

STORMWATER DETENTION AND MANAGEMENT



PROPOSED CARPARK WHITEMARK WHARF- 16 ESPLANADE

Client:	Jo Youl
Certificate of Title:	129006/1
Investigation Date:	Thursday, 29 January 2024

Refer to this Report As

Enviro-Tech Consultants Pty. Ltd. 2022. Site Stormwater Detention and Management Report for Proposed carpark and access road, WHITEMARK WHARF- 16 Esplanade - Unpublished report for Jo Youl by Enviro-Tech Consultants Pty. Ltd., 29 January 2023.

Report Distribution:

This report has been prepared by Enviro-Tech Consultants Pty. Ltd. for the use by parties involved in the proposed residential development of the property named above. It is to be used only to assist in managing stormwater relating to the Site and its development.

Permission is hereby given by Enviro-Tech Consultants Pty. Ltd., and the client, for this report to be copied and distributed to interested parties, but only if it is reproduced in colour, and only distributed in full. No responsibility is otherwise taken for the contents.

Limitations of this report

The data displayed within this document has been prepared using open-source scientific documents and data. Envirotech have used this local and regional data to estimate present and future hazards at the site. The data is by its nature approximate and may contain errors introduced by the data provider(s).

Building plumbing plans are to incorporate information contained within this document. This report contains information for determining trench geometry only and may not contain complete information for hydraulic plumbing design.

1 Introduction

1.1 Background

Enviro-Tech Consultants Pty. Ltd. (Envirotech) were contracted by Jo Youl to prepare a stormwater detention management assessment for a existing guest carpark (17 car spaces), a separate 2 car spaces carpark, an accessible carpark and access road at Whitemark Wharf - 16 Esplanade – Flinders Island which is herein defined as the Site. (Attachment 1 Map 1).

This assessment report has been prepared by an environmental and engineering geologist with hydrology and hydrogeology training and experience.

1.2 Cadastral Title

The land studied in this report is defined by the title 129006/1

2 Stormwater Management

2.1 Proposed Development

Table 1 summarises the provided design documents from which this assessment is based Attachment 2 Preliminary Design Concept Plans.

Table 1 Project Design Drawings

Drafted By	Project Number	Date Generated	Drawings
Adams Building design	010420	27/02/2024	03/28

The proposal involves the construction of a concrete surface to serve as accessible parking and all existing parking and access areas to be constructed of all-weather durable surface (spray sealed).

2.2 Soil Properties

Based on the site field investigation conducted by Enviro-Tech on 25/05/2023 the soil at the site comprises coarse SAND and has an estimated hydraulic conductivity of 6.0 m/day with details presented in Attachment 3.

2.3 Trench Sizing

The sizing of the trenches is summarised in Table 2. Trench sizing calculations are presented in Attachment 4.

Table 2 Trench Sizing

Dimension	Units	Trench 1	Trench 2	Trench 3
Depth	m	1.0	1.0	1.0
Width	m	1.0	1.0	1.2
Length	m	44.0	5.0	10.0

