# FINAL STORMWATER REPORT - STAGE 2

62,78,80 PAPAKURA-CLEVEDON ROAD
CLEVEDON
AUCKLAND



## **ARON KUMAR**

Approved by Delegated Officer

23/05/2025

MAEN	Maven Associates	<b>Job Number</b> 194006		<b>Rev</b> C
1	78,80 Papakura-Clevedon Road al Stormwater Report – Stage 2	<b>Author</b> ML	<b>Date</b> 09/05/2025	<b>Checked</b> JD



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## 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



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#### 1.3 RESOURCE CONSENT

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The consented development at 62, 78 & 80 Papakura Clevedon Road is subject to conditions contained within Consent BUN60399307 (Stage 2). Condition 70 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 clean the overland flow paths to ensure an unobstructed flow of stormwater.



## 2.0 FLOOD MODELLING

#### 2.1 MODELLING METHDOLOGY

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#### 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				
Lots	70/30	8.00				
Roads	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) values					
Road - Accessway	0.020				

As a conservative approach, the piped stormwater network has been assumed to be fully blocked in a 100-year event and will not be considered to provide capacity for 100-year flows.

### **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.

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#### 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.

The stormwater assessment confirms that all overland flow is contained within the road reserve, with no flooding anticipated within the residential lots. A 500mm freeboard has been applied where 100-year flow rates exceed 2.0m³/s, while a 150mm freeboard is applied for flows below this threshold.

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	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     150 mm for all other cases
Overland flow paths, where flow is equal to or in excess of 2m <sup>3</sup> /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

23/05/2025								
Stage 2								
Lot Number	Final Flood Level (m)	Freeboard Required (m)	Auckland Vertical Datum 1946 MFL (m)	NZVD 2016 Datum MFL (m)				
118	9.97	0.15	10.12	9.83				
