Stage 1 site area generates approximately 16L/s & 32L/s for 20% & 1% AEP storms respectively.
- The existing Stage 2 site area generates approximately 171L/s & 347L/s for 20% & 1% AEP storms respectively.
- The proposed overall site development is expected to discharge approximately 216L/s & 440L/s for 20% & 1% AEP storms respectively.
- The proposed Stage 1 site development is expected to discharge approximately 24L/s & 48L/s for 20% & 1% AEP storms respectively. As a result, the development requires 6.27m^3 of stormwater detention. The volume is proposed to be stored underground in either over-sized pipes or tanks to achieve the required volume.
- The proposed Stage 2 site development is expected to discharge approximately 193L/s & 392L/s for 20% & 1% AEP storms respectively. As a result, the development requires 68.89m^3 of stormwater detention. The volume is proposed to be stored underground in either over-sized pipes or tanks to achieve the required volume.
- WSUD requirements have been considered for this development as part of an integrated stormwater management system. As such, MUSIC modelling has been completed showing the use of rainwater reuse tanks, pit baskets, and end-of-line treatment units to meet the best practice pollution reduction targets.
- The developer is required to maintain and manage WSUD treatment systems in accordance with Melbourne Water Guidelines and maintenance schedules.
- Overland flow management during storm events exceeding the 100-year ARI storm intensity is through the natural fall of the land towards the Legal Point of Discharge.
- The Legal Point of Discharge is to match that of the existing LPD strategy. The existing LPD is to a pit in the northeast corner of the property via an existing 375dia outlet pipe. It is to be investigated on site where this pipe discharges to the Council system to downstream of the Site as no outlets could be found nearby with visual inspection.

APPENDIX A – HYDROLOGIC COMPUTATIONS

Site Pre-Development Discharge Calcs - Minor Storm

Total Site Area (A)	16,335	m^2		
			C	**Ae**
Impermeable Area - Roof	3,338	m^2	*0.9*	*3004.2* m^2
Impermeable Area - Paving	4,216	m^2	*0.9*	*3794.4* m^2
Semi-Impermeable Area - Gravel	539	m^2	*0.5*	*269.5* m^2
Permeable Area - Landscape	8,242	m^2	*0.3*	*2472.6* m^2
Total Areas	16,335	m^2	***0.58***	9540.7 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.58	

Pre Development Discharge Q ***186.31*** L/s Q = C.I.A/3600

Site Pre-Development Discharge Calcs - Major Storm

Total Site Area (A)	16,335	m^2		
			C	**Ae**
Impermeable Area - Roof	3,338	m^2	*0.9*	*3004.2* m^2
Impermeable Area - Paving	4,216	m^2	*0.9*	*3794.4* m^2
Semi-Impermeable Area - Gravel	539	m^2	*0.5*	*269.5* m^2
Permeable Area - Landscape	8,242	m^2	*0.3*	*2472.6* m^2
Total Areas	16,335	m^2	***0.58***	9540.7 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.58	

Pre Development Discharge Q ***378.98*** L/s Q = C.I.A/3600

Site Post-Development Discharge Calcs - Minor Storm

Total Site Area (A)	16,335	m^2		
			C	**Ae**
Impermeable Area - Roof	4,600	m^2	*0.9*	*4140* m^2
Impermeable Area - Paving	5,700	m^2	*0.9*	*5130* m^2
Permeable Area - Landscape	6,038	m^2	*0.3*	*1811.4* m^2
Total Areas	16,338	m^2	***0.68***	11081.4 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.68	

Pre Development Discharge Q ***216.36*** L/s Q = C.I.A/3600

Site Post-Development Discharge Calcs - Major Storm

			C	Ae
Total Site Area (A)	16,335	m^2		
Impermeable Area - Roof	4,600	m^2	*0.9*	*4140* m^2
Impermeable Area - Paving	5,700	m^2	*0.9*	*5130* m^2
Permeable Area - Landscape	6,038	m^2	*0.3*	*1811.4* m^2
Total Areas	16,338	m^2	***0.68***	11081.4 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.68	