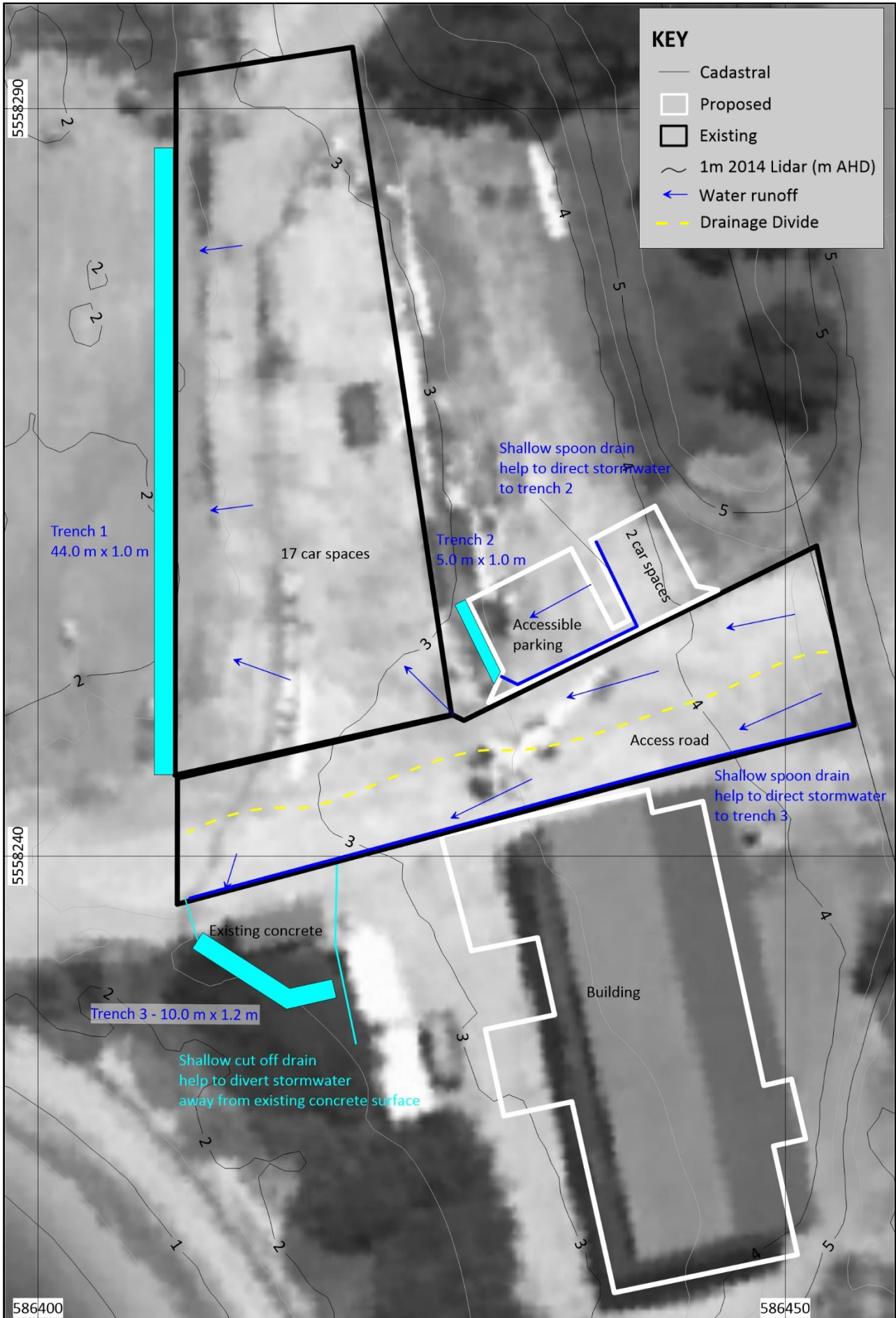


Kris J Taylor BSc (Hons) | Environmental & Engineering Geologist

Director

Enviro-Tech Consultants Pty. Ltd.

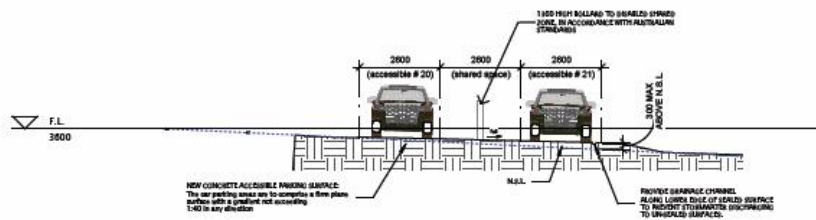
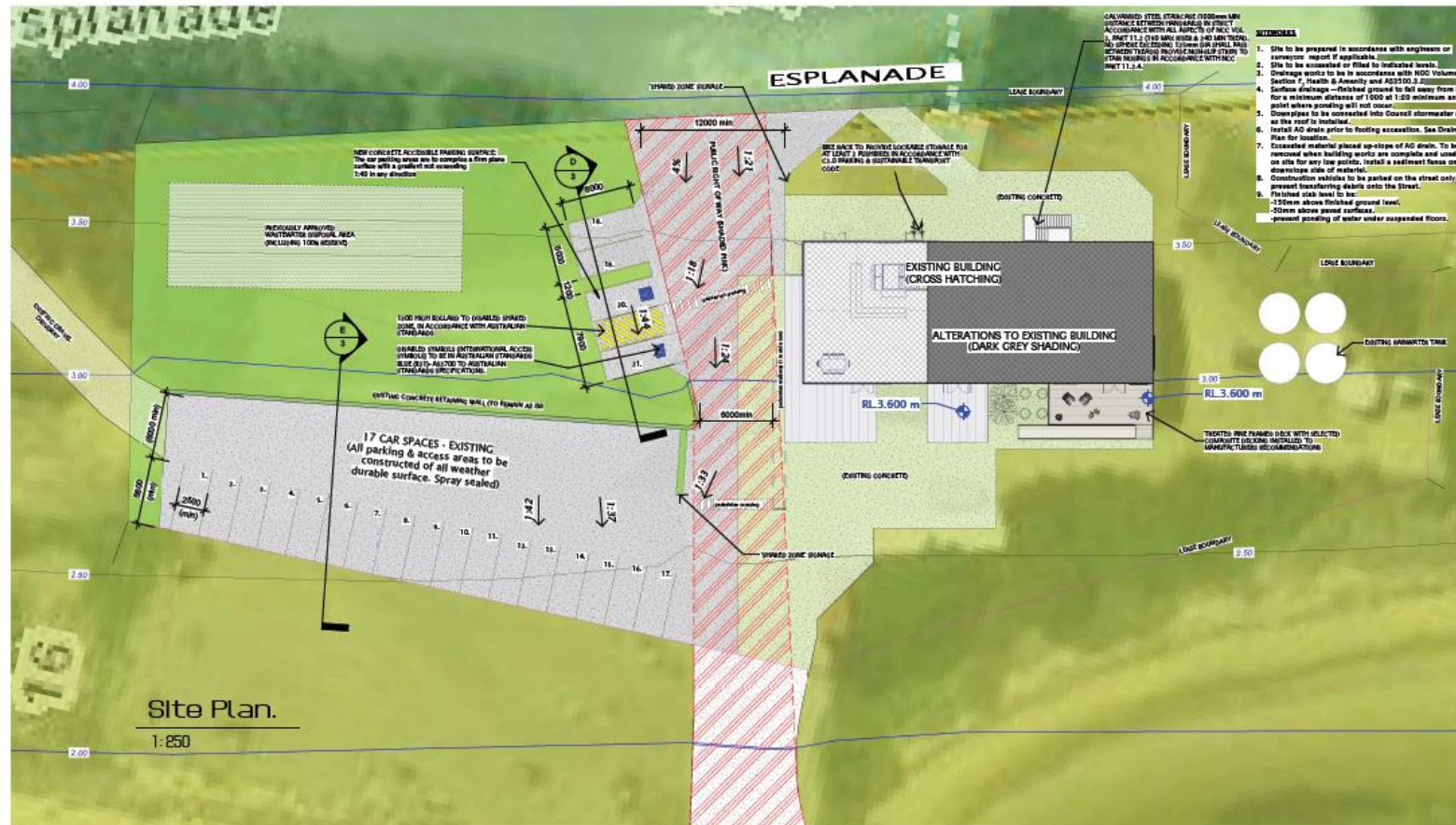
Attachment 1 Mapping