119	9.79	0.15	9.94	9.65				
120	9.91	0.15	10.06	9.77				
121	10.03	0.15	10.18	9.89				
122	9.9	0.15	10.05	9.76				
123	10.64	0.15	10.79	10.5				
124	10.75	0.15	10.9	10.61				
125	10.62	0.15	10.77	10.48				
126	10.56	0.15	10.71	10.42				
127	10.47	0.15	10.62	10.33				
128	10.45	0.15	10.6	10.31				
129	10.57	0.15	10.72	10.43				
130	10.66	0.15	10.81	10.52				
131	10.77	0.15	10.92	10.63				
132	10.78	0.15	10.93	10.64				
133	11.54	0.15	11.69	11.4				
134	11.59	0.15	11.74	11.45				
135	11.6	0.15	11.75	11.46				
136	11.42	0.15	11.57	11.28				
137	11.43	0.15	11.58	11.29				
138	11.34	0.15	11.49	11.2				
139	11.51	0.15	11.66	11.37				
140	11.62	0.15	11.77	11.48				
141	11.63	0.15	11.78	11.49				
142	11.57	0.15	11.72	11.43				
143	12.39	0.15	12.54	12.25				
144	12.48	0.15	12.63	12.34				
145	12.44	0.15	12.59	12.3				
146	12.28	0.15	12.43	12.14				
147	12.08	0.15	12.23	11.94				
148	11.92	0.15	12.07	11.78				
149	12.03	0.15	12.18	11.89				
150	12.04	0.15	12.19	11.9				
151	12.25	0.15	12.4	12.11				
152	12.45	0.15	12.6	12.31				
153	12.5	0.15	12.65	12.36				
154	12.4	0.15	12.55	12.26				
155	12.86	0.15	13.01	12.72				
156	12.95	0.15	13.1	12.81				
157	12.95	0.15	13.1	12.81				
158	12.77	0.15	12.92	12.63				
159	12.54	0.15	12.69	12.4				
160	12.39	0.15	12.54	12.25				

212	12.07	0.15	12.22	11.93
213	11.99	0.15	12.14	11.85
214	11.93	0.15	12.08	11.79
215	11.83	0.15	11.98	11.69
216	11.65	0.15	11.8	11.51
217	11.54	0.15	11.69	11.4
218	11.41	0.15	11.56	11.27
219	11.25	0.15	11.4	11.11
220	11.11	0.15	11.26	10.97
221	10.99	0.15	11.14	10.85
222	10.83	0.15	10.98	10.69
223	10.69	0.15	10.84	10.55
224	10.53	0.15	10.68	10.39
225	10.38	0.15	10.53	10.24
226	10.18	0.15	10.33	10.04
227	10.04	0.15	10.19	9.9
228	9.92	0.15	10.07	9.78
1001	10.49	0.15	10.64	10.35
1002	11.44	0.15	11.59	11.3
1003	12.33	0.15	12.48	12.19
1004	12.83	0.15	12.98	12.69
5000 / 1007	11.28	0.15	11.43	11.14

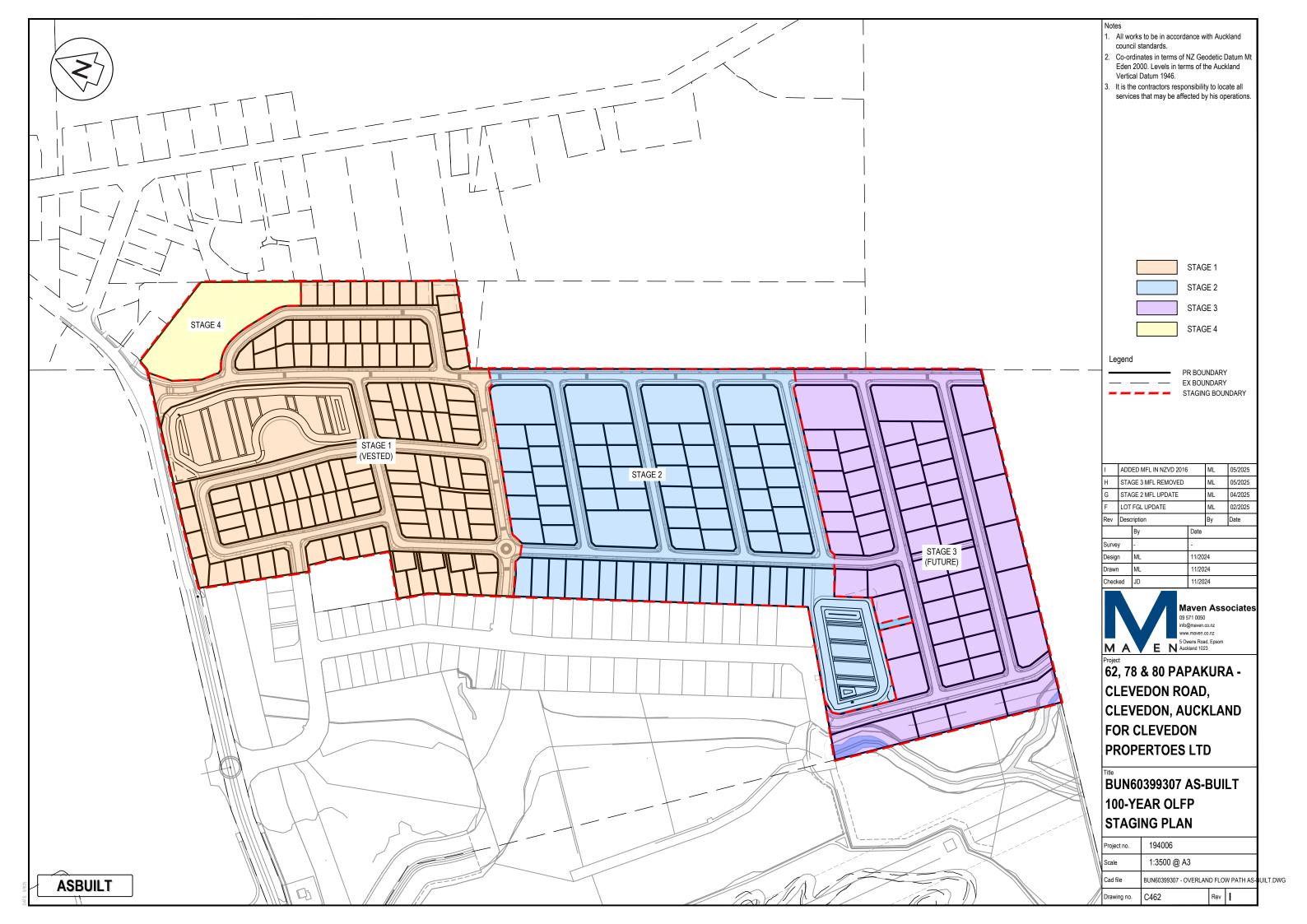


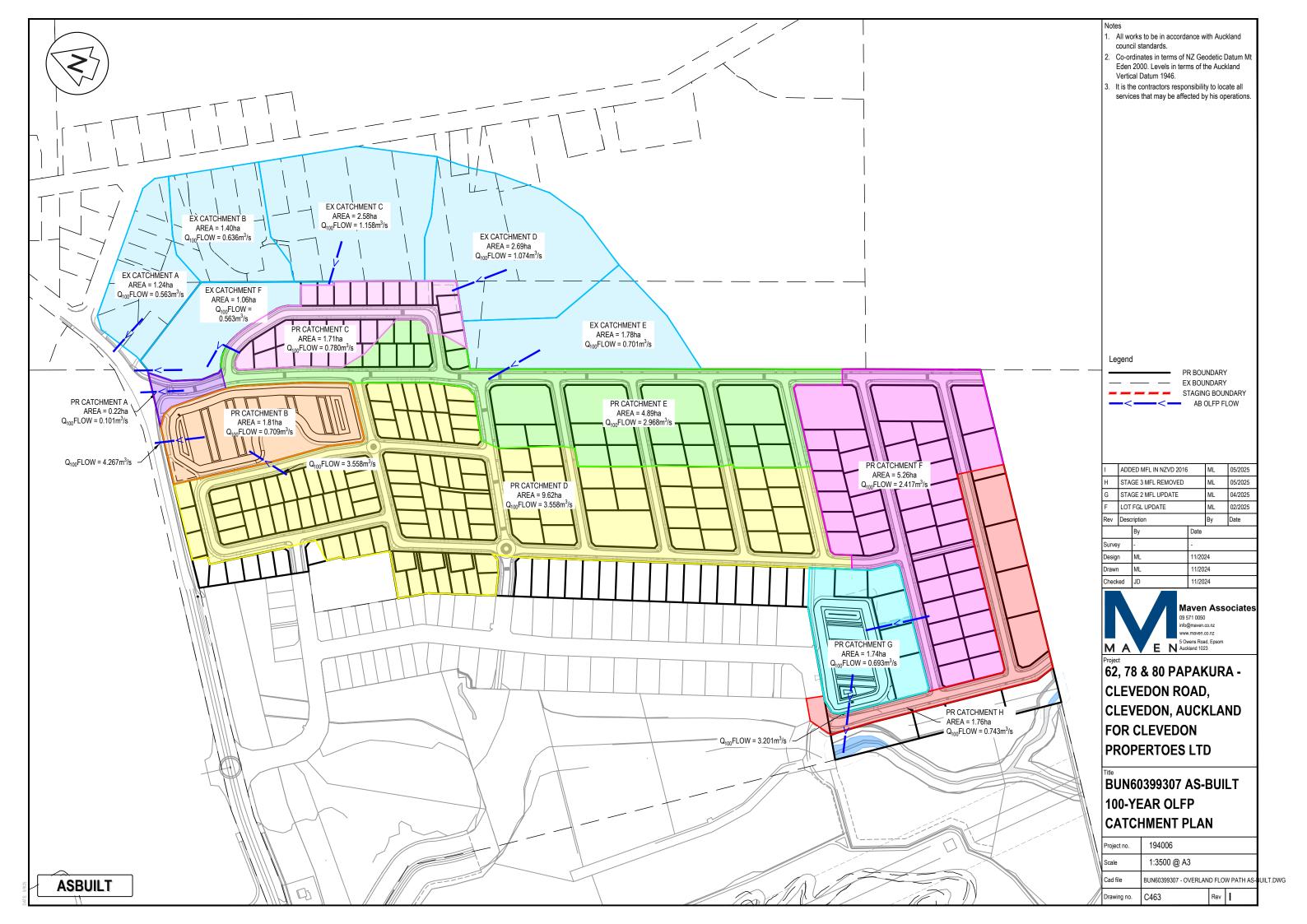
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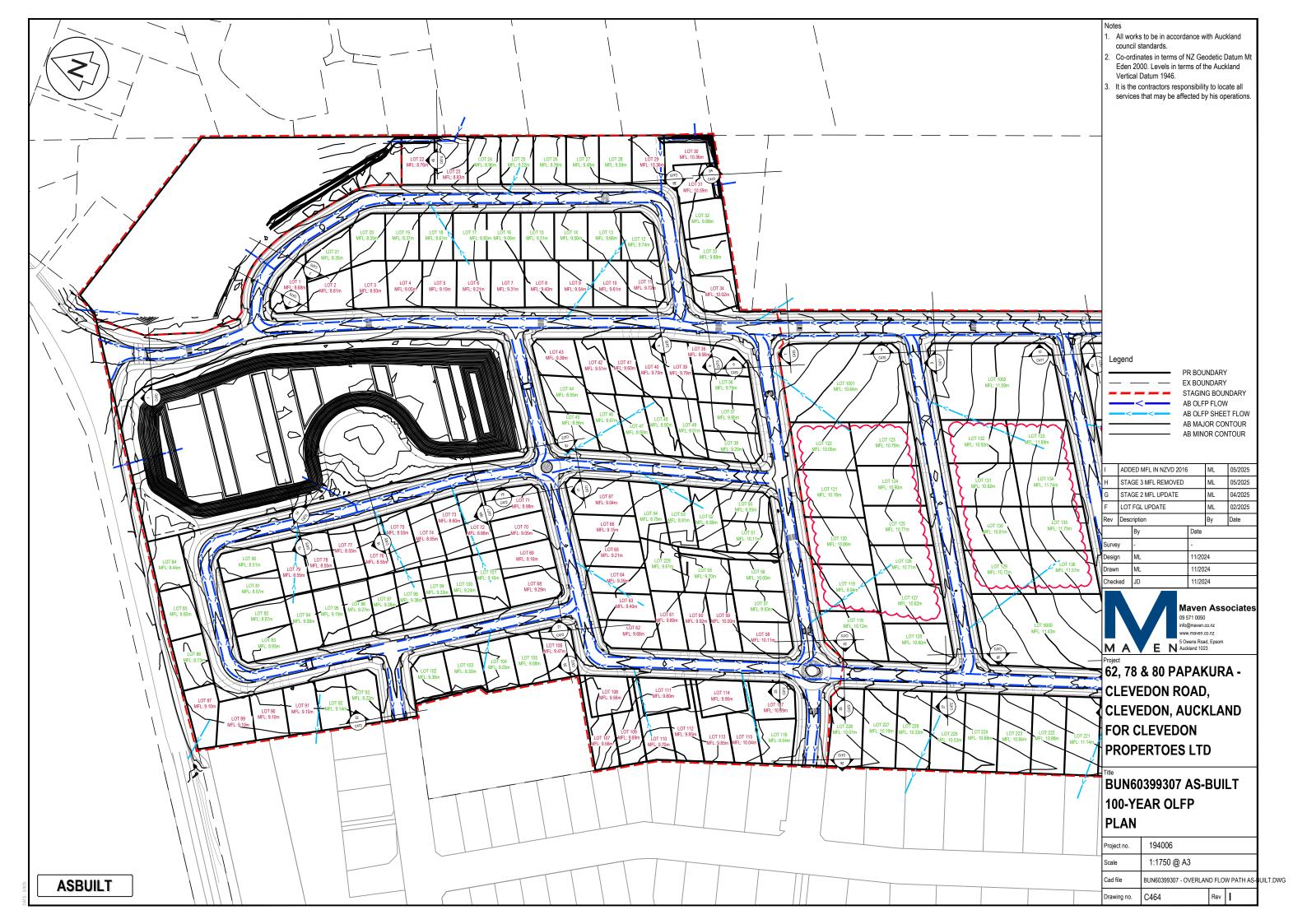
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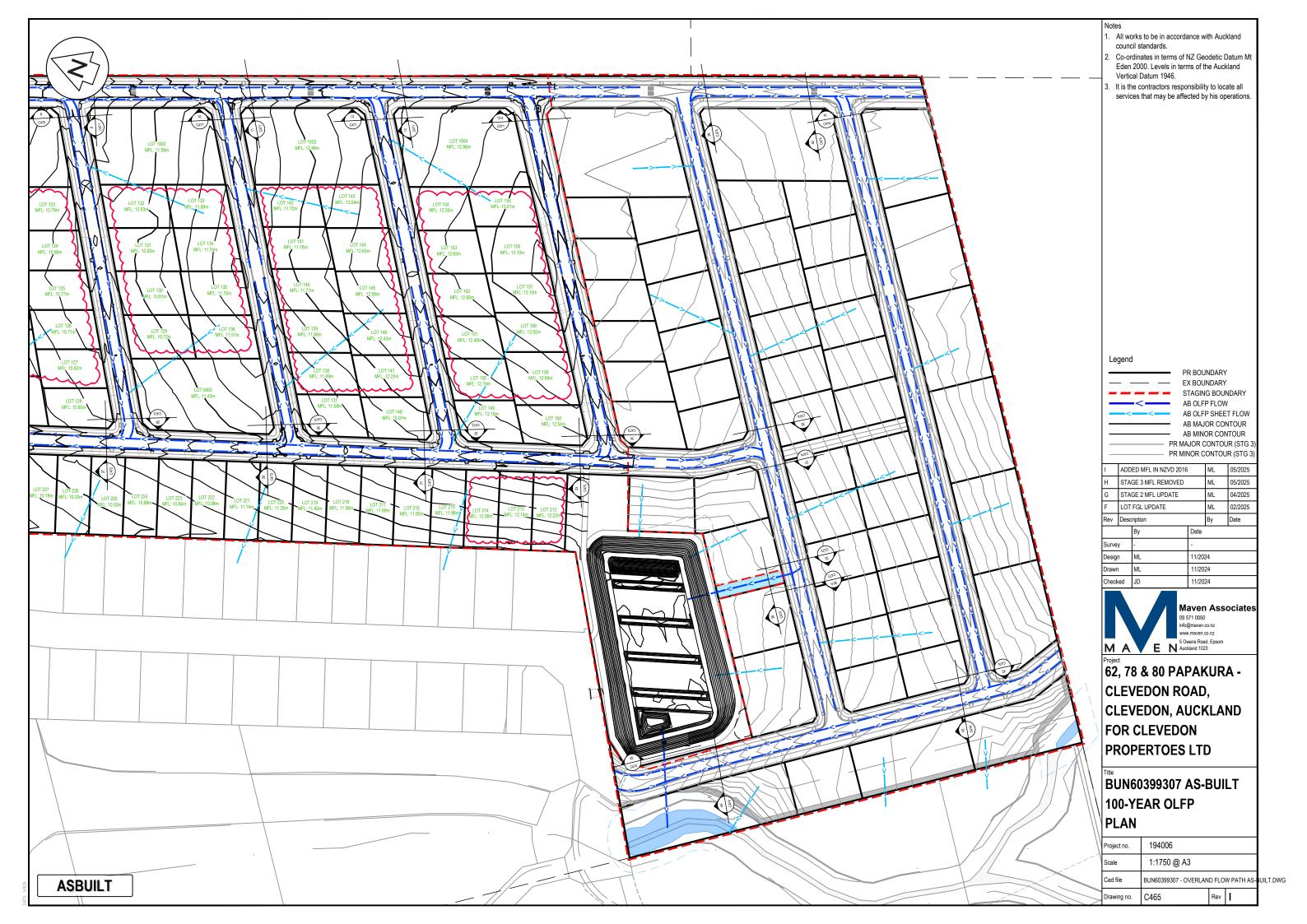
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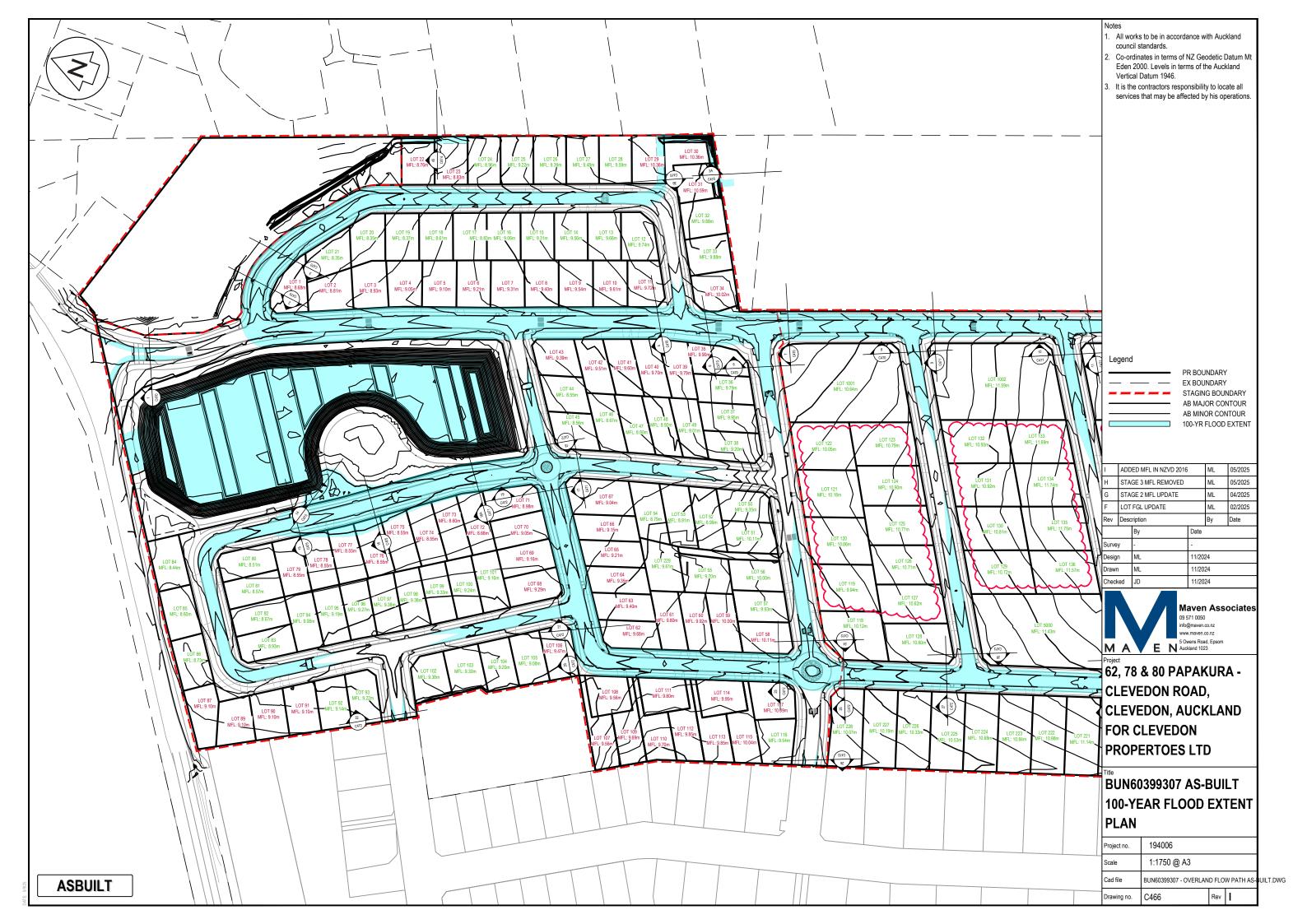
## APPENDIX A – STORMWATER REPORT ASBUILT PLAN