Pre Development Discharge Q ***440.10*** L/s Q = C.I.A/3600

Stage 1 Pre-Development Discharge Calcs - Minor Storm

			C	Ae
Total Site Area (A)	1,736	m^2		
Impermeable Area - Roof	248	m^2	*0.9*	*223.2* m^2
Impermeable Area - Paving	209	m^2	*0.9*	*188.1* m^2
Semi-Impermeable Area - Gravel	34	m^2	*0.5*	*17* m^2
Permeable Area - Landscape	1,245	m^2	*0.3*	*373.5* m^2
Total Areas	1,736	m^2	***0.46***	801.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.46	

Pre Development Discharge Q ***15.66*** L/s Q = C.I.A/3600

Stage 1 Pre-Development Discharge Calcs - Major Storm

			C	Ae
Total Site Area (A)	1,736	m^2		
Impermeable Area - Roof	248	m^2	*0.9*	*223.2* m^2
Impermeable Area - Paving	209	m^2	*0.9*	*188.1* m^2
Semi-Impermeable Area - Gravel	34	m^2	*0.5*	*17* m^2
Permeable Area - Landscape	1,245	m^2	*0.3*	*373.5* m^2
Total Areas	1,736	m^2	***0.46***	801.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.46	

Pre Development Discharge Q ***31.85*** L/s Q = C.I.A/3600

Stage 1 Post-Development Discharge Calcs - Minor Storm

			C	Ae
Total Site Area (A)	1,736	m^2		
Impermeable Area - Roof	540	m^2	*0.9*	*486* m^2
Impermeable Area - Paving	600	m^2	*0.9*	*540* m^2
Permeable Area - Landscape	596	m^2	*0.3*	*178.8* m^2
Total Areas	1,736	m^2	***0.69***	1204.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.69	

Pre Development Discharge Q ***23.53*** L/s Q = C.I.A/3600

Stage 1 Post-Development Discharge Calcs - Major Storm

			C	Ae
Total Site Area (A)	1,736	m^2		
Impermeable Area - Roof	540	m^2	*0.9*	*486* m^2
Impermeable Area - Paving	600	m^2	*0.9*	*540* m^2
Permeable Area - Landscape	596	m^2	*0.3*	*178.8* m^2
Total Areas	1,736	m^2	***0.69***	1204.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.69	

Pre Development Discharge Q ***47.86*** L/s Q = C.I.A/3600

Stage 2 Pre-Development Discharge Calcs - Minor Storm

			C	Ae
Total Site Area (A)	14,602	m^2		
Impermeable Area - Roof	3,090	m^2	*0.9*	*2781* m^2
Impermeable Area - Paving	4,007	m^2	*0.9*	*3606.3* m^2
Semi-Impermeable Area - Gravel	505	m^2	*0.5*	*252.5* m^2
Permeable Area - Landscape	7,000	m^2	*0.3*	*2100* m^2
Total Areas	14,602	m^2	***0.60***	8739.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.60	

Pre Development Discharge Q ***170.67*** L/s Q = C.I.A/3600

Stage 2 Pre-Development Discharge Calcs - Major Storm

			C	Ae
Total Site Area (A)	14,602	m^2		
Impermeable Area - Roof	3,090	m^2	*0.9*	*2781* m^2
Impermeable Area - Paving	4,007	m^2	*0.9*	*3606.3* m^2
Semi-Impermeable Area - Gravel	505	m^2	*0.5*	*252.5* m^2
Permeable Area - Landscape	7,000	m^2	*0.3*	*2100* m^2
Total Areas	14,602	m^2	***0.60***	8739.8 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.60	

Pre Development Discharge Q ***347.16*** L/s Q = C.I.A/3600

Stage 2 Post-Development Discharge Calcs - Minor Storm

			C	Ae
Total Site Area (A)	14,602	m^2		
Impermeable Area - Roof	4,060	m^2	*0.9*	*3654* m^2
Impermeable Area - Paving	5,100	m^2	*0.9*	*4590* m^2
Permeable Area - Landscape	5,442	m^2	*0.3*	*1632.6* m^2
Total Areas	14,602	m^2	***0.68***	9876.6 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	5	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	70.30	mm/hr
Cw (weighted average)	0.68	