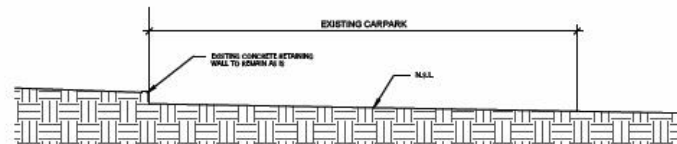
Map 1 Stormwater detention pit dimensions – refer to Attachment 2 for plumbing

Attachment 2 Preliminary Design Concept Plans

NOTES:
REFERS TO LAYOUT PAGES IN THE ARCHITECTURAL DRAWING SET FOR CLINICAL NOTES.



Section D
1:100



Section E
1:100

adams
buildingdesign

Planning Approval A2

170 Adelaide Street
Melbourne, Victoria
3000
T: 03 9415 1000
F: 03 9415 1001
www.adamsbuildingdesign.com.au
APP 21-04-2024 1:01
REV: 0.000000

No.	Date	Description
5	27.02.24	Planning Approval
4	09.10.23	Concept # 4
3	26.02.20	Concept # 1 (VMS)
2	16.02.20	Concept # 3
1	14.02.20	Concept # 1

Project:
Proposed Accommodation
at Flinders Wharf
16 Esplanade, Whitemark,
Flinders 16, 7253

Client:
Jo Youl

Drawing Title:
Site Plan

Scale:
As indicated

Starting Date:
12.02.21

Plot Date:
29/02/2024
2:38:41 PM

Project No:
010420

Drawing No:
3 /28

Attachment 3 Soil Assessment Findings

Soil Infiltration Capacity

Soil on the property is classified as SAND (category 1) with a high permeability (~6m/day).

Attachment 4 Stormwater Detention Management

Proposed Development Footprint

The proposed development plan is presented in Appendix A and total surface areas for drainage calculations are presented in Table 3. Modelling of the water runoff has taken in consideration the natural drainage of existing surfaces and inferred drainage of the proposed pavement as shown in Map 1. Water runoff from the north side of the access road will flow towards the guest parking area (17 car spaces) and into trench 1. Trench 1 will also allow for water runoff deriving from the above-mentioned parking area. Stormwater from the accessible parking area and proposed 2 car spaces parking will flow to trench 2 and the water runoff from the south side of the access way will be diverted to trench 3. A cut off drain is recommended to prevent water flow in the Trench from existing paved areas, not required to be serviced as part of the permit. A spoon drain will be required along the southern side of the existing driveway to collect surface water flow from the southern parts of the access road. Another spoon drain will be required along the western side of the proposed 2 car spaces parking to divert stormwater to trench 2.

Table 3 Site Drainage Surfaces

Proposed Development or Works	Surfacing	Runoff Coefficient	Drainage Surface Area (m ²)
17 Car spaces parking	Spray sealed	0.85	919
Accessible parking & 2 car spaces parking	Concrete	0.85	89
Access road	Spray sealed	0.85	307

Rainfall Depths

The design runoff is based on a 5% Annual Exceedance Probability precipitation event with cumulative values for 1 minute to 168-hour stormflow durations.

This information is obtained from the Bureau of Meteorology (BOM) Design Rainfall Data System with Intensity Duration Frequency (IDF) Design Rainfall Depths specific to the Site.

Data sheets are presented in Figure 1 with rainfall depths (in mm) used in the analysis.

Stormwater Volumes

This analysis is based on total stormwater volumes and not peak flow rates. Stormwater discharge volumes (input into the system given the AEP event) is calculated from the following formula:

$$V = CAI$$

Where:

V = volume accumulated (m³)

C = runoff coefficient

A = area of catchment (metres square)

I = rainfall depth (metres)

Potential Trench Discharge Volumes

Potential trench discharge volumes are calculated from the hydraulic conductivity of the underlying Sand units and the surface area of the base of the trench (transmissivity) for the duration of the hypothetical 5% AEP storm flow event.

Groundwater Transmissivity

Absorption trenches are designed based on vertical hydraulic gradients alone, recharging directly into the underlying Sand observed at the testing location.