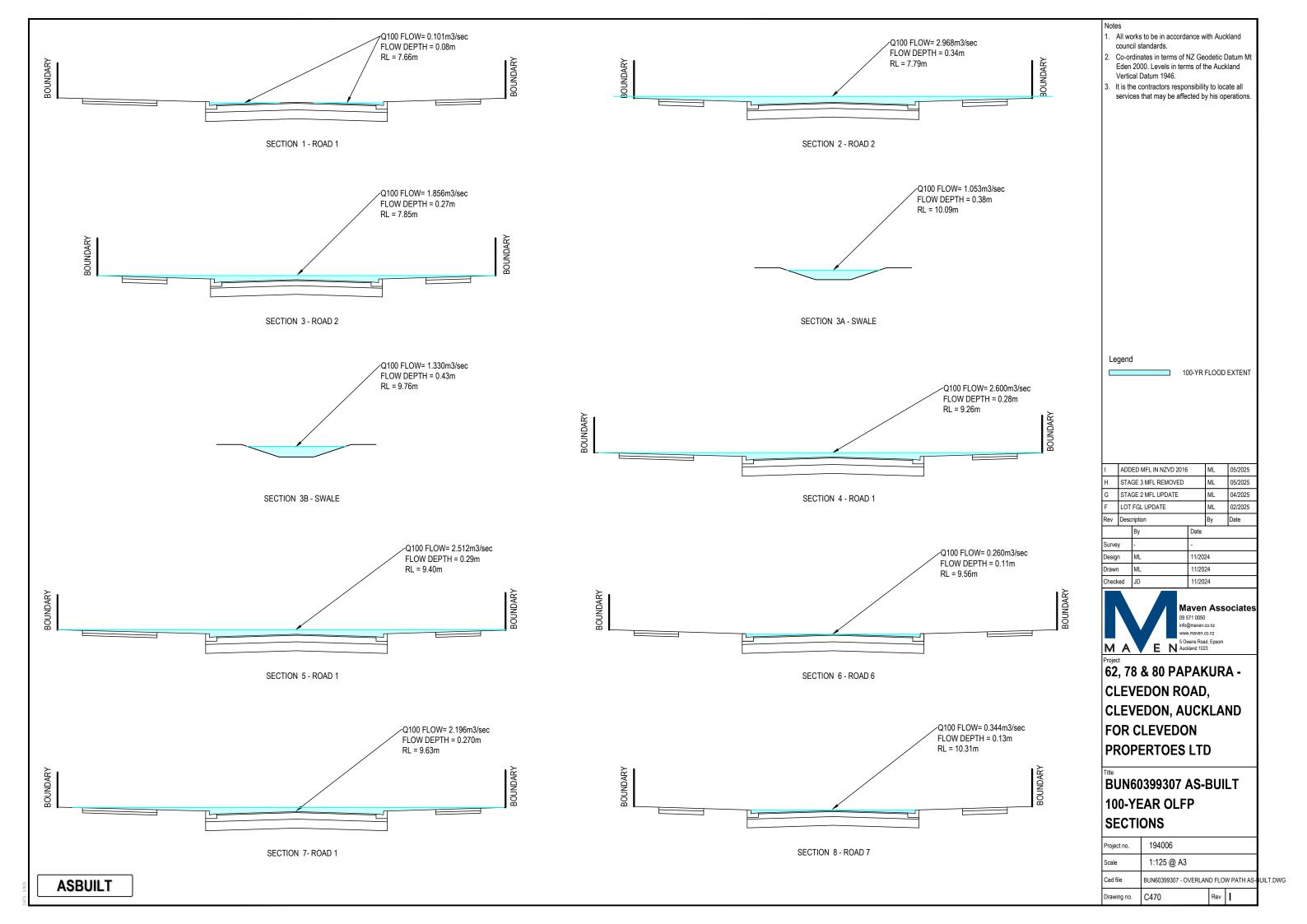


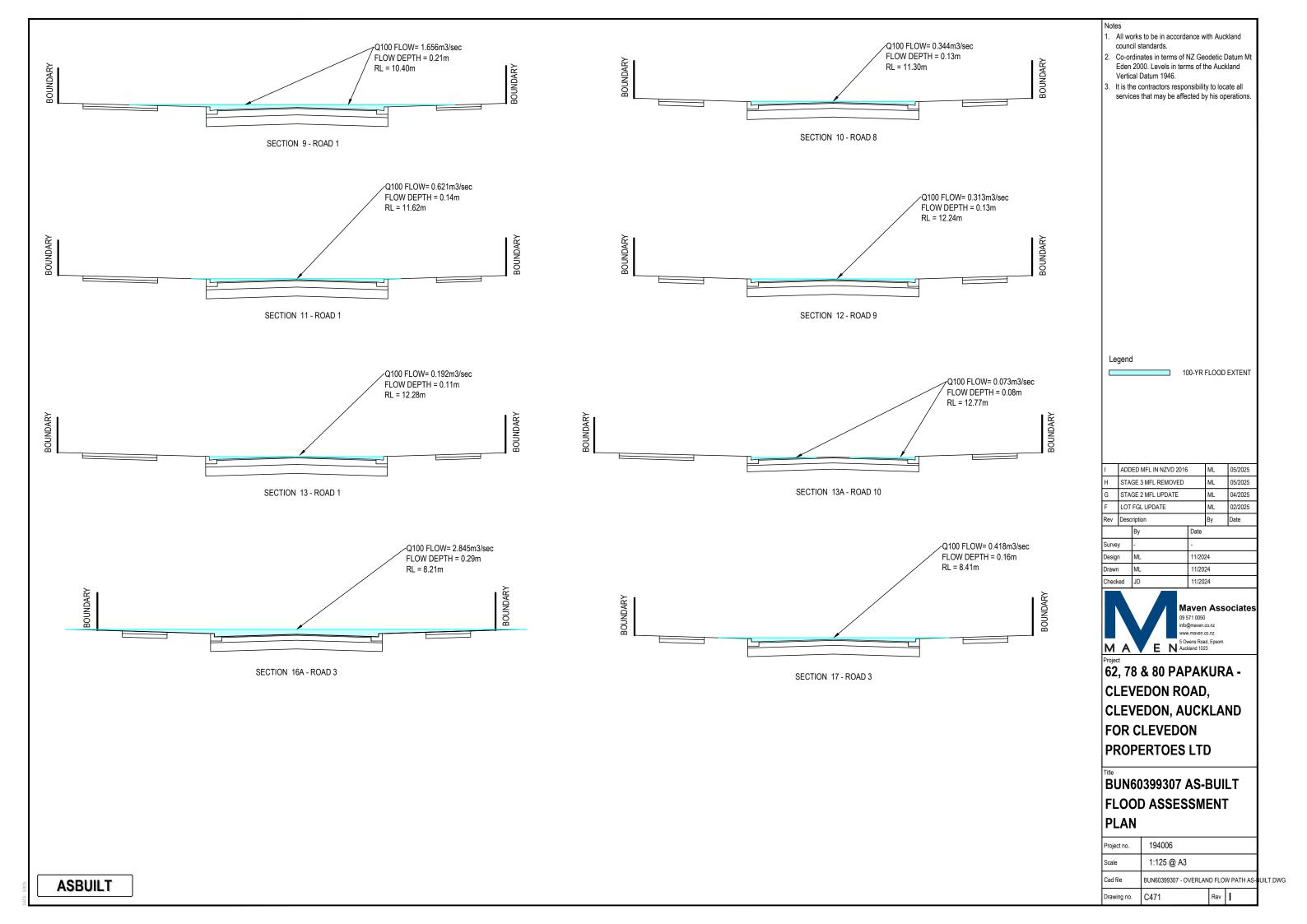


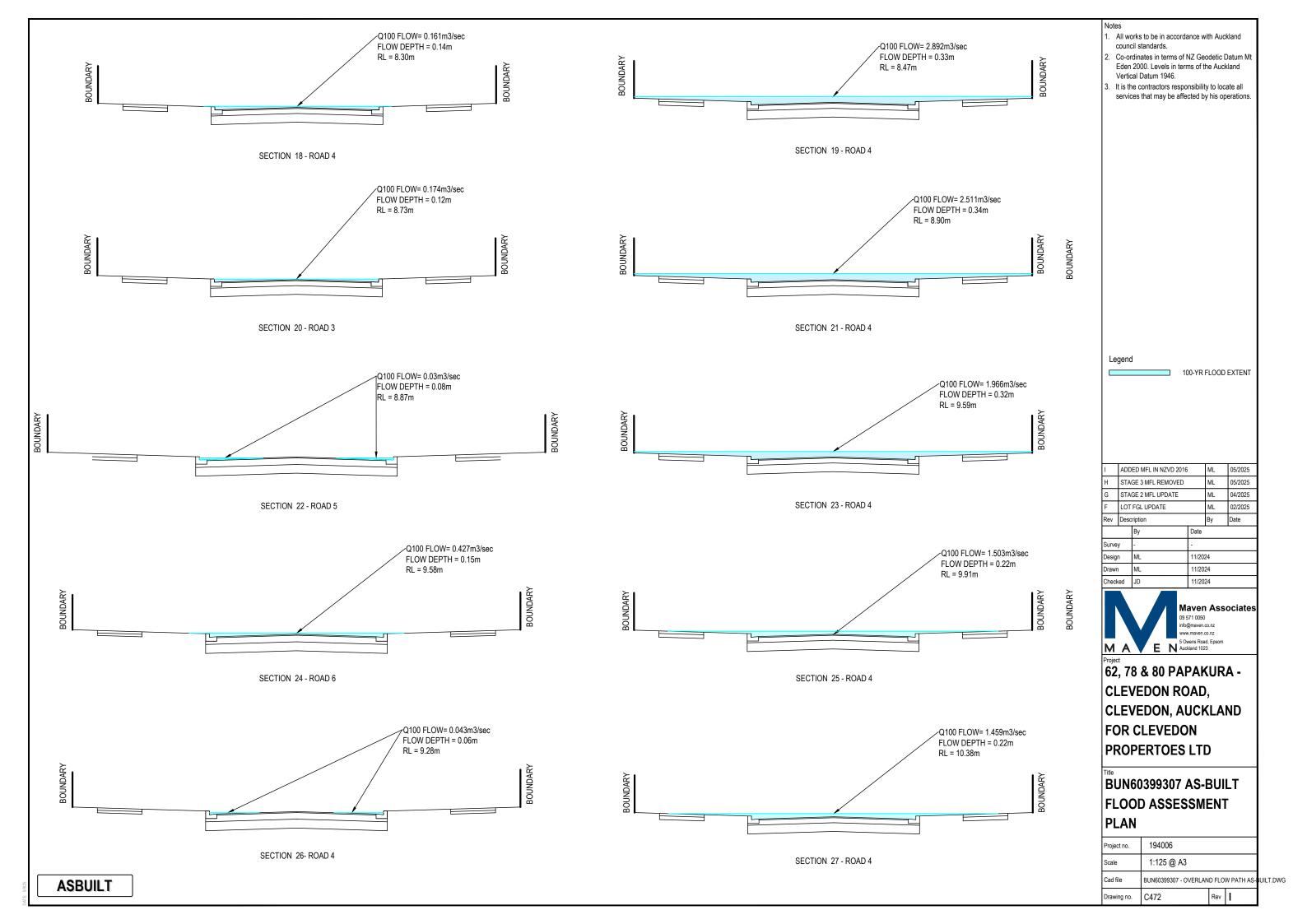


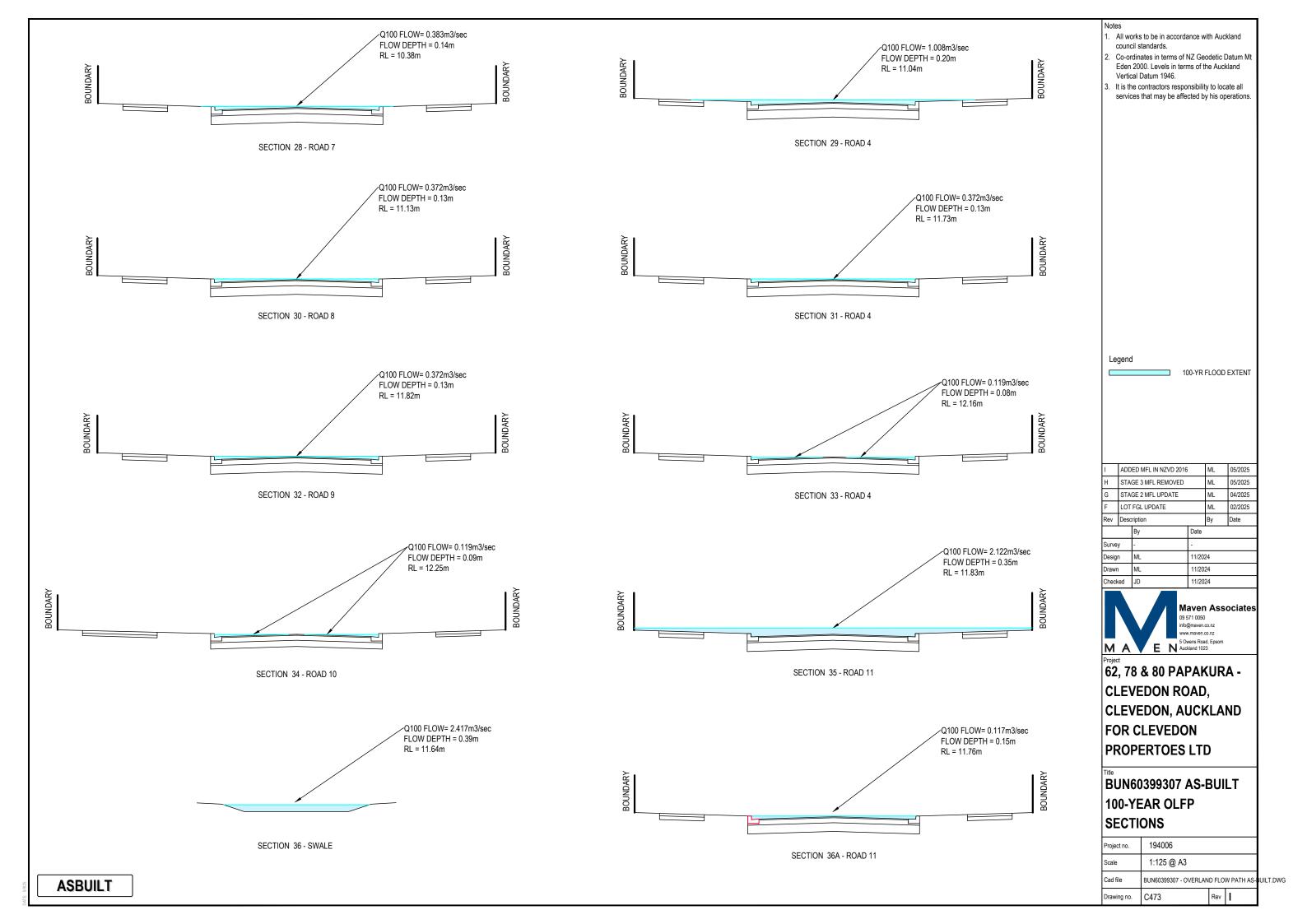


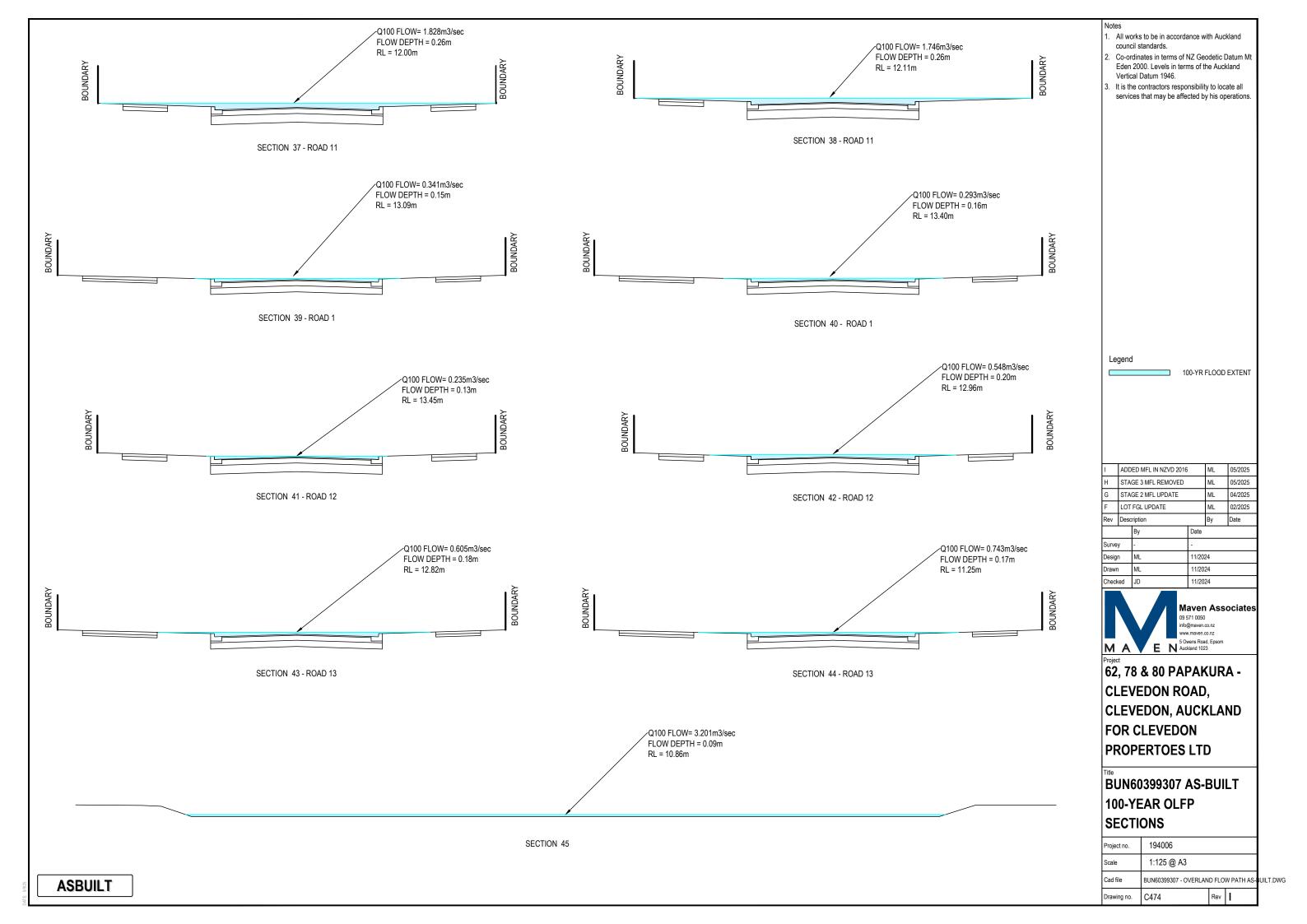


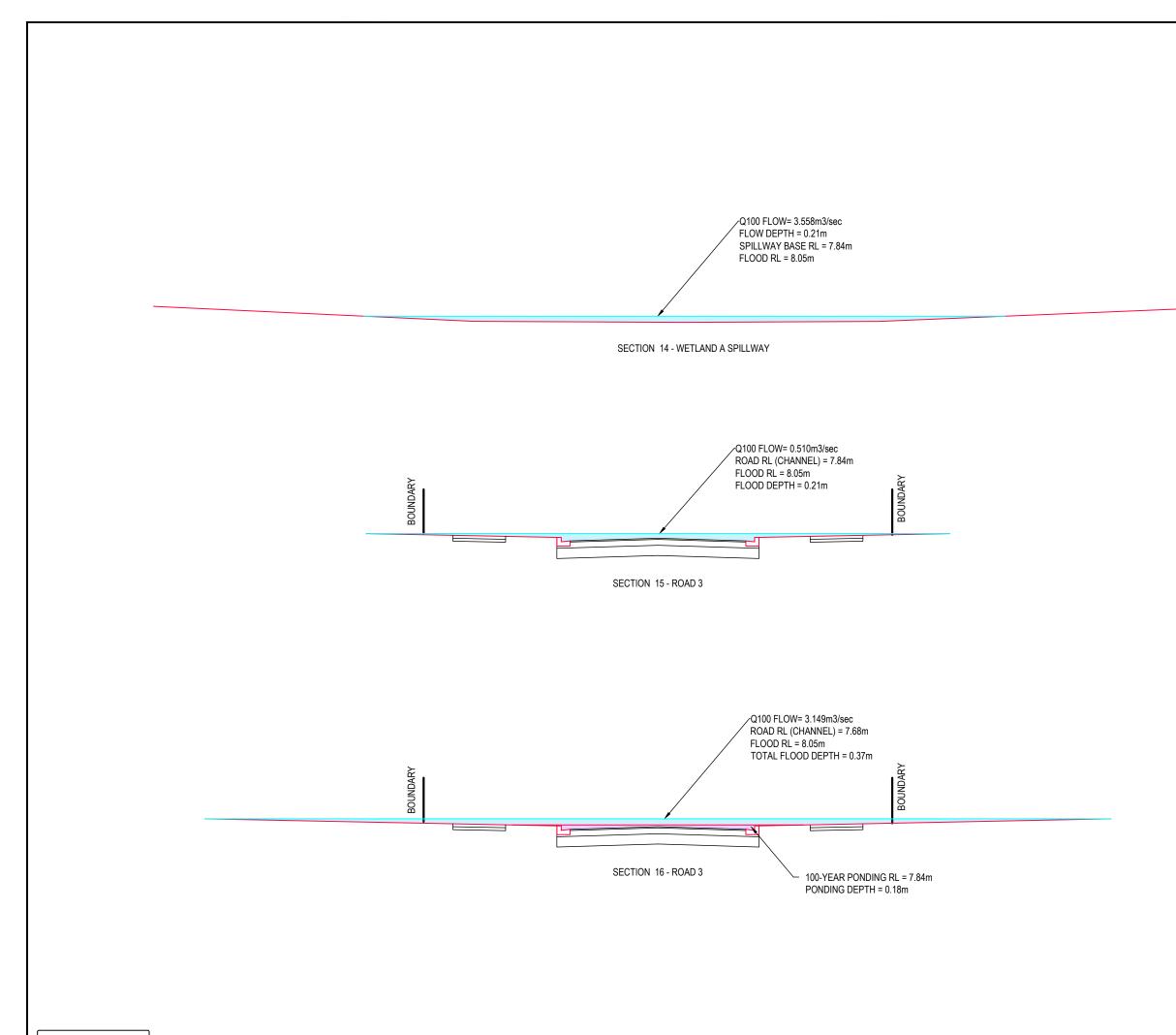












Notes

- 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.
- 3. It is the contractors responsibility to locate all services that may be affected by his operations.

Legend

100-YR FLOOD EXTENT

I	ADD	ED MFL IN NZVD	ML	05/2025			
Н	STA	GE 3 MFL REMOV	ML 05/2025				
G	STA	STAGE 2 MFL UPDATE ML					
F	LOT	FGL UPDATE	ML	02/2025			
Rev	Desc	ription		Ву	Date		
		Ву		Date	,		
Survey Design		-		-			
		ML		11/202	24		
		М		11/2024			