Pre Development Discharge Q ***192.87*** L/s Q = C.I.A/3600

Stage 2 Post-Development Discharge Calcs - Major Storm

			C	Ae
Total Site Area (A)	14,602	m^2		
Impermeable Area - Roof	4,060	m^2	*0.9*	*3654* m^2
Impermeable Area - Paving	5,100	m^2	*0.9*	*4590* m^2
Permeable Area - Landscape	5,442	m^2	*0.3*	*1632.6* m^2
Total Areas	14,602	m^2	***0.68***	9876.6 m^2

Parameters as per City of Greater Geelong Design Requirements

ARI	100	years
Storm Duration	5	min
Storm Duration Table Index	1	
Intensity(I)	143.00	mm/hr
Cw (weighted average)	0.68	

Pre Development Discharge Q ***392.32*** L/s Q = C.I.A/3600

APPENDIX B – OSD RESULTS (DETENTION)

Stage 1 - On-Site Detention Volume Required

Predevolpment Impervious Fraction, C_{W1}	0.5
Postdevolpment Impervious Fraction, C_{W2}	0.80
Total Site Area, A_T (ha)	0.1736
Time of Concentration, T_c (min)	5
Critical Storm Duration	**11**
Detention Volume Required (m^3)	**6.27**

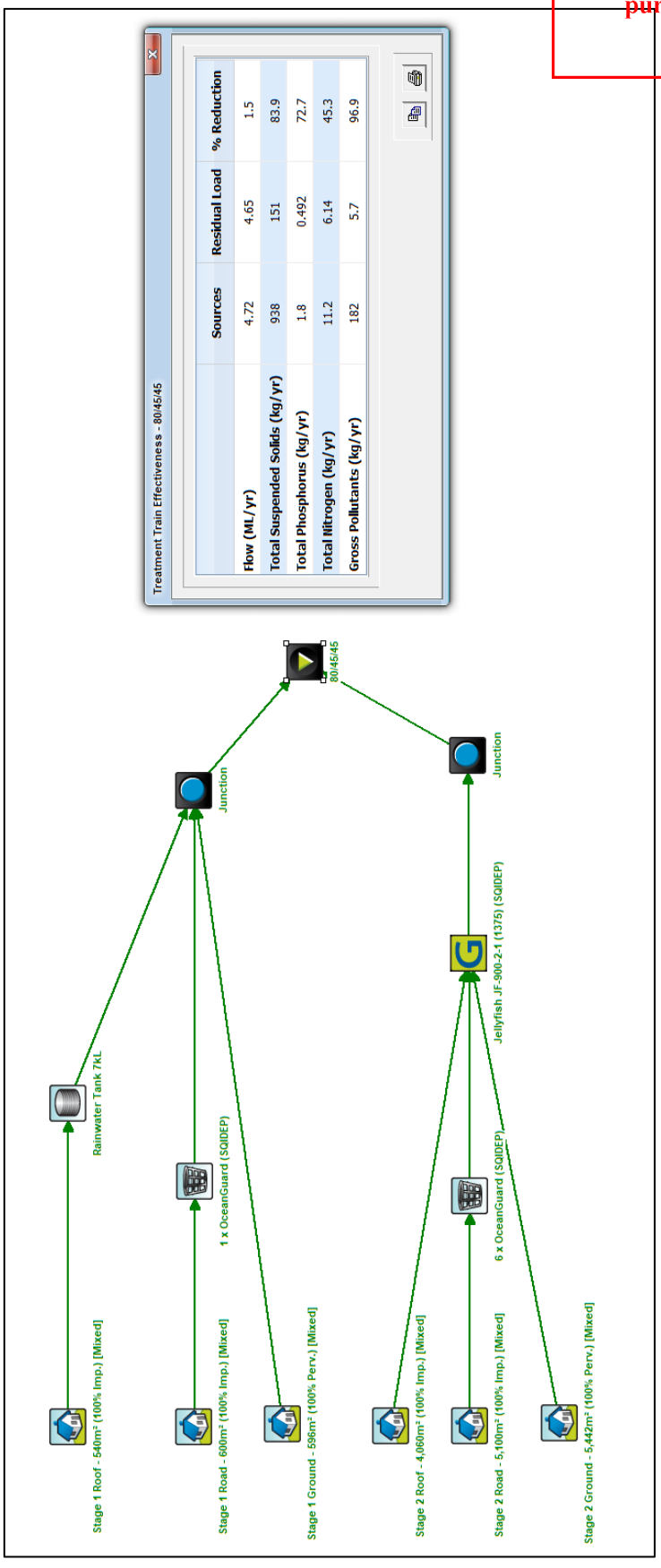
Storm Duration (min)	Pre-Development 1yr ARI (1EY / 63.2% AEP) Intensity (mm/hr)	Post-Development 5yr ARI (20% AEP) Intensity (mm/hr)	I_P (m^3/s)	Q_P (m^3/s)	V_1 (m^3)	S_{max} (m^3)
5	41.9	70.3	0.027	0.010	8.136053	5.11
6	39.2	66	0.025	0.010	9.16608	5.53
7	36.9	62.2	0.024	0.010	10.07806	5.83
8	34.8	58.9	0.023	0.010	10.90671	6.06