Hydraulic Conductivity

A hydraulic conductivity of 6 m per day is suitable for the coarse-grained sandy subsoil profile observed at the site.

Trench Peak Water Volume

The trench peak water volume is calculated from the stormwater volume minus the potential discharge volume to determine the peak net volume stored for the given period.

Stormwater Detention – Total Runoff

Stormwater calculations are based on a 5% AEP stormflow event and presented in Appendix C, with details on Table 5, Table 6 and Table 7.

Stormwater Detention – Trench Geometry

The above calculations are based on:

- Trench 1: 1.0 m deep and 1.0 m wide
- Trench 2: 1.0 deep and 1.0 m wide
- Trench 3: 1.0 m deep and 1.2 m wide with 350mm x 1200mm arches.

Trenches location and geometry are included in Map 1 & Figure 2 and Figure 3.

Label:16 Esplanade Whitemark Flinders Island

Requested coordinate Easting: 586417.1394

Northing: 5558251.8265

Zone: 55

Nearest grid cell Latitude: 40.1125 (S)

Longitude: 148.0125 (E)

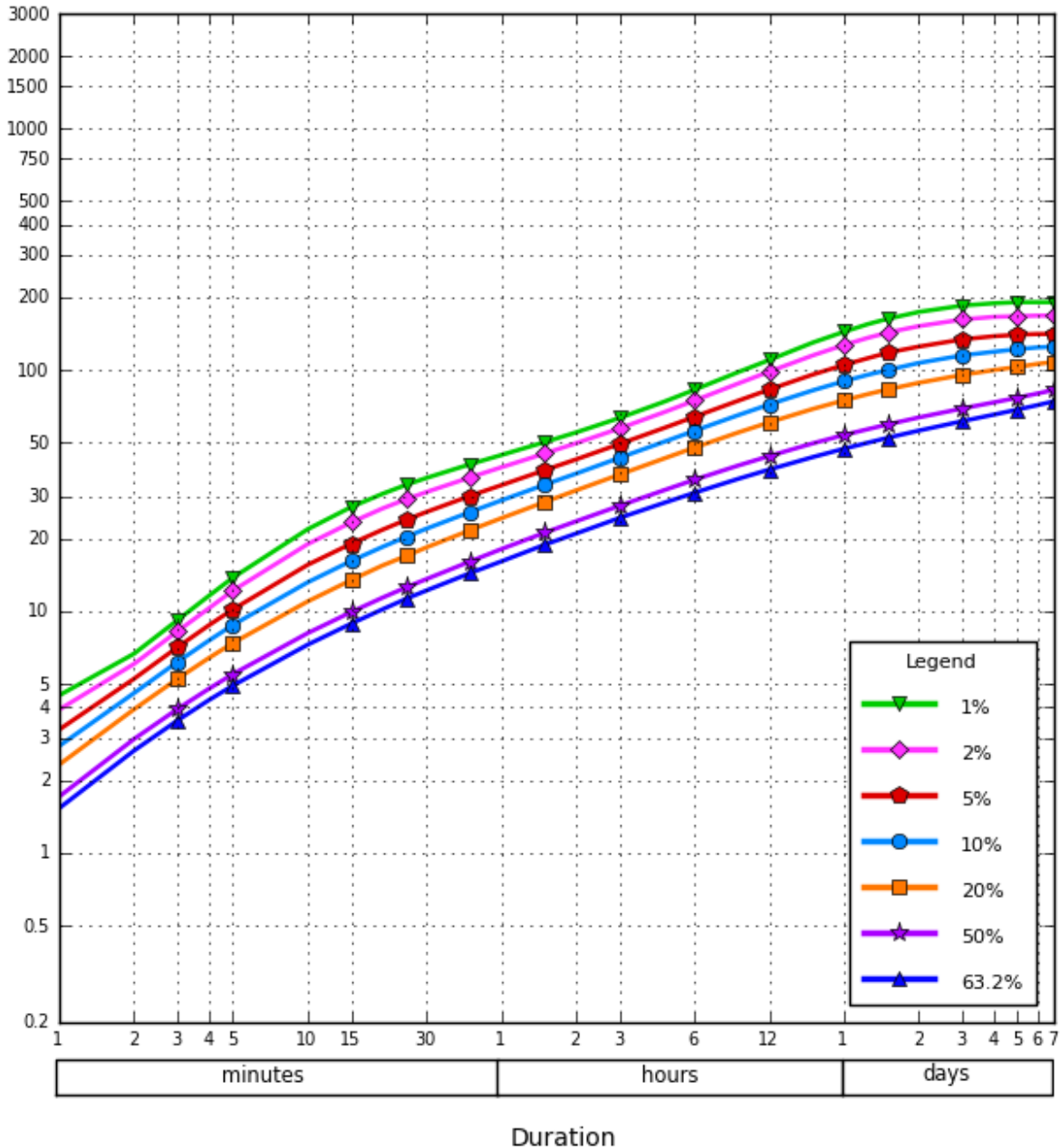
IFD Design Rainfall Depth (mm)

Issued: 22 January 2024

Rainfall depth in millimetres for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).