11/2024

Project

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

Title

# BUN60399307 AS-BUILT 100-YEAR OLFP SECTIONS

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

Lot Final Flood Level  1 8.18 2 8.31 3 8.43 4 8.55 5 6.60 6 8.71 7 8.81 8 8.90 9 9.04 10 9.11 11 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 20 9.33 23 9.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.36 30 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.73 34 9.52 35 9.90 36 9.64 37 9.80 38 9.05 39 9.05 39 9.09 38 9.05 39 9.09 38 9.05 39 9.09 38 9.05 39 9.09 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.76	Freeboard Required  0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.	Stage 1  Auckland Vertical Datum 1946 MFL (m)  8.68  8.81  8.93  9.05  9.10  9.21  9.31  9.40  9.54  9.61  9.72  9.74  9.66  9.56  9.31  9.06  8.83  8.61  8.37  8.35  8.35  8.76  8.83  8.96  9.22  9.39  9.48  9.59  10.36  10.59  9.88  9.88  10.02  9.90  9.79	NZVD 2016 Datum MFL (m)  8.39 8.52 8.64 8.76 8.81 8.92 9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.30 9.59	Lot  91  92  93  94  95  96  97  98  99  100  101  102  103  104  110  111  112  113  114  115  116  117  229	Final Flood Level  8.60 8.99 9.07 8.93 9.04 9.12 9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.45 9.54	0.50 0.15 0.15 0.15 0.15 0.15 0.15 0.15	Auckland Vertical Datum 1946 MFL (m)  9.10  9.14  9.22  9.08  9.19  9.27  9.36  9.38  9.33  9.24  9.16  9.38  9.30  9.20  9.08  9.47  9.56  9.56  9.69	8.81 8.85 8.93 8.79 8.90 8.98 9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.40	Lot  118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136	Final Flood Level  9.97  9.79  9.91  10.03  9.90  10.64  10.75  10.62  10.56  10.47  10.45  10.57  10.66  11.54  11.59  11.60  11.60	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	Auckland Vertical Datum 1946 MFL (m)  10.12  9.94  10.06  10.18  10.05  10.79  10.90  10.77  10.71  10.62  10.60  10.72  10.81  10.92  10.93  11.69	NZVD 2016 Datum MFL (m)  9.83  9.65  9.77  9.89  9.76  10.50  10.61  10.48  10.42  10.33  10.31  10.43  10.52  10.63  10.64  11.40
1 8.18 2 8.31 3 8.43 4 8.55 5 8.60 6 8.71 7 8.81 8 8.90 9 9.04 10 9.11 11 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.36 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.52 35 9.40 36 9.64 37 9.80 36 9.64 37 9.80 38 9.92 40 9.20 41 9.10 42 42 9.93 44 8.40 45 8.41 46 8.55 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	8.68 8.81 8.93 9.05 9.10 9.21 9.31 9.40 9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	8.39 8.52 8.64 8.76 8.81 8.92 9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117	8.60 8.99 9.07 8.93 9.04 9.12 9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.35 9.35	0.50 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.10 9.14 9.22 9.08 9.19 9.27 9.36 9.38 9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	8.81 8.85 8.93 8.79 8.90 8.98 9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.40	118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135	9,97 9,79 9,91 10.03 9,90 10.64 10.75 10.62 10.47 10.45 10.47 10.66 10.77 10.78 11.54 11.59 11.60	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.12 9.94 10.06 10.18 10.05 10.79 10.90 10.77 10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	9.83 9.65 9.77 9.89 9.76 10.50 10.61 10.48 10.42 10.33 10.31 10.43 10.52 10.63 10.64
2 8.31 3 8.43 4 8.55 5 8.60 6 8.71 7 8.81 8 8.90 9 9.04 10 9.11 111 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 31 10.09 32 9.73 33 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.85 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	8.81 8.93 9.05 9.10 9.21 9.31 9.40 9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	8.52 8.64 8.76 8.81 8.92 9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	92 93 94 95 96 97 98 99 100 101 102 103 104 106 106 107 108 109 110 111 112 113 114 115 116 117	8.99 9.07 8.93 9.04 9.12 9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.14 9.22 9.08 9.19 9.27 9.36 9.38 9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69	8.85 8.93 8.79 8.90 8.98 9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.40	119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135	9.79 9.91 10.03 9.90 10.64 10.75 10.62 10.56 10.47 10.47 10.45 10.57 10.66 10.77 10.78 11.54 11.59	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.94 10.06 10.18 10.05 10.79 10.90 10.77 10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	9.65 9.77 9.89 9.76 10.50 10.61 10.48 10.42 10.33 10.31 10.43 10.52 10.63
4 8.55 5 8.60 6 8.71 7 8.81 8 8.90 9 9.04 10 9.11 11 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 33 9.73 33 9.73 33 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 36 9.64 37 9.80 38 9.92 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.05 9.10 9.21 9.31 9.40 9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	8.76 8.81 8.92 9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.66 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117	8.93 9.04 9.12 9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.08 9.19 9.27 9.36 9.38 9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	8.79 8.90 8.98 9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	121 122 123 124 125 126 127 128 129 130 131 132 133 134	10.03 9.90 10.64 10.75 10.62 10.56 10.47 10.45 10.57 10.66 10.77 10.78 11.54 11.59	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.18 10.05 10.79 10.90 10.77 10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	9.89 9.76 10.50 10.61 10.48 10.42 10.33 10.31 10.43 10.52 10.63 10.64
5         8.60           6         8.71           7         8.81           8         8.90           9         9.04           10         9.11           11         9.22           12         9.59           13         9.51           14         9.41           15         9.16           16         8.91           17         8.68           18         8.46           19         8.22           20         8.06           21         7.91           22         8.26           23         8.33           24         8.81           25         9.07           26         9.24           27         9.33           28         9.44           29         9.86           31         10.09           32         9.73           33         9.73           33         9.73           33         9.73           33         9.52           35         9.40           36         9.64           37	0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.10 9.21 9.31 9.40 9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	8.81 8.92 9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117	9.04 9.12 9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.19 9.27 9.36 9.38 9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.69	8.90 8.98 9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	122 123 124 125 126 127 128 129 130 131 132 133 134 135	9.90 10.64 10.75 10.62 10.56 10.47 10.45 10.57 10.66 10.77 10.78 11.54 11.59	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.05 10.79 10.90 10.77 10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	10.50 10.61 10.48 10.42 10.33 10.31 10.43 10.52 10.63 10.64
7 8.81 8 8.90 9 9.04 10 9.11 11 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15	0.50 0.50 0.50 0.50 0.50 0.50 0.15 0.15	9.31 9.40 9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.02 9.11 9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	97 98 99 100 101 102 103 104 106 107 108 109 110 111 112 113 114 115 116 117	9.21 9.23 9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.06 9.30 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.36 9.38 9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	9.07 9.09 9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	124 125 126 127 128 129 130 131 132 133 134 135	10.75 10.62 10.56 10.47 10.47 10.57 10.66 10.77 10.78 11.54 11.59	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.90 10.77 10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	10.61 10.48 10.42 10.33 10.31 10.43 10.52 10.63 10.64
9 9.04 10 9.11 11 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 31 10.09 32 9.73 33 9.73 33 9.73 33 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 42 9.01 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.50 0.50 0.50 0.15 0.15 0.15	9.54 9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.25 9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117	9.18 9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.45 9.54	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.33 9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	9.04 8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	126 127 128 129 130 131 132 133 134 135	10.56 10.47 10.45 10.57 10.66 10.77 10.78 11.54 11.59	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.71 10.62 10.60 10.72 10.81 10.92 10.93 11.69	10.42 10.33 10.31 10.43 10.52 10.63 10.64
10 9.11 11 9.22 12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.50 0.50 0.15 0.15 0.15 0.15 0.15 0.15	9.61 9.72 9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	9.32 9.43 9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	100 101 102 103 104 105 106 108 109 110 111 112 113 114 115 116 117	9.09 9.01 9.23 9.15 9.05 8.93 8.97 9.06 9.19 9.20 9.30 9.35 9.45 9.54	0.15 0.15 0.15 0.15 0.15 0.15 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.24 9.16 9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	8.95 8.87 9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	127 128 129 130 131 132 133 134 135	10.47 10.45 10.57 10.66 10.77 10.78 11.54 11.59 11.60	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	10.62 10.60 10.72 10.81 10.92 10.93 11.69	10.33 10.31 10.43 10.52 10.63 10.64
12 9.59 13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.95 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.74 9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.45 9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	102 103 104 106 106 107 108 109 110 111 112 113 114 115 116 117	9.23 9.15 9.05 8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.15 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.38 9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	9.09 9.01 8.91 8.79 9.18 9.27 9.27 9.40	129 130 131 132 133 134 135	10.57 10.66 10.77 10.78 11.54 11.59 11.60	0.15 0.15 0.15 0.15 0.15 0.15	10.72 10.81 10.92 10.93 11.69	10.43 10.52 10.63 10.64
13 9.51 14 9.41 15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.66 9.56 9.31 9.06 8.83 8.61 8.37 8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.37 9.27 9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	103 104 105 106 107 108 109 110 111 112 113 114 115 116	9.15 9.05 8.93 8.97 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.15 0.15 0.50 0.50 0.50 0.50 0.50	9.30 9.20 9.08 9.47 9.56 9.56 9.69 9.70	9.01 8.91 8.79 9.18 9.27 9.27 9.40	130 131 132 133 134 135	10.66 10.77 10.78 11.54 11.59 11.60	0.15 0.15 0.15 0.15 0.15	10.81 10.92 10.93 11.69	10.52 10.63 10.64
15 9.16 16 8.91 17 8.68 18 8.46 19 8.22 20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	9.31 9.06 8.83 8.61 8.37 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 10.02 9.90	9.02 8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	105 106 107 108 109 110 111 112 113 114 115 116 117	8.93 8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.45	0.15 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.08 9.47 9.56 9.56 9.69 9.70	8.79 9.18 9.27 9.27 9.40	132 133 134 135	10.78 11.54 11.59 11.60	0.15 0.15 0.15	10.93 11.69	10.64
16         8.91           17         8.68           18         8.46           19         8.22           20         8.06           21         7.91           22         8.26           23         8.33           24         8.81           25         9.07           26         9.24           27         9.33           28         9.44           29         9.86           30         9.86           31         10.09           32         9.73           33         9.73           34         9.52           35         9.40           36         9.64           37         9.80           39         9.29           40         9.20           41         9.10           42         9.01           43         8.89           44         8.40           45         8.41           46         8.52           47         8.65           48         8.77           49         8.86           50	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.50 0.50	9.06 8.83 8.61 8.37 8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	8.77 8.54 8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07 10.30	106 107 108 109 110 111 112 113 114 115 116 117	8.97 9.06 9.06 9.19 9.20 9.30 9.35 9.35 9.45 9.54	0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	9.47 9.56 9.56 9.69 9.70	9.27 9.27 9.40	133 134 135	11.54 11.59 11.60	0.15 0.15	11.69	11.40
18         8.46           19         8.22           20         8.06           21         7.91           22         8.26           23         8.33           24         8.81           25         9.07           26         9.24           27         9.33           28         9.44           29         9.86           30         9.86           31         10.09           32         9.73           33         9.73           34         9.52           35         9.40           36         9.64           37         9.80           38         9.05           39         9.29           40         9.20           41         9.10           42         9.01           43         8.89           44         8.40           45         8.41           46         8.52           47         8.65           48         8.77           49         8.86           50         9.15           51	0.15 0.15 0.15 0.15 0.50 0.50 0.15 0.15	8.61 8.37 8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88	8.32 8.08 8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	108 109 110 111 112 113 114 115 116 117	9.06 9.19 9.20 9.30 9.35 9.35 9.45 9.54	0.50 0.50 0.50 0.50 0.50 0.50	9.56 9.69 9.70	9.27 9.40	135	11.60			11.45
20 8.06 21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.50 0.50 0.15 0.15 0.15 0.15	8.35 8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02	8.06 8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07	110 111 112 113 114 115 116 117	9.20 9.30 9.35 9.35 9.45 9.54	0.50 0.50 0.50 0.50	9.70		136	11 42	0.15	11.74 11.75	11.45
21 7.91 22 8.26 23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.50 0.50 0.50 0.15 0.15 0.15 0.15	8.35 8.76 8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	8.06 8.47 8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07 10.30	111 112 113 114 115 116 117	9.30 9.35 9.35 9.45 9.54	0.50 0.50 0.50		9.41	137	11.43	0.15 0.15	11.57 11.58	11.28 11.29
23 8.33 24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.50 0.15 0.15 0.15 0.15 0.15 0.15 0.15	8.83 8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02	8.54 8.67 8.93 9.10 9.19 9.30 10.07 10.07 10.30	113 114 115 116 117	9.35 9.45 9.54	0.50	9.80	9.51	138	11.34	0.15	11.49	11.20
24 8.81 25 9.07 26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.15 0.15 0.15 0.50 0.50 0.50 0.15 0.15 0.15 0.15	8.96 9.22 9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	8.67 8.93 9.10 9.19 9.30 10.07 10.07	114 115 116 117	9.45 9.54		9.85 9.85	9.56 9.56	139 140	11.51 11.62	0.15 0.15	11.66 11.77	11.37 11.48
26 9.24 27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.15 0.15 0.15 0.50 0.50 0.50 0.15 0.15 0.50 0.15 0.50 0.50	9.39 9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.10 9.19 9.30 10.07 10.07	116 117		0.50	9.95	9.66	141	11.63	0.15	11.78	11.49
27 9.33 28 9.44 29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96	0.15 0.15 0.50 0.50 0.50 0.15 0.15 0.50 0.15 0.50 0.15	9.48 9.59 10.36 10.36 10.59 9.88 9.88 10.02 9.90	9.19 9.30 10.07 10.07 10.30	117	0.0000000000000000000000000000000000000	0.50 0.15	10.04 9.54	9.75 9.25	142 143	11.57 12.39	0.15 0.15	11.72 12.54	11.43 12.25
29 9.86 30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.50 0.15 0.15 0.50 0.50 0.50 0.15	10.36 10.36 10.59 9.88 9.88 10.02 9.90	10.07 10.07 10.30	229	9.59	0.50	10.09	9.80	144	12.48	0.15	12.63	12.34
30 9.86 31 10.09 32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.15 0.15 0.50 0.50 0.15 0.15	10.36 10.59 9.88 9.88 10.02 9.90	10.07 10.30		9.46	0.15	9.61	9.32	145 146	12.44 12.28	0.15 0.15	12.59 12.43	12.30 12.14
32 9.73 33 9.73 34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.15 0.15 0.50 0.50 0.15 0.15	9.88 9.88 10.02 9.90							147 148	12.08	0.15	12.23 12.07	11.94 11.78
34 9.52 35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.50 0.15 0.15	10.02 9.90							149	11.92 12.03	0.15 0.15	12.18	11.89
35 9.40 36 9.64 37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50 0.15 0.15	9.90	9.59 9.73						150 151	12.04 12.25	0.15 0.15	12.19 12.40	11.90 12.11
37 9.80 38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.15	9.79	9.61						152	12.45	0.15	12.60	12.31
38 9.05 39 9.29 40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84		9.95	9.50 9.66						153 154	12.50 12.40	0.15 0.15	12.65 12.55	12.36 12.26
40 9.20 41 9.10 42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50	9.20	8.91						155	12.86	0.15	13.01	12.72
42 9.01 43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50	9.79 9.70	9.50 9.41						156 157	12.95 12.95	0.15 0.15	13.10 13.10	12.81 12.81
43 8.89 44 8.40 45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50	9.60	9.31						158 159	12.77	0.15	12.92	12.63 12.40
45 8.41 46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.50	9.51 9.39	9.22 9.10						160	12.54 12.39	0.15 0.15	12.69 12.54	12.40
46 8.52 47 8.65 48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.15	8.55	8.26						212 213	12.07	0.15	12.22	11.93 11.85
48 8.77 49 8.86 50 9.15 51 9.96 52 8.84	0.15 0.15	8.56 8.67	8.27 8.38						214	11.99 11.93	0.15 0.15	12.14 12.08	11.79
49 8.86 50 9.15 51 9.96 52 8.84	0.15 0.15	8.80 8.92	8.51 8.63						215 216	11.83 11.65	0.15 0.15	11.98 11.80	11.69 11.51
51 9.96 52 8.84	0.15	9.01	8.72						217	11.54	0.15	11.69	11.40
52 8.84	0.15 0.15	9.30 10.11	9.01 9.82						218 219	11.41 11.25	0.15 0.15	11.56 11.40	11.27 11.11
ට <b>ර</b>   8.76	0.15	8.99	8.70						220	11.11	0.15	11.26	10.97
54 8.64	0.15 0.15	8.91 8.79	8.62 8.50						221 222	10.99 10.83	0.15 0.15	11.14 10.98	10.85 10.69
55 9.55	0.15	9.70	9.41						223	10.69	0.15	10.84	10.55
56 9.85 57 9.78	0.15 0.15	10.00 9.93	9.71 9.64						224 225	10.53 10.38	0.15 0.15	10.68 10.53	10.39 10.24
58 9.61 59 9.50	0.50 0.50	10.11 10.00	9.82 9.71						226 227	10.18 10.04	0.15 0.15	10.33 10.19	10.04 9.90
60 9.42	0.50	9.92	9.63						228	9.92	0.15	10.07	9.78
61 9.30 62 9.18	0.50 0.50	9.80 9.68	9.51 9.39						1001 1002	10.49 11.44	0.15 0.15	10.64 11.59	10.35 11.30
63 8.90	0.50	9.40	9.11						1003	12.33	0.15	12.48	12.19
64 8.85 65 8.71	0.50 0.50	9.35 9.21	9.06 8.92						1004 5000 / 1007	12.83 11.28	0.15 0.15	12.98 11.43	12.69 11.14
66 8.65	0.50	9.15	8.86						1.55. 1007	11.20	0.13	11.70	
67 8.54 68 8.79	0.50	9.04 9.29	8.75 9.00							Key: Blue	= Deviatio	n from Approved	SMP
69 8.66	0.50	9.16	8.87										
70 8.55 71 8.48	0.50	9.05 8.98	8.76 8.69										
72 8.18	0.50	8.68	8.39										
73 8.10 74 8.05	0.50	8.60 8.55	8.31 8.26										
75 8.05	0.50	8.55	8.26										
76 8.05 77 8.05	0.50 0.50	8.55 8.55	8.26 8.26										
78 8.05	0.50	8.55	8.26										
80 8.36	0.50	8.55 8.51	8.26 8.22										
81 8.42	0.15	8.57	8.28										
83 8.78	0.15 0.15	8.67 8.93	8.38 8.64										
84 8.29 85 8.45	0.15 0.15 0.15 0.15	8.44 8.60	8.15 8.31										
86 8.58	0.15 0.15 0.15 0.15 0.15		8.44										
87 8.60 89 8.60	0.15 0.15 0.15 0.15 0.15 0.15 0.15	8.73	8.81 8.81										
90 8.60	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	8.73 9.10	8.81										
	0.15 0.15 0.15 0.15 0.15 0.15 0.15	8.73											

- 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.