9	33	55.9	0.022	0.010	11.64509	6.19
10	31.4	53.2	0.021	0.010	12.31403	6.25
11	29.9	50.8	0.020	0.010	12.93436	6.27
12	28.6	48.6	0.019	0.010	13.49914	6.23
13	27.4	46.7	0.018	0.010	14.05234	6.17
14	26.3	44.9	0.017	0.010	14.54999	6.06
15	25.3	43.2	0.017	0.010	14.99904	5.91
16	24.4	41.7	0.016	0.010	15.44346	5.75
17	23.6	40.3	0.016	0.010	15.85778	5.55
18	22.8	39	0.015	0.010	16.24896	5.34
19	22.1	37.7	0.015	0.010	16.57996	5.06
20	21.4	36.6	0.014	0.010	16.94336	4.82
25	18.7	31.9	0.012	0.010	18.45947	3.31
30	16.6	28.4	0.011	0.010	19.72096	1.54
35	15.1	25.7	0.010	0.010	20.82043	-0.39
40	13.8	23.5	0.009	0.010	21.75787	-2.49
45	12.8	21.7	0.008	0.010	22.60272	-4.67
50	11.9	20.2	0.008	0.010	23.37813	-6.93
55	11.2	18.9	0.007	0.010	24.06096	-9.28
60	10.6	17.8	0.007	0.010	24.72064	-11.65
75	9.19	15.3	0.006	0.010	26.5608	-18.90
90	8.19	13.5	0.005	0.010	28.1232	-26.43
105	7.44	12.1	0.005	0.010	29.40784	-34.24
120	6.85	11.1	0.004	0.010	30.83136	-41.91
180	5.38	8.46	0.003	0.010	35.24774	-73.86
240	4.56	7.03	0.003	0.010	39.05306	-106.42

Stage 2 - On-Site Detention Volume Required

Predevolpment Impervious Fraction, C_{W1}	0.5
Postdevolpment Impervious Fraction, C_{W2}	0.80
Total Site Area, A_T (ha)	1.4602
Time of Concentration, T_c (min)	10
Critical Storm Duration	**14**
Detention Volume Required (m^3)	**68.89**

