# **FINAL STORMWATER REPORT**

62,78,80 PAPAKURA-CLEVEDON ROAD CLEVEDON AUCKLAND

MAEN	Maven Associates	Job Number 194006		<b>Rev</b> F
Job Title 62	2,78,80 Papakura-Clevedon Road	Author	<b>Date</b>	<b>Checked</b>
Title Fir	nal Stormwater Report	ML	09/03/2025	JD

## **1.0 INTRODUCTION**

## 1.1 PROJECT

The purpose of this report is to provide an overland flow and flooding assessment associated with the proposed development at 62,78 & 80 Papakura-Clevedon Road, Clevedon, as identified within Figure 1 below.

This report provides information in support of an 224c application and is to be read in conjunction with the Engineering drawings and calculations within the Appendices.

## 1.2 SITE DESCRIPTION

The subject site is situated south of Papakura-Clevedon Road. The site is zoned as Single Housing Zone under the Auckland Unitary Plan ('AUP-OP') and is also under Clevedon Village sub-precincts A and B. The surrounding area is a mixture of rural and single housing residential zones.

Auckland Council Geomaps identifies Existing Overland flow paths (OLFP) and resultant 100-year floodplains. As shown in Figure 1 below, the existing site has one primary OLFP which is located within the central northern portion of the site and accounts for majority of the site. One other OLFP is located within the north-eastern portion of the site which flows north and joins with the primary OLFP. There are also minor OLFP generated within the site which flows towards the neighbouring properties.



Figure 1: Existing 100-YR OLFP and Floodplains

### 1.3 RESOURCE CONSENT

The consented development at 62, 78 & 80 Papakura Clevedon Road is subject to conditions contained within Consent BUN60399307. Condition 22 within the resource consent stipulates the following-

Prior to the application for the section 224(c) certificate, the consent holder must provide a Stormwater Report prepared by an appropriately qualified engineer to the satisfaction of the Council identifying:

- a. The 1% AEP flood level for the site and the surrounding road reserves.
- b. A layout plan of the overland flow paths for the site and the adjacent land along the boundary in accordance with the approved EPA before Section 223 approval.
- c. The overland flow path plan must include as-built cross sections of all roads including the ponding areas with levels before overtopping.
- d. As built longitudinal plan and cross sections must be provided for overland flow path locations.
- e. The minimum freeboard floor level of all habitable parts of buildings must be at least 150mm for flows below 2m3 per second and 100 mm deep and where flows exceed this, the minimum freeboard floor level of habitable parts of buildings must be increased to at least 500mm. This may be enforced through a consent notice on the property unless the building consents have already been issued.
- f. No buildings, structures or other obstructions are to be erected in the overland flow paths without prior written permission from the Council; and
- g. Where either existing or proposed overland flow paths cross lot boundaries, the consent holder is to provide the Council with plans to accompany easement(s) to be registered in favour of the Council. Any easement documentation is to be prepared by the consent holder's lawyers to the satisfaction of the Council's solicitors. All costs are to be at the consent holder's expense. The terms of these easements must prevent buildings, structures or other obstructions being erected in the overland flow path, and must require the landowner to maintain, weed and

## 2.0 FLOOD MODELLING

### 2.1 MODELLING METHDOLOGY

#### Surface Model

Stormwater analysis has been carried out based on surveyed as-built information of the finished earthworks and roads.

#### Catchment area

The 100-year overland flows for each of the flooding cross-sections are determined by analysing the catchment areas derived from the as-built finished ground levels. These areas are classified into road areas and lot areas, each with distinct impervious-to-pervious ratios as represented in the table below.

	TP108 Curve Numbers	
Area	Impervious Pervious Ratio	Curve Number
Roads	70/30	90.8
Lots	85/15	94.4

Each flooding cross-section has its own designated catchment area. The specific catchment areas are documented in the TP108 calculation sheets (**Appendix B**).

#### **Channelisation factor**

The channelization factor is applied to decrease the catchment response time, thereby facilitating higher flow velocities. The channelization factor of 0.6 is used following Auckland Council guidelines.

#### **Overland Flow path Capacity**

Cross-sections of the topography along the flow path were created from the roading asbuilt, depth of flow was calculated from Manning's calculation sheets. **(Appendix C)** 

Note that Manning's values were applied in accordance with "Manning's n for Channels" - Chow, 1959

	Manning's (n) value	es
Road - Accessway		0.020

#### **Flood Extent**

The flood extent results from Mannings calculations are overlaid onto the as-built roading plan. The final flood levels are then used to establish the minimum floor levels for the lots, with the relevant freeboard requirements applied accordingly.

## 2.2 RESULTS SUMMARY

### **Flood Inundation Mapping**

Following the results of the OLFP analysis along the cross-sections, the resultant flood extents

associated with the 1% AEP rainfall event are contained within the road reserve.

### Minimum Floor Levels (MFL)

As per the Auckland Council SWCoP and AUP requirements (Figure 2 below), freeboards of 150mm or 500mm are required over these OLFP peak flood levels. Vehicle crossings off the carriageways will be ramped to access lot dwellings. It is anticipated that all units will also have a minimum stepdown of 225mm. This ensures adequate freeboard compliance.

Table 5: Freeboard requirements for the 1% AEP event flood plain and 1% AEP coastal storm inundation including 1 m sea-level rise

Scenario	Freeboard
More Vulnerable Activities* in floodplains	。 500 mm
Less Vulnerable Activities* in floodplains	。 300 mm
Overland flow paths where flow is less than 2m³/s	<ul> <li>500 mm where surface water has a depth of 100 mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling</li> <li>150 mm for all other cases</li> </ul>
Overland flow paths, where flow is equal to or in excess of 2m³/s	<ul> <li>500 mm for More Vulnerable Activities*</li> <li>300 mm for Less Vulnerable Activities*</li> </ul>
Coastal Storm Inundation Areas (1% AEP including 1m sea-level rise)	<ul> <li>500 mm for dwellings and habitable rooms which are subject to wave action from the sea</li> <li>150 mm for all other cases</li> </ul>

Figure 2: AUP – OP Freeboard Requirements

## 2.3 Wetland A inlet spillway

To mitigate backflow effects from downstream at Papakura-Clevedon Road, the overland flow inlet discharge into Wetland A has been constructed at a higher level than the finished levels of Road 3 (Kakano Street). Consequently, a ponding area has been designated at the sag point of Road 3. The base level of the wetland inlet spillway has been constructed at 7.84m RL, which serves as the ponding level for the surrounding area.

A weir calculation has been carried out to determine the flood level of the overland flow entering Wetland A, resulting in a flood RL of 8.05m RL (**Appendix D**). Considering the extent of the ponding area, this flood level has been applied to lots 74-79. By incorporating a 500mm freeboard requirement, the minimum floor level for these lots has been set at 8.55m RL.

## APPENDIX A – STORMWATER REPORT ASBUILT PLAN



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- Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000. Levels in terms of the Auckland Vertical Datum 1946.
- 3. It is the contractors responsibility to locate all services that may be affected by his operations.

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_	_		STAGIN AR	IG BOUI	NDARY OW
F	LOT	FGL UPDATE		ML	03/2025
E D	FLO	0D EXTENT UPDATE	-	ML	02/2025
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BUN60399307 - OVERLAND FLOW PATH AS-BUILT.DWG

Rev F



















![](_page_17_Figure_0.jpeg)

![](_page_17_Figure_2.jpeg)

- Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000. Levels in terms of the Auckland Vertical Datum 1946.
- It is the contractors responsibility to locate all services that may be affected by his operations.

Legend

100-YR FLOOD EXTENT

F	LOT	FGL UPDATE		ML	03/2025
E	LOT	87 - 91 MFL UPDATE		ML	02/2025
D	FLO	OD EXTENT UPDATE		ML	01/2025
С	CRO	SS-SECTION UPDATE		ML	01/2025
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Surve	у	-	-		
Desigr	n	ML	11/202	24	
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![](_page_17_Picture_8.jpeg)

62, 78 & 80 PAPAKURA -CLEVEDON ROAD, CLEVEDON, AUCKLAND FOR CLEVEDON PROPERTOES LTD

BUN60399307 AS-BUILT 100-YEAR OLFP SECTIONS

Project no.	194006			
Scale	1:125 @ A3			
Cad file	BUN60399307 - OVERLAN	ID FLO	W PATH AS-	UILT.DWG
Drawing no.	C475	Rev	F	

		St	age 1					Sta	age 1					Stage	e 2					Sta	ge
Lot	MFL (Consent Condition)	Final Flood Level	Freeboard Required	Final MFL (Minimum Floor	Variation	Lot	MFL (Consent Condition)	Final Flood Level	Freeboard Required	Final MFL (Minimum Floor	Variation	Lot	MFL (Consent Condition)	Final Flood Level	Freeboard Required	Final MFL	Variation	Lot	MFL (Consent Condition)	Final Flood Level	T
1	8.44	8.18	0.50	8.68	0.24	91	9.22	8.60	0.50	9.10	-0.12	118	10.64	9.97	0.15	10.12	-0.52	161	12.74	12.43	+
2	8.57	8.31	0.50	8.81	0.24	92	9.32	8.99	0.15	9.14	-0.18	119	10.14	9.85	0.15	10.00	-0.14	162	12.96	12.63	+
4	8.67	8.43	0.50	9.05	0.26	93	9.32	9.07	0.15	9.22	-0.10	120	10.28	10.01	0.15	10.16	-0.12	163	13.19	12.82	+
5	8.85	8.60	0.50	9.10	0.25	95	9.32	9.04	0.15	9.19	-0.13	122	10.36	10.00	0.15	10.15	-0.21	165	13.41	13.15	+
6	8.95	8.71	0.50	9.21	0.26	96	9.40	9.12	0.15	9.27	-0.13	123	11.04	10.78	0.15	10.93	-0.11	166	13.37	13.06	Ŧ
7	9.40	8.81	0.50	9.31	-0.09	97	9.49	9.21	0.15	9.36	-0.13	124	11.04	10.89	0.15	11.04	0.00	167	12.94	12.70	+
9	9.60	9.04	0.50	9.54	-0.06	99	9.47	9.18	0.15	9.33	-0.14	126	10.94	10.66	0.15	10.81	-0.13	169	12.73	12.48	+
10	9.69	9.11	0.50	9.61	-0.08	100	9.38	9.09	0.15	9.24	-0.14	127	10.83	10.57	0.15	10.72	-0.11	170	12.59	12.35	Ţ
11	9.79	9.22	0.50	9.72	-0.07	101	9.29	9.01	0.15	9.16	-0.13	128	10.95	10.45	0.15	10.60	-0.35	1/1	12.48	12.25	+
13	10.17	9.51	0.15	9.66	-0.51	102	9.45	9.15	0.15	9.30	-0.15	130	11.04	10.74	0.15	10.89	-0.12	172	13.98	13.63	+
14	10.03	9.41	0.15	9.56	-0.47	104	9.34	9.05	0.15	9.20	-0.14	131	11.13	10.88	0.15	11.03	-0.10	174	14.16	13.93	Ţ
15	9.85	9.16	0.15	9.31	-0.54	105	9.23	8.93	0.15	9.08	-0.15	132	11.13	10.82	0.15	10.97	-0.16	175	14.16	13.81	+
17	9.35	8.68	0.15	8.83	-0.52	100	9.72	9.06	0.50	9.56	-0.16	134	12.01	11.72	0.15	11.87	-0.14	177	13.67	13.35	+
18	9.13	8.46	0.15	8.61	-0.52	108	9.72	9.06	0.50	9.56	-0.16	135	12.01	11.75	0.15	11.90	-0.11	178	13.78	13.47	Ţ
19 20	8.93	8.22	0.15	8.37	-0.56	109	9.72	9.19	0.50	9.69	-0.03	136	11.88	11.55	0.15	11.70	-0.18	179	13.85	13.28	+
21	8.14	7.91	0.15	8.35	0.21	111	9.91	9.30	0.50	9.80	-0.11	138	11.69	11.39	0.15	11.54	-0.15	181	12.57	12.20	+
22	9.02	8.26	0.50	8.76	-0.26	112	9.91	9.35	0.50	9.85	-0.06	139	11.88	11.59	0.15	11.74	-0.14	182	12.19	11.23	Ţ
23	9.26	8.33	0.50	8.83	-0.43	113	10.09	9.35	0.50	9.85	-0.24	140	12.01	11.75	0.15	11.90	-0.11	183	13.27	13.00	+
25	9.74	9.07	0.15	9.22	-0.52	115	10.09	9.54	0.50	10.04	-0.05	142	11.84	11.64	0.15	11.79	-0.05	185	13.49	13.21	+
26	9.96	9.24	0.15	9.39	-0.57	116	9.74	9.39	0.15	9.54	-0.20	143	12.80	12.45	0.15	12.60	-0.20	186	13.60	13.32	4
21	10.08	9.33	0.15	9.48	-0.60	229	9.82	9.59	0.50	9.61	-0.03	144	12.91	12.59	0.15	12.74	-0.17	187	13.72	13.43	+
29	10.27	9.86	0.50	10.36	0.09		1 5102		5.25	1 5.01		146	12.73	12.37	0.15	12.52	-0.21	189	13.98	13.68	1
30	10.30	9.86	0.50	10.36	0.06							147	12.51	12.16	0.15	12.31	-0.20	190	14.08	13.80	t
31	10.30	9.73	0.50	9.88	-0.53							148	12.29	11.92	0.15	12.07	-0.22	191	14.19	13.91	+
33	9.87	9.73	0.15	9.88	0.01							150	12.46	12.11	0.15	12.26	-0.20	193	14.13	13.84	1
34	10.22	9.52	0.50	10.02	-0.20							151	12.69	12.35	0.15	12.50	-0.19	194	13.97	13.71	+
35	10.02	9.40	0.50	9.90	-0.12							152	12.90	12.58	0.15	12.73	-0.17	195	12.97	12.70	+
37	10.16	9.80	0.15	9.95	-0.21							154	12.82	12.49	0.15	12.64	-0.18	197	12.70	12.46	1
38	10.23	9.05	0.15	9.20	-1.03							155	13.34	12.98	0.15	13.13	-0.21	198	12.57	12.35	+
40	9.89	9.29	0.50	9.79	-0.10							156	13.46	13.09	0.15	13.24	-0.22	200	12.45	12.23	+
41	9.73	9.10	0.50	9.60	-0.13							158	13.29	12.89	0.15	13.04	-0.25	201	12.44	11.94	1
42	9.65	9.01	0.50	9.51	-0.14							159	13.06	12.64	0.15	12.79	-0.27	202	12.44	11.83	+
44	8.90	8.40	0.15	8.55	-0.35							212	12.42	12.33	0.15	12.29	-0.13	203	12.46	11.38	+
45	9.07	8.41	0.15	8.56	-0.51							213	12.33	12.05	0.15	12.20	-0.13	205	12.46	11.90	Ţ
46	8.83	8.52	0.15	8.67	-0.16							214	12.23	11.96	0.15	12.11	-0.12	206	12.82	12.52	+
48	9.04	8.77	0.15	8.92	-0.12							216	12.02	11.65	0.15	11.80	-0.22	208	12.44	11.75	+
49	9.14	8.86	0.15	9.01	-0.13							217	11.85	11.54	0.15	11.69	-0.16	209	12.36	11.79	+
50	10.26	9.15	0.15	9.30	-0.96							210	11.55	11.41	0.15	11.56	-0.14	210	12.57	11.94	+
52	9.21	8.84	0.15	8.99	-0.22							220	11.40	11.11	0.15	11.26	-0.14	1005	13.36	13.08	1
53	9.07	8.76	0.15	8.91	-0.16							221	11.25	10.99	0.15	11.14	-0.11	1006	13.84	13.55	1
55	10.15	9.55	0.15	9.70	-0.45							222	10.94	10.69	0.15	10.98	-0.10				
56	10.17	9.85	0.15	10.00	-0.17							224	10.99	10.53	0.15	10.68	-0.31				
57	10.08	9.78	0.15	9.93	-0.15							225	10.99	10.38	0.15	10.53	-0.46				
59	10.07	9.50	0.50	10.00	-0.07							220	10.68	10.18	0.15	10.19	-0.49				
60	9.99	9.42	0.50	9.92	-0.07							228	10.53	9.92	0.15	10.07	-0.46				
61 62	9.90	9.30 9.18	0.50	9.80	-0.10							1001	10.85	10.49	0.15	10.64	-0.21				
63	9.48	8.90	0.50	9.40	-0.08							1003	12.67	12.33	0.15	12.48	-0.19				
64	9.40	8.85	0.50	9.35	-0.05							1004	13.22	12.83	0.15	12.98	-0.24				
66	9.22	8.65	0.50	9.21	-0.10								11.09	11.28	1 0.12	11.43	-0.20				
67	9.14	8.54	0.50	9.04	-0.10																
68	9.44	8.79	0.50	9.29	-0.15																
70	9.20	8.55	0.50	9.05	-0.15																
71	9.10	8.48	0.50	8.98	-0.12																
72	8.37	8.18	0.50	8.68	0.31																
74	8.23	8.05	0.50	8.55	0.32																
75	8.16	8.05	0.50	8.55	0.39																
76	8.09	8.05	0.50	8.55	0.46																
78	8.23	8.05	0.50	8.55	0.32																
79	8.32	8.05	0.50	8.55	0.23																
80	8.65	8.36 8.47	0.15	8.51	-0.14																
82	8.82	8.52	0.15	8.67	-0.15																
83	9.14	8.78	0.15	8.93	-0.21																
85 85	8.83	8.29	0.15	8.44	-0.23																
86	8.97	8.58	0.15	8.73	-0.24																
87	9.18	8.60	0.50	9.10	-0.08																
90	9.10	8.60	0.50	9.10	-0.08																

ASBUILT

	Final MFI	
Freeboard	Minimum Eleer	Variation
Required		variation
0.15	12 59	0.16
0.15	12.38	-0.10
0.15	12.78	-0.10
0.15	12.97	-0.22
0.15	13.22	-0.19
0.15	13.30	-0.11
0.15	13.21	-0.16
0.15	12.85	-0.09
0.15	12.75	-0.09
0.15	12.63	-0.10
0.15	12.50	-0.09
0.15	12.40	-0.08
0.15	12.30	-0.30
0.15	13.78	-0.20
0.15	14.08	-0.08
0.15	13.96	-0.20
0.15	13.73	-0.18
0.15	13.50	-0.17
0.15	13.62	-0.16
0.15	13.43	-0.42
0.15	12.71	-0.32
0.15	12.35	-0.22
0.50	11.73	-0.46
0.15	13 15	-0.12
0.15	13.25	-0.13
0.15	13 36	-0.13
0.15	13.30	-0.13
0.15	13.59	-0.10
0.15	13.50	-0.14
0.15	12.05	0.15
0.15	13.05	-0.13
0.15	13.95	-0.13
0.15	14.00	-0.13
0.15	14.12	-0.07
0.15	13.99	-0.14
0.15	13.86	-0.11
0.15	12.85	-0.12
0.15	12.72	-0.10
0.15	12.61	-0.09
0.15	12.50	-0.07
0.15	12.38	-0.07
0.15	12.26	-0.06
0.50	12.44	0.00
0.50	12.33	-0.11
0.50	12.38	0.06
0.15	11.91	-0.55
	12.05	-0.41
0.15	12 67	-0.15
0.15 0.15	12.07	
0.15 0.15 0.15	12.14	-0.30
0.15 0.15 0.15 0.50	12.07 12.14 12.25	-0.30 -0.19
0.15 0.15 0.50 0.50	12.07 12.14 12.25 12.29	-0.30 -0.19 -0.07
0.15 0.15 0.50 0.50 0.50	12.07 12.14 12.25 12.29 12.44	-0.30 -0.19 -0.07 -0.13
0.15 0.15 0.50 0.50 0.50 0.50 0.15	12.07 12.14 12.25 12.29 12.44 12.59	-0.30 -0.19 -0.07 -0.13 -0.01
0.15 0.15 0.50 0.50 0.50 0.50 0.15 0.15	12.14 12.25 12.29 12.44 12.59 13.23	-0.30 -0.19 -0.07 -0.13 -0.01 -0.13

#### Notes

1. All works to be in accordance with Auckland council standards.

- Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000. Levels in terms of the Auckland Vertical Datum 1946.
- It is the contractors responsibility to locate all services that may be affected by his operations.