Depth
(mm)

*AEP - Annual Exceedance Probability
**EY - Exceedance per Year



©Copyright Commonwealth of Australia 2016, Bureau of Meteorology (ABN 92 637 533 532)

Figure 1 Site Australian rainfall and runoff design rainfall - chart

Table 4 Site Australian rainfall and runoff design rainfall - Table

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	1.53	1.71	2.32	2.77	3.24	3.92	4.49
2 min	2.65	2.96	3.93	4.59	5.26	6.06	6.68
3 min	3.54	3.95	5.27	6.19	7.12	8.29	9.22
4 min	4.29	4.78	6.41	7.57	8.76	10.3	11.6
5 min	4.93	5.50	7.40	8.79	10.2	12.2	13.8
10 min	7.28	8.13	11.0	13.2	15.6	19.0	21.9
15 min	8.91	9.95	13.5	16.2	19.1	23.4	27.1
20 min	10.2	11.4	15.5	18.5	21.8	26.7	30.7
25 min	11.3	12.6	17.0	20.4	24.0	29.2	33.5
30 min	12.2	13.6	18.4	22.0	25.8	31.2	35.7
45 min	14.4	16.1	21.7	25.8	30.1	35.9	40.7
1 hour	16.1	18.1	24.3	28.8	33.3	39.5	44.4
1.5 hour	18.9	21.2	28.4	33.5	38.5	45.1	50.3
2 hour	21.0	23.6	31.7	37.2	42.6	49.7	55.1
3 hour	24.4	27.4	36.9	43.3	49.4	57.3	63.3
4.5 hour	28.1	31.7	42.9	50.3	57.4	66.7	73.7
6 hour	31.0	35.1	47.7	56.0	64.0	74.7	82.8
9 hour	35.4	40.2	55.1	65.0	74.6	87.9	98.0
12 hour	38.7	44.0	60.7	72.0	83.0	98.5	110
18 hour	43.6	49.7	69.0	82.4	95.8	115	130
24 hour	47.2	53.8	74.9	89.9	105	127	144
30 hour	50.0	56.9	79.5	95.6	112	136	155
36 hour	52.4	59.5	83.1	100	118	143	163
48 hour	56.1	63.6	88.5	107	125	152	174
72 hour	61.4	69.3	95.5	115	134	162	185
96 hour	65.3	73.4	99.9	119	138	166	189
120 hour	68.6	76.8	103	122	140	167	191
144 hour	71.5	79.9	106	124	141	168	191
168 hour	74.2	82.7	108	125	141	168	191

Table 5 Stormwater calculations Scenario 1

Absorption Trench Scenario 1					
Stormwater Balance Calculations - Trench 1 Runoff					
AEP		5%	Trench Area Adopted (m2)	44.00	
Runoff Scenario		Trench 1			
			Trench Length (m)	44.0	
Trench 1 Runoff Coefficient		85%	Trench Width (m)	1.00	
Trench 1 Area (m2)		919	Trench Depth (m)	1.00	
Transmissive Unit		SAND	Topsoil Thickness - Mounded (m)	0.05	
Hydraulic Conductivity (m/day)		6.0	Drainage Rock Thickness (m)	1.00	
Infiltration Rate (mm/min)		4.2			
			Total Arch Volume (m3)	0.0	
Drainage Rock Porosity		0.35	Est. Volume of Drainage Rock (m3)	44.0	
			Volume of Topsoil In Place (m3)	2.2	
Arch Sizing (mm)		350			
Number of Arches (250 overlap)		0	Trench Peak Water Volume (m3)	15.3	
Arch Width (mm)		584	Trench Peak Water Level (m)	1.0	
Arch Volume (L)		227	Trench Peak Water Level (hours)	45 min	
Rainfall Duration	Duration in min	5% AEP mm	Trench 1 Stormwater Volume (m3)	Potential Trench Discharge (m3)	Net Volume Stored In Trench (m3)
1 min	1	3.2	2.5	0.2	2.3
2 min	2	5.3	4.1	0.4	3.7
3 min	3	7.1	5.6	0.6	5.0
4 min	4	8.8	6.8	0.7	6.1
5 min	5	10.2	8.0	0.9	7.1
10 min	10	15.6	12.2	1.8	10.4
15 min	15	19.1	14.9	2.8	12.2
20 min	20	21.8	17.0	3.7	13.4
25 min	25	24.0	18.7	4.6	14.2
30 min	30	25.8	20.2	5.5	14.7
45 min	45	30.1	23.5	8.3	15.3
1 hour	60	33.3	26.0	11.0	15.0
1.5 hour	90	38.5	30.1	16.5	13.6
2 hour	120	42.6	33.3	22.0	11.3
3 hour	180	49.4	38.6	33.0	5.6
4.5 hour	270	57.4	44.8	49.5	0.0
6 hour	360	64.0	50.0	66.0	0.0
9 hour	540	74.6	58.3	99.0	0.0
12 hour	720	83.0	64.8	132.0	0.0
18 hour	1080	95.8	74.8	198.0	0.0
24 hour	1440	105.0	82.0	264.0	0.0
30 hour	1800	112.0	87.5	330.0	0.0
36 hour	2160	118.0	92.2	396.0	0.0
48 hour	2880	125.0	97.6	528.0	0.0
72 hour	4320	134.0	104.7	792.0	0.0
96 hour	5760	138.0	107.8	1056.0	0.0
120 hour	7200	140.0	109.4	1320.0	0.0
144 hour	8640	141.0	110.1	1584.0	0.0
168 hour	10080	141.0	110.1	1848.0	0.0