Storm Duration (min)	Pre-Development 1yr ARI (1EY / 63.2% AEP) Intensity (mm/hr)	Post-Development 5yr ARI (20% AEP) Intensity (mm/hr)	I_P (m^3/s)	Q_P (m^3/s)	V_1 (m^3)	S_{max} (m^3)
5	41.9	70.3	0.228	0.064	68.43471	49.33
6	39.2	66	0.214	0.064	77.09856	54.17
7	36.9	62.2	0.202	0.064	84.76948	58.02
8	34.8	58.9	0.191	0.064	91.7395	61.17
9	33	55.9	0.181	0.064	97.95022	63.56
10	31.4	53.2	0.173	0.064	103.5769	65.37
11	29.9	50.8	0.165	0.064	108.7946	66.77
12	28.6	48.6	0.158	0.064	113.5452	67.69
13	27.4	46.7	0.152	0.064	118.1983	68.53
14	26.3	44.9	0.146	0.064	122.3842	68.89
15	25.3	43.2	0.140	0.064	126.1613	68.85
16	24.4	41.7	0.135	0.064	129.8994	68.77
17	23.6	40.3	0.131	0.064	133.3844	68.43
18	22.8	39	0.127	0.064	136.6747	67.90
19	22.1	37.7	0.122	0.064	139.4588	66.86
20	21.4	36.6	0.119	0.064	142.5155	66.10
25	18.7	31.9	0.104	0.064	155.2679	59.75
30	16.6	28.4	0.092	0.064	165.8787	51.25
35	15.1	25.7	0.083	0.064	175.1267	41.40
40	13.8	23.5	0.076	0.064	183.0117	30.18
45	12.8	21.7	0.070	0.064	190.118	18.18
50	11.9	20.2	0.066	0.064	196.6403	5.60
55	11.2	18.9	0.061	0.064	202.3837	-7.76
60	10.6	17.8	0.058	0.064	207.9325	-21.32
75	9.19	15.3	0.050	0.064	223.4106	-63.15
90	8.19	13.5	0.044	0.064	236.5524	-107.32
105	7.44	12.1	0.039	0.064	247.3579	-153.83
120	6.85	11.1	0.036	0.064	259.3315	-199.17
180	5.38	8.46	0.027	0.064	296.479	-391.28
240	4.56	7.03	0.023	0.064	328.4866	-588.52

APPENDIX C – MUSIC MODELLING OUTPUT



APPENDIX D – LEGAL POINT OF DISCHARGE

POINT OF DISCHARGE REPORT

Stormwater Drainage, Easement, and Allotment Information

CITY OF GREATER GEELONG

A. APPLICANT:

APPLICATION NO. 2902-2025-SRFI
Reference: AP:
APP Ref: Reference No

Adams Consulting Engineers Pty Ltd
Level 10
620 Bourke Street
MELBOURNE VIC 3000

CONTACT NAME: Philip

CONTACT NUMBER 03 8600 9705

CONTACT EMAIL: CIVILADMIN@ADAMSENG.COM.AU

B. PROPERTY DETAILS

Proposed Development
- Multi Dwelling Re-Development

Property Address: **2-20 McClelland Street, BELL PARK VIC 3215**
6965m2 Lot 1 TP 8759629365m2 Lot 2 PS 734663

C STORMWATER DRAINAGE, EASEMENT AND ALLOTMENT INFORMATION

(i) LOCATION OF STORMWATER DISCHARGE (REGULATION 133 (2)) - Refer Note 1 & 3

- Discharge to the swale drain via existing internal drainage system as shown (assumed location, existing location to be confirm onsite) (current site conditions, not proposed)

(ii) ALLOTMENT BOUNDARY DIMENSIONS - Refer Note 3

- Refer to Plan of Subdivision

(iii) DRAINAGE EASEMENTS ON ALLOTMENT - Refer Note 2 &3

- Refer to Plan of Subdivision

(iv) SIZE, DEPTH AND OFFSET OF STORMWATER DRAINAGE PIPES WITHIN EASEMENTS - Refer to No. 3

- Stormwater not applicable
- Sewer on-site

(v) DETAILS OF FILL ON ALLOTMENT [IF KNOWN] – Refer to Note 3

- Unknown

Notes:
1. The information in relation to the location of stormwater discharge is provided as consent and a report of Council pursuant to the provisions of Regulation 133(2) of the Building Regulations 2018.
2. If it is proposed to carry out any building works over any drainage easement the consent and report of Council pursuant to Regulation 130 of the Building Regulations – 2018 is required.