F	LOT	FGL UPDATE		ML	03/2025
E	LOT	87 - 91 MFL UPDATE		ML	02/2025
D	FLO	OD EXTENT UPDATE		ML	01/2025
С	CRO	SS-SECTION UPDATE		ML	01/2025
Rev	Desc	ription		Ву	Date
		Ву	Date		
Surve	y	-	-		
Design ML			11/2024		
Drawn	1	ML	11/2024		

![](_page_18_Picture_8.jpeg)

62, 78 & 80 PAPAKURA -CLEVEDON ROAD, CLEVEDON, AUCKLAND FOR CLEVEDON PROPERTOES LTD

BUN60399307 AS-BUILT MINIMUM FLOOR LEVEL TABLE

Project no.	194006			
Scale	N/A			
Cad file	BUN60399307 - OVERLAN	ID FLO	W PATH AS-	UILT.DWG
Drawing no.	C480	Rev	F	

## **APPENDIX B – OVERLAND FLOWPATH TP108 CALCULATIONS**

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 1	Rev A
Job Title Calc Title	Clevedon Meadows TP108 Calculation EX Catchment A	Au	thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	1.24	112.59
C	Proposed Roads		94.4	0.00	0.00
С	Existing Lots		90.8	0.00	0.00
C	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	1.240	112.59
CN (weighted) =	total product =112.59total area1.240	) =  - 	90.8	-	
la (average) =	<u>5 x pervious area</u> = <u>5 x</u> total area	<u>0.3720</u> 1.240	1.5	mm	
2. Time of Concentrati	on				
Channelisation factor	C =0.6	(From Table	e 4.2)		
Catchment length	L =0.195	<u>k</u> m (along d	lrainage path	)	
Catchment Slope	Sc= 0.182	_m/m (by equ	ual area metł	nod)	
Runoff factor,	CN         =         90.8           200 - CN         200-         90.8	<u> </u> =	0.83	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	D-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	4 0.6 0.34 1.11	1.67	' =	0.05	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$		=	0.04	hrs
				NO GOOD use	
				0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	ASSOCIATES	Job Number 194006	Sheet 2	Rev A
Job Title C Calc Title T	evedon Meadows P108 Calculation EX Catchment A	Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area</li> <li>Runoff curve number</li> <li>Initial abstraction</li> <li>Time of concentration</li> <li>Calculate storage, S =(1000)</li> <li>Average recurrence interval</li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)</li> <li>Runoff volume, V<sub>24</sub> = 1000x</li> </ol>	A= 0.0124 CN= 90.8 la= 1.5 tc= 0.17 /CN - 10)25.4 , ARI - 2la+2S <sup>2</sup> /(P <sub>24</sub> -la)+S Q <sub>24</sub> A	km2(100ha =1km2) (from worksheet 1) (from worksh	mm 0.268 (GIS)	
	Worksheet 2: Graphi	cal Peak Flow Rate		

	AVEN ASSOCIATE	S	Job N 194	umber 006	Sheet 3	Rev A
Job Title Calc Title	Clevedon Meadows TP108 Calculation EX Catchment B		Aut M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (	la)				
Soil name and classification	Cover description (cover type, hydrologic conditi	, treati on)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70	/30)		90.8	1.40	127.12
С	Proposed Road	s		94.4	0.00	0.00
С	Existing Lots			90.8	0.00	0.00
С	Existing Roads	3		94.4	0.00	0.00
* from Appendix B				Totals =	1.400	127.12
CN (weighted) =	total product =12 total area1	27.12 1.400	=	90.8	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u> 1	0.4200 .400	. 1.5	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	94.2)		
Catchment length	L =	).174	km (along d	rainage path	)	
Catchment Slope	Sc=	0.12	m/m (by equ	ial area meth	nod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	90.8 90.8	=	0.83		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.32	1.11	1.89	=	0.06	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.04	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runoff Paramet	ters a	nd Time of	Concentrati	on	

N	MAVEN ASS	SOCIA	TES	Job Number 194006		Sheet 4	Rev A
Jo Ci	bb Title Clevedon M alc Title TP108 Cal EX Catch	leadows culation ment B		Author ML		Date 15/11/2024	Checked JD
1. 2. 3. 4. 5. 6. 7. 8. 9.	EX CatchData Catchment AreaRunoff curve numberInitial abstractionTime of concentrationCalculate storage, S =(1000/CN - 10)Average recurrence interval, ARI24 hour rainfall depth, P24Compute c* = P24 - 2la/P24 - 2la+25Specific peak flow rate q*Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)$ Runoff volume, $V_{24} = 1000xQ_{24}A$	Ment B A= CN= la= tc= )25.4	0.014 90.8 1.5 #REF!	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) =	25.7	mm 0.268 (GIS)	
	v	Vorksheet	2: Graphic	al Peak Flow Rate			

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 5	Rev A
Job Title Calc Title	Clevedon Meadows TP108 Calculation EX Catchment C	Au	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)	)	90.8	2.25	204.30
С	Pervious Area		74	0.33	24.49
С	Existing Lots		90.8	0.00	0.00
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	2.581	228.79
CN (weighted) =	total product =228.7total area2.58	<u>9</u> = 1	88.6	-	
la (average) =	<u>5 x pervious area</u> = <u>5</u> total area	x 1.0060 2.581	<u>)</u> 1.9	mm	
2. Time of Concentrati	on				
Channelisation factor	C =0.	6 (From Table	e 4.2)		
Catchment length	L =0.18	5 km (along d	Irainage path	)	
Catchment Slope	Sc= <u>0.1</u>	9_m/m (by eq	ual area metł	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{88}{200 - 88}.$	<u>6</u> = 6	0.80		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	D-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	4 0.6 0.33 1.1	3 1.65	; =	0.05	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$		=	0.03	hrs
				NO GOOD use	
				0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	MAVEN ASS	SOCIA	TES	Job Number 194006	Sheet 6	Rev A
Jo Ca	b Title Clevedon M alc Title TP108 Cal EX Catch	leadows culation ment C		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number Initial abstraction	A= CN= Ia=	0.02581 88.6 1.9	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
2	Time of concentration Calculate storage $S = (1000/CN - 10)$	tc=	#REF!	hrs (from worksheet 1)	mm	
2. 3. 4. 5. 6. 7. 8. 9.	Carculate storage, S = (1000/CN - 10) Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2Ia/P24 - 2Ia+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)^2$ Runoff volume, $V_{24} = 1000xQ_{24}A$	5 +S		- 32.5 100 (yr) 280.32 (mm) 0.81 0.160 1.158 m3/s 249.2 6432.91 (m3)	0.268 (GIS)	
	v	/orksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 7	Rev A
Job Title Calc Title	Clevedon Meadows TP108 Calculation EX Catchment D	Au	thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	0.16	14.16
С	Pervious Area		74	2.54	187.74
С	Existing Lots		90.8	0.00	0.00
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	2.693	201.90
CN (weighted) =	total product =201.90total area2.693	<u>)</u> = 3	75.0	-	
la (average) =	<u>5 x pervious area</u> = <u>5 x</u> total area	x 2.5838 2.693	4.8	mm	
2. Time of Concentrati	on				
Channelisation factor	C =0.6	6 (From Table	e 4.2)		
Catchment length	L =0.197	7_km (along d	lrainage path	)	
Catchment Slope	Sc= 0.098	<u>8</u> m/m (by eq	ual area metł	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{75.0}{200 - 75.0}$	<u>)</u> =	0.60	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	D-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	4 0.6 0.34 1.32	2 2.01	=	0.08	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$		=	0.05	hrs
				NO GOOD use	
				0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	<b>IAVEN</b>	ASSOCIA	TES	Job Numb 194006	per	Sheet 8	Rev A
Job Title Calc Title	Clev TP1 EX	edon Meadows 08 Calculation Catchment D		Author ML		Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve num Initial abstraction Time of concentra</li> </ol>	ber	A= CN= la= tc=	0.02693 75.0 4.8 0.17	km2( 100ha =1km (from worksheet 1 mm (from workshe hrs (from workshe	2) ) eet 1) et 1)		
2. Calculate storage	, S =(1000/C	N - 10)25.4		=	84.8	mm	
<ol> <li>Average recurrent</li> <li>24 hour rainfall de</li> <li>Compute c* = P24</li> <li>Specific peak flow</li> <li>Peak flow rate, qp</li> <li>Runoff depth, Q24</li> <li>Runoff volume, V</li> </ol>	ce interval, <i>A</i> epth, P24 4 - 2la/P24 - / rate q* =q*A*P <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup> /(l <sub>24</sub> = 1000xQ <sub>2</sub>	√RI 2la+2S P <sub>24</sub> -la)+S ₄A		100 280.32 0.61 0.141 1.067 210.7 5673.80	(yr) (mm) m3/s (m3)	0.268 (GIS)	
		Worksheet	2: Graphic	al Peak Flow Rate	9		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 9	Rev A
Job Title Calc Title	Clevedon Meadows TP108 Calculation EX Catchment E	Au	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	0.00	0.00
С	Pervious Area		74	1.78	131.50
С	Existing Lots		90.8	0.00	0.00
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	1.777	131.50
CN (weighted) =	total product =131.5total area1.77	<u>0</u> = 7	74.0	-	
la (average) =	<u>5 x pervious area</u> = <u>5</u> total area	x 0.0000 1.777	0.0	mm	
2. Time of Concentration	on				
Channelisation factor	C =0.	6 (From Table	e 4.2)		
Catchment length	L =0.21	9 km (along d	Irainage path	)	
Catchment Slope	Sc= 0.09	<u>8</u> m/m (by eq	ual area meth	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{74.}{200 - 74.}$	<u>0</u> =	0.59		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.37 1.3	4 2.01	=	0.08	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.06	hrs
				NO GOOD	
				use	
				0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 10	Rev A
Job Title Calc Title	Cle TF E	evedon Meadows 2108 Calculation X Catchment E		Author ML		Date 15/11/2024	Checked JD
<ol> <li>Data Catchme Runoff cu Initial abs Time of c</li> <li>Calculate</li> <li>Average</li> <li>24 hour r</li> <li>Compute</li> </ol>	E nt Area rve number traction oncentration storage, S =(1000/ recurrence interval, ainfall depth, P24 c* = P24 - 2la/P24	X Catchment E A= CN= la= tc= CN - 10)25.4 ARI - 2la+2S	0.01777 74.0 0.0 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1 hrs (from worksheet 1 = 100 (yr) 280.32 (mr 0.61	1) ) 89.2 n)	mm	
<ol> <li>Specific p</li> <li>Peak flow</li> <li>Runoff de</li> <li>Runoff vo</li> </ol>	rate, $q_p = q^* A^* P_{24}$ where, $q_p = q^* A^* P_{24}$ where, $Q_{24} = (P_{24} - Ia)^2$ where, $V_{24} = 1000 x C$	/(P <sub>24</sub> -la)+S Ω <sub>24</sub> A		0.141 0.701 m3 212.6 3778.39 (m3	8/s 3)	0.268 (GIS)	
		Worksheet	2: Graphic	al Peak Flow Rate			

	AVEN ASSOCIA	ATES	Job N 194	lumber 1006	Sheet 11	Rev A
Job Title Calc Title	Clevedon Meadov TP108 Calculatio EX Catchment F	ws on :	Au N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstrac	tion (la)				
Soil name and classification	Cover description (cove	r type, treat condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lo	ots (70/30)		90.8	1.08	97.72
С	Pervious	s Area		74	0.00	0.00
С	Existing	Lots		90.8	0.00	0.00
С	Existing	Roads		94.4	0.00	0.00
* from Appendix B				Totals =	1.076	97.72
CN (weighted) =	total product = total area	<u>97.72</u> 1.076	=	90.8		
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.3229	1.5	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	ength L = <u>0.241</u> km (along drainage path)					
Catchment Slope	Sc=	0.63	m/m (by equ	ual area metł	nod)	
Runoff factor,	<u>CN =</u> 200 - CN 20	90.8 0- 90.8	=	0.83	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	D-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.	39 1.11	1.15	=	0.04	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$			=	0.03	hrs
					NO GOOD	
					use	
					0.17	hrs
	Wederland ( D ) ( D			0		
	Worksheet 1: Runoff Pa	irameters a	ind Time of	Concentrati	on	

	MAVEN AS	MAVEN ASSOCIATES		Job Number 194006	Sheet 12	Rev A	
Jo Ca	Job Title Clevedon Meadows Calc Title TP108 Calculation EX Catchment F			Author ML	Date 15/11/2024	Checked JD	
1.	Data Catchment Area Runoff curve number	A= CN=	0.010762 90.8	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)			
	Time of concentration	tc=	0.17	hrs (from worksheet 1)			
2.	Calculate storage, S =(1000/CN - 10	)25.4		= 25.	7 mm		
3. 4. 5. 6. 7. 8. 9.	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute $c^* = P24 - 2Ia/P24 - 2Ia+24$ Specific peak flow rate $q^*$ Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)$ Runoff volume, $V_{24} = 1000 \times Q_{24}A$	S +S		100 (yr) 280.32 (mm) 0.84 0.162 0.489 m3/s 255.3 2747.10 (m3)	0.268 (GIS)		
	Worksheet 2: Graphical Peak Flow Rate						

	AVEN ASSOCIATES	Job I 19	Number 4006	Sheet 1	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 1	Au	uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)	)			
Soil name and classification	Cover description (cover type, tr hydrologic condition	eatment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/3	<u>,</u> 0)	90.8	0.22	19.99
С	Proposed Roads	•	94.4	0.00	0.00
С	Existing Lots		90.8	0.00	0.00
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	0.220	19.99
CN (weighted) =	total product =19.total area0.2	<u>.99</u> = 220	90.8		
la (average) =	<u>5 x pervious area</u> = total area	5 x 0.0660 0.220	<u>)</u> 1.5	mm	
2. Time of Concentration	on				
Channelisation factor	C =	0.6 (From Tabl	e 4.2)		
Catchment length	L =(	0.1 km (along o	drainage path	)	
Catchment Slope	Sc= 0.	. <u>21_</u> m/m (by eq	ual area metł	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{90}{200 - 90}$	<u>0.8</u> = 0.8	0.83	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.22 1.	.11 1.60	) =	0.03	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t <sub>c</sub>		=	0.02	hrs
				NO GOOD use	
				0.17	hrs
	Worksheet 1: Runoff Parameter	rs and Time of	Concentrati	on	

MAVEN ASSOCIATES		Job Number 194006	Sheet 2	Rev 1	
Job Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 1			Author ML	Date 15/11/2024	Checked JD
1. Data Catchment Area Runoff curve number Initial abstraction	A= CN= Ia=	0.002201 90.8 1.5	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
Time of concentration 2. Calculate storage, S =(1000/CN	tc= I - 10)25.4	0.17	hrs (from worksheet 1) = 25.7	' mm	
2. Outculate storage, $C = (1000/611 - 10)20.4$ 3. Average recurrence interval, ARI 4. 24 hour rainfall depth, P24 5. Compute c* = P24 - 2la/P24 - 2la+2S 6. Specific peak flow rate q* 7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 9. Runoff volume, $V_{24} = 1000xQ_{24}A$			100 (yr) 282.32 (mm) 0.84 0.162 0.101 m3/s 257.2 566.20 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 3	Rev 1	
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 2	Au	thor //L	Date 15/11/2024	Checked JD	
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)					
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area	
С	Proposed Lots (70/30)		90.8	2.81	255.14	
С	Proposed Roads		94.4	2.08	196.38	
С	Exisiting Lots		74	1.78	131.50	
СС	Existing Roads		94.4	0.00	0.00	
* from Appendix B			Totals =	6.667	583.02	
CN (weighted) =	total product =583.02total area6.667	<u>2</u> =	87.4	-		
la (average) =	<u>5 x pervious area</u> = <u>5 x</u> total area	<u>&lt; 2.9320</u> 6.667	2.2	mm		
2. Time of Concentration	011					
Channelisation factor	Channelisation factor C = <u>0.6</u> (From Table 4.2)					
Catchment length	Catchment length L = <u>0.712</u> km (along drainage path)					
Catchment Slope	Sc= 0.076	ે m/m (by equ	ual area meth	nod)		
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{87.4}{200 - 87.4}$	<u> </u> = 	0.78	-		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.80 1.15	5 2.17	=	0.17	hrs	
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.11	hrs	
				NO GOOD use 0.17	hrs	
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on		

MAVEN ASSOCIATES		Job Number 194006	Sheet 4	Rev 1	
Job Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 2			Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentration</li> <li>Calculate storage, S =(1000/0</li> </ol>	A= CN= la= tc= CN - 10)25.4	0.066672 87.4 2.2 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 36.5	5 mm	
<ol> <li>Average recurrence interval, <i>x</i></li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24 -</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/0</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ</li> </ol>	ARI 2la+2S P <sub>24</sub> -la)+S <sub>24</sub> A		100 (yr) 280.32 (mm) 0.79 0.159 2.968 m3/s 245.9 16393.44 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		
	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 5	Rev 1
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Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 3	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	1.29	117.13
С	Proposed Roads		94.4	0.42	39.65
С	Exisiting Lots		74	2.69	199.06
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	4.400	355.84
CN (weighted) =	total product =355.84total area4.400		80.9		
la (average) =	<u>5 x pervious area</u> = 5 x total area	<u> </u>	3.6	mm	
2. Time of Concentrati	on				
Channelisation factor	C =0.6	(From Table	e 4.2)		
Catchment length	L =0.52	km (along d	rainage path	)	
Catchment Slope	Sc= 0.083	_m/m (by equ	ual area meth	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{80.9}{200 - 80.9}$	-	0.68		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	D-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.65 1.24	2.11	=	0.14	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.10	hrs
				NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

М	MAVEN AS	SSOCIATES	Job Number 194006	Sheet 6	Rev 1
Job Cal	o Title Clevedor c Title TP108 C PR Cat	n Meadows Calculation chment 3	Author ML	Date 15/11/2024	Checked JD
1. 2. 3. 4. 5. 6.	PR Cat Data Catchment Area Runoff curve number Initial abstraction Time of concentration Calculate storage, S =(1000/CN Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2Ia/P24 - 2Ia+ Specific peak flow rate q*	chment 3 A= 0.044 CN= 80.9 Ia= 3.6 tc= 0.17 10)25.4 -2S	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 60.1 0.100 (yr) 0.69 0.150	mm	
7. 8. 9.	Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)^2$ Runoff volume, $V_{24} = 1000xQ_{24}A$	a)+S	1.856 m3/s	0.268 (GIS)	
		Worksheet 2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIAI	ES	Job N 194	lumber 1006	Sheet 7	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 3A		Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstractio	on (la)				
Soil name and classification	Cover description (cover ty hydrologic con	vpe, treat dition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots	(70/30)		90.8	0.00	0.00
С	Proposed Ro	oads		94.4	0.00	0.00
С	Exisiting Lo	ots		74	2.69	199.06
С	Existing Ro	ads		94.4	0.00	0.00
* from Appendix B				Totals =	2.690	199.06
CN (weighted) =	total product = total area	<u>199.06</u> 2.690	=	74.0	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	2.6900 2.690	- 5.0	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	94.2)		
Catchment length	L =	0.2	km (along d	rainage path	)	
Catchment Slope	Sc=	0.083	m/m (by equ	ual area metł	nod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	74.0 74.0	.=	0.59		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.35	1.34	2.11	=	0.08	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$			=	0.06	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runoff Para	meters a	ind Time of	Concentrati	on	

MAVEN A	SSOCIAI	ES	Job Number 194006	Sheet 8	Rev 1
Job Title Cleved Calc Title TP108 PR Ca	on Meadows Calculation tchment 3A		Author ML	Date 15/11/2024	Checked JD
PR Ca1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN -3. Average recurrence interval, ARI4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2la6. Specific peak flow rate q*7. Peak flow rate, $q_p$ =q*A*P <sub>24</sub> 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-1)^2$ 9. Runoff volume, $V_{24} = 1000xQ_{24}A$	A= CN= la= tc= • 10)25.4	0.0269 74.0 5.0 0.17	km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 89.2 100 (yr) 280.32 (mm) 0.60 0.140 0.140 1.053 m3/s 207.9 5593.13 (m3)	mm 0.268 (GIS)	
	Workshoot 2	Granhid	al Book Flow Bate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 9	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 3B	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	0.59	53.57
С	Proposed Roads		94.4	0.00	0.00
С	Exisiting Lots		74	2.69	199.06
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	3.280	252.63
CN (weighted) =	total product =252.63total area3.280	<u>3</u> =	77.0	-	
la (average) =	5 x pervious area = 5 x total area	<u>&lt; 2.8670</u> 3.280	4.4	mm	
2. Time of Concentration	on				
Channelisation factor	C =0.6	<u>)</u> (From Table	e 4.2)		
Catchment length	L = 0.29	) km (along d	rainage path	)	
Catchment Slope	Sc= 0.08	∑m/m (by eq	ual area meth	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{77.0}{200 - 77.0}$	<u>)</u> = )	0.63	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	)-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.44 1.29	9 2.13	=	0.10	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.07	hrs
				NO GOOD	
				use 0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

M	MAVEN AS	SOCIATE	ES	Job Number 194006	Sheet 10	Rev 1
Job Cale	o Title Clevedon I c Title TP108 Ca PR Catchr	Meadows Iculation nent S3B		Author ML	Date 15/11/2024	Checked JD
1. 1. 2. 3. 4. 5. 6. 7.	PR Catchr Data Catchment Area Runoff curve number Initial abstraction Time of concentration Calculate storage, S =(1000/CN - 10 Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2 Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$	A= CN= la= tc= 0)25.4	0.0328 77.0 4.4 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 75.8 	mm 0.268 (GIS)	
9.	Runoff volume, $V_{24} = (P_{24}-14)/(P_{24}-14)$	Vorksheet 2: 0	Graphic	7101.16 (m3)		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 11	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 4	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	2.47	224.37
С	Proposed Roads		94.4	1.62	153.11
C	Eisiting Lots		74	1.78	131.50
	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	5.870	508.97
CN (weighted) =	total product =508.97total area5.870	<u>/</u> =	86.7	-	
la (average) =	<u>5 x pervious area</u> = 5 x total area	<u>&lt; 2.7616</u> 5.870	2.4	mm	
2. Time of Concentration	on				
Channelisation factor	C =0.6	<u>)</u> (From Table	e 4.2)		
Catchment length	L =0.464	km (along d	rainage path	)	
Catchment Slope	Sc=0.0836	∑m/m (by equ	ual area meth	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{86.7}{200 - 86.7}$	<u>/</u> =	0.77		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.60 1.16	6 2.11	=	0.12	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.08	hrs
				NO GOOD use 0 17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	VEN ASSOCI	ATES	Job Number 194006	Sheet 12	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 4	3	Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentratio</li> <li>Calculate storage, S</li> <li>Average recurrence</li> <li>24 hour rainfall depth</li> <li>Compute c* = P24 - 2</li> </ol>	PR Catchment 4 A A CN la n tc =(1000/CN - 10)25.4 interval, ARI n, P24 2la/P24 - 2la+2S	= 0.058699 = 86.7 = 2.4 = 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 38. 	9 mm	
6. Specific peak flow ra 7. Peak flow rate, $q_p=q^2$ 8. Runoff depth, $Q_{24} = q^2$ 9. Runoff volume, $V_{24} = q^2$	te q* <sup>:</sup> A*P <sub>24</sub> :/P <sub>24</sub> -Ia) <sup>2</sup> /(P <sub>24</sub> -Ia)+S : 1000xQ <sub>24</sub> A		0.158 <b>2.600</b> m3/s 243.8 14311.80 (m3)	0.268 (GIS)	
	Workshe	et 2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 13	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 5	Au	thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	2.40	217.70
С	Proposed Roads		94.4	1.51	142.07
С	Exisiting Lots		74	1.78	131.50
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	5.680	491.27
CN (weighted) =	total product =491.23total area5.680	<u>7</u> =	86.5	-	
la (average) =	<u>5 x pervious area</u> = <u>5</u> : total area	x 2.7220 5.680	2.4	mm	
2. Time of Concentrati	on				
Channelisation factor	C =0.6	6 (From Table	e 4.2)		
Catchment length	L =0.436	<u>6 </u> km (along d	lrainage path	)	
Catchment Slope	Sc=0.038	<u>3 </u> m/m (by eqi	ual area meth	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{86.5}{200 - 86.5}$	<u>5</u> =	0.76	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	4 0.6 0.58 1.16	6 2.67	' =	0.15	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$		=	0.10	hrs
				NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	MAVEN ASS	OCIA	TES	Job Number 194006	Sheet 14	Rev 1
Job T Calc	Title Clevedon N Title TP108 Calo PR Catchi	eadows culation ment 5		Author ML	Date 15/11/2024	Checked JD
1. D C R In Ti 2. C	Data Catchment Area Runoff curve number nitial abstraction Time of concentration Calculate storage, S =(1000/CN - 10)	A= CN= la= tc= 25.4	0.056796 86.5 2.4 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 39.6	) mm	
3. A 4. 24 5. C 6. S 7. P 8. R 9. R	Average recurrence interval, ARI 4 hour rainfall depth, P24 Compute c* = P24 - 2Ia/P24 - 2Ia+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+1$ Runoff volume, $V_{24} = 1000xQ_{24}A$	·S		100 (yr) 280.32 (mm) 0.78 0.158 2.512 m3/s 243.2 13814.17 (m3)	0.268 (GIS)	
	w	orksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCI	ATES	Job N 194	lumber 4006	Sheet 15	Rev 1
Job Title Calc Title	Clevedon Mead TP108 Calcula PR Catchmen	lows tion t 6	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstr	action (la)				
Soil name and classification	Cover description (co hydrologi	ver type, treat c condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed	, Lots (70/30)		90.8	0.47	42.95
С	Propos	ed Roads		94.4	0.10	9.22
С	Exisiti	ng Lots		74	0.00	0.00
С	Existin	g Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.571	52.17
CN (weighted) =	total product = total area	<u>52.17</u> 0.571	=	91.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.1566 ).571	1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.054	km (along d	rainage path	)	
Catchment Slope	Sc=	0.01	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN =</u> 200 - CN	91.4 200- 91.4	=	0.84	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.15 1.10	3.98	=	0.05	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$	•		=	0.04	hrs
					NO GOOD use 0 17	hrs
					0.17	
	Worksheet 1: Runoff	Parameters a	nd Time of	Concentrati	on	