Table 6 Stormwater calculations Scenario 2

Absorption Trench Scenario 2					
Stormwater Balance Calculations - Trench 2 Runoff					
AEP		5%	Trench Area Adopted (m2)	5.00	
Runoff Scenario		Trench 2			
			Trench Length (m)	5.0	
Trench 2 Runoff Coefficient		85%	Trench Width (m)	1.00	
Trench 2 Area (m2)		89	Trench Depth (m)	1.00	
Transmissive Unit		SAND	Topsoil Thickness - Mounded (m)	0.05	
Hydraulic Conductivity (m/day)		6.0	Drainage Rock Thickness (m)	1.00	
Infiltration Rate (mm/min)		4.2			
			Total Arch Volume (m3)	0.0	
Drainage Rock Porosity		0.35	Est. Volume of Drainage Rock (m3)	5.0	
			Volume of Topsoil In Place (m3)	0.3	
Arch Sizing (mm)		350			
Number of Arches (250 overlap)		0	Trench Peak Water Volume (m3)	1.3	
Arch Width (mm)		584	Trench Peak Water Level (m)	0.8	
Arch Volume (L)		227	Trench Peak Water Level (hours)	45 min	
Rainfall Duration	Duration in min	5% AEP mm	Trench 2 Stormwater Volume (m3)	Potential Trench Discharge (m3)	Net Volume Stored In Trench (m3)
1 min	1	3.2	0.2	0.0	0.2
2 min	2	5.3	0.4	0.0	0.4
3 min	3	7.1	0.5	0.1	0.5
4 min	4	8.8	0.7	0.1	0.6
5 min	5	10.2	0.8	0.1	0.7
10 min	10	15.6	1.2	0.2	1.0
15 min	15	19.1	1.4	0.3	1.1
20 min	20	21.8	1.6	0.4	1.2
25 min	25	24.0	1.8	0.5	1.3
30 min	30	25.8	2.0	0.6	1.3
45 min	45	30.1	2.3	0.9	1.3
1 hour	60	33.3	2.5	1.3	1.3
1.5 hour	90	38.5	2.9	1.9	1.0
2 hour	120	42.6	3.2	2.5	0.7
3 hour	180	49.4	3.7	3.8	0.0
4.5 hour	270	57.4	4.3	5.6	0.0
6 hour	360	64.0	4.8	7.5	0.0
9 hour	540	74.6	5.6	11.3	0.0
12 hour	720	83.0	6.3	15.0	0.0
18 hour	1080	95.8	7.2	22.5	0.0
24 hour	1440	105.0	7.9	30.0	0.0
30 hour	1800	112.0	8.5	37.5	0.0
36 hour	2160	118.0	8.9	45.0	0.0
48 hour	2880	125.0	9.5	60.0	0.0
72 hour	4320	134.0	10.1	90.0	0.0
96 hour	5760	138.0	10.4	120.0	0.0
120 hour	7200	140.0	10.6	150.0	0.0
144 hour	8640	141.0	10.7	180.0	0.0
168 hour	10080	141.0	10.7	210.0	0.0

Table 7 Stormwater calculations Scenario 3

Stormwater Balance Calculations - Trench 3 Runoff					
AEP		5%	Trench Area Adopted (m2)		12.50
Runoff Scenario		Trench 3			
			Trench Length (m)		10.4
Trench 3 Runoff Coefficient		85%	Trench Width (m)		1.20
Trench 3 Area (m2)		307	Trench Depth (m)		1.00
Transmissive Unit		SAND	Topsoil Thickness - Mounded (m)		0.05
Hydraulic Conductivity (m/day)		6.0	Drainage Rock Thickness (m)		1.00
Infiltration Rate (mm/min)		4.17			
			Total Arch Volume (m3)		2.0
Drainage Rock Porosity		0.35	Est. Volume of Drainage Rock (m3)		10.5
			Volume of Topsoil In Place (m3)		0.6
Arch Sizing (mm)		350			
Number of Arches (250 overlap)		9	Trench Peak Water Volume (m3)		5.6
Arch Width (mm)		584	Trench Peak Water Level (m)		1.0
Arch Volume (L)		227	Trench Peak Water Level (hours)		1 hour
Rainfall Duration	Duration in min	5% AEP mm	Trench 3 Stormwater Volume (m3)	Potential Trench Discharge (m3)	Net Volume Stored In Trench (m3)
1 min	1	3.2	0.8	0.1	0.8
2 min	2	5.3	1.4	0.1	1.3
3 min	3	7.1	1.9	0.2	1.7
4 min	4	8.8	2.3	0.2	2.1
5 min	5	10.2	2.7	0.3	2.4
10 min	10	15.6	4.1	0.5	3.5
15 min	15	19.1	5.0	0.8	4.2
20 min	20	21.8	5.7	1.0	4.6
25 min	25	24.0	6.3	1.3	5.0
30 min	30	25.8	6.7	1.6	5.2
45 min	45	30.1	7.9	2.3	5.5
1 hour	60	33.3	8.7	3.1	5.6
1.5 hour	90	38.5	10.0	4.7	5.4
2 hour	120	42.6	11.1	6.3	4.9
3 hour	180	49.4	12.9	9.4	3.5
4.5 hour	270	57.4	15.0	14.1	0.9
6 hour	360	64.0	16.7	18.8	0.0
9 hour	540	74.6	19.5	28.1	0.0
12 hour	720	83.0	21.7	37.5	0.0
18 hour	1080	95.8	25.0	56.3	0.0
24 hour	1440	105.0	27.4	75.0	0.0
30 hour	1800	112.0	29.2	93.8	0.0
36 hour	2160	118.0	30.8	112.5	0.0
48 hour	2880	125.0	32.6	150.0	0.0
72 hour	4320	134.0	35.0	225.0	0.0
96 hour	5760	138.0	36.0	300.0	0.0
120 hour	7200	140.0	36.5	375.0	0.0
144 hour	8640	141.0	36.8	450.0	0.0
168 hour	10080	141.0	36.8	525.0	0.0

