AD DESIGN+CONSULTING

Engineering + Development
Infrastructure Services
Project Management

16/09/2022

David Boyle
Assessment Officer
TasWater
GPO Box 1393
Hobart, TAS 7001

Dear David,

RE: 5 Rose Lane, South Launceston
TWDA 2022/01229-LCC (DA0439/2022)

In reference to your request for further information dated 02th August 2022 regarding the above-mentioned project, please refer responses below addressing the raised items.

Should you have any further queries, please contact me on the details below.

Yours sincerely,

Tom Norman

Senior Engineer

AD Design & Consulting Pty Ltd

tom@addconsulting.com.au

(03) 6144 7652

Item 1:

Response

To determine hydraulic loading on the TasNetwork system and to obtain further advice as to the boundary conditions at the site a preliminary hydraulic analysis was undertaken. Detailed of the analysis are enclosed, which summarises all information required by TasWater.

A stormwater management plan has been completed showing that the post-development stormwater runoff can be mitigated to pre-existing levels. Refer to the enclosed stormwater management plan for details.

Item 2:

Response

A preliminary water and sewer design has been completed with the proposed works and property connection shown. Propoerty connections shown are indicative and will be further confirmed once detailed design commence. The design does show that the property connection can be located per TasWater specifications and the all new TasWater infastrucutre is to be constructed in public land, with no easements proposed.

No existing property connection are shown on the TasWater GIS, nor were they located during surveying of the site. As such it has been assumed that the site is not services by any existing property connections and that new ones will be constructed.

Sewerage Demand Calculations

AD DESIGN+CONSULTING
Engineering / Project Management / Property Development

Client
Project: 5 Rose Lane, South Launceston - Commercial
Number: 22 054
Revision: A
By: TN

Data Inputs

New Development?	Yes	
Development Area	.76 ha	Rear carpark not considered
Development Type	Commercial	
Pct Impervious	70%	
Rainfall Intensity	14.0 mm/hr	One Hour, 50% AEP. Ontain from BOM
Ground Water Pct	30%	Assumed some areas are effected

Loadings:

Code	No.	ET	Description
BE04	2990.00	17.94	Office

Copy and insert above row to add new type. ET + Description will reference Code type and update

Demand:

ET	17.94 ET
ADWF	0.10 L/s
PDWF	0.79 L/s
GWI	0.01 L/s
RDI	0.23 L/s

Design Flow	1.02 L/s
DF / PDWF	1.30

Demand calculated automatically, do not change

Water Demand Calculations

AD DESIGN+CONSULTING
Engineering / Project Management / Property Development

Client
Project: 5 Rose Lane, South Launceston - Commercial
Number: 22 054
Revision: A
By: TN

Data Inputs

ET for PSD	Yes	Use the ET or number of units for PSD calc
Tourist Zone	No	Is this a tourist zone

Loadings:

Code	No.	ET	Description
Similtaneous Hydrants	1.00		Assume the offices are fire compartmentulised
BE04	2990.00	11.96	Office

Copy and insert above row to add new type. ET + Description will reference Code type and update

Demand:

ET	11.96 ET	
AD	0.09 L/s	
PD	0.21 L/s	AD x 2.25
PH	0.43 L/s	PD x 2
if Units < 101, Check PSD		
PSD	1.94 L/s	AS3500.1.18 Section 3.2.3

Design Criteria:

Base Demand	0.97 L/s	Using PSD
Fire Demand	10.00 L/s	

Peak Flows

Peak	1.94 L/s	
2/3 Peak + Fire	11.29 L/s	

Demand calculated automatically, do not change

Required Pressure

Line	Flow (L/s)	Size (mm)	Length (m)	Velocity (m/s)	Re	k (m)	CW	Lambda	Fitting	Ku	Friction Loss (m)	Static Head (m)	Minor Losses (m)	Total Loss (m)
AB	11.29	100	88	1.437	9.58E+04	1.50E-04	1.33E-08	0.0182			1.683	4		
									Tee-Branch	1.80			0.190	
									Meter	5.00			0.527	
									Hydrant	5.00			0.527	6.926