N	MAVEN ASSO	CIA	ATES	Job Number 194006	Sheet 16	Rev 1
Jo Ci	bb Title Clevedon Me alc Title TP108 Calcu PR Catchm	adows lation ent 6		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number Initial abstraction	A= CN= la=	0.005707 91.4 1 4	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	5.4		= 23.8	mm	
3.	Average recurrence interval, ARI			100 (yr)		
4.	24 hour rainfall depth, P24			280.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.85		
6.	Specific peak flow rate q*			0.163		
/.  0	Peak flow rate, $q_p = q^* A^* P_{24}$			0.260 m3/s	0.268 (GIS)	
9.	Runoff volume, $V_{24} = (P_{24} - ia) / (P_{24} - ia) + S$			1466.57 (m3)		
	Wo	rksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	lumber 1006	Sheet 17	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcul PR Catchme	adows ation ent 7	Au N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	traction (la)				
Soil name and classification	Cover description (c hydrolog	over type, treat gic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propose	d Lots (70/30)		90.8	1.92	174.60
С	Propo	sed Roads		94.4	1.29	122.02
C	Exis	iting Lots		74	1.78	131.50
	EXIS	ing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	4.993	428.12
CN (weighted) =	total product = total area	<u>428.12</u> 4.993	=	85.8	-	
la (average) =	<u>5 x pervious area</u> = total area	5 x	<u>2.5478</u> 1.993	2.6	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.39	km (along d	rainage path	)	
Catchment Slope	Sc=	0.1	m/m (by equ	ual area metł	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	85.8 200- 85.8	=	0.75	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.54 1.17	2.00	=	0.11	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.07	hrs
					NO GOOD	
					use	
					0.17	hrs
	Worksheet 1: Runof	f Parameters a	nd Time of	Concentrati	on	

	VEN ASSOCIA	ATES	Job Number 194006	Sheet 18	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 7		Author ML	Date 15/11/2024	Checked JD
1. Data Catchment Area Runoff curve number	A= CN=	0.049925 85.8	km2( 100ha =1km2) (from worksheet 1)		
Time of concentration	ia= tc=	2.6 0.17	hrs (from worksheet 1)		
2. Calculate storage, S =	(1000/CN - 10)25.4		= 42.2	mm	
<ol> <li>Average recurrence in</li> <li>24 hour rainfall depth,</li> <li>Compute c* = P24 - 21</li> <li>Specific peak flow rate</li> <li>Peak flow rate, q<sub>p</sub>=q*A</li> <li>Runoff depth, Q<sub>24</sub> = (F</li> <li>Runoff volume, V<sub>24</sub> = 1</li> </ol>	terval, ARI P24 a/P24 - 2la+2S e q* $^{*}P_{24}$ $P_{24}$ -la) <sup>2</sup> /(P <sub>24</sub> -la)+S 1000xQ <sub>24</sub> A		100 (yr) 280.32 (mm) 0.77 0.157 2.196 m3/s 241.1 12038.56 (m3)	0.268 (GIS)	
	Worksheet	t 2: Graphic	al Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	lumber 4006	Sheet 19	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcul PR Catchme	adows lation ent 8	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	traction (la)				
Soil name and classification	Cover description (c	over type, treat gic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propose	d Lots (70/30)		90.8	0.65	58.86
С	Propo	sed Roads		94.4	0.11	10.03
С	Exis	iting Lots		74	0.00	0.00
С	Exist	ing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.755	68.89
CN (weighted) =	total product = total area	<u>68.89</u> 0.755	=	91.3	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.2104 ).755	1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.65	km (along d	rainage path	)	
Catchment Slope	Sc=	0.1	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.3 200- 91.3	.=	0.84	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.75 1.10	2.00	=	0.14	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.09	hrs
					NO GOOD use	bro
					0.17	

N	MAVEN ASSO	CIA	ATES	Job Number 194006	Sheet 20	Rev 1
Jo Ci	bb Title Clevedon Mea alc Title TP108 Calcu PR Catchmo	adows lation ent 8		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.007545 91.3	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	1.4	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	5.4		= 24.2	mm	
3. 4. 5. 7. 8. 9.	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ Runoff volume, $V_{24} = 1000xQ_{24}A$			100 (yr) 280.32 (mm) 0.85 0.162 0.162 0.344 m3/s 256.7 1936.60 (m3)	0.268 (GIS)	
	Wo	rksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 21	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 9	Au	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (la	)			
Soil name and classification	Cover description (cover type, t hydrologic conditior	reatment, and ı)	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/3	30)	90.8	1.27	115.74
С	Proposed Roads		94.4	1.29	122.02
С	Exisiting Lots		74	1.17	86.58
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	3.737	324.34
CN (weighted) =	total product =324total area3.7	. <u>.34</u> = 737	86.8		
la (average) =	<u>5 x pervious area</u> = total area	5 x 1.7463 3.737	2.3	mm	
2. Time of Concentrati	on				
Channelisation factor	C =	0.6 (From Table	e 4.2)		
Catchment length	L =0.3	<u>309 </u> km (along d	Irainage path	)	
Catchment Slope	Sc=0	0.08 m/m (by eq	ual area metł	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{8}{200 - 8}$	<u>6.8</u> =	0.77		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	4 0.6 0.46 1	.16 2.13	; =	0.10	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$		=	0.06	hrs
				NO GOOD use	hre
				0.17	
	Worksheet 1: Runoff Paramete	rs and Time of	Concentrati	on	

MAVEN	ASSOCIA	TES	Job Number 194006	Sheet 22	Rev 1
Job Title Cleve Calc Title TP1 PR	edon Meadows 08 Calculation Catchment 9		Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area</li> <li>Runoff curve number Initial abstraction</li> <li>Time of concentration</li> <li>Calculate storage, S =(1000/Cl</li> <li>Average recurrence interval, A</li> </ol>	A= CN= la= tc= N - 10)25.4	0.037373 86.8 2.3 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 38.7	mm	
<ol> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24 - 2</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/(F</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub></li> </ol>	2la+2S 9 <sub>24</sub> -la)+S 4A		280.32 (mm) 0.78 0.158 1.656 m3/s 244.0 9120.22 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIA	TES	Job N 194	lumber 1006	Sheet 23	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 10	i	Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction	on (la)				
Soil name and classification	Cover description (cover t hydrologic col	ype, treat ndition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots	s (70/30)		90.8	0.64	58.13
С	Proposed R	Roads		94.4	0.12	10.89
С	Exisiting L	ots		74	0.00	0.00
С	Existing Ro	oads		94.4	0.00	0.00
* from Appendix B				Totals =	0.756	69.02
CN (weighted) =	total product = total area	<u>69.02</u> 0.756	.=	91.3	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.2094	1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.88	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN 200-	91.3 - 91.3	=	0.84		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.92	2 1.10	2.46	=	0.21	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.14	hrs
					OK use 0.20862886	hrs
	Worksheet 1: Runoff Para	ameters a	ind Time of	Concentrati	on	

MAVEN A	SSOCIA	TES	Job Number 194006	Sheet 24	Rev 1
Job Title Cleved Calc Title TP108 PR Ca	lon Meadows Calculation atchment 10		Author ML	Date 15/11/2024	Checked JD
Calc FileIf You PR Calc1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN)3. Average recurrence interval, AR4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2la6. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)^2$ 9. Runoff volume, $V_{24} = 1000xQ_{24}A$	A= CN= la= tc= - 10)25.4	0.007556 91.3 1.4 0.21	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 24.1 100 (yr) 280.32 (mm) 0.85 0.163 0.163 0.163 1940.32 (m3)	mm 0.268 (GIS)	
	Workshoot	2: Cronbid	al Book Flow Poto		

	AVEN ASSOCIATES	s	Job N 194	umber 006	Sheet 25	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 11		Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (la	a)				
Soil name and classification	Cover description (cover type, the hydrologic condition	treatm on)	ent, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/3	30)		90.8	0.63	57.62
С	Proposed Roads	6		94.4	0.72	68.00
С	Exisiting Lots			74	0.00	0.00
C	Existing Roads			94.4	0.00	0.00
* from Appendix B				Totals =	1.355	125.62
CN (weighted) =	total product =125total area1.	<u>5.62</u> = .355		92.7		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u> 1.3	0.2984	. 1.1	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	<u>0.6</u> (F	From Table	e 4.2)		
Catchment length	L =(	0.22 ki	m (along di	rainage path	)	
Catchment Slope	Sc=	0.05 m	n/m (by equ	ial area meth	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{CN}{200 - CN}$	92.7_= 92.7		0.86	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.37	1.08	2.46	=	0.08	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.06	hrs
					NO GOOD	
					0.17	hrs
	Worksheet 1: Runoff Paramete	ers an	d Time of	Concentrati	on	

MAVEN 2	ASSOCIA	TES	Job Number 194006	Sheet 26	Rev 1
Job Title Cleve Calc Title TP10 PR C	don Meadows 8 Calculation Catchment 11		Author ML	Date 15/11/2024	Checked JD
1. Data Catchment Area Runoff curve number Initial abstraction	A= CN= la= tc=	0.013549 92.7 1.1	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1)		
<ol> <li>Calculate storage, S =(1000/CN</li> </ol>	l - 10)25.4	0.17	= 20.0	mm	
<ol> <li>Average recurrence interval, AF</li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24 - 2</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/(P</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub></li> </ol>	RI Ia+2S ₂₄-la)+S A		100 (yr) 280.32 (mm) 0.87 0.164 0.621 m3/s 260.6 3530.72 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOC	CIATES	Job N 194	lumber 4006	Sheet 27	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows Ilation ent 12	Au M	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	straction (la)				
Soil name and classification	Cover description ( hydrolo	cover type, treat gic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propose	ed Lots (70/30)		90.8	0.63	57.62
С	Prope	osed Roads		94.4	0.05	4.97
С	Exis	siting Lots		74	0.00	0.00
С	Exis	ting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.687	62.60
CN (weighted) =	total product = total area	<u>62.60</u> 0.687	=	91.1	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.1983 ).687	1.4	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.085	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area metł	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.1 200- 91.1	.=	0.84		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.20 1.10	2.46	=	0.04	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runo	ff Parameters a	ind Time of	Concentrati	on	

MAVEN MAVEN	ASSOCIA	TES	Job Number 194006	Sheet 28	Rev 1
Job Title Cle Calc Title TP PF	vedon Meadows 108 Calculation R Catchment 12		Author ML	Date 15/11/2024	Checked JD
1. Data Catchment Area Runoff curve number Initial abstraction	A= CN= la=	0.006873 91.1 1.4	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
<ol> <li>Calculate storage, S =(1000/0</li> </ol>	ւշ= CN - 10)25.4	0.17	= 24.9	mm	
<ol> <li>Average recurrence interval, .</li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24 -</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/.</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ</li> </ol>	ARI - 2la+2S (P <sub>24</sub> -la)+S 9 <sub>24</sub> A		100 (yr) 280.32 (mm) 0.85 0.162 0.162 0.313 m3/s 256.0 1759.69 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	lumber 4006	Sheet 29	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcula PR Catchmer	dows ation at 13	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abst	raction (Ia)				
Soil name and classification	Cover description (co	over type, treat ic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed	, I Lots (70/30)		90.8	0.00	0.00
С	Propos	sed Roads		94.4	0.42	39.24
С	Exisi	ting Lots		74	0.00	0.00
С	Existi	ng Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.416	39.24
CN (weighted) =	total product = total area	<u> </u>	=	94.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.0624	0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.134	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	94.4 200- 94.4	=	0.89	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.27 1.06	2.46	=	0.06	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.04	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runoff	Parameters a	ind Time of	Concentrati	on	

MAVEN	ASSOCIA	TES	Job Number 194006	Sheet 30	Rev 1
Job Title Cleve Calc Title TP10 PR 0	edon Meadows 08 Calculation Catchment 13		Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentration</li> <li>Calculate storage, S =(1000/CN</li> </ol>	A= CN= la= tc= N - 10)25.4	0.004157 94.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 15.1	mm	
<ol> <li>Average recurrence interval, AF</li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P24 - 2</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/(P</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub></li> </ol>	RI 2la+2S 2 <sub>24</sub> -la)+S A		100 (yr) 280.32 (mm) 0.90 0.165 0.192 m3/s 265.3 1102.74 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOC	CIATES	Job N 194	lumber 4006	Sheet 31	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calco PR Catchme	eadows ulation ent 13A	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Ab	straction (la)				
Soil name and classification	Cover description ( hydrolo	cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propos	ed Lots (70/30)		90.8	0.00	0.00
С	Prop	osed Roads		94.4	0.16	14.92
С	Exi	siting Lots		74	0.00	0.00
С	Exis	ting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.158	14.92
CN (weighted) =	total product = total area	<u>14.92</u> 0.158	=	94.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.0237 ).158	0.8	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.087	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN =</u> 200 - CN	94.4 200- 94.4	=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.20 1.06	2.46	=	0.04	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/5	3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runo	ff Parameters a	nd Time of	Concentrati	on	

	N ASSOCIA	TES	Job Number 194006	Sheet 32	Rev 1
Job Title ( Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 13A		Author ML	Date 15/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentration</li> </ol>	A= CN= la= tc=	0.001581 94.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1)		
<ol> <li>Calculate storage, S =(100)</li> <li>Average recurrence interval</li> <li>24 hour rainfall depth, P24</li> <li>Compute c* = P24 - 2la/P2</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la</li> <li>Runoff volume, V<sub>24</sub> = 1000</li> </ol>	0/CN - 10)25.4 al, ARI 4 - 2Ia+2S ) <sup>2</sup> /(P <sub>24</sub> -Ia)+S xQ <sub>24</sub> A		= 15.1	mm 0.268 (GIS)	
	Worksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATE	ES	Job N 194	lumber 1006	Sheet 1	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 14		Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction	(la)				
Soil name and classification	Cover description (cover type hydrologic condit	e, treat tion)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (7	0/30)		90.8	6.62	601.07
С	Proposed Roa	ds		94.4	3.00	283.28
С	Existing Lots	3		90.8	0.00	0.00
С	Existing Road	ls		94.4	0.00	0.00
* from Appendix B				Totals =	9.621	884.35
CN (weighted) =	total product =8 total area	9.621	=	91.9	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	2.4360 9.621	1.3	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	94.2)		
Catchment length	L =	0.814	km (along d	rainage path	)	
Catchment Slope	Sc=	0.007	m/m (by equ	ual area metł	nod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	91.9 91.9	=	0.85		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	4 0.6 0.87	1.09	4.43	=	0.36	hrs
SCS Lag for HEC-HMS	$t_p = 2/3 t_c$			=	0.24	hrs
					OK	
					use	
					0.35516677	hrs
	Worksheet 1: Runoff Parame	eters a	nd Time of	Concentrati	on	

MA	MAVEN AS	SOCIA	TES	Job Number 194006	r	Sheet 2	Rev 1
Job Ti Calc T	itle Clevedor Title TP108 C PR Cato	n Meadows alculation chment 14		Author ML		Date 15/11/2024	Checked JD
<ol> <li>Cale T</li> <li>Cale T</li> <li>Cale Cale Cale Cale Cale Cale Cale Cale</li></ol>	ata atchment Area unoff curve number tial abstraction me of concentration alculate storage, S =(1000/CN - 1 verage recurrence interval, ARI hour rainfall depth, P24 ompute c* = P24 - 2Ia/P24 - 2Ia+ becific peak flow rate q* eak flow rate, $q_p=q^*A^*P_{24}$ unoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)^2$	A= CN= la= tc= 10)25.4 2S	0.096206 91.9 1.3 0.36	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet hrs (from worksheet = 	) t 1) 22.3 rr) nm)	mm 0.268 (GIS)	
9. Ru	unoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A	Worksheet	2: Graphic	25049.87 (n	n3)		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 3	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 15	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, tro hydrologic condition	eatment, and )	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30	))	90.8	0.67	60.65
С	Proposed Roads		94.4	0.44	41.48
С	Existing Lots		90.8	0.00	0.00
C	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	1.107	102.12
CN (weighted) =	total product =102.total area1.1	<u>12</u> = 07	92.2		
la (average) =	<u>5 x pervious area</u> = total area	5 x 0.2663 1.107	1.2	mm	
2. Time of Concentration	on				
Channelisation factor	C =(	).6 (From Tabl	e 4.2)		
Catchment length	L =0.2	61_km (along c	drainage path	ו)	
Catchment Slope	Sc=0.	<u>05 </u> m/m (by eq	ual area met	hod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{92}{200 - 200 - 92}$	<u>2.2</u> = 2.2	0.86		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.41 1.	09 2.46	=	0.09	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.06	hrs
				NO GOOD use 0 17	hrs
	Worksheet 1: Runoff Parameters	s and Time of	Concentrati	on	

	N ASSOCIZ	ATES	Job Number 194006	Sheet 4	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 15		Author ML	Date 1/11/2024	Checked JD
<ol> <li>Data Catchment Area</li> <li>Runoff curve number Initial abstraction Time of concentration</li> <li>Calculate storage, S =(10)</li> <li>Average recurrence intern</li> <li>24 hour rainfall depth, P2</li> <li>Compute c* = P24 - 2la/F</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>2</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-I)</li> <li>Runoff volume, V<sub>24</sub> = 100</li> </ol>	PR Catchment 15 A= CN= la= tc= 00/CN - 10)25.4 /al, ARI 4 24 - 2la+2S 4 a) <sup>2</sup> /(P <sub>24</sub> -la)+S 0xQ <sub>24</sub> A	0.011073 92.2 1.2 0.17	ML         km2(100ha =1km2)         (from worksheet 1)         mm (from worksheet 1)         =       21.4         100         (yr)         282.32         (mm)         0.87         0.163         0.163         261.2         2892.59         (m3)	0.268 (GIS)	
	Workshee	t 2: Graphic	cal Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 5	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 16	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	5.97	541.63
С	Proposed Roads		94.4	2.55	240.55
C	Existing Lots		90.8	0.00	0.00
СС	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	8.513	782.18
CN (weighted) =	total product =782.18total area8.513	<u>3</u> =	91.9		
la (average) =	5 x pervious area = 5 x total area	<u>2.1718</u> 8.513	1.3	mm	
2. Time of Concentration	on				
Channelisation factor	C =0.6	<u>6</u> (From Table	e 4.2)		
Catchment length	L =0.814	km (along d	Irainage path	ו)	
Catchment Slope	Sc= 0.0066	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN = 91.9</u> 200 - CN 200- 91.9	<u>)</u> =	0.85		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.87 1.09	9 4.51	=	0.36	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.24	hrs
				OK use 0.36134542	hrs
	Worksheet 1: Runoff Parameters a	and Time of	Concentrati	on	

MAVEN A	ASSOCIA	TES	Job Number 194006		Sheet 6	Rev 1
Job Title Cleved Calc Title TP108 PR C	don Meadows 3 Calculation atchment 16		Author ML		Date 1/11/2024	Checked JD
Calc FileIP for PR C1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN)3. Average recurrence interval, AF4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 26. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24})^2$ 9. Runoff volume, $V_{24} = 1000 \times Q_{24}$	A= CN= la= tc= I - 10)25.4 RI la+2S <sub>24</sub> -la)+S	0.085133 91.9 1.3 0.36	Implement         km2(100ha =1km2)         (from worksheet 1)         mm (from worksheet 1)         =       2         100         100         (yr)         282.32         (mm)         0.131         3.149         m3/s         260.3         22155.94         (m3)	22.5	mm 0.268 (GIS)	JU
	Worksheet	2: Graphic	cal Peak Flow Rate			