Figure 2 Trench Design – Site Specific for Soil Conditions

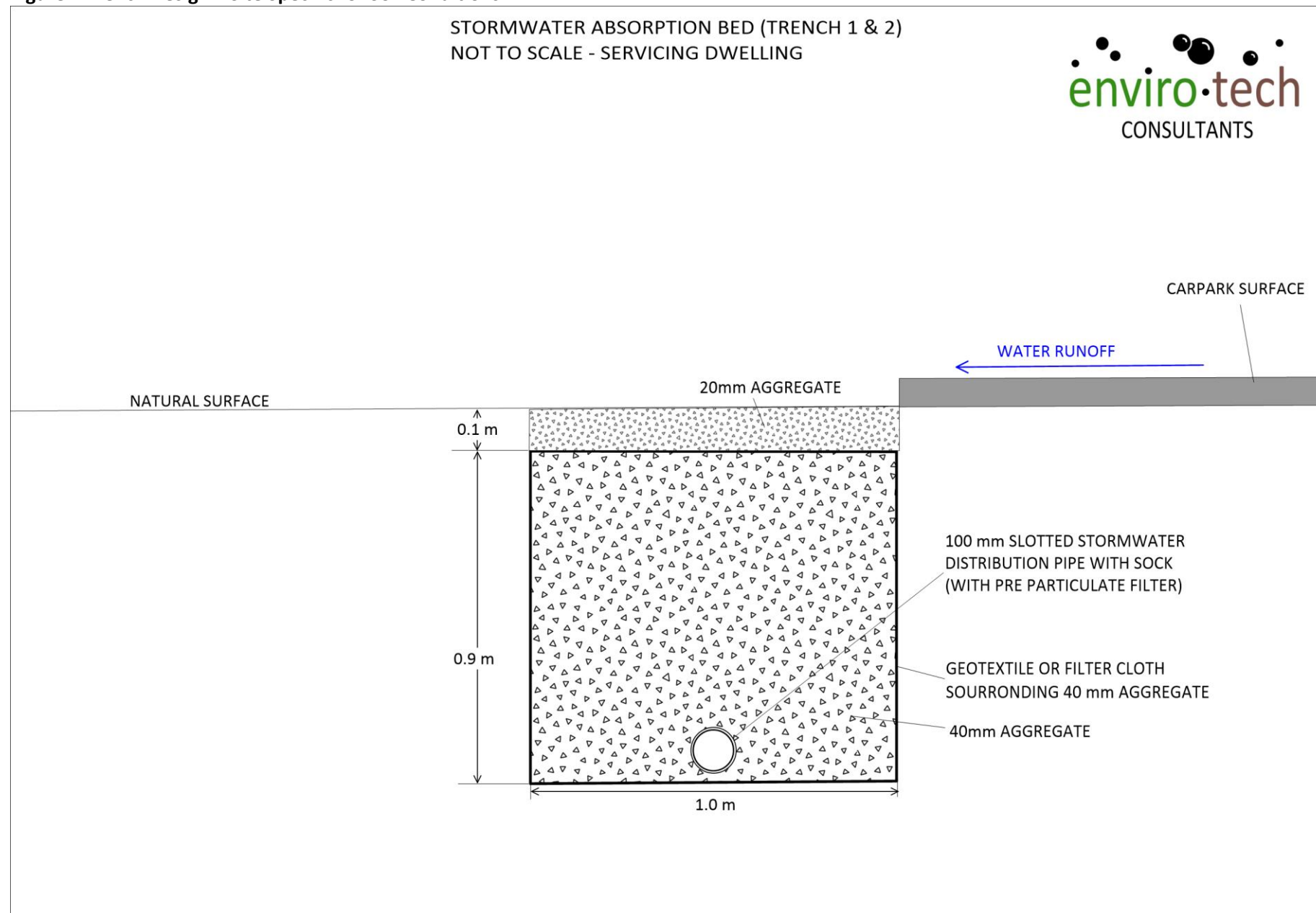
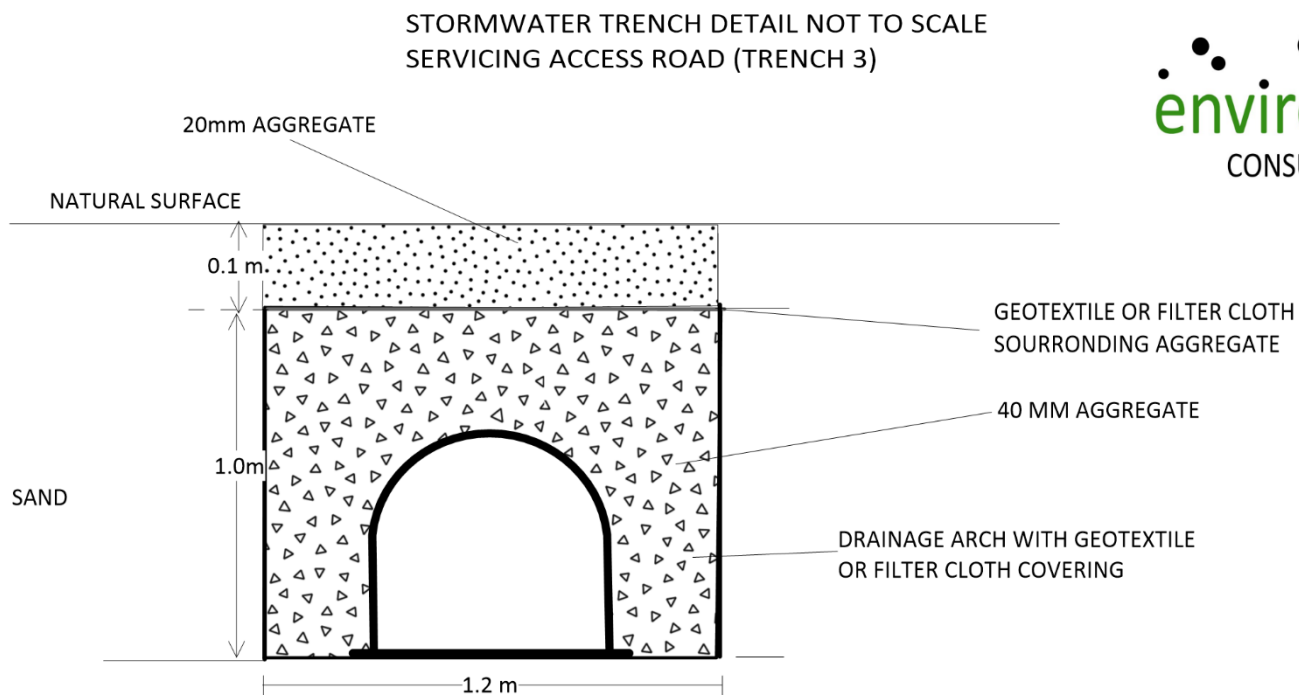