Fitting Ku Values	
Reducer	0.9
45 Bend	0.4
90 Bend	0.9
Tee- Thru	0.6
Tee-Branch	1.8
Meter	5
Hydrant	5

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WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THE EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

SUBJECT TO FINAL VERIFICATION AND APPROVAL

FOR APPROVAL
NOT FOR CONSTRUCTION

Rev No	Date	Revision Note	Drn	Ver.	App.
A	16/09/22	Development Application	TN	TN	TN

AD DESIGN + CONSULTING
Engineering / Infrastructure Services / Project Management

Client: Errol Stewart

Project: 5 Rose Lane, South Launceston

		Signed	Date
Drawn	TN		16/09/22
Designed	TN	Signed	Date 16/09/22
Checked	TN	Signed	Date 16/09/22
Approved	AD	Signed	Date 16/09/22

Drawing Title: Commercial Development
Water and Sewer General Arrangement
Sheet 1

Project No.: 22054
Scale: -
Sheet Size: A3
Drawing No.: D-01-10-01
Rev: A

PLOTTED: 9/16/2022 12:09:00 PM C:\12ds\data\addc-s1\22054 - 5 rose lane, south launceston - commercial_10271\02 cadd\drawings\da\d-01-10-01.dwg

DESIGN MEMO

TO: **Development Engineer, Launceston City Council**

FROM: **Tom Norman**

DATE: **23/09/2022**

PROJECT: **5 Rose Lane, South Launceston – Commercial Development**

RE: **Design Memorandum – Stormwater Quality and Quantity**

AD Design & Consulting has been engaged to provide advice on the stormwater management requirements for a proposed commercial development at 5 Rose Lane, South Launceston.

This document aims to satisfy the requirements of Launceston City Council through:

- assessment of the stormwater discharges from the site and providing mitigation solutions if required; and
- determining the requirements for stormwater quality treatment devices to satisfy pollutant reduction targets.

Key site details are tabulated in Table 1.

Table 1: Site details

Location	**5 Rose Lane, South Launceston**
Municipality	Launceston City Council
Property Area	Approximately 1.42 ha

Figure 1: 5 Rose Lane, South Hobart (LIST, 2022)

1 Stormwater Quantity

A hydrological and hydraulic study has been undertaken for the site to determine the impacts of the development on stormwater discharge. The pre-developed scenario was modelled to obtain the existing runoff rates from the site. This was then compared to the post-development model, which accounted for the construction of pavement, structures, and new drainage infrastructure. To attenuate the flows from the site, stormwater detention was included.