	AVEN ASSOCIATE	s	Job N 194	umber 1006	Sheet 7	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 16A		Aut M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (	(la)				
Soil name and	Cover description (cover type	, treatr	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
C	Proposed Lots (70	)/30)		90.8	a 5.26	478.03
C	Proposed Road	ls		94.4	2.43	229.26
С	Existing Lots			90.8	0.00	0.00
С	Existing Roads	S		94.4	0.00	0.00
* from Appendix B				Totals =	7.693	707.29
CN (weighted) =	total product = 70 total area	07.29 7.693	=	91.9		
la (average) =	<u>5 x pervious area</u> = total area	5 x 7	<u>1.9437</u> .693	. 1.3	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.814	km (along d	lrainage path	ו)	
Catchment Slope	Sc= 0.	.0066	m/m (by eqi	ual area met	hod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	91.9 91.9	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.87	1.09	4.51	=	0.36	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.24	hrs
					OK use 0.36110983	hrs
	Worksheet 1: Runoff Paramet	ters a	nd Time of	Concentrati	on	

MAVEN 2	ASSOCIA	TES	Job Number 194006	Sheet 8	Rev 1	
Job Title Clever Calc Title TP10 PR Ca	don Meadows 8 Calculation atchment 16A		Author ML	Date 1/11/2024	Checked JD	
PR Ca         1. Data Catchment Area         Runoff curve number         Initial abstraction         Time of concentration         2. Calculate storage, S =(1000/CN)         3. Average recurrence interval, AF         4. 24 hour rainfall depth, P24         5. Compute c* = P24 - 2la/P24 - 2         6. Specific peak flow rate q*         7. Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub> 8. Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup> /(P)         9. Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub>	A= CN= la= tc= N - 10)25.4 RI 2/24-la)+S A	0.076932 91.9 1.3 0.36	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 22. 100 (yr) 282.32 (mm) 0.86 0.131 2.845 m3/s 260.4 20034.26 (m3)	3 mm 0.268 (GIS)		
	Worksheet	2: Graphic	cal Peak Flow Rate			
	AVEN ASSOCI	ATES	Job N 194	lumber 4006	Sheet 9	Rev 1
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Job Title Calc Title	Clevedon Meado TP108 Calculati PR Catchment	ows on 17	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstra	ction (la)				
Soil name and classification	Cover description (cover description (cover	er type, treati condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)			90.8	0.18	16.58
С	Propose	d Roads		94.4	0.72	67.81
С	Existin	g Lots		90.8	0.00	0.00
С	Existing	Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.901	84.39
CN (weighted) =	total product = total area	<u>84.39</u> 0.901	=	93.7		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.1625 0.901	0.9	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.113	km (along c	Irainage path	ו)	
Catchment Slope	Sc=	0.14	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN =</u> 200 - CN 2	93.7 00- 93.7	=	0.88		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0	0.24 1.07	1.80	=	0.04	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff P	arameters a	nd Time of	Concentrati	on	

Job Title Calc TitleClevedon Meadows TP108 Calculation PR Catchment 17Author MLDate 1/1/1/2024Checke JD1. Data Catchment AreaA= $0.009009 \text{ km2}(100ha = 1km2)$ Runoff curve numberCN= $93.7 \text{ (from worksheet 1)}$ 1. Initial abstractionIa= $0.9 \text{ mm} (from worksheet 1)$ Initial abstractionIa= $0.9 \text{ mm} (from worksheet 1)$ 1. Time of concentrationtc= $0.17 \text{ hrs} (from worksheet 1)$ Time of concentration $1000 \text{ (yr)}$ 2. Calculate storage, S = (1000/CN - 10)25.4= $17.2 \text{ mm}$ 3. Average recurrence interval, ARI $100 \text{ (yr)}$ 4. 24 hour rainfall depth, P24 $282.32 \text{ (mm)}$ 5. Compute c* = P24 - 2la/P24 - 2la+2S $0.89 \text{ (mm)}$ 6. Specific peak flow rate q* $0.164 \text{ m3/s}$ 7. Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub> $0.418 \text{ m3/s}$ 8. Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup> /(P <sub>24</sub> -la)+S $265.2 \text{ (m3)}$ 9. Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A $2389.55 \text{ (m3)}$	MAVEN ASSOCIAT	TES	Job Number 194006	Sheet 10	Rev 1
1. Data       Catchment Area       A= $0.009009 \text{ km2}(100ha = 1 \text{ km2})$ Runoff curve number       CN= $93.7 \text{ (from worksheet 1)}$ Initial abstraction       Ia= $0.9 \text{ mm (from worksheet 1)}$ Time of concentration       tc= $0.17 \text{ hrs (from worksheet 1)}$ 2. Calculate storage, S =(1000/CN - 10)25.4       = $17.2 \text{ mm}$ 3. Average recurrence interval, ARI       100 (yr)         4. 24 hour rainfall depth, P24       282.32 (mm)         5. Compute c* = P24 - 2la/P24 - 2la+2S       0.89         6. Specific peak flow rate q*       0.164         7. Peak flow rate, $q_p=q^*A^*P_{24}$ 0.4418 m3/s       0.268 (GIS)         8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 265.2         9. Runoff volume, $V_{24} = 1000xQ_{24}A$ 2389.55 (m3)	Job Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 17		Author ML	Date 1/11/2024	Checked JD
6. Specific peak flow rate q*       0.164         7. Peak flow rate, $q_p=q^*A^*P_{24}$ 0.418         8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 265.2         9. Runoff volume, $V_{24} = 1000xQ_{24}A$ 2389.55	PR Catchment 17         1. Data       Catchment Area       A=       A=	0.009009 km2 93.7 (fro 0.9 mm 0.17 hrs =	2( 100ha =1km2) m worksheet 1) n (from worksheet 1) (from worksheet 1) 17.2 17.2 282.32 (mm) 0.89	mm	
	<ol> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P<sub>24</sub></li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-la)<sup>2</sup>/(P<sub>24</sub>-la)+S</li> <li>Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A</li> </ol>		0.164 0.418 m3/s 265.2 2389.55 (m3)	0.268 (GIS)	

	AVEN ASSOC	IATES	Job N 194	lumber 1006	Sheet 11	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcula PR Catchmer	dows ation at 18	Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abst	raction (la)				
Soil name and	Cover description (cc	ver type, treat	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolog	ic condition)			a 0.10	CN x area
C	Proposed Lots (70/30) Proposed Roads			90.0	0.10	0.94 23.50
C	Exist	Existing Lots			0.23	0.00
C	Existi	ng Roads		94.4	0.00	0.00
		5		-		
* from Appendix B				Totals =	0.347	32.44
CN (weighted) =	total product = total area	<u>32.44</u> 0.347	=	93.4		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.0669	1.0	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.062	km (along d	lrainage path	1)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	93.4 200- 93.4	.=	0.88		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.16 1.08	2.46	=	0.04	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3$	c		=	0.02	hrs
					NO GOOD use	bre
	Workshoet 4: Dure-ff	Paramatana -	nd Time of	Concorteration	0.17	1115

MAVEN ASSO	CIATES	Job Number 194006	Sheet 12	Rev 1
Job Title Clevedon Mead Calc Title TP108 Calculat PR Catchment	ows ion 18	Author ML	Date 1/11/2024	Checked JD
Calc littleIP108 Calculat PR Catchment1. Data Catchment AreaRunoff curve numberInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN - 10)25.43. Average recurrence interval, ARI4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2la+2S6. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$	on 18 A= 0.003474 CN= 93.4 Ia= 1.0 tc= 0.17 4	ML km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 18.0 100 (yr) 282.32 (mm) 0.89 0.164 0.164 m3/s	mm 0.268 (GIS)	JD
9. Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A	sheet 2: Graphi	918.64 (m3)		

	AVEN ASSOCI	ATES	Job N 194	lumber 1006	Sheet 13	Rev 1
Job Title Calc Title	Clevedon Meado TP108 Calculati PR Catchment	ws on 19	Au N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstra	ction (la)				
Soil name and	Cover description (cove	er type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	nydrologic Proposod I	Proposed Lots (70/30)			a 4 25	
<u>с</u>	Proposed	Proposed Lots (70/30) Proposed Roads			2.03	191.96
C	Existin	g Lots		90.8	0.00	0.00
C	Existing	Roads		94.4	0.00	0.00
* from Appendix B				Totals =	6.282	577.76
CN (weighted) = la (average) =	total product = total area	<u>577.76</u> 6.282 <u>5 x</u> 6	= <u>1.5797</u> 3.282	92.0	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.689	km (along d	Irainage path	1)	
Catchment Slope	Sc=	0.068	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN =</u> 200 - CN 2	92.0 00- 92.0	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0	.78 1.09	2.24	=	0.16	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t <sub>c</sub>			=	0.11	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Pa	arameters a	nd Time of	Concentrati	on	

MA	MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 14	Rev 1
Job Title Calc Titl	e Cle e TP PF	vedon Meadows 108 Calculation & Catchment 19		Author ML		Date 1/11/2024	Checked JD
<ol> <li>Data Catc</li> <li>Runo</li> <li>Initia</li> <li>Time</li> <li>Calci</li> <li>Calci</li> <li>Aver</li> <li>24 ho</li> <li>Com</li> <li>Spec</li> <li>Peak</li> <li>Runo</li> </ol>	e PP PR PR PR PR PR PR PR PR PR	A= CN= la= tc= CN - 10)25.4 ARI - 2la+2S (P <sub>24</sub> -la)+S	0.062824 92.0 1.3 0.17	ML         km2(100ha =1km2)         (from worksheet 1)         mm (from worksheet 1)         hrs (from worksheet 1)         =         100         (yr)         282.32         (mm)         0.86         0.163         2.892         m3/s	)	mm 0.268 (GIS)	JU
9. Runo	off volume, V <sub>24</sub> = 1000xC	Q₂₄A Worksheet	2: Graphic	16365.36 (m3)			

	AVEN ASSOC	IATES	Job N 194	lumber 1006	Sheet 15	Rev 1
Job Title Calc Title	Clevedon Mead TP108 Calcula PR Catchmen	dows ation t 20	Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abst	raction (la)				
Soil name and	Cover description (co	ver type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrologi	Proposed Lots (70/30)			a 0.01	CN x area
	Proposed	Proposed Lots (70/30) Proposed Roads			0.21	19.08
C	Exist	ina Lots		90.8	0.00	0.00
С	Existir	ng Roads		94.4	0.00	0.00
+ ( ) + D				<u> </u>		0.1.00
* from Appendix B				Totals =	0.377	34.82
CN (weighted) =	total product = total area	<u>34.82</u> 0.377	=	92.4		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.0881	. 1.2	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.099	km (along d	lrainage path	1)	
Catchment Slope	Sc=	0.04	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	92.4 200- 92.4	=	0.86		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.22 1.09	2.63	=	0.05	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t	c		=	0.03	hrs
					NO GOOD	
					use	
					0.17	hrs
	Worksheet 1: Runoff	Parameter <u>s a</u>	nd Time of	Concentrati	on	

	N ASSOCIA	ATES	Job Number 194006	Sheet 16	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 20		Author ML	Date 1/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentration</li> <li>Calculate storage, S =(10)</li> <li>Average recurrence inter</li> <li>24 hour rainfall depth, P2</li> <li>Compute c* = P24 - 2la/F</li> <li>Specific peak flow rate q*</li> <li>Peak flow rate, q<sub>p</sub>=q*A*P</li> <li>Runoff depth, Q<sub>24</sub> = (P<sub>24</sub>-</li> <li>Runoff volume, V<sub>24</sub> = 100</li> </ol>	PR Catchment 20 A= CN= la= tc= 00/CN - 10)25.4 /al, ARI 4 224 - 2la+2S 24 a) <sup>2</sup> /(P <sub>24</sub> -la)+S 0xQ <sub>24</sub> A	0.003769 92.4 1.2 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 20.9 100 (yr) 282.32 (mm) 0.163 0.163 0.174 m3/s 261.7 986.30 (m3)	mm 0.268 (GIS)	
	Workshee	t 2: Graphic	cal Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	umber 1006	Sheet 17	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcul PR Catchme	adows ation nt 21	Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	traction (Ia)				
Soil name and	Cover description (c	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolog	gic condition)			a 0.74	CN x area
C	Proposed	Proposed Lots (70/30) Proposed Roads			3.71	164 52
<u>с</u>	Exis	ting Lots		90.8	0.00	0.00
C	Exist	ng Roads		94.4	0.00	0.00
* from Appendix B				Totals =	5.456	501.64
CN (weighted) = la (average) = 2. Time of Concentratio	<u>total product =</u> total area <u>5 x pervious area</u> = total area <b>on</b>	<u>501.64</u> 5.456 <u>5 x</u> 5	= <u>1.3753</u> .456	92.0	mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)	、 、	
Catchment length	L =	0.608	km (along d	Irainage patr	1) hod)	
Runoff factor,	<u>CN =</u> 200 - CN	92.0 200- 92.0	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.72 1.09	2.22	=	0.15	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.10	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff	Parameters a	nd Time of	Concentrati	on	

MAVEN A	ASSOCIA	TES	Job Number 194006		Sheet 18	Rev 1
Job Title Cleved Calc Title TP108 PR C	don Meadows 3 Calculation atchment 21		Author ML		Date 1/11/2024	Checked JD
Calc TitleIPTO PR C1. Data Catchment AreaRunoff curve number Initial abstractionTime of concentration2. Calculate storage, S =(1000/CN)3. Average recurrence interval, AF4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 26. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24})^2$ 9. Runoff volume, $V_{24} = 1000 \times Q_{24}$	A= CN= la= tc= I - 10)25.4 RI la+2S <sub>24</sub> -la)+S	0.054556 92.0 1.3 0.17	ML         km2(100ha =1km2)         (from worksheet 1)         mm (from worksheet 1)         =       2         100       (yr)         282.32       (mm)         0.86       0.163         2.511       m3/s         260.5       14209.27         14209.27       (m3)	22.2	mm 0.268 (GIS)	

	AVEN ASSOC	CIATES	Job N 194	lumber 1006	Sheet 19	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchmo	adows Ilation ent 22	Au M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Ab	straction (la)				
Soil name and	Cover description (	cover type, treat	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolo	gic condition)		CN*	a	CN x area
	Propose	Proposed Lots (70/30) Proposed Roads			0.00	0.00
C C	Exi	sting Lots		90.8	0.00	0.00
C	Exis	ting Roads		94.4	0.00	0.00
		•				
* from Appendix B				Totals =	0.065	6.17
CN (weighted) =	total product = total area	<u>6.17</u> 0.065	=	94.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.0098 ).065	- 0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.033	km (along d	Irainage patł	ו)	
Catchment Slope	Sc=	0.01	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	94.4 200- 94.4	=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.11 1.06	3.98	=	0.04	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runot	ff Parameters a	nd Time of	Concentrati	on	

MAVEN MAVEN	ASSOCIA	TES	Job Number 194006	Sheet 20	Rev 1
Job Title Clev Calc Title TP1 PR	edon Meadows 08 Calculation Catchment 22		Author ML	Date 1/11/2024	Checked JD
PR 1. Data Catchment Area Runoff curve number Initial abstraction Time of concentration 2. Calculate storage, S =(1000/0 3. Average recurrence interval, A 4. 24 hour rainfall depth, P24 5. Compute c* = P24 - 2la/P24 - 6. Specific peak flow rate q* 7. Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub> 8. Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup> /0 9. Runoff volume, V <sub>24</sub> = 1000xQ	Catchment 22 A= CN= la= tc= CN - 10)25.4 ARI 2la+2S (P <sub>24</sub> -la)+S <sub>24</sub> A	0.000654 94.4 0.8 0.17	km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 15.1 15.1 282.32 (mm) 0.90 0.165 0.165 0.165 0.030 m3/s 174.79 (m3)	0.268 (GIS)	
	Worksheet	2: Graphic	cal Peak Flow Rate		

	AVEN ASSOCIAT	TES	Job N 194	umber 1006	Sheet 21	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 23		Aut M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstractio	on (la)				
Soil name and	Cover description (cover ty	/pe, treat	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	nydrologic cor			a 275		
С С	Proposed Edis	(70/30) oads		94.4	1.52	143.03
C	Existing Lo	ots		90.8	0.00	0.00
С	Existing Ro	ads		94.4	0.00	0.00
* for us Anno su dia D				T - 4 - 1 -	4.000	
" from Appendix B				i otais =	4.268	393.02
CN (weighted) =	total product = total area 5 x pervious area =	<u>393.02</u> 4.268 5 x	1.0532	92.1	mm	
	total area	4	.268			
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.481	km (along d	Irainage path	i)	
Catchment Slope	Sc=	0.07	m/m (by equ	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN 200-	92.1 92.1	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>−0.30</sup>					
= 0.14	0.6 0.62	1.09	2.22	=	0.13	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.08	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Para	meters a	nd Time of	Concentrati	on	

M	MAVEN ASSOCI	ATES	Job Number 194006	Sheet 22	Rev 1
Job Calc	Title Clevedon Meadow Title TP108 Calculation PR Catchment 23	S	Author ML	Date 1/11/2024	Checked JD
1. E F II 7 2. C 3. A 4. 2 5. C 6. s 7. F 8 F	PR Catchment 23         Data         Catchment Area         Runoff curve number         CN         nitial abstraction         la         Fime of concentration         Calculate storage, S =(1000/CN - 10)25.4         Average recurrence interval, ARI         24 hour rainfall depth, P24         Compute c* = P24 - 2la/P24 - 2la+2S         Specific peak flow rate q*         Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{01} = (P_{01} a)^2/(P_{01} a)+S$	= 0.042683 = 92.1 = 1.2 = 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 21.9 21.9 0.00 0.86 0.163 0.163 0.163 0.163 0.163	mm 0.268 (GIS)	
9. F	Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A Worksh	eet 2: Graphi	11132.13 (m3)		

	AVEN ASSOC	CIATES	Job N 194	lumber 4006	Sheet 23	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows Ilation ent 24	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	straction (la)				
Soil name and	Cover description (c	cover type, treat	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrologic condition)			CN*	а	CN x area
	Propose	ed Lots (70/30)		90.8	0.76	69.12
<u>с</u>	Exi	sting Lots		90.8	0.00	0.00
C	Exis	ting Roads		94.4	0.00	0.00
		•				
				<u> </u>	0.000	04.04
* from Appendix B				l otals =	0.929	84.94
CN (weighted) =	total product = total area	<u>84.94</u> 0.929	_=	91.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.2535	1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	_(From Tabl	e 4.2)		
Catchment length	L =	0.09	_km (along o	drainage path	ו)	
Catchment Slope	Sc=	0.02	_m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.4 200- 91.4	_=	0.84		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.20 1.10	3.23	=	0.06	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	3 t <sub>c</sub>		=	0.04	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runof	ff Paramete <u>rs a</u>	und Time of	Concentrati	on	

	EN ASSOCI	ATES	Job Number 194006	Sheet 24	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 24		Author ML	Date 1/11/2024	Checked JD
<ol> <li>Data Catchment Area Runoff curve number Initial abstraction Time of concentration</li> <li>Calculate storage, S =</li> </ol>	A= CN= la= tc= (1000/CN - 10)25.4	0.009288 91.4 1.4 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 23.7	· mm	
<ol> <li>Average recurrence in</li> <li>24 hour rainfall depth,</li> <li>Compute c* = P24 - 21</li> <li>Specific peak flow rate</li> <li>Peak flow rate, q<sub>p</sub>=q*A</li> <li>Runoff depth, Q<sub>24</sub> = (P</li> <li>Runoff volume, V<sub>24</sub> = 1</li> </ol>	terval, ARI P24 a/P24 - 2la+2S q* *P <sub>24</sub> <sub>24</sub> -la) <sup>2</sup> /(P <sub>24</sub> -la)+S 000xQ <sub>24</sub> A		100 (yr) 282.32 (mm) 0.85 0.163 0.163 0.427 m3/s 259.1 2406.13 (m3)	0.268 (GIS)	
	Workshee	t 2: Graphic	cal Peak Flow Rate		

	AVEN ASSOCI	IATES	Job N 194	lumber 1006	Sheet 25	Rev 1
Job Title Calc Title	Clevedon Meac TP108 Calcula PR Catchmen	lows tion t 25	Au N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstr	action (la)				
Soil name and	Cover description (co	ver type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	nyarologi Broposod	hydrologic condition)			a 1.00	
C	Proposed	ed Roads		90.8	1.99	119 73
c	Existi	na Lots		90.8	0.00	0.00
C	Existin	g Roads		94.4	0.00	0.00
* from Appendix B				Totals =	3.261	300.62
CN (weighted) =	total product = total area	<u>300.62</u> 3.261	.= 0 7879	92.2	mm	
la (avolago)	total area	3	.261			
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.446	km (along d	Irainage path	n)	
Catchment Slope	Sc=	0.075	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	92.2 200- 92.2	=	0.86		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.59 1.09	2.18	=	0.12	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t	c		=	0.08	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runoff	Parameters a	nd Time of	Concentrati	on	

M	MAVEN ASSOCI	ATES	Job Number 194006	Sheet 26	Rev 1
Job Calc	Title Clevedon Meadows Title TP108 Calculation PR Catchment 25	i .	Author ML	Date 1/11/2024	Checked JD
1. C C F	Data Catchment Area A= Runoff curve number CN= nitial abstraction la=	= 0.032605 = 92.2 = 1.2	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
т 2. С	Time of concentration tc= Calculate storage, S =(1000/CN - 10)25.4	- 0.17	hrs (from worksheet 1) = 21.5	mm	
3. A 4. 2 5. C 6. S 7. F 8. F 9. F	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ Runoff volume, $V_{24} = 1000xQ_{24}A$		100 (yr) 282.32 (mm) 0.87 0.163 0.163 1.503 m3/s 261.2 8514.81 (m3)	0.268 (GIS)	
	Workshe	et 2: Graphic	cal Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	lumber 4006	Sheet 27	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcul PR Catchme	adows lation nt 26	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	traction (la)				
Soil name and	Cover description (c	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolog	hydrologic condition)			а	CN x area
	Propose	a Lots (70/30)		90.8	0.00	0.00
c	Exis	sting Lots		90.8	0.00	0.00
C	Exist	ing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.093	8.77
CN (weighted) =	total product = total area	<u>8.77</u> 0.093	=	94.4		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.0139 0.093	- 0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.042	km (along c	Irainage path	1)	
Catchment Slope	Sc=	0.24	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	94.4 200- 94.4	=	0.89		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.12 1.06	1.53	=	0.02	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.01	hrs
					NO GOOD	
					use	hra
					0.17	nrs
	Worksheet 1: Runof	f Paramete <u>rs</u> a	nd Time of	Concentrati	on	

MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 28	Rev 1
Job Title Cleve Calc Title TP1 PR	edon Meadows 08 Calculation Catchment 26		Author ML		Date 1/11/2024	Checked JD
PR1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/C3. Average recurrence interval, A4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 -6. Specific peak flow rate q*7. Peak flow rate, $q_p=q*A*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(l)$ 9. Runoff volume, $V_{24} = 1000xQ_2$	A= CN= la= tc= N - 10)25.4 NRI 2la+2S P <sub>24</sub> -la)+S	0.000929 94.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 15 100 (yr) 282.32 (mm) 0.90 0.165 0.165 0.043 m3/s 267.3 248.29 (m3)	5.1	mm 0.268 (GIS)	
	Worksheet	: 2: Graphic	cal Peak Flow Rate			

	AVEN ASSOC	IATES	Job N 194	lumber 1006	Sheet 29	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcul PR Catchmer	dows ation nt 27	Au M	thor 1L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial Abst	raction (la)				
Soil name and	Cover description (co	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
Classification	Bronosoc	Proposed Late (70/20)			a 1 00	180.86
C	Propos	sed Roads		94.4	1.18	111 00
C	Exist	ting Lots		90.8	0.00	0.00
С	Existi	ng Roads		94.4	0.00	0.00
* from Appondix B				Totals =	3 169	201.86
				TOLAIS -	3.100	291.00
CN (weighted) =	total product = total area	291.86 3.168	=	92.1		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u> 3	0.7739	1.2	mm	
2. Time of Concentration	ion					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.387	km (along d	lrainage path	n)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	92.1 200- 92.1	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/20)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	4 0.6	0.53 1.09	2.22	=	0.11	hrs
SCS Lag for HEC-HMS	t <sub>p</sub> = 2/3	t <sub>c</sub>		=	0.07	hrs
					NO GOOD use	hrs
	Worksheet 1: Dunoff	Parameters a	nd Time of	Concentrati	0.17	111.5

MAVEN A	SSOCIA	TES	Job Number 194006	Sheet 30	Rev 1
Job Title Cleved Calc Title TP108 PR Ca	on Meadows Calculation tchment 27		Author ML	Date 1/11/2024	Checked JD
Calc FiteIP108 PR Calc1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN)3. Average recurrence interval, AR4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2l6. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_2)$ 9. Runoff volume, $V_{24} = 1000xQ_{24}A^2$	A= CN= la= tc= - 10)25.4 l a+2S 4-la)+S	0.031677 92.1 1.2 0.17	ML km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 21 100 (yr) 282.32 (mm) 0.163 1.459 m3/s 261.0 8266.82 (m3)	.7 mm 0.268 (GIS)	JU
	Worksheet	2: Graphic	cal Peak Flow Rate		

	AVEN ASSOC	IATES	Job N 194	lumber 1006	Sheet 31	Rev 1
Job Title Calc Title	Clevedon Meac TP108 Calcula PR Catchmen	dows ation t 28	Au N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abst	raction (la)				
Soil name and	Cover description (co	ver type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrologi		CN*	а	CN x area	
C	Proposed	Lots (70/30)		90.8	0.17	15.50
C	Propos	ing Lots		94.4	0.05	61.80
C C	Existi	ng Roads		94.4	0.00	0.00
		5				
					0.005	
* from Appendix B				Totals =	0.825	77.30
CN (weighted) = la (average) =	total product = total area <u>5 x pervious area</u> =	<u>77.30</u> 0.825	= 0.1494	93.7	mm	
	total area	0	.825	•		
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.106	km (along d	lrainage path	1)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	93.7 200- 93.7	=	0.88		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.23 1.07	2.46	=	0.05	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t	c		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff	Parameters a	nd Time of	Concentrati	on	

	MAVEN ASSOCI	ATES	Job Number 194006	Sheet 32	Rev 1
Jo Ca	b Title Clevedon Meadows Ilc Title TP108 Calculation PR Catchment 28		Author ML	Date 1/11/2024	Checked JD
2. 3. 4. 5. 6. 7. 8.	IncludeIP Too Calculation PR Catchment 28Data Catchment AreaA=Runoff curve numberCN=Initial abstractionIa=Time of concentrationtc=Calculate storage, S =(1000/CN - 10)25.4Average recurrence interval, ARI24 hour rainfall depth, P24Compute c* = P24 - 2Ia/P24 - 2Ia+2SSpecific peak flow rate q*Peak flow rate, $q_p$ =q*A*P <sub>24</sub> Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$	0.008254 93.7 0.9 0.17	ML         km2(100ha =1km2)         (from worksheet 1)         mm (from worksheet 1)         =       17.2         100         (yr)         282.32         0.89         0.164         0.383         m3/s	1/11/2024 mm 0.268 (GIS)	JU
9.	Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A Worksher	et 2: Graphic	2188.96 (m3)		

MAVEN ASSOCIATES			Job N 194	umber 1006	Sheet 33	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows lation ent 29	Aut M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	straction (Ia)				
Soil name and	Cover description (c	cover type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolo	hydrologic condition)			a	CN x area
	Propose	a Lois (70/30)		90.8	1.34	80.22
C	Exis	sting Lots		90.8	0.00	0.00
c	Exist	ting Roads		94.4	0.00	0.00
				-		
* from Appendix B				Totals =	2.187	201.63
CN (weighted) =	total product = total area	<u>201.63</u> 2.187	=	92.2		
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.5286 187	. 1.2	mm	
2. Time of Concentrati	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.981	km (along d	lrainage path	1)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN =</u> 200 - CN	92.2 200- 92.2	=	0.86		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.99 1.09	2.22	=	0.20	hrs
SCS Lag for HEC-HMS $t_p$ = 2/3 $t_c$		3 t <sub>c</sub>		=	0.13	hrs
					OK use 0.20072199	hrs
	Worksheet 1: Runof	f Paramete <u>rs</u> a	nd Time of	Concentrati	on	

MAVEN ASSOCIATES		Job Number 194006	Sheet 34	Rev 1	
Job Title Clevedon Calc Title TP108 C PR Catc	lob Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 29		Author ML	Date 1/11/2024	Checked JD
Calc TitleTP108 C PR Catc1. Data Catchment AreaRunoff curve number Initial abstractionTime of concentration2. Calculate storage, S =(1000/CN3. Average recurrence interval, ARI4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2la+6. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)^2$ 9. Runoff volume, $V_{24} = 1000xQ_{24}A$	alculation hment 29 A= CN= la= tc= 10)25.4 -2S a)+S	0.021869 92.2 1.2 0.20	ML km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 21.5 282.32 (mm) 0.87 0.163 1.008 m3/s 261.1 5711.01 (m3)	1/11/2024	JD
	Worksheet	2: Graphic	cal Peak Flow Rate		

MAVEN ASSOCIATES			Job Number 194006		Sheet 35	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows lation ent 30	Au M	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Number (CN) and initial Abstraction (Ia)						
Soil name and	Cover description (c	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	Proposo	d Loto (70/20)			a 0.67	CN x area
<u>с</u>	Propose	used Roads		90.0	0.07	13.35
C	Exis	sting Lots		90.8	0.00	0.00
C	Exist	ing Roads		94.4	0.00	0.00
		•				
* from Appendix B				Totals =	0.810	74.07
CN (weighted) = la (average) = 2. Time of Concentration	total product = total area <u>5 x pervious area</u> = total area <b>on</b>	<u>74.07</u> 0.810 <u>5 x</u> 0	= 0.2218 0.810	<u>91.4</u> 1.4	mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.106	km (along d	Irainage path	1)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.4 200- 91.4	=	0.84		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.23 1.10	2.22	=	0.05	hrs
SCS Lag for HEC-HMS $t_p = 2/3 t_c$		t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runof	f Parameters a	nd Time of	Concentrati	on	

MAVEN ASSOCIATES		Job Number 194006	Sheet 36	Rev 1	
Job Title Cleved Calc Title TP108 PR Ca	lon Meadows 3 Calculation atchment 30		Author ML	Date 1/11/2024	Checked JD
Calc FileIPTOR PR Calc1. Data Catchment AreaRunoff curve number Initial abstractionInitial abstractionTime of concentration2. Calculate storage, S =(1000/CN)3. Average recurrence interval, AF4. 24 hour rainfall depth, P245. Compute c* = P24 - 2la/P24 - 2la6. Specific peak flow rate q*7. Peak flow rate, $q_p=q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_2)$ 9. Runoff volume, $V_{24} = 1000xQ_{24}/r^2$	A= CN= la= tc= 1 - 10)25.4 RI la+2S 24-la)+S	0.008101 91.4 1.4 0.17	ML km2(100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 23.8 0.100 0.85 0.163 0.372 m3/s 2098.15 (m3)	1/11/2024	JU

	AVEN ASSOC	IATES	Job N 194	lumber 4006	Sheet 37	Rev 1
Job Title Calc Title	Clevedon Mead TP108 Calcula PR Catchmen	dows ation t 31	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstr	raction (la)				
Soil name and	Cover description (co	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of	
classification	hydrologi	c condition)		CN*	а	CN x area
C	Proposed	Lots (70/30)		90.8	0.67	60.72
C C	Fiopos	ing Lots		94.4	0.14	0.00
C	Existin	ng Roads		94.4	0.00	0.00
						74.07
* from Appendix B				l otals =	0.810	74.07
CN (weighted) =	total product = total area	74.07 0.810	=	91.4		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.2218	- 1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.106	km (along d	Irainage path	ו)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.4 200- 91.4	=	0.84		
$t_c = 0.14 \text{ C L}^{0.66}$ (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.23 1.10	2.22	=	0.05	hrs
SCS Lag for HEC-HMS.	t <sub>p</sub> = 2/3 t	c		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff	Parameters a	nd Time of	Concentrati	on	

	MAVEN ASSOCIATES		Job Number 194006		Sheet 38	Rev 1	
Job Title Calc Title	Cle TF Pl	evedon Meadows 2108 Calculation R Catchment 31		Author ML		Date 1/11/2024	Checked JD
<ol> <li>Data Catchment Runoff curr Initial abstr Time of co</li> <li>Calculate s</li> <li>Average re</li> <li>24 hour rai</li> <li>Compute c</li> <li>Specific pe</li> <li>Peak flow r</li> <li>Runoff dep</li> </ol>	Area /e number action ncentration torage, S =(1000 currence interval nfall depth, P24 * = P24 - 21a/P24 ak flow rate q* rate, q <sub>p</sub> =q*A*P <sub>24</sub> th, Q <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup>	R Catchment 31 A= CN= Ia= tc= /CN - 10)25.4 , ARI - 2Ia+2S	0.008101 91.4 1.4 0.17	km2( 100ha =1km2 (from worksheet 1) mm (from worksheet hrs (from worksheet = 100 (y 282.32 (r 0.85 0.163 0.163 0.372 n 259.0	et 1) t 1) 23.8 yr) mm)	mm 0.268 (GIS)	JU
9. Runoff volu	ıme, V <sub>24</sub> = 1000xι	Q₂₄A Workshee	t 2: Graphic	2098.15 (i	m3)		

MAVEN ASSOCIATES			Job Number 194006		Sheet 39	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows lation ent 32	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Number (CN) and initial Abstraction (Ia)						
Soil name and	Cover description (c	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	Proposo	d Loto (70/20)			a 0.67	CN x area
<u>с</u>	Propose	sed Roads		94.4	0.07	13.35
C	Exis	sting Lots		90.8	0.00	0.00
C	Exist	ing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.810	74.07
CN (weighted) = la (average) =	total product = total area	<u>74.07</u> 0.810 <u>5 x</u>	= 0.2218	91.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.106	km (along c	Irainage path	1)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.4 200- 91.4	=	0.84		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.23 1.10	2.22	=	0.05	hrs
SCS Lag for HEC-HMS $t_p = 2/3 t_c$		e t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runof	f Parameters a	nd Time of	Concentrati	on	

M	MAVEN ASSOCIATES		Job Number 194006	Sheet 40	Rev 1
Jo Ca	b Title Clevedon Meado Ic Title TP108 Calculatio PR Catchment 3	ws on 2	Author ML	Date 1/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number C Initial abstraction	A= 0.00810 N= 91. a= 1.	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)25.4	ic= 0.1	<ul> <li>+ hrs (from worksheet 1)</li> <li>= 23.8</li> </ul>	mm	
<ol> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> </ol>	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute $c^* = P24 - 2la/P24 - 2la+2S$ Specific peak flow rate $q^*$ Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ Runoff volume, $V_{24} = 1000xQ_{24}A$		100 (yr) 282.32 (mm) 0.85 0.163 0.163 0.372 m3/s 259.0 2098.15 (m3)	0.268 (GIS)	
	Works	heet 2: Graph	ical Peak Flow Rate		

MAVEN ASSOCIATES			Job Number 194006		Sheet 41	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchme	adows lation ent 33	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Number (CN) and initial Abstraction (Ia)						
Soil name and	Cover description (c	over type, treati	ment, and	Curve Number	Area (ha) 10000m2=1h	Product of
classification	Proposo	d Loto (70/20)			a	
C	Propose	sed Roads		90.0	0.00	24.21
C	Exis	sting Lots		90.8	0.00	0.00
C	Exist	ing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.257	24.21
CN (weighted) =	total product = total area <u>5 x pervious area</u> = total area	<u>24.21</u> 0.257 <u>5 x</u>		94.4	mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.12	km (along c	Irainage path	1)	
Catchment Slope	Sc=	0.08	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	94.4 200- 94.4	=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.25 1.06	2.13	=	0.05	hrs
SCS Lag for HEC-HMS.	SCS Lag for HEC-HMS $t_p = 2/3 t_c$			=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runof	f Parameters a	nd Time of	Concentrati	on	

MA	MAVEN ASSOCIATES		Job Number 194006		Sheet 42	Rev 1	
Job Title Calc Title	Job Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 33		Author ML		Date 1/11/2024	Checked JD	
<ol> <li>Data Catol Runc Initial Time</li> <li>Calcu</li> <li>Avera</li> <li>24 ho</li> <li>Calcu</li> <li>Avera</li> <li>Spec</li> <li>Feak</li> <li>Runc</li> <li>Runc</li> </ol>	hment Area off curve number I abstraction e of concentration ulate storage, S =(1000/ age recurrence interval, our rainfall depth, P24 pute c* = P24 - 2Ia/P24 cific peak flow rate q* a flow rate, $q_p=q^*A^*P_{24}$ off depth, $Q_{24} = (P_{24}-Ia)^2/$ off volume, $V_{24} = 1000xG$	A= CN= la= tc= CN - 10)25.4 ARI - 2la+2S (P <sub>24</sub> -la)+S 0 <sub>24</sub> A	0.002565 94.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 100 (yr) 282.32 (mm) 0.90 0.165 0.165 0.119 m3/s 267.3 685.54 (m3)	15.1	mm 0.268 (GIS)	
		Worksheet	t 2: Graphic	cal Peak Flow Rate			

MAVEN ASSOCIATES			Job N 194	Job Number 194006		Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchmo	adows Ilation ent 34	Au N	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abs	straction (la)				
Soil name and	Cover description (cover type, treatment			Curve Number	Area (ha) 10000m2=1h	Product of
classification	hydrolo	hydrologic condition)			a	CN x area
	Propose	ed Lots (70/30)		90.8	0.00	0.00
C	Fiopo	sting Lots		94.4	0.20	0.00
C	Exis	ting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.257	24.21
CN (weighted) =	total product = total area	<u>24.21</u> 0.257	=	94.4		
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.0385	0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.091	km (along c	Irainage path	1)	
Catchment Slope	Sc=	0.08	m/m (by eq	ual area met	hod)	
Runoff factor,	<u>CN</u> = 200 - CN	94.4 200- 94.4	.=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6	0.21 1.06	2.13	=	0.04	hrs
SCS Lag for HEC-HMS $t_p = 2/3 t_c$		3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runot	ff Parameters a	nd Time of	Concentrati	on	

MA	MAVEN ASSOCIATES		Job Number 194006		Sheet 44	Rev 1	
Job 1 Calc	Job Title Clevedon Meadows Calc Title TP108 Calculation PR Catchment 34			Author ML		Date 1/11/2024	Checked JD
1. D C R In T 2. C 3. A 4. 24 5. C 6. S 7. P 8. R 9. R	PR Catc Data Catchment Area Runoff curve number nitial abstraction Time of concentration Calculate storage, S =(1000/CN - $-$ Average recurrence interval, ARI 44 hour rainfall depth, P24 Compute c* = P24 - 2Ia/P24 - 2Ia+ Specific peak flow rate q* Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub> Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -Ia) <sup>2</sup> /(P <sub>24</sub> -Ia) Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A	hment 34 A= CN= la= tc= 10)25.4 22S a)+S	0.002565 94.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) = 1 100 (yr) 282.32 (mm) 0.90 0.165 0.165 0.119 m3/s 267.3 685.54 (m3)	5.1	mm 0.268 (GIS)	
		Worksheet	2: Graphic	cal Peak Flow Rate			
	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 1	Rev 1		
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Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 35	Au M	thor IL	Date 15/11/2024	Checked JD		
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)						
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area		
С	Proposed Lots (70/30)		90.8	3.58	325.15		
С	Proposed Roads		94.4	1.04	97.75		
С	Existing Lots		90.8	0.00	0.00		
C	Existing Roads		94.4	0.00	0.00		
* from Appendix B	total product = 422.9	1 =	Totals =	4.617	422.91		
la (average) = 2. Time of Concentration	total area 4.61 <u>5 x pervious area</u> = <u>5</u> total area <b>5</b>	7 x <u>1.0743</u> 4.617	1.2	mm			
Channelisation factor	C =0.	6 (From Table	e 4.2)				
Catchment length	L =0.47	<u>∂</u> km (along d	rainage path	)			
Catchment Slope	Sc=0.0	5_m/m (by equ	ual area meth	nod)			
Runoff factor,	<u>CN = 91.</u> 200 - CN 200- 91.	<u>6</u> = 6	0.85				
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>						
= 0.14	0.6 0.61 1.1	0 2.46	=	0.14	hrs		
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.09	hrs		
				NO GOOD use 0.17	hrs		
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on			

N	MAVEN ASSC	CIA	TES	Job Number 194006	Sheet 2	Rev 1
Jo Ci	bb Title Clevedon Mea alc Title TP108 Calcul PR Catchmen	dows ation nt 35		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.046165 91.6	km2( 100ha =1km2) (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)25	.4		= 23.3	mm	
3. 4. 5. 6.	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2S Specific peak flow rate q*			100 (yr) 282.32 (mm) 0.86 0.163		
7. 8.	Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$			2.122 m3/s	0.268 (GIS)	
9.	Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A	ksheet	2: Graphic	11987.45 (m3)		

	AVEN ASSOCIATES	Job N 194	lumber 4006	Sheet 3	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 36	Au	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numbe	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, trea hydrologic condition)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30)		90.8	4.11	372.83
С	Proposed Roads		94.4	1.15	108.89
С	Existing Lots		90.8	0.00	0.00
C	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	5.260	481.72
CN (weighted) =	total product =481.72total area5.260	<u>2</u> = )	91.6	-	
la (average) =	<u>5 x pervious area</u> = <u>5 x</u> total area	x 1.4049 5.260	1.3	mm	
2. Time of Concentration	on				
Channelisation factor	C =0.6	<u>} (From Table</u>	e 4.2)		
Catchment length	L =0.527	/ km (along d	rainage path	)	
Catchment Slope	Sc=0.05	5_m/m (by equ	ual area meth	nod)	
Runoff factor,	$\frac{\text{CN}}{200 - \text{CN}} = \frac{91.6}{200 - 91.6}$	<u>6</u> =	0.84		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.66 1.10	2.46	=	0.15	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.10	hrs
				NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Parameters	and Time of	Concentrati	on	

	MAVEN ASS	OCIA	TES	Job Number 194006	Sheet 4	Rev 1
Jo Ca	b Title Clevedon M alc Title TP108 Calc PR Catchn	eadows ulation nent 36		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.052596 91.6	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	1.3	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)	25.4		= 23.3	mm	
3.	Average recurrence interval, ARI			100 (yr)		
4.	24 hour rainfall depth, P24			282.32 (mm)		
5.	Compute c* = P24 - 2Ia/P24 - 2Ia+2S			0.86		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>			2.417 m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+$	S		259.4		
9.	Runoff volume, $V_{24} = 1000xQ_{24}A$			13645.92 (m3)		
	W	orksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIAT	ES	Job N 194	umber 006	Sheet 5	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 36A		Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstractio	n (la)				
Soil name and classification	Cover description (cover ty hydrologic con	pe, treat dition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots	(70/30)		90.8	0.52	47.65
С	Proposed Ro	bads		94.4	0.12	11.47
С	Existing Lo	ots		90.8	0.00	0.00
С	Existing Roa	ads		94.4	0.00	0.00
* from Appendix B				Totals =	0.646	59.12
CN (weighted) =	total product = total area	59.12 0.646	=	91.5	-	
la (average) =	<u>5 x pervious area</u> = total area	5 x (	0.1757	. 1.4	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	. 4.2)		
Catchment length	L =	0.075	km (along di	rainage path)	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN 200-	91.5 91.5	.=	0.84	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.18	1.10	2.46	=	0.04	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Parar	neters a	and Time of	Concentrati	on	