	ADD	ED MFL IN NZVD 2016		ML	05/2025	
1	STA	GE 3 MFL REMOVED		ML	05/2025	
3	STA	GE 2 MFL UPDATE		ML	04/2025	
	LOT	FGL UPDATE		ML	02/2025	
lev	Desc	ription		Ву	Date	
		Ву				
urve	у	-		-		
esigr	n	ML		11/2024		
rawn	1	ML	11/20	24		
hock	od	ID	11/20	24		



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	D FLO	W PATH AS-	BUILT.
Drawing no.	C480	Rev	1	

## APPENDIX B – OVERLAND FLOWPATH TP108 CALCULATIONS

MAEN	MAVEN ASSO	CIATES		Number 4006	Sheet 1	Rev A
Job Title Calc Title	Clevedon N TP108 Cal EX Catch	culation	_	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	nber (CN) and initial A	bstraction (la)				
Soil name and classification		(cover type, treat ologic condition) sed Lots (70/30)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C C	Pro	Proposed Lots (70/30)  Proposed Roads  Existing Lots  Existing Roads				0.00 0.00 0.00
* from Appendix B				Totals =	1.240	112.59
CN (weighted) =	total product = total area	<u>112.59</u> 1.240	-	90.8	-	
la (average) = 2. Time of Concentr	5 x pervious area = total area	5 x	0.3720 1.240	<u>)</u> 1.5	mm	
Channelisation factor	C =	0.6	.(From Table	e 4.2)		
Catchment length	L =	0.195	km (along c	Irainage path	)	
Catchment Slope	Sc=	0.182	m/m (by eq	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	90.8	•	0.83	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	200-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0	.14 0.6	0.34 1.11	1.67	<b>'</b> =	0.05	hrs
SCS Lag for HEC-HN	1S t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

M A E N	MAVEN .	ASSOCIA:	res	Job Numl 194006		Sheet 2	Rev A
Job Title Calc Title	TP10	edon Meadows 08 Calculation Catchment A		Author ML		Date 15/11/2024	Checked JD
1. Data Catchment /	Area	A=	0.0124	km2( 100ha =1km	2)		
Runoff curve	e number	CN=	90.8	(from worksheet 1	)		
Initial abstra	Initial abstraction la=		1.5	mm (from worksho	eet 1)		
Time of con	centration	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate st	orage, S =(1000/C <b>i</b>	N - 10)25.4		=	25	5.7 mm	
3. Average red	urrence interval, Al	રા		100	(yr)		
4. 24 hour rain	fall depth, P24			280.32	(mm)		
5. Compute c*	= P24 - 2la/P24 - 2	la+2S		0.84			
6. Specific pea	k flow rate q*			0.162			
7. Peak flow ra	ite, q <sub>p</sub> =q*A*P <sub>24</sub>			0.563	m3/s	0.268 (GIS)	

Worksheet 2: Graphical Peak Flow Rate

255.3

3165.21 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

M A E N	ASSO	CIATES		Number 94006	Sheet 3	Rev A
Job Title Calc Title	Clevedon M TP108 Cal EX Catch	culation		uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial A	ostraction (la)				
Soil name and classification	Cover description hydro	(cover type, tre		Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propo	sed Lots (70/30	)	90.8	1.40	127.12
С	_	posed Roads		94.4	0.00	0.00
С		xisting Lots		90.8	0.00	
С	Ex	isting Roads		94.4	0.00	0.00
				<del> </del>		
* from Appendix B				Totals =	1.400	127.12
CN (weighted) =  la (average) =  2. Time of Concentrat	total product = total area  5 x pervious area = total area ion	127.1 1.40 5		90.8 0 1.5	mm	
Channelisation factor	C =	0	. <u>6</u> (From Tabl	le 4.2)		
Catchment length	L =	0.17	<u>′4 </u> km (along d	drainage path)	)	
Catchment Slope	Sc=	0.1	12 m/m (by eq	qual area meth	ıod)	
Runoff factor,	CN = 200 - CN	90 200- 90	<u>.8</u> = <u>.8</u>	0.83	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	4 0.6	0.32 1.1	11 1.89	9 =	0.06	hrs
SCS Lag for HEC-HMS	5 t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	0.04	hrs
					NO GOOD	

MAEN	MAVEN	ASSOCIA	TES	ES Job Number 194006		Sheet 4	Rev A
Job Title Calc Title				Author ML		Date 15/11/2024	Checked JD
Data     Catchment A	rea	A=	0.014	km2( 100ha =1km2	2)		
Runoff curve	number	CN=	90.8	(from worksheet 1)	)		
Initial abstrac	etion	la=	1.5	mm (from workshe	et 1)		
Time of cond	entration	tc=	#REF!	hrs (from workshee	et 1)		
Calculate sto	rage, S =(1000/C	N - 10)25.4		=	25.7	mm	
3. Average recu	ırrence interval, A	ARI		100	(yr)		
4. 24 hour rainf	all depth, P24			280.32	(mm)		
5. Compute c*	= P24 - 2la/P24 -	2la+2S		0.84			
6. Specific peal	flow rate q*			0.162			
7. Peak flow rat	e, q <sub>p</sub> =q*A*P <sub>24</sub>			0.636	m3/s	0.268 (GIS)	
8. Runoff depth	, Q <sub>24</sub> = (P <sub>24</sub> -la) <sup>2</sup> /(l	P <sub>24</sub> -la)+S		255.3			

Worksheet 2: Graphical Peak Flow Rate

3573.63 (m3)

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

MAVEN	MAVEN ASS	OCIATES		lumber 4006	Sheet 5	Rev A
Job Title Calc Title	TP108 (	n Meadows Calculation chment C		thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	mber (CN) and initial	Abstraction (Ia)				
Soil name and classification		ion (cover type, treat drologic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Pro	posed Lots (70/30)		90.8	2.25	204.30
C		Pervious Area		74	0.33	
C C		Existing Lots		90.8 94.4	0.00	0.00
		Existing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	2.581	228.79
la (average) = 2. Time of Concentr	total area <u>5 x pervious area</u> total area  ration			1.9	mm	
Channelisation factor	c C	= 0.6	(From Table	e 4.2)		
Catchment length	L:	= 0.185	km (along d	lrainage path	)	
Catchment Slope	So	= <u>0.19</u>	m/m (by equ	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	88.6 200- 88.6	-	0.80	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0	0.14 0.6	0.33 1.13	1.65	=	0.05	hrs
SCS Lag for HEC-HN	MS t <sub>p</sub>	= 2/3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	hrs

MAEN	MAVEN ASSOCIA		TES	Job Number 194006		Sheet 6	Rev A
Job Title Calc Title	Clevedon Meadows Author TP108 Calculation ML EX Catchment C				Date 15/11/2024	Checked JD	
1. Data Catchment <i>I</i>	Area	A=	0.02581	km2( 100ha =1km2)			
Runoff curve	number	CN=	88.6	(from worksheet 1)			
Initial abstra	Initial abstraction la=			mm (from worksheet 1	)		
Time of cond	centration	tc=	#REF!	hrs (from worksheet 1)	)		
2. Calculate sto	orage, S =(1000/CN	- 10)25.4		=	32.5	mm	
3. Average rec	urrence interval, AR	1		100 (yr)			
4. 24 hour rain	fall depth, P24			280.32 (mm	n)		
5. Compute c*	= P24 - 2Ia/P24 - 2I	a+2S		0.81			
6. Specific pea	k flow rate q*			0.160			
7. Peak flow ra	te, q <sub>p</sub> =q*A*P <sub>24</sub>			<b>1.158</b> m3/	's	0.268 (GIS)	

Worksheet 2: Graphical Peak Flow Rate

249.2

6432.91 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

MAVEN	MAVEN ASS	OCIATES		Number 4006	Sheet 7	Rev A
Job Title Calc Title	TP108 C	n Meadows Calculation chment D		ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	mber (CN) and initial	Abstraction (la)				
Soil name and classification	hyd	on (cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C C	Pro	posed Lots (70/30) Pervious Area		90.8	0.16 2.54	
C		Existing Lots		90.8	0.00	
C		Existing Roads		94.4	0.00	
* from Appendix B				Totals =	2.693	201.90
la (average) = 2. Time of Concent	5 x pervious area total area ration		2.5838 2.693	<u>3</u> 4.8	mm	
Channelisation facto	r C	0.6	(From Table	e 4.2)		
Catchment length	L=	0.197	km (along c	Irainage path	)	
Catchment Slope	Sc	0.098	m/m (by eq	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	75.0 200- 75.0	-	0.60	-	
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	0.34 1.32	2.01	=	0.08	hrs
SCS Lag for HEC-HI	MS t <sub>p</sub> :	= 2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

MAEN	MAVEN ASSOCIATES		Job Number 194006		Sheet 8	Rev A	
Job Title Calc Title					Date 15/11/2024	Checked JD	
Data     Catchment Ar	rea	A=	0.02693	km2( 100ha =1km2)			
Runoff curve	number	CN=	75.0	(from worksheet 1)			
Initial abstrac	tion	la=	4.8	mm (from worksheet 1)			
Time of conce	entration	tc=	0.17	hrs (from worksheet 1)			
Calculate stor	rage, S =(1000/0	CN - 10)25.4		=	84.8 ı	mm	
3. Average recu	rrence interval,	ARI		100 (yr)			
4. 24 hour rainfa	ıll depth, P24			280.32 (mm)	)		
5. Compute c* =	P24 - 2la/P24 -	- 2la+2S		0.61			
6. Specific peak	flow rate q*			0.141			
7. Peak flow rate	e, q <sub>p</sub> =q*A*P <sub>24</sub>			<b>1.067</b> m3/s	s (	0.268 (GIS)	

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$  5673.80 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

Worksheet 2: Graphical Peak Flow Rate

210.7

MAEN	MAVEN	ASSO	CIATE	s		lumber 4006	Sheet 9	Rev A
Job Title Calc Title		Clevedon M TP108 Calc EX Catchr	culation			thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) a	nd initial Ab	straction (	la)				
Soil name and classification	Cover	<sup>-</sup> description hydrol	(cover type,		nent, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С			sed Lots (70			90.8	0.00	0.00
C			ervious Area	1		74	1.78	
C	-+		xisting Lots isting Roads			90.8 94.4	0.00	
		LAI	Stilly Roads	5		34.4	0.00	0.00
* from Appendix B						Totals =	1.777	131.50
CN (weighted) =	total pro total are			31.50 = 1.777	=	74.0		
la (average) =	total are	ious area =	_	5 x 1.	0.0000 777	0.0	mm	
2. Time of Concent		2		3.0 (	=			
Channelisation factor	or	C =		0.6 (	From Table	e 4.2)		
Catchment length		L =		0.219 k	km (along d	rainage path	)	
Catchment Slope		Sc=	(	0.098 r	m/m (by equ	ual area meth	iod)	
Runoff factor,	CN 200 -		200-	74.0 74.0	=	0.59		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN	I/200-CN) <sup>-0.55</sup>	Sc <sup>-0.30</sup>						
=	0.14	0.6	0.37	1.34	2.01	=	0.08	hrs
SCS Lag for HEC-H	IMS	t <sub>p</sub> = 2	/3 t <sub>c</sub>			=	0.06 NO GOOD use 0.17	hrs

MA EN	VEN ASSOCIA	TES	Job Number 194006	Sheet 10	Rev A
Job Title Calc Title				Date 15/11/2024	Checked JD
1. Data Catchment Area	A=	0.01777	km2( 100ha =1km2)		
Runoff curve number	CN=	74.0	(from worksheet 1)		
Initial abstraction	Initial abstraction la=		mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2. Calculate storage, S =	=(1000/CN - 10)25.4		=	89.2 mm	
3. Average recurrence in	nterval, ARI		100 (yr)		
4. 24 hour rainfall depth	, P24		280.32 (mm)		
5. Compute c* = P24 - 2	la/P24 - 2la+2S		0.61		
6. Specific peak flow rate	e q*		0.141		
7. Peak flow rate, q <sub>p</sub> =q*/	A*P <sub>24</sub>		<b>0.701</b> m3/s	0.268 (GIS)	

Worksheet 2: Graphical Peak Flow Rate

212.6

3778.39 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

MAEN	MAVEN ASSC	CIATES		Number 4006	Sheet 11	Rev A
Job Title Calc Title	Clevedon I TP108 Cal EX Catch	culation		ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	mber (CN) and initial A	bstraction (la)				
Soil name and classification	hydro	n (cover type, treat plogic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		sed Lots (70/30)		90.8	1.08	
C C		ervious Area		74 90.8	0.00	
C		Existing Lots kisting Roads		90.8	0.00	
* from Appendix B				Totals =	1.076	97.72
CN (weighted) =  la (average) =  2. Time of Concentr	total product = total area  5 x pervious area = total area ation		_	90.8	mm	
Channelisation factor	C =	0.6	_(From Table	e 4.2)		
Catchment length	L =	0.241	km (along d	Irainage path	)	
Catchment Slope	Sc=	0.63	_m/m (by eq	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	90.8 200- 90.8	_	0.83	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	200-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-HM	<b>d</b> S t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

Σ	MAVEN ASSOCIATES  ob Title clevedon Meadows TP108 Calculation EX Catchment F		ATES	Job Number 194006		Sheet 12	Rev A
				Author ML		Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.010762	km2( 100ha =1km2)			
	Runoff curve number	CN=	90.8	(from worksheet 1)			
	Initial abstraction	la=	1.5	mm (from worksheet 1	)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)			
2.	Calculate storage, S =(1000/0	CN - 10)25.4		=	25.7	mm	
3.	Average recurrence interval,	ARI		100 (yr)			
4.	24 hour rainfall depth, P24			280.32 (mm	)		
5.	Compute c* = P24 - 2Ia/P24 -	· 2la+2S		0.84			
6.	Specific peak flow rate q*			0.162			

**0.489** m3/s

255.3

0.268 (GIS)

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

Worksheet 2: Graphical Peak Flow Rate

M A E N	MAVEN ASS	SOCIATES		Number 4006	Sheet 1	Rev 1
Job Title Calc Title	TP108	on Meadows Calculation tchment 1	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) and initia	l Abstraction (la)				
Soil name and classification	hy	tion (cover type, treat drologic condition) oposed Lots (70/30)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		Proposed Roads		94.4	0.00	0.00
C		Existing Lots Existing Roads		90.8	0.00	
* from Appendix B				Totals =	0.220	19.99
CN (weighted) =	total product = total area		_	90.8	-	
la (average) = 2. Time of Concent	5 x pervious area		0.0660 0.220	<u>)</u> 1.5	mm	
Channelisation facto	or C	= 0.6	(From Table	e 4.2)		
Catchment length	L	= 0.1	km (along o	Irainage path	)	
Catchment Slope	S	c= <u>0.21</u>	_m/m (by eq	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	90.8 200- 90.8	-	0.83	-	
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	0.22 1.11	1.60	) =	0.03	hrs
SCS Lag for HEC-H	MS t <sub>p</sub>	= 2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

MAVEN ASSOCIATE				Job Number 194006		Sheet 2	Rev 1
		Clevedon Meadows TP108 Calculation PR Catchment 1		Author ML		Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.002201	km2( 100ha =1km	2)		
	Runoff curve number	CN=	90.8	(from worksheet 1)	)		
	Initial abstraction	la=	1.5	mm (from workshe	et 1)		
	Time of concentration	tc=	0.17	hrs (from workshee	et 1)		
2.	Calculate storage, S =(100	0/CN - 10)25.4		=	25.7	mm	
	Average recurrence interval  24 hour rainfall depth, P24	al, ARI		100			

0.84

0.162

257.2

566.20 (m3)

**0.101** m3/s

0.268 (GIS)

5. Compute c\* = P24 - 2la/P24 - 2la+2S

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

6. Specific peak flow rate q\*

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub>

M A E N	AVEN ASSOCIATES		umber 1006	Sheet 3	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 2	-	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Number	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, treat hydrologic condition)	ment, 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	Existing Lots		74	1.78	
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	6.667	583.02
CN (weighted) =	total product = 583.02 total area 6.667	-	87.4		
la (average) =		2.9320 6.667	2.2	mm	
2. Time of Concentration		5.007			
Channelisation factor	C = 0.6	(From Table	e 4.2)		
Catchment length	L = <u>0.712</u>	km (along d	rainage path	)	
Catchment Slope	Sc= <u>0.076</u>	m/m (by equ	ual area meth	nod)	
Runoff factor,	CN     =     87.4       200 - CN     200-     87.4	.=	0.78	-	
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 0.80 1.15	2.17	=	0.17	hrs
SCS Lag for HEC-HMS.	$t_p = 2/3 t_c$		=	0.11 NO GOOD	hrs
				use 0.17	hrs
	Worksheet 1: Runoff Parameters a	and Time of	Concentrati	on	