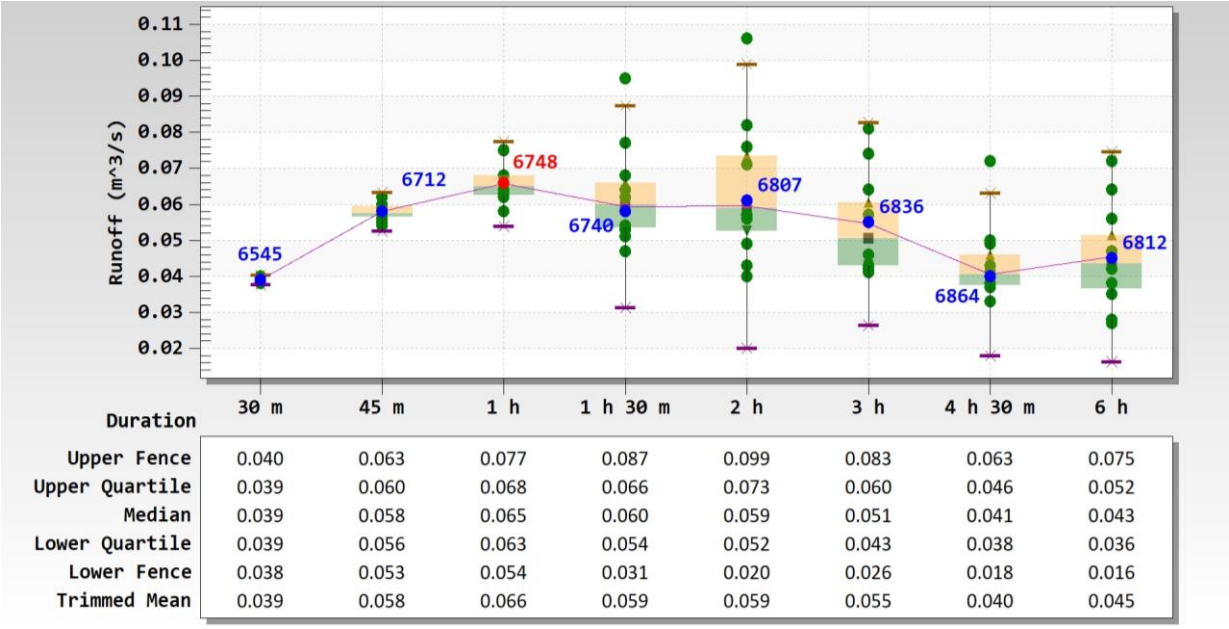
Pre-development Hydrology

Hydrology was undertaken in accordance with the Australian Rainfall and Runoff 2019, utilising the Laurenson Method for runoff routing. The pre-developed scenario uses a lumped catchment approach to determine site runoff, the properties are given below:

Table 2: catchment properties for the predevelopment catchment

Area	1.42 ha
Equal Area Slope	2.5 %
Manning's	0.05
Fraction impervious	0%
Losses	10mm IL and 2mm CL

This resulted in a maximum mean site discharge **of 66 L/s and a critical storm duration of 1 hours**. The ensemble box plot of the hydrology is shown below. This was be adopted as the permissible site discharge for the developed scenario.



Duration	30 m	45 m	1 h	1 h 30 m	2 h	3 h	4 h 30 m	6 h
Upper Fence	0.040	0.063	0.077	0.087	0.099	0.083	0.063	0.075
Upper Quartile	0.039	0.060	0.068	0.066	0.073	0.060	0.046	0.052
Median	0.039	0.058	0.065	0.060	0.059	0.051	0.041	0.043
Lower Quartile	0.039	0.056	0.063	0.054	0.052	0.043	0.038	0.036
Lower Fence	0.038	0.053	0.054	0.031	0.020	0.026	0.018	0.016
Trimmed Mean	0.039	0.058	0.066	0.059	0.059	0.055	0.040	0.045

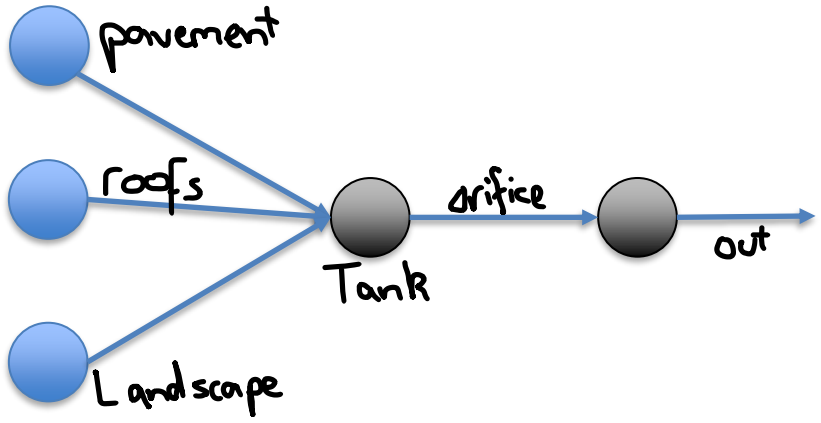
Figure 2: Pre-development catchment, runoff ensemble box plot

Post-Development Hydrology and Hydraulics

To determine post development site runoff, it was necessary to undertake a coupled hydrological – hydraulic model which accounted for the on-site detention.

1.1.1 On site detention

To mitigate stormwater to the pre-development level, on-site detention is proposed. This detention volume will be implemented as an underground tank with a DN150 orifice which will attenuate stormwater from the entire development. A schematic of the underground detention model is given below.