M	MAVEN ASSOCIATES		Job Number 194006		Sheet 6	Rev 1	
Jo Ca	b Title Clevedon Me alc Title TP108 Calc PR Catchme	adows ulation nt 36A		Author ML		Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.006463 91.5	km2( 100ha =1km (from worksheet 1	2)		
	Initial abstraction	la=	1.4	mm (from workshe	et 1)		
2.	Time of concentration Calculate storage, S =(1000/CN - 10)25	tc= 5.4	0.17	hrs (from workshe	et 1) 23.7	mm	
3.	Average recurrence interval, ARI			100	(yr)		
4.	24 hour rainfall depth, P24			282.32	(mm)		
5.	Compute c* = P24 - 2Ia/P24 - 2Ia+2S			0.86			
6.	Specific peak flow rate q*			0.163			
7.	Peak flow rate, $q_p=q^*A^*P_{24}$			0.297	m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$			259.1			
9.	Runoff volume, $V_{24}$ = 1000xQ <sub>24</sub> A			1674.78	(m3)		
	Wo	rksheet	2: Graphic	al Peak Flow Rate	9		

	AVEN ASSOCIAT	ES	Job N 194	umber 006	Sheet 7	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 37		Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction	n (la)				
Soil name and classification	Cover description (cover typ hydrologic cond	e, treat lition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (	70/30)		90.8	3.06	277.78
С	Proposed Roa	ads		94.4	0.92	86.68
C	Existing Lot	S		90.8	0.00	0.00
	Existing Roa	as		94.4	0.00	0.00
* from Appendix B				Totals =	3.978	364.46
CN (weighted) =	total product = total area	364.46 3.978	.=	91.6		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.9178 3.978	. 1.2	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.421	km (along di	rainage path)	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	lod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	91.6 91.6	=	0.85		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	)-CN) <sup>-0.55</sup> Sc <sup>−0.30</sup>					
= 0.14	0.6 0.56	1.10	2.46	=	0.13	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.09	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Param	neters a	and Time of	Concentratio	on	

	MAVEN ASS	OCIA	TES	Job Number 194006	Sheet 8	Rev 1
Jo Ca	b Title Clevedon M alc Title TP108 Calc PR Catchrr	eadows ulation tent 37		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.039775 91.6	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	1.2	mm (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10):	25.4	0.17	= 23.2	mm	
3.	Average recurrence interval, ARI			100 (yr)		
4.	24 hour rainfall depth, P24					
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.86		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, $q_p = q^*A^*P_{24}$			<b>1.828</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+$	S		259.7		
9.	Runoff volume, $V_{24} = 1000xQ_{24}A$			10330.99 (m3)		
	w	orksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIAT	ES	Job N 194	umber 006	Sheet 9	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 38		Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstractior	n (la)				
Soil name and classification	Cover description (cover typ hydrologic cond	be, treat lition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (	70/30)		90.8	3.06	277.52
C	Proposed Ro	ads		94.4	0.74	70.23
C	Existing Lot	ts		90.8	0.00	0.00
	Existing Roa	as		94.4	0.00	0.00
* from Appendix B				Totals =	3.800	347.75
CN (weighted) =	total product = total area	347.75 3.800	=	91.5		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.9169 3.800	. 1.2	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L = _	0.4	km (along di	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	lod)	
Runoff factor,	<u>CN =</u> 200 - CN 200-	91.5 91.5	=	0.84		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.55	1.10	2.46	=	0.12	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.08	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Param	neters a	and Time of	Concentrati	on	

N	MAVEN ASSOC	CIAT	ES	Job Number 194006	Sheet 10	Rev 1
Jo Ci	bb Title Clevedon Meado alc Title TP108 Calculati PR Catchment	ows ion 38		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= 0. CN=	.038004 91.5 1 2	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)25.4			= 23.6	mm	
3. 4. 5. 6. 7. 8. 9.	Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ Runoff volume, $V_{24} = 1000xQ_{24}A$			100 (yr) 282.32 (mm) 0.86 0.163 0.163 1.746 m3/s 259.4 9856.62 (m3)	0.268 (GIS)	
	Works	sheet 2:	Graphic	al Peak Flow Rate		

	AVEN ASSOCIAT	ES	Job N 194	umber 006	Sheet 11	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 39		Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction	n (la)				
Soil name and classification	Cover description (cover typhy hydrologic cond	pe, treat dition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (	(70/30)		90.8	0.38	34.85
С	Proposed Ro	ads		94.4	0.36	33.60
С	Existing Lo	ts		90.8	0.00	0.00
С	Existing Roa	ads		94.4	0.00	0.00
* from Appendix B				Totals =	0.740	68.45
CN (weighted) =	total product = total area	68.45 0.740	=	92.5	-	
la (average) =	<u>5 x pervious area</u> = total area	5 x (	0.1151 ).740	. 0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.19	km (along di	rainage path)	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN 200-	92.5 92.5	=	0.86		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.33	1.09	2.46	=	0.07	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.05	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Paran	neters a	Ind Time of	Concentrati	on	

	MAVEN ASS	OCIA	TES	Job Number 194006	Sheet 12	Rev 1
Jo Ca	bb Title Clevedon Me alc Title TP108 Calco PR Catchm	eadows ulation ent 39		Author ML	Date 15/11/202	Checked 24 JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.007397 92.5	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	0.8	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	5.4		= 20	).5 mm	
3.	Average recurrence interval, ARI			(yr)		
4.	24 hour rainfall depth, P24			282.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.87		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, $q_p=q^*A^*P_{24}$			<b>0.341</b> m3/s	0.268 (GIS	3)
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+3$	3		262.4		
9.	Runoff volume, $V_{24} = 1000xQ_{24}A$			1941.22 (m3)		
	W	nrksheet	2. Granhic	al Peak Flow Rate		

	AVEN ASSOCIA	ATES	Job N 194	umber 1006	Sheet 13	Rev 1
Job Title Calc Title	Clevedon Meadov TP108 Calculatio PR Catchment 40	vs n D	Aut M	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstrac	tion (la)				
Soil name and classification	Cover description (cover hydrologic c	r type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lo	ots (70/30)		90.8	0.36	32.32
С	Proposed	Roads		94.4	0.28	26.44
С	Existing	Lots		90.8	0.00	0.00
C	Existing I	Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.636	58.76
CN (weighted) =	total product = total area	<u>58.76</u> 0.636	=	92.4	-	
la (average) =	<u>5 x pervious area</u> = total area	<u> </u>	0.1068 ).636	. 0.8	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	94.2)		
Catchment length	L =	0.131	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN =</u> 200 - CN 20	<u>92.4</u> 0- 92.4	=	0.86		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.2	26 1.09	2.46	=	0.06	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.04	hrs
					NO GOOD use	
					0.17	hrs
	Worksheet 1: Runoff Pa	rameters a	nd Time of	Concentrati	on	

M	MAVEN AS	SOCIA	TES	Job Number 194006	Sheet 14	Rev 1
Jo Ca	b Title Clevedon Ilc Title TP108 Ca PR Catch	Meadows Ilculation Iment 40		Author ML	Date 15/11/2024	Checked JD
1. 2. 3.	Data Catchment Area Runoff curve number Initial abstraction Time of concentration Calculate storage, S =(1000/CN - 10 Average recurrence interval, ARI	A= CN= la= tc= 0)25.4	0.00636 92.4 0.8 0.17	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1) hrs (from worksheet 1) = 20.9	mm	<u> </u>
4. 5. 6. 7. 8. 9.	24 nour rainfail depth, P24 Compute c* = P24 - 2la/P24 - 2la+2 Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)^2$ Runoff volume, $V_{24} = 1000xQ_{24}A$	:S )+S		0.87 0.163 0.293 m3/s 262.0 1666.29 (m3)	0.268 (GIS)	
		Worksheet	2: Graphic	al Peak Flow Rate		

	Job Number 194006		Sheet 15	Rev 1		
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 41	5	Aut N	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstracti	ion (la)				
Soil name and classification	Cover description (cover the second sec	type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots	s (70/30)		90.8	0.36	32.32
С	Proposed F	Roads		94.4	0.16	14.65
C	Existing L	_ots		90.8	0.00	0.00
C	Existing R	oads		94.4	0.00	0.00
* from Appendix B				Totals =	0.511	46.97
CN (weighted) =	total product = total area	<u>46.97</u> 0.511	=	91.9		
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u>	0.1068 ).511	. 1.0	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.095	km (along di	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	iod)	
Runoff factor,	<u>CN =</u> 200 - CN 200	<u>91.9</u> - 91.9	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.21	1 1.09	2.46	=	0.05	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.03	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Para	ameters a	Ind Time of	Concentrati	on	

	MAVEN ASS	OCIA	ATES	Job Number 194006	Sheet 16	Rev 1
Jo Ca	bb Title Clevedon Me alc Title TP108 Calcu PR Catchmo	adows Ilation ent 41		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.005111 91.9	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	1.0	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	5.4		= 22.4	mm	
3.	Average recurrence interval, ARI			(yr)		
4.	24 hour rainfall depth, P24			282.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.86		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, $q_p = q^*A^*P_{24}$			0.235 m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S_{24}$	6		260.5		
9.	Runoff volume, $V_{24}$ = 1000xQ <sub>24</sub> A			1331.52 (m3)		
	Wa	rksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATE	s	Job N 194	umber 006	Sheet 17	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 42		Aut M	hor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (I	la)				
Soil name and classification	Cover description (cover type, hydrologic conditio	treatr on)	nent, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70)	/30)		90.8	0.83	75.79
С	Proposed Roads	s		94.4	0.36	33.60
C	Existing Lots			90.8	0.00	0.00
С	Existing Roads			94.4	0.00	0.00
* from Appendix B				Totals =	1.191	109.39
CN (weighted) =	total product =10total area1	.191	=	91.9		
la (average) =	<u>5 x pervious area</u> = total area	5 x 1	0.2504	1.1	mm	
2. Time of Concentration	on					
Channelisation factor	C =	0.6	(From Table	4.2)		
Catchment length	L =0	.225	km (along dı	rainage path)	)	
Catchment Slope	Sc=	0.05	m/m (by equ	al area meth	iod)	
Runoff factor,	<u>CN</u> = 200 - CN 200-	<u>91.9</u> 91.9	=	0.85		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	0.6 0.37	1.09	2.46	=	0.08	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.06	hrs
					NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Paramet	ers a	nd Time of (	Concentratio	on	

N	MAVEN ASSO	CIA	ATES	Job Number 194006	Sheet 18	Rev 1
Jo Ci	bb Title Clevedon Mead alc Title TP108 Calcula PR Catchment	ows tion t42		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number Initial abstraction	A= CN= la=	0.011906 91.9 1.1	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2. 3. 4. 5. 6. 7. 8. 9.	Calculate storage, S =(1000/CN - 10)25.4 Average recurrence interval, ARI 24 hour rainfall depth, P24 Compute c* = P24 - 2la/P24 - 2la+2S Specific peak flow rate q* Peak flow rate, $q_p=q^*A^*P_{24}$ Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ Runoff volume, $V_{24} = 1000xQ_{24}A$	1		= 22.5	mm 0.268 (GIS)	
	Work	sheet	2: Graphic	al Peak Flow Rate		

	Job Number 194006		Sheet 19	Rev 1			
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 43		Aut M	hor IL	Date 15/11/2024	Checked JD	
1. Runoff Curve Numbe	er (CN) and initial Abstraction (	la)					
Soil name and classification	Cover description (cover type, hvdrologic conditi	, treati on)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area	
С	Proposed Lots (70	/30)		90.8	0.83	75.79	
С	Proposed Road	ls		94.4	0.48	45.23	
С	Existing Lots			90.8	0.00	0.00	
С	Existing Roads	3		94.4	0.00	0.00	
* from Appendix B				Totals =	1.314	121.02	
CN (weighted) =	total product =12 total area1	2 <u>1.02</u> 1.314	=	92.1			
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x</u> 1	0.2504	. 1.0	mm		
2. Time of Concentration	on						
Channelisation factor	C =	0.6	(From Table	4.2)			
Catchment length	L =	0.24	km (along dı	rainage path)	)		
Catchment Slope	Sc=	0.05	m/m (by equ	ial area meth	nod)		
Runoff factor,	<u>CN =</u> 200 - CN 200-	92.1 92.1	=	0.85			
$t_c = 0.14 \text{ C L}^{0.66} (\text{CN}/200)$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>						
= 0.14	0.6 0.39	1.09	2.46	=	0.09	hrs	
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$			=	0.06	hrs	
use							
					0.17	hrs	
	Worksheet 1: Runoff Paramet	ters a	nd Time of (	Concentrati	on		

	MAVEN ASS	OCIA	ATES	Job Number 194006	Sheet 20	Rev 1
Jo Ci	bb Title Clevedon Me alc Title TP108 Calcu PR Catchmo	adows Ilation ent 43		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number Initial abstraction	A= CN= la=	0.013138 92.1 1 0	km2( 100ha =1km2) (from worksheet 1) mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	5.4		= 21	7 mm	
3.	Average recurrence interval, ARI			100 (yr)		
4.	24 hour rainfall depth, P24			282.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.87		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>			0.605 m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S_{24}$	3		261.2		
9.	Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A			3431.37 (m3)		
	Wo	orksheet	: 2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	Job Number 194006		Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 44	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (la	)			
Soil name and classification	Cover description (cover type, to hydrologic condition	reatment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/3	60)	90.8	0.83	75.73
С	Proposed Roads		94.4	0.78	73.22
С	Existing Lots		90.8	0.00	0.00
C	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	1.610	148.94
CN (weighted) =	total product =148total area1.6	<u>.94</u> = 610	92.5	-	
la (average) =	<u>5 x pervious area</u> = total area	<u>5 x 0.2502</u> 1.610	0.8	mm	
2. Time of Concentration	on				
Channelisation factor	C =	0.6 (From Table	e 4.2)		
Catchment length	L =	114 km (along d	rainage path	)	
Catchment Slope	Sc=0	.05 m/m (by eq	ual area meth	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{9}{200 - 9}$	<u>2.5</u> = 2.5	0.86		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.56 1	.09 2.46	=	0.13	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.08	hrs
				NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Paramete	rs and Time of	Concentrati	on	

	MAVEN ASS	OCIA	TES	Job Number 194006	Sheet 22	Rev 1
Jo Ca	b Title Clevedon Ma alc Title TP108 Calc PR Catchm	eadows ulation ent 44		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.016096 92.5	km2( 100ha =1km2) (from worksheet 1)		
	Initial abstraction	la=	0.8	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10)2	25.4		= 20.5	mm	
3. 4.	Average recurrence interval, ARI 24 hour rainfall depth, P24			100 (yr) 282.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2S			0.87		
6.	Specific peak flow rate q*			0.163		
7.	Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>			<b>0.743</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+3$	5		262.4		
9.	Runoff volume, V <sub>24</sub> = 1000xQ <sub>24</sub> A			4224.26 (m3)		
	Wa	orksheet	2: Graphic	al Peak Flow Rate		

	AVEN ASSOCIATES	Job N 194	Job Number 194006		Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 45	Au	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, tro hydrologic condition	eatment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (70/30	))	90.8	4.11	372.83
С	Proposed Roads		94.4	1.15	108.89
С	Existing Lots		74	1.74	128.75
С	Existing Roads		94.4	0.00	0.00
* from Appendix B	total product - 610	49 -	Totals =	7.000	610.48
la (average) =	total product 010.   total area 7.0   5 x pervious area =   total area =	5 x 3.1448 7.000	2.2	mm	
2. Time of Concentration	on				
Channelisation factor	C =	0.6 (From Table	e 4.2)		
Catchment length	L =0.6	77_km (along d	rainage path	)	
Catchment Slope	Sc=0.04	47_m/m (by equ	ual area meth	nod)	
Runoff factor,	$\frac{CN}{200 - CN} = \frac{87}{200 - 87}$	<u>7.2</u> = <u>7.2</u>	0.77		
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/200)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>				
= 0.14	0.6 0.77 1.	15 2.50	=	0.19	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.13	hrs
				OK use 0.18717196	hrs
	Worksheet 1: Runoff Parameter	s and Time of	Concentrati	on	

M	MAVEN AS	SOCIA	TES	Job Number 194006	Sheet 24	Rev 1
Jo Ca	b Title Clevedon I Ic Title TP108 Cal PR Catch	Meadows culation ment 45		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area Runoff curve number	A= CN=	0.069995 87.2 2 2	km2( 100ha =1km2) (from worksheet 1)		
	Time of concentration	tc=	0.19	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000/CN - 10	)25.4		= 37.2	mm	
3.	Average recurrence interval, ARI			100 (yr)		
4.	24 hour rainfall depth, P24			282.32 (mm)		
5.	Compute c* = P24 - 2la/P24 - 2la+2	5		0.79		
6.	Specific peak flow rate q*			0.162		
7.	Peak flow rate, $q_p=q^*A^*P_{24}$			<b>3.201</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)$	+S		247.2		
9.	Runoff volume, $V_{24} = 1000xQ_{24}A$			17303.76 (m3)		
	v	Vorksheet	2: Graphic	al Peak Flow Rate		

## APPENDIX C – OVERLAND FLOWPATH MANNINGS CALCULATIONS

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 1	Rev A
Job Title Calc Title	Pro	Clevedo oposed Overlan	on Meadows d Flowpath - Section 1	Author ML	Date 15/11/2024	Checked JD
<u> </u>	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	122 l/s 0.008 m/m 0.254 m2 7.17 m 0.035410567 m 0.02		
L	.ongitu	idinal slope				
		S=		0.008 m/m		
5	Section	Location		1		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/1	n	0.08 m 5.64 m 0.008 m/m 0.254 m <sup>2</sup> 7.17 m 0.035 0.020 0.482 m/sec		
		Depth x Veloci	ty (D.V)	0.04		
		Channel Flow VxA	(Q)	122 l/sec		
		100 year peak	discharge =	101 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	E N	MAVEN	ASSOCIATES	Job Number 194006	Sheet 2	Rev A			
Job Title		Clevedo	on Meadows	Author	Date	Checked			
Calc Title	Pro	oposed Overlan	d Flowpath - Section 2	ML	15/11/2024	JD			
<u> </u>	Design	Spreadsheet f	or Mannings Formula						
	Calc 1: Capacity of Channel Flow (Q), Mannings formula								
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P					
	Where	Q=	Channel Flow	3030 l/s					
		S =	Longitudinal Slope	0.003 m/m					
		A =	Cross sectional area	3.255 m2					
		P=	Wetted Perimeter	16.41 m					
		R =	Hydraulic Radius	0.198318406 m					
		n =	Mannings n	0.02					
	Longitu	udinal slope							
		S=		0.003 m/m					
:	Sectior	n Location		2					
		Depth=		0.34 m					
		Width=		17.61 m					
		S=		0.003 m/m					
		A=		3.255 m <sup>2</sup>					
		P=		16.41 m					
		R=		0.198					
		n=		0.020					
		Velocity (V)		0.931 m/sec					
		R(2/3) S(1/2)/	n						
		Depth x Veloci	ity (D.V)	0.32					
		Channel Flow VxA	(Q)	3030 l/sec					
		100 year peak	discharge =	2968 l/sec	ОК				
		* Refer TP108	Modelling for Flow rates						

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 3	Rev A
Job Title Calc Title	Pro	Clevedo oposed Overlan	n Meadows d Flowpath - Section 3	Author ML	Date 15/11/2024	Checked JD
₫	)esign	Spreadsheet f	or Mannings Formula			
<u>c</u>	alc 1:	Capacity of Cl	nannel Flow (Q), Mannings	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	1871 l/s 0.005 m/m 2.086 m2 16.30 m 0.12795976 m 0.02		
L	.ongitu	idinal slope				
		S=		0.005 m/m		
s	ection	Location		3		
		Depth= Width= S= A= P= R= n= Velocity (V)		0.27 m 16.00 m 0.005 m/m 2.086 m <sup>2</sup> 16.30 m 0.128 0.020 0.897 m/sec		
		R(2/3) S(1/2)/ ı	n			
		Depth x Veloci	ty (D.V)	0.24		
		Channel Flow VxA	(Q)	1871 l/sec		
		100 year peak	discharge =	1856 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 4	Rev A
Job Title Calc Title	Pro	Clevedo posed Overlanc	on Meadows I Flowpath - Section 3A	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of CI	nannel Flow (Q), Mannings	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	1092 l/s 0.003 m/m 0.988 m2 3.85 m 0.256423566 m 0.02		
	Longitu	udinal slope				
		S=		0.003 m/m		
:	Sectior	n Location		3A		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci Channel Flow VxA	n ty (D.V) (Q) discharge =	0.38 m 3.73 m 0.003 m/m 0.988 m <sup>2</sup> 3.85 m 0.256 0.020 1.105 m/sec 0.42 0.42 1092 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 5	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title	Pro	posed Overland	Flowpath - Section 3B	ML	15/11/2024	JD
			·····			• -
!	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
,	Where	Q=	Channel Flow	1339 l/s		
	· · · · · · · ·	S =	Longitudinal Slope	0.003 m/m		
		A =	Cross sectional area	1.145 m2		
		P=	Wetted Perimeter	4.10 m		
		R =	Hvdraulic Radius	0.279200195 m		
		n =	Mannings n	0.02		
.	Longitu	udinal slope				
		S=		0.003 m/m		
:	Sectior	n Location		3B		
		Denth-		0.42		
		Depin=		0.43 m		
				0.002 m/m		
		S- ^-		$1.145 \text{ m}^2$		
		R-		1.145 m		
		F= R=		4.10 11		
		n=		0.279		
				0.020		
		Velocity (V)		1.169 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.50		
		Channel Flow	$(\mathbf{O})$	1339 //sec		
		VxA				
		100 year peak	discharge =	1330 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 6	Rev A
Job Title Calc Title	Pro	Clevedo oposed Overlan	on Meadows d Flowpath - Section 4	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	2698 l/s 0.007 m/m 2.448 m2 18.09 m 0.135360796 m 0.02		
L	.ongitu	ıdinal slope				
	C	S=		<b>0.007</b> m/m		
s	Section	Location		4		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci	n ty (D.V)	0.28 m 17.81 m 0.007 m/m 2.448 m <sup>2</sup> 18.09 m 0.135 0.020 1.102 m/sec 0.31		
		Channel Flow VxA	(Q)	2698 l/sec		
		100 year peak	discharge =	2600 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 7	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title	Pro	posed Overlan	d Flowpath - Section 5	ML	15/11/2024	JD
	esign	Spreadsheet f	or Mannings Formula	I	l	<u> </u>
<u>c</u>	alc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
. w	Vhere	Q=	Channel Flow	2546 I/s		
	more	S =	Longitudinal Slope	0.005 m/m		
		Α =	Cross sectional area	2 627 m2		
		P=	Wetted Perimeter	18 29 m		
		R =	Hydraulic Radius	0 144 m		
		n =	Mannings n	0.02		
 - г	onaitu	idinal slope				
	<b>j</b>	S=		<b>0.005</b> m/m		
s	ection	Location		5		
		Depth=		0.29 m		
		Width=		18.00 m		
		S=		0.005 m/m		
		A=		2.627 m <sup>2</sup>		
		P=		18.29 m		
		R=		0.144		
		n=		0.020		
		Velocity (V)		0.969 m/sec		
		R(2/3) S(1/2)/ I	n			
		Depth x Veloci	ty (D.V)	0.28		
		Channel Flow	(Q)	2546 l/sec		
		VXA				
		100 year peak	discharge =	2512 l/sec	OK	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 8	Rev A
Job Title Calc Titl∉	Pro	Clevedo oposed Overlan	n Meadows d Flowpath - Section 6	Author ML	Date 15/11/2024	Checked JD
<u></u>	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	279 l/s 0.009 m/m 0.403 m2 7.23 m 0.055778547 m 0.02		
L 1	.ongitu	idinal slope				
		S=		0.009 m/m		
s	Section	Location		6		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci Channel Flow	n ty (D.V) (Q)	0.11 m 7.00 m 0.009 m/m 0.403 m <sup>2</sup> 7.23 m 0.056 0.020 0.692 m/sec 0.08 <b>279</b> l/sec		
		VxA 100 year peak	discharge =	260 l/sec	OK	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 9	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title	Pre	oposed Overlan	d Flowpath - Section 7	ML	15/11/2024	JD
		-	-			
	<u>Design</u>	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	2218 l/s		
		S =	Longitudinal Slope	0.006 m/m		
		A =	Cross sectional area	2.254 m2		
		P=	Wetted Perimeter	17.58 m		
		R =	Hydraulic Radius	0.128221173 m		
		n =	Mannings n	0.02		
	Longitu	udinal slope				
		S=		0.006 m/m		
	Sectior	n Location		7		
		Depth=		0.27 m		
		Width=		17.31 m		
		S=		0.006 m/m		
		A=		2.254 m <sup>2</sup>		
		P=		17.58 m		
		R=		0.128		
		n=		0.020		
		Velocity (V)		0.984 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.27		
		Channel Flow	$(\mathbf{O})$	2218 //sec		
		VxA				
		100 year peak	discharge =	2196 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			
L						