M	MAVEN ASSOCIA		ATES	ES Job Number 194006		Sheet 4	Rev 1
	b Title Ic Title	Clevedon Meadows TP108 Calculation PR Catchment 2		Author ML		Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.066672	km2( 100ha =1km2)			
	Runoff curve number	CN=	87.4	(from worksheet 1)			
	Initial abstraction	la=	2.2	mm (from worksheet 1)			
	Time of concentration	tc=	0.17	hrs (from worksheet 1)			
2.	Calculate storage, S =(1	000/CN - 10)25.4		=	36.5 m	m	
3.	Average recurrence inte	rval, ARI		100 (yr)			
4.	24 hour rainfall depth, P	24		280.32 (mm)	)		
5.	Compute c* = P24 - 2la	P24 - 2la+2S		0.79			

M A E N	AVEN ASSOCIATES		umber 1006	Sheet 5	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 3	-	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Number	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, treat hydrologic condition)	ment, 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	
С	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	4.400	355.84
CN (weighted) =	total product = 355.84 total area 4.400	-	80.9	-	
la (average) =	· · · · · · · · · · · · · · · · · · ·	3.1400 4.400	3.6	mm	
2. Time of Concentration		+.400			
Channelisation factor	C = 0.6	.(From Table	e 4.2)		
Catchment length	L = <u>0.52</u>	km (along d	rainage path	)	
Catchment Slope	Sc= <u>0.083</u>	m/m (by equ	ıal area meth	nod)	
Runoff factor,	CN     =     80.9       200 - CN     200-     80.9	-	0.68		
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 0.65 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 a	and Time of	Concentrati	on	

М	MAVEN ASSOCIATED THE Clevedon Meado TP108 Calculation PR Catchment		res	Job Number 194006	Sheet 6	Rev 1
					Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.044	km2( 100ha =1km2)		
	Runoff curve number	CN=	80.9	(from worksheet 1)		
	Initial abstraction	la=	3.6	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000	/CN - 10)25.4		= 60	1 mm	
3.	Average recurrence interval	, ARI		100 (yr)		
4.	24 hour rainfall depth, P24			280.32 (mm)		
5.	Compute c* = P24 - 2Ia/P24	- 2la+2S		0.69		
6.	Specific peak flow rate q*			0.150		
7.	Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>			<b>1.856</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24}-la)^2$	<sup>2</sup> /(P <sub>24</sub> -la)+S		227.4		
9.	Runoff volume, $V_{24} = 1000x$	Q <sub>24</sub> A		10005.27 (m3)		

MAEN	MAVEN	ASSO	CIAT:	ES		lumber 4006	Sheet 7	Rev 1
Job Title Calc Title				tion ML			Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) an	d initial Ab	straction	ı (la)				
Soil name and classification	Cover	description hydrol	(cover typ		ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С			sed Lots (			90.8	0.00	0.00
С			posed Roa			94.4	0.00	
С			isiting Lot			74	2.69	
С		Exi	sting Roa	ds		94.4	0.00	0.00
* from Appendix B						Totals =	2.690	199.06
la (average) =  2. Time of Concent	total area	ous area =	_	2.690 5 x	2.6900 2.690	5.0	mm	
Channelisation facto	or	C =	_	0.6	(From Table	e 4.2)		
Catchment length		L =	_	0.2	km (along d	lrainage path	)	
Catchment Slope		Sc=	_	0.083	m/m (by eq	ual area meth	nod)	
Runoff factor,	200 - C		200-	74.0 74.0	=	0.59		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN	/200-CN) <sup>-0.55</sup> S	8c <sup>-0.30</sup>						
=	0.14	0.6	0.35	1.34	2.11	=	0.08	hrs
SCS Lag for HEC-H	MS	$t_p = 2$	/3 t <sub>c</sub>			=	0.06 NO GOOD use 0.17	hrs

MAEN	IAVEN	ASSOCIA	TES	Job Numl 194006			Sheet 8	Rev 1
Job Title Calc Title	TP	vedon Meadows 108 Calculation Catchment 3A		Author ML			Date 15/11/2024	Checked JD
Data     Catchment Area		A=	0.0269	km2( 100ha =1km	12)			
Runoff curve num	ber	CN=	74.0	(from worksheet 1	)			
Initial abstraction		la=	5.0	mm (from worksho	eet 1)			
Time of concentra	tion	tc=	0.17	hrs (from workshe	et 1)			
2. Calculate storage	S =(1000/0	CN - 10)25.4		=	;	89.2 r	nm	
3. Average recurren	ce interval, <i>i</i>	ARI		100	(yr)			
4. 24 hour rainfall de	pth, P24			280.32	(mm)			
5. Compute c* = P24	l - 2Ia/P24 -	2la+2S		0.60				
6. Specific peak flow	rate q*			0.140				
7. Peak flow rate, q <sub>p</sub>	=q*A*P <sub>24</sub>			1.053	m3/s	C	).268 (GIS)	

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  5593.13 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

MAEN	MAVEN ASSO	CIATES		Number 4006	Sheet 9	Rev 1
Job Title Calc Title		Meadows alculation nment 3B	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	mber (CN) and initial A	Abstraction (la)				
Soil name and classification		on (cover type, treat	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		osed Lots (70/30)		90.8	0.59	53.57
С		roposed Roads		94.4	0.00	
С		Exisiting Lots		74	2.69	
С		Existing Roads		94.4	0.00	0.00
				+		
* from Appendix B				Totals =	3.280	252.63
la (average) = 2. Time of Concentr	total area <u>5 x pervious area</u> =  total area  ration			<u>)</u> 4.4	mm	
Channelisation factor	r C=	0.6	_(From Table	e 4.2)		
Catchment length	L =	0.29	_km (along d	lrainage path	)	
Catchment Slope	Sc=	. 0.08	_m/m (by eq	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	77.0 200- 77.0	_	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	0.14 0.6	0.44 1.29	2.13	3 =	0.10	hrs
SCS Lag for HEC-HN	MS t <sub>p</sub> =	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

MAEN	MAVEN	ASSOCIA	TES	Job Numb 194006		Sheet 10	Rev 1
lob Title Calc Title	TP	vedon Meadows 108 Calculation Catchment S3B		Author ML		Date 15/11/2024	Checked JD
I. Data Catchment <i>I</i>	Area	A=	0.0328	km2( 100ha =1km	12)		
Runoff curve	e number	CN=	77.0	(from worksheet 1	)		
Initial abstra	ction	la=	4.4	mm (from worksho	eet 1)		
Time of con-	centration	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate st	orage, S =(1000/0	CN - 10)25.4		=	7	5.8 mm	
3. Average rec	urrence interval,	ARI		100	(yr)		
1. 24 hour rain	fall depth, P24			280.32	(mm)		
5. Compute c*	= P24 - 2la/P24 -	· 2la+2S		0.64			
S. Specific pea	k flow rate q*			0.145			
7. Peak flow ra	te, q <sub>p</sub> =q*A*P <sub>24</sub>			1.330	m3/s	0.268 (GIS)	

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

1.330 m3/s 0.268 (GIS)

216.5

7101.16 (m3)

MAVEN	MAVEN	ASSO	CIATE	s		lumber 4006	Sheet 11	Rev 1
Job Title Calc Title				ulation			Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) a	nd initial Ab	straction (I	a)				
Soil name and classification	Cover		ogic condition	on)	nent, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C			sed Lots (70/			90.8	2.47	224.37
C C			oosed Roads	S		94.4	1.62	
C			siting Lots sting Roads			74 94.4	1.78 0.00	131.50 0.00
<u> </u>		LXI	Stilly Moaus			34.4	0.00	0.00
* from Appendix B	•					Totals =	5.870	508.97
CN (weighted) =  la (average) =  2. Time of Concent	total are	a ious area =		5 x 5 870	= <u>2.7616</u> 870	2.4	mm	
Channelisation facto	or	C =		0.6	(From Table	e 4.2)		
Catchment length		L =	0	.464	km (along d	rainage path)	)	
Catchment Slope		Sc=	0.0	0836	m/m (by equ	ual area meth	nod)	
Runoff factor,	CN 200 -			86.7 86.7	=	0.77		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN	1/200-CN) <sup>-0.55</sup>	Sc <sup>-0.30</sup>						
=	0.14	0.6	0.60	1.16	2.11	=	0.12	hrs
SCS Lag for HEC-H	MS	t <sub>p</sub> = 2.	/3 t <sub>c</sub>			=	0.08 NO GOOD use 0.17	hrs

MAVEN ASSOCIA			TES	Job Number 194006		Sheet 12	Rev 1
Job Title Calc Title	Ţ	levedon Meadows P108 Calculation PR Catchment 4		Author ML		Date 15/11/2024	Checked JD
Data     Catchment	Area	A=	0.058699	km2( 100ha =1km	n2)		
Runoff curv	e number	CN=	86.7	(from worksheet 1	)		
Initial abstr	action	la=	2.4	mm (from worksho	eet 1)		
Time of co	ncentration	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate s	torage, S =(1000	/CN - 10)25.4		=	38.9	mm	
3. Average re	currence interval	, ARI		100	(yr)		
4. 24 hour rai	nfall depth, P24			280.32	(mm)		

6. Specific peak flow rate q\*7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

5. Compute c\* = P24 - 2la/P24 - 2la+2S

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

0.158

2.600 m3/s 0.268 (GIS)

243.8

14311.80 (m3)

0.78

MAEN	MAVEN A	ASSOCI	ATES		Number 4006	Sheet 13	Rev 1
Job Title Calc Title		on Meadows At Calculation atchment 5			Date 15/11/2024	Checked JD	
1. Runoff Curve Nu	mber (CN) and	initial Abstr	action (Ia)				
Soil name and classification  C  C	Cover des	hydrologi Proposed	ver type, treac condition) Lots (70/30) ed Roads		Curve Number CN* 90.8 94.4	Area (ha) 10000m2=1h a 2.40	CN x area 217.70
C C			ng Lots g Roads		74 94.4	1.78 0.00	
* from Appendix B					Totals =	5.680	491.27
CN (weighted) =	total produc	<u>t =</u>	491.27 5.680	_	86.5	-	
la (average) = 2. Time of Concent	5 x pervious total area ration	s area =	5	x 2.7220 5.680	<u>)</u> 2.4	mm	
Channelisation facto	r	C =	0.6	6 (From Tabl	e 4.2)		
Catchment length		L =	0.436	6 km (along o	drainage path	)	
Catchment Slope		Sc=	0.038	3 m/m (by eq	ual area metl	nod)	
Runoff factor,	CN 200 - CN	=	86.5 200- 86.5	_	0.76	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/s)}$	(200-CN) <sup>-0.55</sup> Sc <sup>-0</sup>	0.30					
= (	).14 (	0.6	0.58 1.16	5 2.67	<b>?</b> =	0.15	hrs
SCS Lag for HEC-HI	MS	$t_{p} = 2/3 t_{o}$	3		=	NO GOOD use 0.17	hrs

MALEN	MAVEN AS		TES	Job Number 194006		Sheet 14	
Job Title Calc Title	TP	vedon Meadows 108 Calculation R Catchment 5		Author ML	Da 15/11/		Checked JD
Data     Catchment A	ırea	A=	0.056796	km2( 100ha =1km2)			
Runoff curve	number	CN=	86.5	(from worksheet 1)			
Initial abstrac	ction	la=	2.4	mm (from worksheet 1)	)		
Time of cond	entration	tc=	0.17	hrs (from worksheet 1)			
2. Calculate sto	orage, S =(1000/0	CN - 10)25.4		=	39.6 mm		

100 (yr) 3. Average recurrence interval, ARI 280.32 (mm) 4. 24 hour rainfall depth, P24 5. Compute c\* = P24 - 2la/P24 - 2la+2S 0.78

6. Specific peak flow rate q\* 0.158

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> **2.512** m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 243.2

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 13814.17 (m3)

MAVEN	MAVEN	ASSO	CIAT	ES		lumber 4006	Sheet 15	Rev 1
Job Title Calc Title		Clevedon M TP108 Cald PR Catchi	culation			ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) aı	nd initial Ab	ostraction	ı (la)				
Soil name and classification	Cover		logic cond	lition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C C		Proposed Lots (70/30) Proposed Roads				90.8	0.47 0.10	42.95 9.22
C			isiting Lot			74	0.00	
С			isting Roa			94.4	0.00	
* from Appendix B	•					Totals =	0.571	52.17
CN (weighted) =  la (average) =  2. Time of Concent	total area	ous area =	-	52.17 0.571 5 x		91.4	mm	
Channelisation facto		C =		0.6	(From Table	e 4.2)		
Catchment length		L =	_	0.054	km (along c	Irainage path	)	
Catchment Slope		Sc=	_	0.01	m/m (by eq	ual area meth	nod)	
Runoff factor,	200 -		200-	91.4 91.4	=	0.84	-	
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	0.15	1.10	3.98	s =	0.05	hrs
SCS Lag for HEC-H	MS	t <sub>p</sub> = 2	/3 t <sub>c</sub>			=	NO GOOD use 0.17	hrs

MAVEN	MAVEN ASSOCIATES		Job Number 194006	Sheet 16	Rev 1
ob Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 6		Author ML	Date 15/11/2024	Checked JD
. Data Catchment Area	A=	0.005707	km2( 100ha =1km2)		
Runoff curve number	CN=	91.4	(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 =(1	000/CN - 10)25.4		=	23.8 mm	

3. Average recurrence interval, ARI  $\frac{100}{4} \text{ (yr)}$ 4. 24 hour rainfall depth, P24  $\frac{280.32}{5} \text{ (mm)}$ 5. Compute c\* = P24 - 2la/P24 - 2la+2S  $\frac{0.85}{5}$ 6. Specific peak flow rate q\*  $\frac{0.163}{5}$ 7. Peak flow rate,  $q_p = q^*A^*P_{24}$   $\frac{0.260}{5}$  m3/s 0.268 (GIS)
8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  257.0

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

Worksheet 2: Graphical Peak Flow Rate

1466.57 (m3)

MAEN	MAVEN	ASSO	CIATE	ES		lumber 4006	Sheet 17	Rev 1
Job Title Calc Title		Clevedon M TP108 Calc PR Catchr	culation			thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve N	umber (CN) a	and initial At	ostraction /	(la)				_
Soil name and classification		Propos	logic condit sed Lots (70	tion) (0/30)	nent, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area 174.60
C C		Ex	posed Road xisiting Lots xisting Road	3		94.4 74 94.4	1.29 1.78 0.00	131.50
* from Appendix B						Totals =	4.993	428.12
CN (weighted) =	total pro			<del>128.12</del> = 4.993	=	85.8	-	
la (average) =  2. Time of Concen	total are	<u>vious area</u> = ea	_	5 x 4.	2.5478 993	2.6	mm	
Channelisation factor	or	C =	_	0.6 (	From Table	e 4.2)		
Catchment length		L =	_	0.39 k	دm (along d	Irainage path	)	
Catchment Slope		Sc=	_	<u>0.1</u> r	n/m (by eq	ual area meth	nod)	
Runoff factor,	200 -		200-	85.8 85.8	=	0.75	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN)}$	N/200-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-H	łMS	t <sub>p</sub> = 2.	/3 t <sub>c</sub>			=	NO GOOD use 0.17	hrs

Λ	MAVEN A	SSOCTA	пъс	Job Number	Shee	et	Rev
МА	E N	SSOCIA	.TES	194006	18		1
Job Tit Calc Ti	tle TP108	on Meadows Calculation atchment 7		Author ML	Date 15/11/2	1	Checked JD
1. Dat Cat	ta tchment Area	A=	0.049925	km2( 100ha =1km2)			
Rur	noff curve number	CN=	85.8	(from worksheet 1)			
Initi	ial abstraction	la=	2.6	mm (from worksheet 1)			
Tim	ne of concentration	tc=	0.17	hrs (from worksheet 1)			
2. Cal	culate storage, S =(1000/CN	- 10)25.4		=	42.2 mm		

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

Worksheet 2: Graphical Peak Flow Rate

12038.56 (m3)