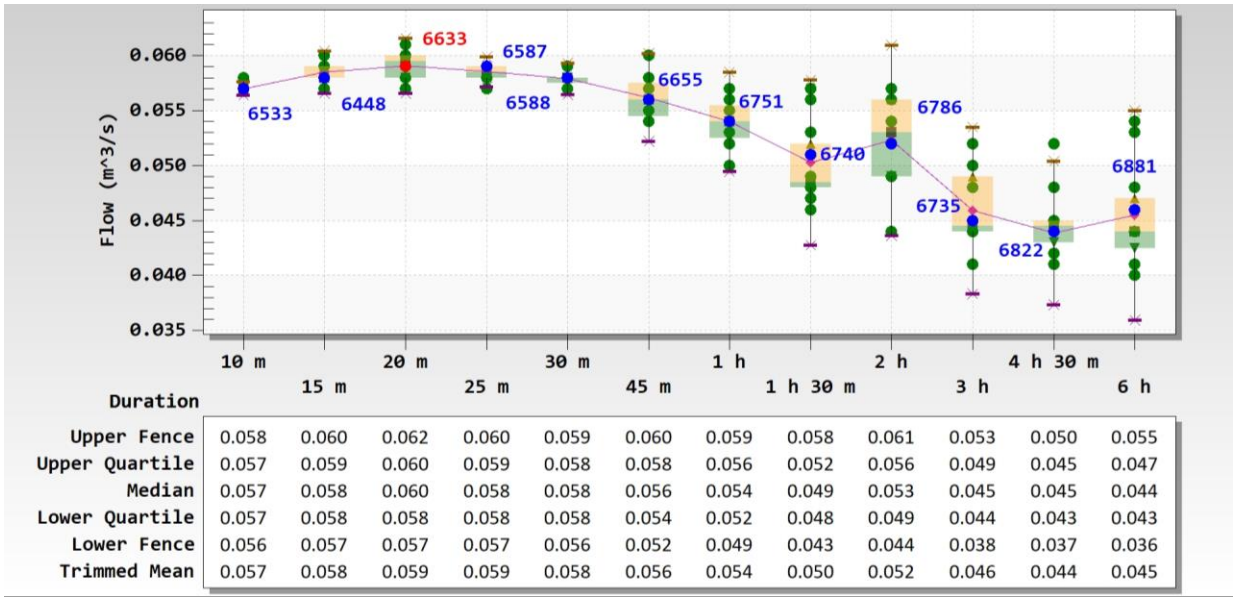


The hydrology parameters applied to the developed catchment are given below. The impervious areas consist of roofs and pavement areas, the pervious area is the landscaping. Catchment slope is the equal area slope across the site.

Table 3: catchment properties for the developed site

	Impervious	Pervious
Area	0.781 ha (55% FIA)	0.639
Slope	2.5	2.5
Manning's	0.013	0.05
Fraction impervious	100%	0%
Losses	0mm IL and 0mm CL	10mm IL and 2mm CL

The box plot for the stormwater runoff for the developed site is given below. This includes attenuations of the flows through the underground stormwater detention tank.



Duration	10 m	15 m	20 m	25 m	30 m	45 m	1 h	1 h 30 m	2 h	3 h	4 h 30 m	6 h
Upper Fence	0.058	0.060	0.062	0.060	0.059	0.060	0.059	0.058	0.061	0.053	0.050	0.055
Upper Quartile	0.057	0.059	0.060	0.059	0.058	0.058	0.056	0.052	0.056	0.049	0.045	0.047
Median	0.057	0.058	0.060	0.058	0.058	0.056	0.054	0.049	0.053	0.045	0.045	0.044
Lower Quartile	0.057	0.058	0.058	0.058	0.058	0.054	0.052	0.048	0.049	0.044	0.043	0.043
Lower Fence	0.056	0.057	0.057	0.057	0.056	0.052	0.049	0.043	0.044	0.038	0.037	0.036
Trimmed Mean	0.057	0.058	0.059	0.059	0.058	0.056	0.054	0.050	0.052	0.046	0.044	0.045

Figure 3: Site stormwater runoff ensemble box plots with detention at the property boundary

The plot above shows that the maximum mean runoff from the site is **59 L/s with a critical storm duration of 20min**. The hydrograph for the critical storm duration is given below.