MAVEN		A
Job Title Clevedon Meadows Author Calc Title Proposed Overland Flowpath - Section 8 ML	or Date 15/11/2024	Checked JD
Design Spreadsheet for Mannings Formula		
Calc 1: Capacity of Channel Flow (Q), Mannings formula		
(AD <sup>2/3</sup> c <sup>1/2</sup> )/-		
Q= (AR <sup></sup> S <sup></sup> )/n	R=A/P	
Where Q= Channel Flow 365	l/s	
S = Longitudinal Slope 0.006	m/m	
A = Cross sectional area 0.524	m2	
P= Wetted Perimeter 6.87	m	
R = Hydraulic Radius 0.076329206	m	
n = Mannings n 0.02		
Longitudinal slope		
S= 0.006	m/m	
Section Location 8		
Depth= 0.13	m	
Width= 6.60	m	
S= 0.006	m/m	
A= 0.524	m <sup>2</sup>	
P= 6.87	m	
R= 0.076		
n= 0.020		
Velocity (V) 0.696	m/sec	
R(2/3) S(1/2)/ n		
Depth x Velocity (D.V) 0.09		
Channel Flow (Q) 365 VxA	l/sec	
100 year peak discharge = 344	l/sec OK	
* Refer TP108 Modelling for Flow rates		

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 11	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title	Pro	oposed Overlan	d Flowpath - Section 9	ML	15/11/2024	JD
					I	
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of CI	nannel Flow (Q), Mannings	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	1677 l/s		
		S =	Longitudinal Slope	0.013 m/m		
		A =	Cross sectional area	1.353 m2		
		P=	Wetted Perimeter	13.33 m		
		R =	Hydraulic Radius	0.101500375 m		
		n =	Mannings n	0.02		
	Longitu	udinal slope				
		S=		<b>0.013</b> m/m		
	Sectior	n Location		9		
		Depth=		0.21 m		
		Width=		13.07 m		
		S=		0.013 m/m		
		A=		1.353 m <sup>2</sup>		
		P=		13.33 m		
		R=		0.102		
		n=		0.020		
		Velocity (V)		1.240 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.26		
		Channel Flow	$\langle O \rangle$	4077 1/200		
		VxA	(Q)	1677 //sec		
		100 year peak	discharge =	1656 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			
MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 12	Rev A
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Job Title Calc Title	Pro	Clevedo posed Overlanc	n Meadows I Flowpath - Section 10	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Mannings	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
V	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	350 l/s 0.005 m/m 0.56 m2 7.52 m 0.074487896 m 0.02		
L	ongitu	idinal slope				
		S=		<b>0.005</b> m/m		
5	Section	Location		10		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/1 Depth x Veloci Channel Flow VxA 100 year peak * Refer TP108	n ty (D.V) (Q) discharge = Modelling for Flow rates	0.13 m 6.60 m 0.005 m/m 0.56 m <sup>2</sup> 7.52 m 0.074 0.020 0.625 m/sec 0.08 <b>350</b> l/sec 344 l/sec	OK	

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 13	Rev A
Job Title Calc Titl∉	Pro	Clevedo posed Overlanc	on Meadows I Flowpath - Section 11	Author ML	Date 15/11/2024	Checked JD
Ē	)esign	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Ch	nannel Flow (Q), Mannings	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius	666 l/s 0.013 m/m 0.654 m2 8.66 m 0.075545801 m		
		n =	Mannings n	0.02		
L 1	.ongitu	idinal slope				
		S=		0.013 m/m		
s	Section	Location		11		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/1 Depth x Veloci Channel Flow VxA 100 year peak * Refer TP108	n ty (D.V) (Q) discharge = Modelling for Flow rates	0.14 m 8.39 m 0.013 m/m 0.654 m <sup>2</sup> 8.66 m 0.076 0.020 1.018 m/sec 0.14 <b>666</b> l/sec 621 l/sec	OK	

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 14	Rev A
Job Title Calc Titl∉	Pro	Clevedo posed Overlanc	n Meadows I Flowpath - Section 12	Author ML	Date 15/11/2024	Checked JD
Ē	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Ch	nannel Flow (Q), Mannings	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	335 l/s 0.005 m/m 0.526 m2 6.87 m 0.076620539 m 0.02		
L	.ongitu	ıdinal slope				
		S=		0.005 m/m		
s	Section	Location		12		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/1 Depth x Veloci Channel Flow VxA 100 year peak * Refer TP108	n ty (D.V) (Q) discharge = Modelling for Flow rates	0.13 m 6.60 m 0.005 m/m 0.526 m <sup>2</sup> 6.87 m 0.077 0.020 0.637 m/sec 0.08 <b>335</b> l/sec 313 l/sec	ОК	

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 15	Rev A
Job Title Calc Title	Pro	Clevedo posed Overlanc	n Meadows I Flowpath - Section 13	Author ML	Date 15/11/2024	Checked JD
	esign	Spreadsheet f	or Mannings Formula			
<u>c</u>	alc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
, v	Vhere	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	213 l/s 0.004 m/m 0.438 m2 7.23 m 0.060547415 m 0.02		
L	ongitu	idinal slope				
		S=		<b>0.004</b> m/m		
s	ection	Location		13		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ n Depth x Veloci Channel Flow VxA 100 year peak	n ty (D.V) (Q) discharge =	0.11 m 7.00 m 0.004 m/m 0.438 m <sup>2</sup> 7.23 m 0.061 0.020 0.487 m/sec 0.05 <b>213</b> l/sec 192 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 16	Rev A		
Job Title Calc Titl∉	Prop	Clevedo posed Overland	on Meadows Flowpath - Section 13A	Author ML	Date 15/11/2024	Checked JD		
	<u>Design</u>	Spreadsheet f	or Mannings Formula					
	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
,	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	80 l/s 0.005 m/m 0.208 m2 5.74 m 0.036236934 m 0.02				
	Longitu	udinal slope						
		S=		0.005 m/m				
	Section	Location		13A				
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ n Depth x Velocity (D.V) Channel Flow (Q) VxA 100 year peak discharge = * Refer TP108 Modelling for Flow rates		0.08 m 5.26 m 0.005 m/m 0.208 m <sup>2</sup> 5.74 m 0.036 0.020 0.387 m/sec 0.03 <b>80</b> l/sec 73 l/sec	OK			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 20	Rev A		
Job Title		Clevedo	on Meadows	Author	Date	Checked		
Calc Title	I	Mannings Calcu	lations - Section 16A	ML	15/11/2024	JD		
		0						
1	Design Spreadsheet for Mannings Formula							
	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
,	Where	Q=	Channel Flow	2902 l/s				
		S =	Longitudinal Slope	0.007 m/m				
		A =	Cross sectional area	2.597 m2				
		P=	Wetted Perimeter	18.79 m				
		R =	Hydraulic Radius	0.138 m				
		n =	Mannings n	0.02				
	Longitu	udinal slope						
		S=		0.007 m/m				
:	Sectior	ction Location		Section 16A				
		Depth=		0.29 m				
		Width=		18.53 m				
		S=		0.007 m/m				
		A=		2.597 m <sup>2</sup>				
		P=		18.79 m				
		R=		0.138				
		n=		0.020				
		Velocity (V)		1 117 m/sec				
		R(2/3) S(1/2)/	n	1.117 11/360				
		R(2/0) O(1/2)/						
		Depth x Veloci	ty (D.V)	0.32				
		Channel Flow VxA	(Q)	2902 l/sec				
		100 year peak	discharge =	2845 l/sec	ОК			
		* Refer TP108	Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 21	Rev A	
Job Title		Clevedo	on Meadows	Author	Date	Checked	
Calc Title		Mannings Calcu	lations - Section 17	ML	15/11/2024	JD	
		-					
<u> </u>	Design Spreadsheet for Mannings Formula						
<u> </u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula			
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
V V	Vhere	Q=	Channel Flow	447 l/s			
		S =	Longitudinal Slope	0.008 m/m			
		A =	Cross sectional area	0.812 m2			
		P=	Wetted Perimeter	18.79 m			
		R =	Hydraulic Radius	0.043 m			
		n =	Mannings n	0.02			
L 1	ongitu	udinal slope					
		S=		0.008 m/m			
5	Sectior	ion Location		Section 17			
		Depth=		0.16 m			
		Width=		9.27 m			
		S=		0.008 m/m			
		A=		0.812 m <sup>2</sup>			
		P=		18.79 m			
		R=		0.043			
		n=		0.020			
		Velocity (V)		0.550 m/sec			
		R(2/3) S(1/2)/	n				
		Depth x Veloci	ty (D.V)	0.09			
		Channel Elow	$(\mathbf{O})$	<b>117</b> 1/200			
		VxA	(Q)				
		100 year peak	discharge =	418 l/sec	ОК		
	* Refer TP108 Modelling for Flow rates						

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 22	Rev A		
Job Title		Clevedo	on Meadows	Author	Date	Checked		
Calc Title		Mannings Calcu	lations - Section 18	ML	15/11/2024	JD		
		-						
<u></u>	Design Spreadsheet for Mannings Formula							
<u> </u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
v	Vhere	Q=	Channel Flow	166 l/s				
		S =	Longitudinal Slope	0.002 m/m				
		A =	Cross sectional area	0.628 m2				
		P=	Wetted Perimeter	15.38 m				
		R =	Hydraulic Radius	0.041 m				
		n =	Mannings n	0.02				
L	ongitu	udinal slope						
		S=		0.002 m/m				
s	Sectior	ion Location		Section 18				
		Depth=		0.14 m				
		Width=		7.56 m				
		S=		0.002 m/m				
		A=		0.628 m <sup>2</sup>				
		P=		15.38 m				
		R=		0.041				
		n=		0.020				
		Velocity (V)		0.265 m/sec				
		R(2/3) S(1/2)/	n					
		Depth x Veloci	tv (D V)	0.04				
		Departy voice	( <b>J</b> ( <b>J</b> ))	0.01				
		Channel Flow VxA	(Q)	166 l/sec				
		100 year peak	discharge =	161 l/sec	ОК			
	* Refer TP108 Modelling for Flow rates							

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 23	Rev A
Job Title		Clevedo	n Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	lations - Section 19	ML	15/11/2024	JD
		•				
Design Spreadsheet for Mannings Formula						
<u>c</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula					
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
w	Vhere	Q=	Channel Flow	2956 l/s		
		S =	Longitudinal Slope	0.008 m/m		
		A =	Cross sectional area	3.137 m2		
		P=	Wetted Perimeter	32.40 m		
		R =	Hydraulic Radius	0.097 m		
		n =	Mannings n	0.02		
L	.ongitı	udinal slope				
		S=		0.008 m/m		
s	Sectior	ion Location		Section 19		
		Depth=		0.33 m		
		Width=		16.00 m		
		S=		0.008 m/m		
		A=		3.137 m <sup>2</sup>		
		P=		32.40 m		
		R=		0.097		
		n=		0.020		
		$\lambda$ (alocity ( $\lambda$ ()		0.040		
		Velocity (V)		0.942 m/sec		
		R(2/3) S(1/2)/1	n			
		Depth x Veloci	ty (D.V)	0.31		
		Channel Flow VxA	(Q)	2956 l/sec		
		100 year peak	discharge =	2892 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 24	Rev A	
Job Title		Clevedo	on Meadows	Author	Date	Checked	
Calc Title	I	Mannings Calcu	lations - Section 20	ML	15/11/2024	JD	
D	esign	Spreadsheet f	or Mannings Formula				
<u>C</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula						
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
w	/here	Q=	Channel Flow	195 l/s			
		S =	Longitudinal Slope	0.006 m/m			
		A =	Cross sectional area	0.471 m2			
		P=	Wetted Perimeter	13.46 m			
		R =	Hydraulic Radius	0.035 m			
		n =	Mannings n	0.02			
Lo	ongitu	idinal slope					
		S=		0.006 m/m			
S	ection	ion Location		Section 20			
		Depth=		0.12 m			
		Width=		6.60 m			
		S=		0.006 m/m			
		A=		0.471 m <sup>2</sup>			
		P=		13.46 m			
		R=		0.035			
		n=		0.020			
		Velocity (V)		0.414 m/sec			
		R(2/3) S(1/2)/ r	n				
		Depth x Veloci	ty (D.V)	0.05			
		Channel Flow VxA	(Q)	195 l/sec			
		100 year peak	discharge =	174 l/sec	OK		
	* Refer TP108 Modelling for Flow rates						

МАЕ	MAVEN	I ASSOCIATES	Job Number 194006	Sheet 25	Rev A			
Job Title	Cleve	don Meadows	Author	Date	Checked			
Calc Title	Mannings Cal	culations - Section 21	ML	15/11/2024	JD			
	-							
Desig	Design Spreadsheet for Mannings Formula							
Calc	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
	Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P					
Whe	re Q=	Channel Flow	2543 l/s					
	S =	Longitudinal Slope	0.005 m/m					
	A =	Cross sectional area	3.301 m2					
	P=	Wetted Perimeter	32.43 m					
	R =	Hydraulic Radius	0.102 m					
	n =	Mannings n	0.02					
Long	jitudinal slope							
	S=		0.005 m/m					
Secti	ion Location		Section 21					
	Depth=		0.34 m					
	Width=		2.51 m					
	S=		0.005 m/m					
	A=		3.301 m <sup>2</sup>					
	P=		32.43 m					
	R=		0.102					
	n=		0.020					
	Velocity (V)		0.770 m/sec					
	R(2/3) S(1/2)	)/ n						
	Depth x Velo	ocity (D.V)	0.26					
	Channel Flov	ν (Ω)	2543 I/sec					
	VxA		2010 8000					
	100 year pea	ak discharge =	2511 l/sec	ОК				
	* Refer TP10	8 Modelling for Flow rates						

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 26	Rev A			
Job Title		Clevedo	on Meadows	Author	Date	Checked			
Calc Title		Mannings Calcu	lations - Section 22	ML	15/11/2024	JD			
<u>D</u>	Design Spreadsheet for Mannings Formula								
<u>c</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula								
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P					
w N	Vhere	Q=	Channel Flow	44 l/s					
		S =	Longitudinal Slope	0.005 m/m					
		A =	Cross sectional area	0.184 m2					
		P=	Wetted Perimeter	10.30 m					
		R =	Hydraulic Radius	0.018 m					
		n =	Mannings n	0.02					
L	ongitu	udinal slope							
		S=		0.005 m/m					
S	ection	Location		Section 22					
		Depth=		0.08 m					
		Width=		5.10 m					
		S=		0.005 m/m					
		A=		0.184 m <sup>2</sup>					
		P=		10.30 m					
		R=		0.018					
		n=		0.020					
		Velocity (V)		0.241 m/sec					
		R(2/3) S(1/2)/ I	n						
		Depth x Veloci	ty (D.V)	0.02					
		Channel Flow	(Q)	44 l/sec					
		VxA							
		100 year peak	discharge =	30 l/sec	ОК				
		* Refer TP108	Modelling for Flow rates						

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 27	Rev A		
Job Title		Clevedo	on Meadows	Author	Date	Checked		
Calc Title		Mannings Calcu	lations - Section 23	ML	15/11/2024	JD		
	Design Spreadsheet for Mannings Formula							
	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
	Where	Q=	Channel Flow	2075 l/s				
		S =	Longitudinal Slope	0.005 m/m				
		A =	Cross sectional area	2.92 m2				
		P=	Wetted Perimeter	32.37 m				
		R =	Hydraulic Radius	0.090 m				
		n =	Mannings n	0.02				
	Longit	udinal slope						
		S=		0.005 m/m				
	Sectio	on Location		Section 23				
		Depth=		0.32 m				
		Width=		16.00 m				
		S=		0.005 m/m				
		A=		2.92 m <sup>2</sup>				
		P=		32.37 m				
		R=		0.090				
		n=		0.020				
		$\lambda$ (alogity ( $\lambda$ ()		0.711 m/200				
			_	0.711 m/sec				
		R(2/3) S(1/2)/	n					
		Depth x Veloci	ty (D.V)	0.23				
		Channel Flow	(Q)	2075 //sec				
		VxA						
		100 year peak	discharge =	1966 l/sec	ОК			
	* Refer TP108 Modelling for Flow rates							

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 28	Rev A	
Job Title Calc Titl∉	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 24	Author ML	Date 15/11/2024	Checked JD	
		•	•				
	Design	Spreadsheet f	or Mannings Formula				
	Calc 1: Capacity of Channel Flow (Q), Mannings formula						
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
,	Where	Q=	Channel Flow	449 l/s			
		S =	Longitudinal Slope	0.005 m/m			
		A =	Cross sectional area	0.696 m2			
		P=	Wetted Perimeter	8.92 m			
		R =	Hydraulic Radius	0.078035654 m			
		n =	Mannings n	0.02			
	Longitu	udinal slope					
		S=		<b>0.005</b> m/m			
	Sectior	Location		24			
		Depth=		0.15 m			
		Width=		8.66 m			
		S=		0.005 m/m			
		A=		0.696 m <sup>2</sup>			
		P=		8.92 m			
		R=		0.078			
		n=		0.020			
		Velocity (V)		0.645 m/sec			
		R(2/3) S(1/2)/	n				
		Depth x Veloci	ty (D.V)	0.10			
		Channel Flow VxA	(Q)	449 l/sec			
		100 year peak	discharge =	427 l/sec	ОК		
	* Refer TP108 Modelling for Flow rates						

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 29	Rev A		
Job Title Calc Title	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 25	Author ML	Date 15/11/2024	Checked JD		
!	Design	Spreadsheet f	or Mannings Formula					
9	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	1521 I/s 0.008 m/m 1.485 m2 13.53 m 0.109723659 m 0.02				
1	Longitı	udinal slope						
		S=		0.008 m/m				
	Sectior	Location		25				
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci	n ty (D.V)	0.22 m 13.27 m 0.008 m/m 1.485 m <sup>2</sup> 13.53 m 0.110 0.020 1.024 m/sec 0.23				
		Channel Flow VxA	(Q)	1521 l/sec				
		100 year peak	discharge =	1503 l/sec	ОК			
		* Refer TP108	Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 30	Rev A
Job Title Calc Title	Pro	Clevedo oposed Overland	on Meadows I Flowpath - Section 26	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of CI	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	67 l/s 0.014 m/m 0.12 m2 4.12 m 0.029097963 m 0.02		
	Longitı	udinal slope				
		S=		<b>0.014</b> m/m		
	Sectior	1 Location		26		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci	n ty (D.V)	0.06 m 4.00 m 0.014 m/m 0.12 m <sup>2</sup> 4.12 m 0.029 0.020 0.559 m/sec 0.03		
		Channel Flow VxA	(Q)	67 l/sec		
		100 year peak	discharge =	43 l/sec	OK	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 31	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title	Pro	posed Overland	d Flowpath - Section 27	ML	15/11/2024	JD
	Design	Spreadsheet f	or Mannings Formula	L	I	
	Calc 1:	Capacity of CI	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	1504 l/s		
		S =	Longitudinal Slope	0.008 m/m		
		A =	Cross sectional area	1.474 m2		
		P=	Wetted Perimeter	13.51 m		
		R =	Hydraulic Radius	0.109104367 m		
		n =	Mannings n	0.02		
	Longitu	udinal slope				
		S=		0.008 m/m		
	Sectior	Location		27		
		Depth=		0.22 m		
		Width=		13.20 m		
		S=		0.008 m/m		
		A=		1.474 m <sup>2</sup>		
		P=		13.51 m		
		R=		0.109		
		n=		0.020		
		$\lambda$ (alocity ( $\lambda$ ())		1 000 m/a a a		
			n	1.020 m/sec		
		R(2/3) 3(1/2)/	11			
		Depth x Veloci	ty (D.V)	0.22		
		Channel Flow	(0)	1504 //sec		
		VxA	()			
		100 year peak	discharge =	1459 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 32	Rev A
Job Title Calc Titl∉	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 28	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	391 l/s		
		S =	Longitudinal Slope	0.005 m/m		
		A =	Cross sectional area	0.613 m2		
		P=	Wetted Perimeter	7.99 m		
		R =	Hydraulic Radius	0.076759329 m		
		n =	Mannings n	0.02		
	Longitu	udinal slope				
		S=		0.005 m/m		
	Sectior	Location		28		
		Depth=		0.14 m		
		Width=		7.72 m		
		S=		0.005 m/m		
		A=		0.613 m <sup>2</sup>		
		P=		7.99 m		
		R=		0.077		
		n=		0.020		
		Velocity (V)		0.638 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.09		
		Channel Flow VxA	(Q)	<b>391</b> l/sec		
		100 year peak	discharge =	383 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