Figure 3 Trench 3 Design – Site Specific for Soil Conditions



Trench Depth (m)	1.10
Target Unit in Base of Trench	SAND
Trench Width (m)	1.20
Trench Dimensions	Trench 3
Trench Length (m)	10
Trench Area (m ²)	12.5
Number of Arches	9
Arch Length (mm)	1200
Arch Width (mm)	350
Arch Overlap (mm)	NA
Estimated Drainage Rock Volume m ³	10.5

NOTES:

Trench to be excavated level
Smearing and compaction of base and sides to be avoided
Geotextile filter to be placed over the arches
All works are to comply with AS3500 and Tasmanian Plumbing Code

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Owner /Agent
 Address
 Suburb/postcode

Qualified person details:

Qualified person:
Address: Phone No:
 Fax No:
Licence No: Email address:

Qualifications and Insurance details: (description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Speciality area of expertise: (description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Details of work: Coastal Inundation Assessment

Address: Lot No:
 Certificate of title No:
The assessable item related to this certificate: (description of the assessable item being certified)
Assessable item includes –

- a material;
- a design
- a form of construction
- a document
- testing of a component, building system or plumbing system
- an inspection, or assessment, performed

Certificate details:

Certificate type: (description from Column 1 of Schedule 1 of the Director's Determination - Certificates by Qualified Persons for Assessable Items n)

This certificate is in relation to the above assessable items, at any stage, as part of – (tick one)

☒ building work, plumbing work or plumbing installation or demolition work

OR

☐ a building, temporary structure or plumbing installation

In issuing this certificate the following matters are relevant –

Documents:

Enviro-Tech Consultants Pty. Ltd. 1900. Stormwater Detention and Management Report for a Proposed Carpark, WHITEMARK WHARF- 16 - Esplanade . Unpublished report for Jo Youl by Enviro-TechConsultants Pty. Ltd., 29/01//2024

Relevant
calculations:

References:

- Tasmanian Planning Scheme - State Planning Provisions 2023

Substance of Certificate: (what it is that is being certified)


- To ensure that the Site storm-water is appropriately managed which includes but is not limited to an assessment of erosion and storm-water quality management.

Scope and/or Limitations

I certify the matters described in this certificate.

Qualified person:

Signed:



Certificate No:

Date:

29/01/2024