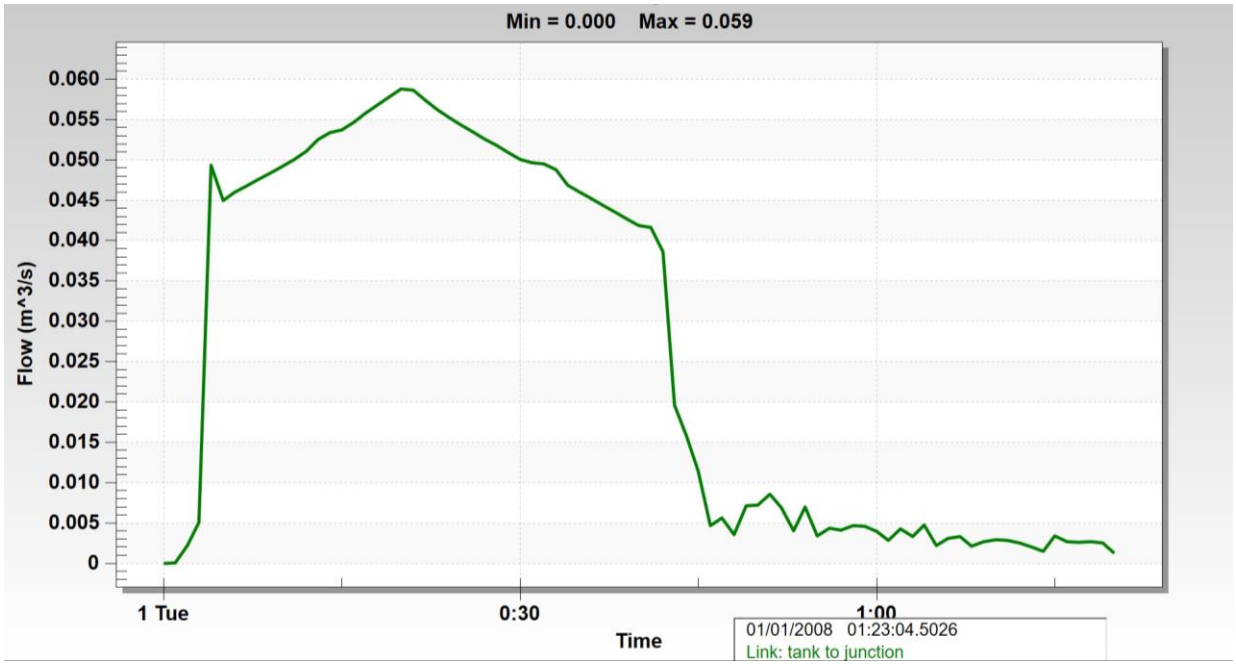
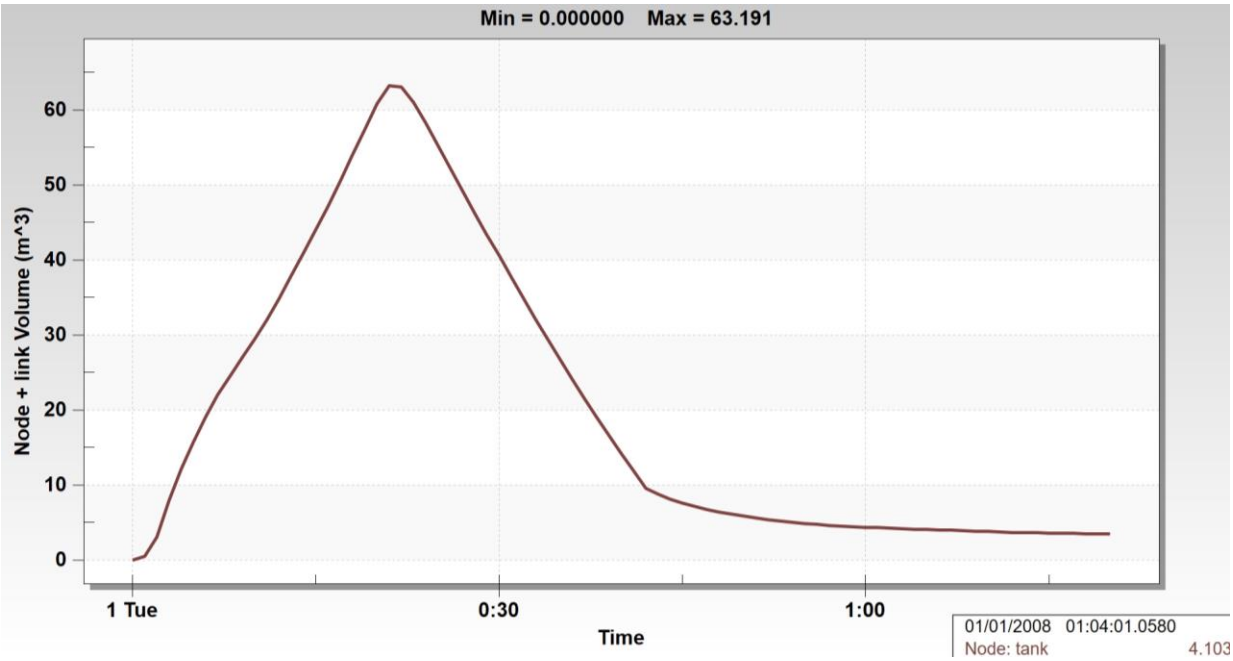