MA	E N	MAVEN	ASSOCIATES	Job Number 194006	Sheet 33	Rev A
Job Title Calc Titl∉	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 29	Author ML	Date 15/11/2024	Checked JD
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of Cl	nannel Flow (Q), Mannings	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	1012 l/s 0.007 m/m 1.141 m2 11.67 m 0.097797206 m 0.02		
	Longitu	udinal slope		<b>0.007</b> m/m		
	Section	S=		29		
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci	n ty (D.V)	0.2 m 11.40 m 0.007 m/m 1.141 m <sup>2</sup> 11.67 m 0.098 0.020 0.887 m/sec 0.18		
		Channel Flow VxA	(Q)	1012 l/sec		
		100 year peak	discharge =	1008 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 34	Rev A		
Job Title Calc Title	Pro	Clevedo oposed Overland	on Meadows I Flowpath - Section 30	Author ML	Date 15/11/2024	Checked JD		
	Design	Spreadsheet f	or Mannings Formula		1			
	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
	0/0 4/0							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
	Where	0=	Channel Flow	423 I/s				
	Whiche	S =	Longitudinal Slope	0.008 m/m				
		Δ =	Cross sectional area	0.525 m2				
		R - P-	Wetted Perimeter	6.87 m				
		F-		0.07 11				
		R =	Hydraulic Radius	0.076474873 m				
		n =	Mannings n	0.02				
	Longitu	udinal slope						
		S=		0.008 m/m				
	Sectior	Location		30				
		Depth=		0.13 m				
		Width=		6.60 m				
		S=		0.008 m/m				
		A=		$0.525 \text{ m}^2$				
		P=		6.87 m				
		R=		0.076				
		n=		0.020				
		Velocity (V)		0.805 m/sec				
		R(2/3) S(1/2)/	n					
		Depth x Veloci	ty (D.V)	0.10				
				(00 I/				
		VxA	(Q)	423 //sec				
		100 year peak	discharge =	372 l/sec	ОК			
	* Refer TP108 Modelling for Flow rates							

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 35	Rev A		
Job Title Calc Title	Pro	Clevedo posed Overlanc	n Meadows I Flowpath - Section 31	Author ML	Date 15/11/2024	Checked JD		
!	Design	Spreadsheet f	or Mannings Formula					
9	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	299 l/s 0.008 m/m 0.426 m2 6.84 m 0.062326262 m 0.02				
	Longitu	idinal slope						
		S=		0.008 m/m				
	Sectior	Location		31				
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/1 Depth x Veloci Channel Flow VxA	n ty (D.V) (Q)	0.13 m 6.60 m 0.008 m/m 0.525 m <sup>2</sup> 6.84 m 0.062 0.020 0.702 m/sec 0.08 <b>423</b> l/sec				
		100 year peak	discharge =	372 l/sec	ОК			
		* Refer TP108	Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 36	Rev A
Job Title Calc Title	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 32	Author ML	Date 15/11/2024	Checked JD
	<u>Design</u>	Spreadsheet f	or Mannings Formula			
	Calc 1:	<u>s formula</u>				
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	\ <b>A</b> /l= = = =	0		440 1/-		
	vvnere	Q=		448 l/s		
		S =	Longitudinal Slope	0.009 m/m		
		A =	Cross sectional area	0.525 m2		
		P=	Wetted Perimeter	6.87 m		
		R =	Hydraulic Radius	0.076474873 m		
		n =	Mannings n	0.02		
	Longitı	udinal slope				
		S=		0.009 m/m		
	Sectior	Location		32		
		Depth=		0.13 m		
		Width=		6.60 m		
		S=		0.009 m/m		
		۵–		$0.525 \text{ m}^2$		
		A- D-		0.525 11		
		P=		0.87 11		
		R=		0.076		
		n=		0.020		
		Velocity (V)		0.854 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.11		
		Channal Elow	( <b>0</b> )	449 1/200		
		VxA	(@)	440 //360		
		100 year peak	discharge =	372 l/sec	ОК	
		* Refer TP108	Modelling for Flow rates			

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 37	Rev A		
Job Title Calc Title	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 33	Author ML	Date 15/11/2024	Checked JD		
!	Design	Spreadsheet f	or Mannings Formula					
9	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	140 l/s 0.009 m/m 0.246 m2 5.91 m 0.041610284 m 0.02				
1	Longitu	udinal slope						
		S=		0.009 m/m				
	Sectior	Location		33				
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci Channel Flow VxA	n ty (D.V) (Q) discharge =	0.08 m 5.74 m 0.009 m/m 0.246 m <sup>2</sup> 5.91 m 0.042 0.020 0.569 m/sec 0.05 <b>140</b> l/sec	OK			
		* Refer TP108	Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 38	Rev A		
Job Title Calc Title	Pro	Clevedo posed Overland	on Meadows I Flowpath - Section 34	Author ML	Date 15/11/2024	Checked JD		
	Design	Spreadsheet f	or Mannings Formula		<u>.</u>			
	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
,	Where	Q= S = A = P= R = n =	Channel Flow Longitudinal Slope Cross sectional area Wetted Perimeter Hydraulic Radius Mannings n	155 l/s 0.011 m/m 0.246 m2 5.91 m 0.041610284 m 0.02				
	Longitu	udinal slope						
		S=		<b>0.011</b> m/m				
:	Sectior	Location		34				
		Depth= Width= S= A= P= R= n= Velocity (V) R(2/3) S(1/2)/ Depth x Veloci	n ty (D.V)	0.09 m 5.94 m 0.011 m/m 0.246 m <sup>2</sup> 5.91 m 0.042 0.020 0.629 m/sec 0.06				
		Channel Flow VxA	(Q)	155 l/sec				
		100 year peak	discharge =	119 l/sec	ОК			
		* Refer TP108	Modelling for Flow rates					

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 39	Rev A	
Job Title		Clevedo	on Meadows	Author	Date	Checked	
Calc Title		Mannings Calcu	lations - Section 35	ML	15/11/2024	JD	
!	Design Spreadsheet for Mannings Formula						
9	Calc 1:	Capacity of Cl	s formula				
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
, I I I I I I I I I I I I I I I I I I I	Where	Q=	Channel Flow	2148 l/s			
		S =	Longitudinal Slope	0.003 m/m			
		A =	Cross sectional area	3.478 m2			
		P=	Wetted Perimeter	32.43 m			
		R =	Hydraulic Radius	0.107 m			
		n =	Mannings n	0.02			
1	Longit	udinal slope					
		S=		0.003 m/m			
:	Sectio	ion Location		Section 35			
		Depth=		0.35 m			
		Width=		16.00 m			
		S=		0.003 m/m			
		A=		3.478 m <sup>2</sup>			
		P=		32.43 m			
		R=		0.107			
		n=		0.020			
		$\lambda$		0 619 m/200			
			n	0.010 m/sec			
		R(2/3) 3(1/2)/	11				
		Depth x Veloci	ty (D.V)	0.22			
		Channel Flow	(Q)	2148 l/sec			
		VxA					
		100 year peak	discharge =	2122 l/sec	ОК		
	* Refer TP108 Modelling for Flow rates						

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 40	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	ulations - Section 36	ML	15/11/2024	JD
	Design	n Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of C	hannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	2476 l/s		
		S =	Longitudinal Slope	0.009 m/m		
		A =	Cross sectional area	1.381 m2		
		P=	Wetted Perimeter	5.94 m		
		R =	Hydraulic Radius	0.233 m		
		n =	Mannings n	0.02		
	Longit	udinal slope				
		S=		0.009 m/m		
	Section	ion Location		Section 36		
		Depth=		0.39 m		
		Width=		5.85 m		
		S=		0.009 m/m		
		A=		1.381 m <sup>2</sup>		
		P=		5.94 m		
		R=		0.233		
		n=		0.020		
		Velocity (V)		1 793 m/sec		
		R(2/3) S(1/2)/	n	1.100 11/000		
		Depth x Veloci	ity (D.V)	0.70		
		Channel Flow VxA	(Q)	2476 l/sec		
		100 year peak	discharge =	2417 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 41	Rev A			
Job Title		Clevedo	n Meadows	Author	Date	Checked			
Calc Title	Ма	annings Calcul	ations - Section 36 A	ML	15/11/2024	JD			
De	Design Spreadsheet for Mannings Formula								
<u>Ca</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula								
	(	Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P					
w	here	Q=	Channel Flow	334 l/s					
	:	S =	Longitudinal Slope	0.005 m/m					
		A =	Cross sectional area	0.525 m2					
	I	P=	Wetted Perimeter	6.86 m					
	I	R =	Hydraulic Radius	0.076 m					
	I	n =	Mannings n	0.02					
Lo	ongitud	dinal slope							
	;	S=		0.005 m/m					
Se	ection	Location		Section 36A					
	I	Depth=		0.15 m					
	١	Width=		0.12 m					
	:	S=		0.005 m/m					
		A=		0.525 m <sup>2</sup>					
	I	P=		6.86 m					
	l	R=		0.076					
	I	n=		0.020					
	,	Velocity (V)		0.637 m/sec					
		R(2/3) S(1/2)/ r	ı	0.007 11/300					
		( ) ( )							
	I	Depth x Velocit	ty (D.V)	0.19					
	(	Channel Flow VxA	(Q)	334 I/sec					
		100 year peak	discharge =	297 l/sec	ОК				
	* Refer TP108 Modelling for Flow rates								

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 42	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	lations - Section 37	ML	15/11/2024	JD
		•				
	esign	Spreadsheet f	or Mannings Formula			
<u>c</u>	alc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
w	Vhere	Q=	Channel Flow	1841 l/s		
		S =	Longitudinal Slope	0.005 m/m		
		A =	Cross sectional area	2.717 m2		
		P=	Wetted Perimeter	32.34 m		
		R =	Hydraulic Radius	0.084 m		
		n =	Mannings n	0.02		
L	.ongitı	udinal slope				
		S=		0.005 m/m		
s	ectior	ion Location		Section 37		
		Depth=		0.3 m		
		Width=		15.84 m		
		S=		0.005 m/m		
		A=		2.717 m <sup>2</sup>		
		P=		32.34 m		
		R=		0.084		
		n=		0.020		
		Velocity (V)		0.678 m/sec		
		R(2/3) S(1/2)/ I	n	0.070 11/360		
		Depth x Veloci	ty (D.V)	0.20		
		Channel Flow VxA	(Q)	1841 //sec		
		100 year peak	discharge =	1828 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 43	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	lations - Section 38	ML	15/11/2024	JD
	Design	Spreadsheet f	or Mannings Formula			
	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
	Where	Q=	Channel Flow	1790 l/s		
		S =	Longitudinal Slope	0.005 m/m		
		A =	Cross sectional area	2.66 m2		
		P=	Wetted Perimeter	31.99 m		
		R =	Hydraulic Radius	0.083 m		
		n =	Mannings n	0.02		
	Longit	udinal slope				
		S=		0.005 m/m		
	Sectio	ion Location		Section 38		
		Depth=		0.26 m		
		Width=		15.80 m		
		S=		0.005 m/m		
		A=		2.66 m <sup>2</sup>		
		P=		31.99 m		
		R=		0.083		
		n=		0.020		
		$\lambda$ (alooity ( $\lambda$ /)		0.672 m/200		
			_	0.673 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.17		
		Channel Flow VxA	(Q)	1790 l/sec		
		100 year peak	discharge =	1746 l/sec	OK	
	* Refer TP108 Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 44	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	lations - Section 39	ML	15/11/2024	JD
	Design	Spreadsheet f	or Mannings Formula			
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v v	Vhere	Q=	Channel Flow	344 l/s		
		S =	Longitudinal Slope	0.008 m/m		
		A =	Cross sectional area	0.665 m2		
		P=	Wetted Perimeter	16.86 m		
		R =	Hydraulic Radius	0.039 m		
		n =	Mannings n	0.02		
L 1	.ongitı	udinal slope				
		S=		0.008 m/m		
s	Sectior	ion Location		Section 39		
		Depth=		0.15 m		
		Width=		8.24 m		
		S=		0.008 m/m		
		A=		0.665 m <sup>2</sup>		
		P=		16.86 m		
		R=		0.039		
		n=		0.020		
		Velocity (V)		0.518 m/sec		
		R(2/3) S(1/2)/	n	0.010 11/000		
		( ) ( )				
		Depth x Veloci	ty (D.V)	0.08		
		Channel Flow VxA	(Q)	344 l/sec		
		100 year peak	discharge =	341 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 45	Rev A		
Job Title		Clevedo	on Meadows	Author	Date	Checked		
Calc Title		Mannings Calcu	lations - Section 40	ML	15/11/2024	JD		
	Design Spreadsheet for Mannings Formula							
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>				
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
v v	Vhere	Q=	Channel Flow	305 l/s				
		S =	Longitudinal Slope	0.005 m/m				
		A =	Cross sectional area	0.728 m2				
		P=	Wetted Perimeter	17.80 m				
		R =	Hydraulic Radius	0.041 m				
		n =	Mannings n	0.02				
L	.ongitı	udinal slope						
		S=		0.005 m/m				
s	Sectior	on Location		Section 40				
		Depth=		0.16 m				
		Width=		8.80 m				
		S=		0.005 m/m				
		A=		0.728 m <sup>2</sup>				
		P=		17.80 m				
		R=		0.041				
		n=		0.020				
		Velocity (V)		0.419 m/sec				
		R(2/3) S(1/2)/	n	0.110 11,000				
		. , . ,						
		Depth x Veloci	ty (D.V)	0.07				
		Channel Flow VxA	(Q)	305 l/sec				
		100 year peak	discharge =	293 l/sec	ОК			
		* Refer TP108	Modelling for Flow rates					

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 46	Rev A
Job Title		Clevedo	on Meadows	Author	Date	Checked
Calc Title		Mannings Calcu	lations - Section 41	ML	15/11/2024	JD
		-				
<u> </u>	Design	Spreadsheet f	or Mannings Formula			
<u> </u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	s formula		
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P		
v	Vhere	Q=	Channel Flow	242 l/s		
		S =	Longitudinal Slope	0.005 m/m		
		A =	Cross sectional area	0.567 m2		
		P=	Wetted Perimeter	13.47 m		
		R =	Hydraulic Radius	0.042 m		
		n =	Mannings n	0.02		
<u> </u> ц	ongitu	udinal slope				
		S=		0.005 m/m		
s	Sectior	ion Location		Section 41		
		Depth=		0.13 m		
		Width=		7.26 m		
		S=		0.005 m/m		
		A=		0.567 m <sup>2</sup>		
		P=		13.47 m		
		R=		0.042		
		n=		0.020		
		Velocity (V)		0.427 m/sec		
		R(2/3) S(1/2)/	n			
		Depth x Veloci	ty (D.V)	0.06		
		Channel Flow VxA	(Q)	242  /sec		
		100 year peak	discharge =	235 l/sec	ОК	
	* Refer TP108 Modelling for Flow rates					

	MAVEN	ASSOCIATES	Job Number 194006	Sheet 47	Rev A				
Job Title	Cleved	on Meadows	Author	Date	Checked				
Calc Title	Mannings Calc	ulations - Section 42	ML	15/11/2024	JD				
					-				
Desig	Design Spreadsheet for Mannings Formula								
<u>Calc</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula								
	Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P						
When	e ∩=	Channel Flow	574 l/s						
When	S =	Longitudinal Slope	0.005  m/m						
	Δ =	Cross sectional area	1 114 m2						
	P=	Wetted Perimeter	20.00 m						
	R =	Hydraulic Radius	0.056 m						
	n =	Mannings n	0.02						
			0.02						
Long	itudinal slope								
	S=		<b>0.005</b> m/m						
Section	on Location		Section 42						
	Depth=		0.20 m						
	Width=		9.89 m						
	S=		0.005 m/m						
	A=		1.114 m <sup>2</sup>						
	P=		20.00 m						
	R=		0.056						
	n=		0.020						
	Velocity (V)		0.515 m/sec						
	R(2/3) S(1/2)/	'n							
	Denth x Velor	sity (D V)	0.28						
	Boparx voice	(D.V)	0.20						
	Channel Flow VxA	r (Q)	574 l/sec						
	100 year peal	< discharge =	548 l/sec	ОК					
	* Refer TP108 Modelling for Flow rates								

	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 48	Rev A		
Job Title		Clevedo	on Meadows	Author	Date	Checked		
Calc Title		Mannings Calcu	Ilations - Section 43	ML	15/11/2024	JD		
	Design Spreadsheet for Mannings Formula							
<u>c</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula							
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P				
v	Vhere	Q=	Channel Flow	635 l/s				
		S =	Longitudinal Slope	0.010 m/m				
		A =	Cross sectional area	1 m2				
		P=	Wetted Perimeter	22.06 m				
		R =	Hydraulic Radius	0.045 m				
		n =	Mannings n	0.02				
L	.ongitı	udinal slope						
		S=		0.010 m/m				
s	ectior	on Location		Section 43				
		Depth=		0.18 m				
		Width=		10.91 m				
		S=		0.010 m/m				
		A=		1 m <sup>2</sup>				
		P=		22.06 m				
		R=		0.045				
		n=		0.020				
		Velocity (V)		0.635 m/sec				
		R(2/3) S(1/2)/ I	n					
				0.44				
		Depth x Veloci	ty (D.V)	0.11				
		Channel Flow VxA	(Q)	635 l/sec				
		100 year peak	discharge =	605 l/sec	ОК			
	* Refer TP108 Modelling for Flow rates							

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 49	Rev A	
Job Title		Clevedo	on Meadows	Author	Date	Checked	
Calc Title		Mannings Calcu	lations - Section 44	ML	15/11/2024	JD	
		Ū					
	Design Spreadsheet for Mannings Formula						
<u>c</u>	Calc 1: Capacity of Channel Flow (Q), Mannings formula						
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
v N	Vhere	Q=	Channel Flow	753 l/s			
		S =	Longitudinal Slope	0.017 m/m			
		A =	Cross sectional area	0.929 m2			
		P=	Wetted Perimeter	21.16 m			
		R =	Hydraulic Radius	0.044 m			
		n =	Mannings n	0.02			
L L	.ongitı	udinal slope					
		S=		0.017 m/m			
s	Sectior	on Location		Section 44			
		Depth=		0.17 m			
		Width=		10.46 m			
		S=		0.017 m/m			
		A=		0.929 m <sup>2</sup>			
		P=		21.16 m			
		R=		0.044			
		n=		0.020			
		Velocity (V)		0.810 m/sec			
		R(2/3) S(1/2)/ I	n	0.010 11/000			
		Depth x Veloci	ty (D.V)	0.14			
		Channel Flow VxA	(Q)	753 l/sec			
		100 year peak	discharge =	743 l/sec	ОК		
	* Refer TP108 Modelling for Flow rates						

MA	EN	MAVEN	ASSOCIATES	Job Number 194006	Sheet 50	Rev A	
Job Title		Clevedo	on Meadows	Author	Date	Checked	
Calc Title		Mannings Calcu	lations - Section 45	ML	15/11/2024	JD	
		-					
<u> </u>	Design Spreadsheet for Mannings Formula						
<u>c</u>	Calc 1:	Capacity of Cl	nannel Flow (Q), Manning	<u>s formula</u>			
		Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P			
v	Vhere	Q=	Channel Flow	3266 l/s			
		S =	Longitudinal Slope	0.017 m/m			
		A =	Cross sectional area	2.595 m2			
		P=	Wetted Perimeter	30.56 m			
		R =	Hydraulic Radius	0.085 m			
		n =	Mannings n	0.02			
L 1	ongitu	udinal slope					
		S=		<b>0.017</b> m/m			
s	Sectior	on Location		Section 45			
		Depth=		0.13 m			
		Width=		30.53 m			
		S=		0.017 m/m			
		A=		2.595 m <sup>2</sup>			
		P=		30.56 m			
		R=		0.085			
		n=		0.020			
		Velocity (V)		1.259 m/sec			
		R(2/3) S(1/2)/	n				
		Donth y Valaci		0.16			
			ty (D.V)	0.10			
		Channel Flow VxA	(Q)	3266 l/sec			
		100 year peak	discharge =	3201 l/sec	ОК		
	* Refer TP108 Modelling for Flow rates						
## **APPENDIX D – WEIR CALCULATIONS**

	MAVEN	ASSOCIATES	Job Number 194006	Sheet 1	Rev A
Job Title Calc Title	62, 78 & 80 Papakura-Clevedon Road, Clevedon Flood Assessment Weir Calculations		Author ML	Date 7/02/2025	Checked JD
	Section	14			
	Discharge over Q = 1.7 x L x H <sup>A</sup> Trying L = H = Q = Q(TP108) = Velocity DEPTH X VELOCITY Energy Grade Line	broad crested weir 21.893 0.209 3.558 3.558 0.833 0.25 0.244	m m m <sup>3</sup> /s m <sup>3</sup> /s (worst case) <b>m</b>		