MAEN	MAVEN ASSO	OCIATES		Number 4006	Sheet 19	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catc	lculation		ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	mber (CN) and initial A	Abstraction (la)				
Soil name and classification  C  C	hydr Prop	n (cover type, treat cologic condition) osed Lots (70/30) coposed Roads	iment, and	Curve Number CN* 90.8 94.4	Area (ha) 10000m2=1h a 0.65	CN x area 58.86
C C	E	Exisiting Lots Existing Roads		74 94.4	0.00	0.00
* from Appendix B				Totals =	0.755	68.89
CN (weighted) =	total product = total area	68.89 0.755	_	91.3	-	
la (average) = 2. Time of Concenti	5 x pervious area = total area ration		0.2104 0.755	<u>l</u> 1.4	mm	
Channelisation factor	r C=	0.6	(From Table	e 4.2)		
Catchment length	L=	0.65	km (along o	drainage path	)	
Catchment Slope	Sc=	0.1	m/m (by eq	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-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0	0.14 0.6	0.75 1.10	2.00	) =	0.14	hrs
SCS Lag for HEC-HN	MS $t_p =$	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

MAV MAV	AVEN ASSOCIATES		Job Number 194006	Sheet 20	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 8		Author ML	Date 15/11/2024	Checked JD
Data     Catchment Area	A=	0.007545	km2( 100ha =1km2)		
Runoff curve number	CN=	91.3	(from worksheet 1)		
Initial abstraction	la=	1.4	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

24.2 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

2. Calculate storage, S =(1000/CN - 10)25.4

6. Specific peak flow rate q\* 0.162

7. Peak flow rate,  $q_p = q^*A^*P_{24}$  0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  256.7

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 1936.60 (m3)

MAEN	MAVEN	ASSO	CIAT	ES		lumber 4006	Sheet 21	Rev 1
Job Title Calc Title		Clevedon M TP108 Cald PR Catchi	culation			thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nւ	ımber (CN) a	nd initial Ab	straction	ı (la)				
Soil name and classification	Cover		logic cond	ition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C C		Proposed Lots (70/30) Proposed Roads				90.8	1.27 1.29	115.74 122.02
C			isiting Lot			74	1.17	
С			isting Roa			94.4	0.00	0.00
* from Appendix B						Totals =	3.737	324.34
CN (weighted) =	total pro total are		<u></u>	324.34 3.737	=	86.8	-	
la (average) =  2. Time of Concent	total are	i <u>ous area</u> = a	_	5 x	1.7463 5.737	2.3	mm	
Channelisation factor		C =		0.6	(From Table	2.4.2)		
	ונ	C =	_					
Catchment length		L =	_	0.309	km (along d	lrainage path	)	
Catchment Slope		Sc=	_	0.08	m/m (by eq	ual area meth	nod)	
Runoff factor,	CN 200 -		200-	86.8	=	0.77	-	
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	0.46	1.16	2.13	=	0.10	hrs
SCS Lag for HEC-H	MS	t <sub>p</sub> = 2	/3 t <sub>c</sub>			=	0.06 NO GOOD use 0.17	hrs

MAVEN ASSOCIATES			Job Number 194006	Sheet 22		Rev 1	
Job Title Calc Title	TP108	on Meadows Calculation atchment 9		Author ML	Date 15/11/2		Checked JD
Data     Catchment A	rea	A= (	0.037373	km2( 100ha =1km2)			
Runoff curve	number	CN=	86.8	(from worksheet 1)			
Initial abstrac	tion	la=	2.3	mm (from worksheet 1)			
Time of conc	entration	tc=	0.17	hrs (from worksheet 1)			
2. Calculate sto	rage, S =(1000/CN -	10)25.4		= ;	38.7 mm		
Average recu	ırrence interval, ARI			100 (yr)			

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<sub>p</sub>=q\*A\*P<sub>24</sub>

(mm)

0.78

0.158

1.656

m3/s

0.268 (GIS)

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  9120.22 (m3)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 

Worksheet 2: Graphical Peak Flow Rate

244.0

MAEN	MAVEN ASSO	CIATES		lumber 4006	Sheet 23	Rev 1
Job Title Calc Title	Clevedon M TP108 Cal PR Catchi	culation	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial A	bstraction (la)				
Soil name and classification		ologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		sed Lots (70/30)		90.8	0.64	58.13
C C		pposed Roads xisiting Lots		94.4	0.12 0.00	
С		xisting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.756	69.02
CN (weighted) =  Ia (average) =	total product = total area  5 x pervious area = total area	69.02 0.756	-	91.3	mm	
2. Time of Concentra	tion					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.88	km (along d	Irainage path	)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	91.3 200- 91.3	-	0.84		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.	14 0.6	0.92 1.10	2.46	; =	0.21	hrs
SCS Lag for HEC-HM	S $t_p = 2$	2/3 t <sub>c</sub>		=	0.14	hrs
					OK use 0.20862886	hrs

MAV M A E N	EN ASSOCIA	Job Number 194006	Sheet 24	Rev 1	
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 10		Author ML	Date 15/11/2024	Checked JD
Data     Catchment Area	A=	0.007556	km2( 100ha =1km2)		
Runoff curve number	CN=	91.3	(from worksheet 1)		
Initial abstraction	la=	1.4	mm (from worksheet 1)		
Time of concentration	tc=	0.21	hrs (from worksheet 1)		

24.1 mm

3. Average recurrence interval, ARI 100 (yr)

2. Calculate storage, S =(1000/CN - 10)25.4

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

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 0.344 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  256.8

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  1940.32 (m3)

MAEN	MAVEN ASSO	CIATES		lumber 4006	Sheet 25	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catch	lculation	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	mber (CN) and initial A	Abstraction (la)				
Soil name and classification  C  C	hydr Propo	n (cover type, treat ologic condition) osed Lots (70/30)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a 0.63 0.72	CN x area 57.62
C C	E	oposed Roads Exisiting Lots xisting Roads		94.4 74 94.4	0.00 0.00	0.00
* from Appendix B				Totals =	1.355	125.62
CN (weighted) =	total product = total area	125.62 1.355	•	92.7	-	
la (average) = 2. Time of Concentr	5 x pervious area = total area ration		0.2984 1.355	1.1	mm	
Channelisation factor	. C =	0.6	.(From Table	e 4.2)		
Catchment length	L =	0.22	km (along c	Irainage path	)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area meth	nod)	
Runoff factor,	<u>CN =</u> 200 - CN	92.7 200- 92.7		0.86	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/s)}$	200-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-HN	<b>MS</b> t <sub>p</sub> =	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

M A E N	AVEN ASSOCIA	Job Number 194006	Sheet 26	Rev 1	
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 11		Author ML	Date 15/11/2024	Checked JD
Data     Catchment Area	A=	0.013549	km2( 100ha =1km2)		
Runoff curve numb	er CN=	92.7	(from worksheet 1)		
Initial abstraction	la=	1.1	mm (from worksheet 1)	)	
Time of concentrati	ion tc=	0.17	hrs (from worksheet 1)		
Calculate storage,	S =(1000/CN - 10)25.4		=	20.0 mm	

MAEN	MAVEN	ASSO	CIAT	ES		lumber 4006	Sheet 27	Rev 1
Job Title Calc Title		Clevedon M TP108 Calc PR Catchn	ulation		-	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	ımber (CN) ar	nd initial Ab	straction	n (la)				
Soil name and classification	Cover		logic cond	dition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С			sed Lots (			90.8	0.63	
С			posed Ro			94.4	0.05	
C			isiting Loti isting Roa			74 94.4	0.00	
		EAI	Stiriy Roa	ias		94.4	0.00	0.00
* from Appendix B						Totals =	0.687	62.60
CN (weighted) =	total prod total area		-	62.60 0.687		91.1		
la (average) =	total area	<u>ous area</u> = a	_	5 x	0.1983 ).687	<u>3</u> 1.4	mm	
2. Time of Concent	ration							
Channelisation factor	or	C =	-	0.6	(From Table	e 4.2)		
Catchment length		L =	_	0.085	km (along d	Irainage path	)	
Catchment Slope		Sc=	_	0.05	m/m (by eq	ual area meth	iod)	
Runoff factor,	200 - 0		200-	91.1 91.1	_=	0.84		
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	0.20	1.10	2.46	; =	0.04	hrs
SCS Lag for HEC-H	MS	$t_p = 2i$	/3 t <sub>c</sub>			=	0.03 NO GOOD use 0.17	hrs

M	MAVEN	ASSOCIA	TES	Job Number 194006		neet 28	Rev 1
Job Title Calc Title	TP	vedon Meadows 108 Calculation R Catchment 12		Author ML	_	ate 1/2024	Checked JD
Data     Catchment Area	1	A=	0.006873	km2( 100ha =1km2)			
Runoff curve nu	mber	CN=	91.1	(from worksheet 1)			
Initial abstractio	n	la=	1.4	mm (from worksheet 1)			
Time of concent	tration	tc=	0.17	hrs (from worksheet 1)			
Calculate storage	je, S =(1000/0	CN - 10)25.4		=	24.9 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\* 0.162

7. Peak flow rate,  $q_p = q^*A^*P_{24}$  0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  256.0

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 1759.69 (m3)

MAEN	MAVE	N ASSO	CIAT	ES		lumber 4006	Sheet 29	Rev 1
Job Title Calc Title		Clevedon M TP108 Calo PR Catchn	culation			ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	umber (CN)	and initial Al	bstractio	n (la)				
Soil name and classification	Cove	er description hydro	(cover typologic cond		ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С			sed Lots (			90.8	0.00	0.00
C			posed Ro			94.4	0.42	
C C			kisiting Lo isting Roa			74 94.4	0.00	0.00
<u> </u>		ĽΧ	isting NO	Juo		34.4	0.00	0.00
* from Appendix B						Totals =	0.416	39.24
CN (weighted) =	total pr total ar	roduct = rea	-	39.24 0.416	=	94.4	-	
la (average) =  2. Time of Concen	total ar	<u>vious area</u> = ea	-	5 x	0.0624 0.416	0.8	mm	
Channelisation factor		C =		0.6	(From Table	e 4.2)		
Catchment length		L =	-			Irainage path	)	
Catchment Slope		Sc=	_			ual area meth		
Runoff factor,		<u>CN = </u>	200-	94.4	=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN	I/200-CN) <sup>-0.5</sup>	<sup>5</sup> Sc <sup>-0.30</sup>						
=	0.14	0.6	0.27	1.06	2.46	; =	0.06	hrs
SCS Lag for HEC-H	IMS	t <sub>p</sub> = 2	2/3 t <sub>c</sub>			=	NO GOOD use 0.17	hrs

M A E N	MAVEN ASSOCIAT		TES	Job Number 194006		Sheet 30	Rev 1
Job Title Calc Title	1	levedon Meadows P108 Calculation PR Catchment 13		Author ML		Date 15/11/2024	Checked JD
Data     Catchment a	Area	A=	0.004157	km2( 100ha =1km	12)		
Runoff curve	e number	CN=	94.4	(from worksheet 1	)		
Initial abstra	ction	la=	0.8	mm (from worksho	eet 1)		
Time of con	centration	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate st	orage, S =(1000	)/CN - 10)25.4		=	15.1	mm	
3. Average red	urrence interva	I, ARI		100	(yr)		
4. 24 hour rain	fall depth, P24			280.32	(mm)		

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  1102.74 (m3)

MA E N	AVEN ASSOCIATES		umber 1006	Sheet 31	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 13A	-	thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Number	er (CN) and initial Abstraction (Ia)				
Soil name and classification	Cover description (cover type, treat hydrologic condition)	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 Roads		94.4	0.16	
C	Existing Lots		74	0.00	
	Existing Roads		94.4	0.00	0.00
* from Appendix B			Totals =	0.158	14.92
CN (weighted) =	total product = 14.92 total area 0.158	-	94.4		
la (average) =	5 x pervious area = 5 x total area	0.0237 0.158	0.8	mm	
2. Time of Concentration		J. 130			
Channelisation factor	C = 0.6	(From Table	4.2)		
Catchment length	L = <u>0.087</u>	km (along d	rainage path	)	
Catchment Slope	Sc= 0.05	m/m (by equ	ıal area meth	iod)	
Runoff factor,	CN     =     94.4       200 - CN     200-     94.4	.=	0.89		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/200	I-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.	$t_p = 2/3 t_c$		=	0.03	hrs
				NO GOOD use 0.17	hrs
	Worksheet 1: Runoff Parameters a	and Time of	Concentrati	on	

M A E N	MAVEN ASSOCIATES		Job Number 194006		Sheet 32		
Job Title Calc Title	TP10	don Meadows 8 Calculation atchment 13A		Author ML	15	Date 5/11/2024	Checked JD
Data     Catchment Are	ea	A=	0.001581	km2( 100ha =1km2)			
Runoff curve r	umber	CN=	94.4	(from worksheet 1)			
Initial abstracti	on	la=	0.8	mm (from worksheet 1)	1		
Time of conce	ntration	tc=	0.17	hrs (from worksheet 1)			
Calculate stora	age, S =(1000/CN	l - 10)25.4		=	15.1 mm	ı	
Average recur	rence interval, AF	RI		100 (yr)			

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia) + S$  265.3 9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  419.40 (m3)

M A E N	MAVEN	ASSO	CIATI	£S		Number 4006	Sheet 1	Rev 1
Job Title Calc Title		Clevedon M TP108 Calc PR Catchm	culation			uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve N	umber (CN) a	ınd initial Ak	straction	(la)	_	_		
Soil name and classification C			(cover type logic condi	ition)	nent, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C C		Prop Ex	posed Roa xisting Lots	ads s		94.4 90.8	3.00 0.00	283.28 0.00
С		Exi	isting Road	ds		94.4	0.00	0.00
* from Appendix B	<u> </u>					Totals =	9.621	884.35
CN (weighted) =	total pro total are		_{	884.35 = 9.621	=	91.9	-	
la (average) =  2. Time of Concen	total are	<u>vious area</u> = ea	_	5 x 9.	<u>2.4360</u> .621	<u>1</u> 1.3	s mm	
Channelisation fact	.or	C =	_	0.6	(From Table	e 4.2)		
Catchment length		L =	_	0.814	km (along d	drainage path	)	
Catchment Slope		Sc=	_	0.007	m/m (by eqi	ual area meth	nod)	
Runoff factor,	CN 200 -		200-	91.9 91.9	=	0.85	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN	N/200-CN) <sup>-0.55</sup>	Sc <sup>-0.30</sup>						
=	0.14	0.6	0.87	1.09	4.43	; =	0.36	hrs
SCS Lag for HEC-F	·lMS	$t_p = 2t$	/3 t <sub>c</sub>			=	OK use 0.35516677	-

MAEN	MAVEN	EN ASSOCIAT		Job Numbe 194006	er	Sheet 2	Rev 1
Job Title Calc Title	TP	vedon Meadows 108 Calculation R Catchment 14		Author ML		Date 15/11/2024	Checked JD
Data     Catchment Are	a	A=	0.096206	km2( 100ha =1km2	2)		
Runoff curve n	umber	CN=	91.9	(from worksheet 1)			
Initial abstraction	on	la=	1.3	mm (from workshe	et 1)		
Time of concer	ntration	tc=	0.36	hrs (from workshee	et 1)		
Calculate stora	ge, S =(1000/0	CN - 10)25.4		=	22.3	mm	
			1				

 3. Average recurrence interval, ARI
 100 (yr)

 4. 24 hour rainfall depth, P24
 282.32 (mm)

5. Compute c\* = P24 - 2la/P24 - 2la+2S 0.86

6. Specific peak flow rate q\* 0.131

7. Peak flow rate,  $q_p = q^*A^*P_{24}$  3.558 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  260.4

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$  25049.87 (m3)

MAEN	MAVEN AS	SOCIAT	ES		umber 1006	Sheet 3	Rev 1
Job Title Calc Title	TP108	Ion Meadows 3 Calculation atchment 15			thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Nun	nber (CN) and initi	al Abstraction	ı (la)				
Soil name and classification		otion (cover typ ydrologic cond		ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Pi	roposed Lots (			90.8	0.67	
C C		Proposed Ros Existing Lot			94.4 90.8	0.44	
C		Existing Roa			94.4	0.00	
* from Appendix B					Totals =	1.107	102.12
CN (weighted) =  Ia (average) =	total product = total area  5 x pervious are	- e <u>a</u> =	102.12 1.107	0.2663	92.2	- mm	
2. Time of Concentra	total area ation		1	.107			
Channelisation factor	•	C = _	0.6	(From Table	e 4.2)		
Catchment length	1	L= <u></u>	0.261	km (along c	Irainage patl	۱)	
Catchment Slope	;	Sc=	0.05	m/m (by eq	ual area met	:hod)	
Runoff factor,	200 - CN	200-	92.2	=	0.86	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	200-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-HM	<b>IS</b> 1	$r_p$ = 2/3 $t_c$			=	NO GOOD use 0.17	hrs