Figure 4: Hydrograph of the 20min storm duration from the site

The volume required for on-site detention is a minimum of 64m^2. The volume plot is given below.



1.1.1.1 Results

A summuray of the site runoff is given below:

	Pre-development	**Post-development**
Runoff rate	66 L/s	59 L/s
Critical storm duration	60 min	20 min

Detention tank properties as modelled:

Tank volume	64m^3 min
Orifice size	DN150

2 Stormwater Quality

The Tasmania State Government outlines the requirements for water quality objectives for new developments. These reduction targets are to be met under the requirements of Launceston City Council.

Methodology

Water quality modelling has been undertaken in accordance with Water by Design guidelines. MUSIC software has been used to estimate the reduction targets for the given development.

Model Parameters

Modelling parameters used within MUSIC modelling software are shown in Table 4, Table 5, Table 6 and Table 7.

Table 4: Catchment areas

Land Use Category	Treatable Area (m^2)
Roofs	
Roads	
Landscape	

Table 5: Rainfall data

Parameter	Value
Rain Station	Hobart - 094145
Time Step	6 min
Modelling Period	2021
Mean Annual Rainfall	620
Evapotranspiration	903

Table 6: Rainfall parameters

Parameter	Value
Rainfall threshold	1
Soil Storage Capacity	120
Initial Storage Capacity	25
Field Capacity	50
Infiltration Capacity coeff. A	200
Infiltration Capacity exp. B	1
Initial Depth	10
Daily Recharge Rate	25.00

Daily Base Flow Rate	5.00
Daily Deep Seepage Rate	0

Table 7: Pollutant sources - urban

Pollutant	Surface Type	Storm Flow		Base Flow	
		Mean (log mg/l)	SD (log mg/L)	Mean (log mg/l)	SD (log mg/L)
TSS	Roof	1.301	0.333	-	-
	Hardstand/ Road	2.431	0.333	-	-
	Ground	1.900	0.333	0.96	0.401
TP	Roof	-0.886	0.242	-	-
	Hardstand/ Road	-0.301	0.242	-	-
	Ground	-0.700	0.242	-0.731	0.360
TN	Roof	0.301	0.205	-	-
	Hardstand/ Road	0.342	0.205	-	-
	Ground	0.243	0.182	0.455	0.363

Treatment Train

A treatment train consisting of a 1500 Series SPEL Ecoceptor, and a SPEL Hydrosystem HS1500/5 was sufficient to reduce the relevant parameters to below the acceptable stormwater quality targets. Figure 5 displays a schematic of the treatment train as modelled within MUSIC.