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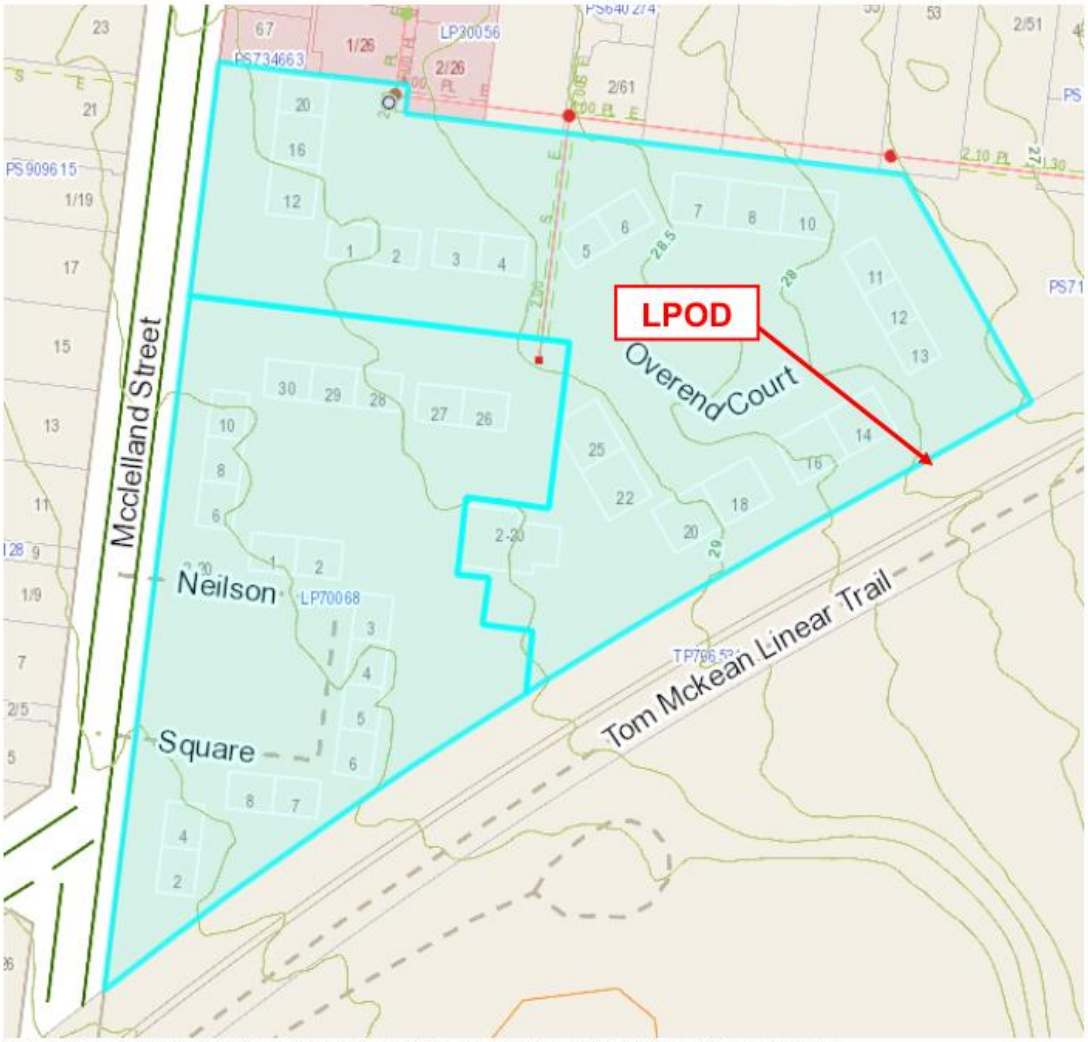
3. The information provided has been drawn from records held by the City of Greater Geelong. It is believed that the information is correct but if you intend relying on it, you should make on-site investigations and enquiries of all other sources to verify accuracy. The City of Greater Geelong accepts no liability if this information is subsequently found to be in error or incomplete.

Authorised Officer: **Alana Purton** Issued: **20-Nov-2025**



***arrow location is indicative only and existing connection should be confirmed onsite**

ADVERTISED PLAN

ENGL-059

APPENDIX E – CCMA 1% STORMWATER FLOOD MAPPING