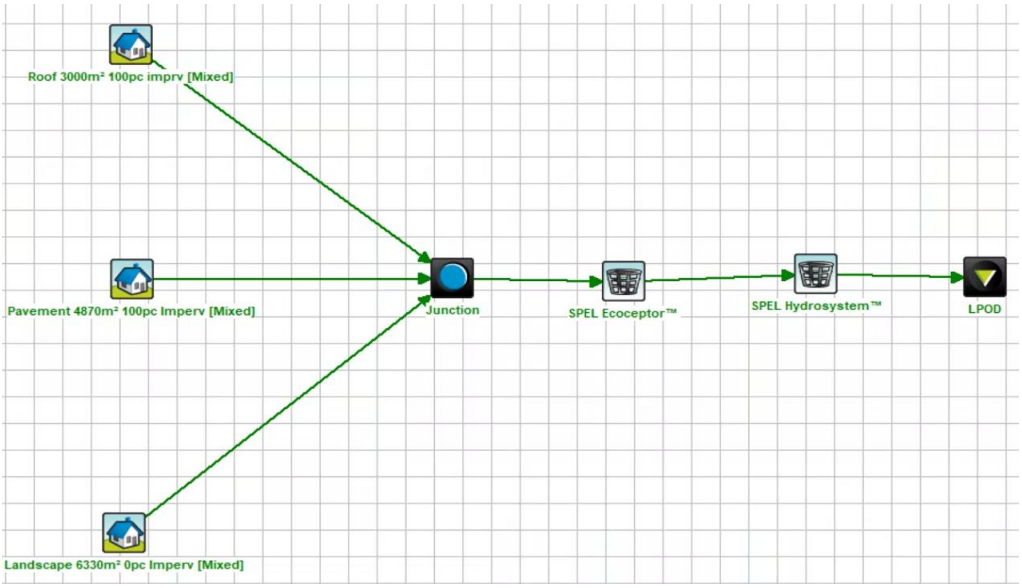


Figure 5: Proposed treatment train

Table 8: Treatment nodes

Node	Quantity	Description
SPEL 1500 Series Ecoceptor	1	Vertically configured pollutant trap, sediment and light liquids separator
SPEL Hydrosystem HS1000	1	Proprietary stormwater filter that uses sedimentation, filtration, adsorption and precipitation to treat stormwater.

Results

The results of the pollution reduction are summarised in Table 9. It is shown that the proposed treatment train is effective at reducing the target pollutants to required levels.

Table 9: Pollution reduction results

Pollutant	Source	Residual Load	Reduction (%)
Total Suspended Solids	1100	90.9	**91.8**
Total Phosphorus	2.3	0.314	**86.3**
Total Nitrogen	11.8	3.97	**66.4**
Gross Pollutants	177	0.694	**99.6**

3 Conclusion

It is concluded that the inclusion of on-site detention is effective at mitigating site runoff to pre-existing levels. The existing site runoff was calculated to be 66L/s which was taken as the permissible site discharge. To mitigate these flows a underground stormwater tank with a DN150 orifice and minimum detention volume of 64m^3 is necessary.

A SPEL Ecoceptor 1500 series and a SPEL Hydrosystem HS1000 have been found to be effective at reducing pollutant levels to required values.

It is therefore shows that the site can be developed in accordance with the Launceston City Council planning scheme.

Kind regards,

Tom Norman
Senior Engineer

AD DESIGN + CONSULTING

Rev No	Date	Revision Note	Drn	Ver.	App.
A	26/09/2022	For Development Application	TN	TN	AD

AD DESIGN+CONSULTING
Engineering / Infrastructure Services / Project Management

Client: Errol Stewart

Project: 5 Rose Lane, South Launceston

Drawn TN	Signed	Date 26/09/2022	
Designed TN	Signed	Date 26/09/2022	
Checked AD	Signed	Date TN	
Approved AD	Signed	Date 26/09/2022	

Drawing Title: Commercial Development, Stormwater General Arrangement, Sheet 1

FOR APPROVAL
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Project No. 22054	
Scale 1:750	Sheet Size A3
Drawing No. D-01-07-01	Rev A

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