MAV E N	MAVEN ASSOCIA		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
Data     Catchment Area	A=	0.011073	km2( 100ha =1km2)		
Runoff curve number	CN=	92.2	(from worksheet 1)		
Initial abstraction	la=	1.2	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

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)

0.87

0.163

**0.510** m3/s

s/s 0.268 (GIS)

21.4 mm

261.2

2892.59 (m3)

MAEN	MAVEN ASS	OCIATES		lumber 4006	Sheet 5	Rev 1
Job Title Calc Title	TP108 C	n Meadows alculation hment 16	-	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	mber (CN) and initial	Abstraction (la)				
Soil name and classification	hyd	on (cover type, treat rologic condition) posed Lots (70/30)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a 5.97	Product of CN x area 541.63
C C		roposed Roads Existing Lots		94.4 90.8	2.55 0.00	240.55
С	E	Existing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	8.513	782.18
CN (weighted) =	total product = total area		-	91.9	-	
la (average) =  2. Time of Concentr	5 x pervious area total area ation		2.1718 3.513	1.3	mm	
Channelisation factor	C =	= 0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.814	km (along o	drainage path	n)	
Catchment Slope	Sc	0.0066	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN	91.9 200- 91.9	•	0.85		
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-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-HM	// t <sub>p</sub> =	= 2/3 t <sub>c</sub>		=	OK use 0.36134542	•

MA E N	VEN ASSOCIA	ATES	S Job Number 194006		Sheet 6	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 16		Author ML		Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.085133	km2( 100ha =1km2)			
Runoff curve number	CN=	91.9	(from worksheet 1)			
Initial abstraction	la=	1.3	mm (from workshee	t 1)		
Time of concentration	tc=	0.36	hrs (from worksheet	1)		
2. Calculate storage, S	=(1000/CN - 10)25.4		=	22.5 n	nm	
		I				

100 (yr)

Average recurrence interval, ARI

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\* 0.131

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 3.149 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  260.3

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 22155.94 (m3)

MAEN	MAVEN ASSO	CIATES		lumber 4006	Sheet 7	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catchi	lculation	Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Nun	nber (CN) and initial A	Abstraction (Ia)				
Soil name and classification	hydro	Cover description (cover type, treatment hydrologic condition) Proposed Lots (70/30) Proposed Roads			Area (ha) 10000m2=1h a 5.26	CN x area
C C C	E				2.43 0.00 0.00	0.00
* from Appendix B				Totals =	7.693	707.29
CN (weighted) =	total product = total area	707.29 7.693	-	91.9		
la (average) =  2. Time of Concentra	<u>5 x pervious area</u> = total area ation		1.9437 7.693	1.3	mm	
Channelisation factor	C =	0.6	.(From Tabl	e 4.2)		
Catchment length	L =	0.814	km (along o	drainage path	1)	
Catchment Slope	Sc=	0.0066	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN	91.9 200- 91.9	•	0.85	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	200-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-HN	1S t <sub>p</sub> =	2/3 t <sub>c</sub>		=	OK use 0.36110983	•

MAV.	EN ASSOCIATE	Job Number 194006	Sheet 8	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 16A	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0.0	76932 km2( 100ha =1km2)		
Runoff curve number	CN=	91.9 (from worksheet 1)		
Initial abstraction	la=	1.3 mm (from worksheet 1)		
Time of concentration	tc=	0.36 hrs (from worksheet 1)		

2. Calculate storage, S =(1000/CN - 10)25.4 = 22.3 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 0.86

6. Specific peak flow rate q\* 0.131

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 2.845 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$  260.4

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 20034.26 (m3)

M A E N	AVEN ASSOCIAT	ES		lumber 1006	Sheet 9	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 17		Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Number	er (CN) and initial Abstraction	n (la)				
Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)			Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Proposed Lots (			90.8	0.18	
С	Proposed Ro			94.4	0.72	
С	Existing Lo			90.8	0.00	
С	Existing Roa	ids		94.4	0.00	0.00
* from Appendix B				Totals =	0.901	84.39
CN (weighted) =	total product = total area	84.39 0.901	=	93.7		
la (average) =	5 x pervious area = total area	5 x	<u>0.1625</u> .901	0.9	mm	
2. Time of Concentration		·	.001			
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L = _	0.113	km (along c	Irainage path	n)	
Catchment Slope	Sc=	0.14	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN 200-	93.7 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 0.24	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 Param	neters a	nd Time of	Concentrati	on	

M A	MAVEN E N	ASSOCIA	TES	Job Number 194006		Sheet 10	Rev 1
Job Title Calc Title	TF	evedon Meadows P108 Calculation R Catchment 17		Author ML		Date 1/11/2024	Checked JD
Data     Catch	ment Area	A=	0.009009	km2( 100ha =1km2)			
Runof	f curve number	CN=	93.7	(from worksheet 1)			
Initial	abstraction	la=	0.9	mm (from worksheet	1)		
Time	of concentration	tc=	0.17	hrs (from worksheet	1)		
2. Calcul	ate storage, S =(1000	/CN - 10)25.4		=	17.2 ו	mm	

3. Average recurrence interval, ARI 100 (yr)

4. 24 hour rainfall depth, P24 282.32 (mm)

5. Compute  $c^* = P24 - 2Ia/P24 - 2Ia + 2S$  0.89

6. Specific peak flow rate  $q^*$  0.164

7. Peak flow rate,  $q_p = q^*A^*P_{24}$  0.418 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24} - Ia)^2/(P_{24} - Ia) + S$  265.2

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

Worksheet 2: Graphical Peak Flow Rate

2389.55 (m3)

MAEN	MAVEI	N ASSO	CIAT	ES		lumber 4006	Sheet 11	Rev 1
Job Title Calc Title		Clevedon M TP108 Cal PR Catchi	culation		Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve N	umber (CN)	and initial A	bstractio	n (la)				
Soil name and classification	Cove	Cover description (cover type, treatment, an hydrologic condition)  Proposed Lots (70/30)					Area (ha) 10000m2=1h a	Product of CN x area
С						90.8	0.10	
C C			posed Ro			94.4	0.25	
С		Existing Lots Existing Roads				90.8 94.4	0.00	
* from Appendix B						Totals =	0.347	32.44
CN (weighted) =  la (average) =  2. Time of Concen	total ar <u>5 x per</u> total ar	vious area =		32.44 0.347 5 x	0.0669 .347	93.4	mm	
Channelisation fact	or	C =		0.6	(From Tabl	e 4.2)		
Catchment length		L =		0.062	km (along o	drainage patl	า)	
Catchment Slope		Sc=	-	0.05	m/m (by eq	ual area met	thod)	
Runoff factor,		CN = - CN	200-	93.4 93.4	=	0.88	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN)}$	N/200-CN) <sup>-0.5</sup>	<sup>5</sup> Sc <sup>-0.30</sup>						
=	0.14	0.6	0.16	1.08	2.46	=	0.04	hrs
SCS Lag for HEC-H	HMS	$t_p = 2$	2/3 t <sub>c</sub>			=	NO GOOD use 0.17	hrs

MAVEN ASSOCIATES			Job Number 194006	Sheet 12	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 18		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0	.003474 km	2( 100ha =1km2)		
Runoff curve number	CN=	93.4 (fro	m worksheet 1)		
Initial abstraction	la=	1.0 mm	ı (from worksheet 1)		
Time of concentration	tc=	0.17 hrs	(from worksheet 1)		

Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

\_\_\_\_\_(yr)

282.32 (mm)

0.89

**0.161** m3/s

0.164

0.268 (GIS)

18.0 mm

264.4

918.64 (m3)

MAEN	MAVEN A	SSOCIATI	ES		lumber 1006	Sheet 13	Rev 1
Job Title Calc Title	TP1	Clevedon Meadows TP108 Calculation PR Catchment 19			Author ML		Checked JD
1. Runoff Curve Nu	mber (CN) and in	itial Abstraction	(la)				
Soil name and classification	Cover desc	Cover description (cover type, treatment, a hydrologic condition)				Area (ha) 10000m2=1h a	Product of CN x area
С		Proposed Lots (7	0/30)		90.8	4.25	385.80
С		Proposed Roa	ds		94.4	2.03	191.96
С		Existing Lots			90.8	0.00	0.00
С		Existing Road	ds		94.4	0.00	0.00
* from Appendix B					Totals =	6.282	577.76
la (average) = 2. Time of Concentr	total area <u>5 x pervious a</u> total area  ration	<u>area</u> =	6.282 5 x 6.2	1.5797 82	_ 1.3	mm	
Channelisation factor		C =	<u>0.6</u> (F	rom Table	e 4.2)		
		L =	0.689 kı	n (along d	Irainage path	1)	
Catchment length				, ,			
Catchment length		Sc=			ual area met	hod)	
	CN 200 - CN	_			ual area met 0.85		
Catchment Slope	200 - CN	Sc=	0.068 m 92.0 =				
Catchment Slope Runoff factor,	200 - CN 200-CN) <sup>-0.55</sup> Sc <sup>-0.3</sup>	Sc=	0.068 m 92.0 =		0.85		hrs
Catchment Slope  Runoff factor, $t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/S}^{0.66} \text{ (CN/S}^{0.66})$	200 - CN 200-CN) <sup>-0.55</sup> Sc <sup>-0.3</sup> 14 0.6	Sc=	0.068 m 92.0 = 92.0	/m (by eq	0.85	0.16	
Catchment Slope Runoff factor, $t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/S)}$	200 - CN 200-CN) <sup>-0.55</sup> Sc <sup>-0.3</sup> 14 0.6	Sc=	0.068 m 92.0 = 92.0	/m (by eq	0.85	0.16	

MAV M A E N	EN ASSOCIATE	Job Number 194006	Sheet 14	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 19	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0.0	062824 km2( 100ha =1km2)		
Runoff curve number	CN=	92.0 (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 22.2 mm

100 (yr) 3. Average recurrence interval, ARI 282.32 (mm) 4. 24 hour rainfall depth, P24

5. Compute c\* = P24 - 2la/P24 - 2la+2S 0.86

6. Specific peak flow rate q\* 0.163

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> **2.892** m3/s 0.268 (GIS)

260.5

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 16365.36 (m3)

MAEN	MAVEN ASSO	CIATES	Job Number 194006		Sheet 15	Rev 1
Job Title Calc Title	Clevedon M TP108 Calc PR Catchn	culation	Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Nur	nber (CN) and initial Ab	ostraction (la)				
Soil name and classification	Cover description hydrol	(cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		ed Lots (70/30)		90.8	0.21	19.08
C C		oosed Roads kisting Lots		94.4 90.8	0.17	
C		sting Roads		90.8	0.00	
* from Appendix B				Totals =	0.377	34.82
CN (weighted) = la (average) = 2. Time of Concentr	total product = total area  5 x pervious area = total area ation	34.82 0.377 5 x	•	92.4	mm	
Channelisation factor	C =	0.6	.(From Tabl	e 4.2)		
Catchment length	L =	0.099	km (along o	drainage patl	h)	
Catchment Slope	Sc=	0.04	m/m (by eq	ual area me	thod)	
Runoff factor,	<u>CN</u> = 200 - CN	92.4 200- 92.4	.=	0.86	_	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-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-HM	1S t <sub>p</sub> = 2	/3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD	-

0.17 hrs

MAV.	MAVEN ASSOCIATES			Sheet 16	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 20		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	Α= (	0.003769	km2( 100ha =1km2)		
Runoff curve number	CN=	92.4	(from worksheet 1)		
Initial abstraction	la=	1.2	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

2. Calculate storage, S =(1000/CN - 10)25.4 = 20.9 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> 0.174 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  261.7

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 986.30 (m3)

MAEN	MAVEN	ASSO	CIATE	s		lumber 1006	Sheet 17	Rev 1
Job Title Calc Title		Clevedon Mo TP108 Calc PR Catchm	ulation		Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Nun	nber (CN) a	and initial Ab	straction	(la)				
Soil name and classification	classification hydrologic condition)					Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
C			ed Lots (70			90.8	3.71	337.12
C			osed Road			94.4	1.74	
C 			isting Lots sting Roads			90.8 94.4	0.00	
		EXIS	suriy Roaus	5		94.4	0.00	0.00
* from Appendix B						Totals =	5.456	501.64
CN (weighted) =  la (average) =  2. Time of Concentra	total are	ea rious area =		01.64 5.456 5 x 5		92.0	3 mm	
Channelisation factor		C =	_	0.6	(From Tabl	e 4.2)		
Catchment length		L =		0.608	km (along c	Irainage pat	h)	
Catchment Slope		Sc=		0.07	m/m (by eq	ual area me	thod)	
Runoff factor,	200 ·		200-	92.0	=	0.85	<u>i</u>	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	200-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-HM	IS	$t_{p} = 2/$	3 t <sub>c</sub>			=	0.10	hrs
							NO GOOD use	-

0.17 hrs

MAV.	MAVEN ASSOCIATES			Sheet 18	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 21		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.054556	km2( 100ha =1km2)		
Runoff curve number	CN=	92.0	(from worksheet 1)		
Initial abstraction	la=	1.3	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

100 (yr)

282.32 (mm)

0.86

0.163

**2.511** m3/s

0.268 (GIS)

22.2 mm

260.5

14209.27 (m3)

MAEN	MAVEN	ASSO	CIATES		lumber 4006	Sheet 19	Rev 1
Job Title Calc Title		Clevedon M TP108 Cal PR Catchi	culation	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	mber (CN) ar	nd initial A	bstraction (la)				
Soil name and classification	Cover	hydro	(cover type, treation)	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C			sed Lots (70/30)		90.8	0.00	
C C			posed Roads xisting Lots		94.4	0.07 0.00	
C			isting Roads		94.4	0.00	
		LX	ioung reduce		04.4	0.00	0.00
* from Appendix B					Totals =	0.065	6.17
CN (weighted) =	total prod		<u>6.1</u> 0.06	_	94.4	-	
la (average) = 2. Time of Concentr	total area	<u>ous area</u> =	5	x 0.0098 0.065	<u>3</u> 0.8	mm	
Channelisation factor	r	C =	0.	6 (From Tabl	e 4.2)		
Catchment length		L =	0.03	3 km (along o	drainage patl	า)	
Catchment Slope		Sc=	0.0	<u>1</u> m/m (by ed	lual area me	thod)	
Runoff factor,	200 - 0		94. 200- 94.	_	0.89	-	
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	0.11 1.0	6 3.98	3 =	0.04	hrs
SCS Lag for HEC-HN	ИS	$t_p = 2$	2/3 t <sub>c</sub>		=	0.03	hrs
						NO GOOD	

use 0.17

hrs

MAEN	IAVEN ASSOCI <i>F</i>	ATES	Job Number 194006	Sheet 20	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 22		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.000654	km2( 100ha =1km2)		
Runoff curve num	nber CN=	94.4	(from worksheet 1)		
Initial abstraction	la=	0.8	mm (from worksheet 1)		
Time of concentra	ation tc=	0.17	hrs (from worksheet 1)		

2. Calculate storage, S =(1000/CN - 10)25.4 = 15.1 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 0.90

6. Specific peak flow rate q\* 0.165

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 0.030 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  267.3

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 174.79 (m3)

MAEN	MAVEN ASS	OCIATES		lumber 4006	Sheet 21	Rev 1
Job Title Calc Title	TP108 C	Clevedon Meadows TP108 Calculation PR Catchment 23			Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial	Abstraction (la)				
Soil name and classification		on (cover type, treat rologic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		osed Lots (70/30)		90.8	2.75	
C	P	roposed Roads		94.4	1.52	
C C		Existing Lots Existing Roads		90.8	0.00	
		Existing Rodus		94.4	0.00	0.00
* from Appendix B				Totals =	4.268	393.02
CN (weighted) =  Ia (average) =	total product = total area  5 x pervious area total area		-	92.1	- ! mm	
2. Time of Concentra	tion					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.481	km (along	drainage pat	h)	
Catchment Slope	Sc	0.07	m/m (by eq	ual area me	thod)	
Runoff factor,	CN = 200 - CN	92.1 200- 92.1	-	0.85	<u>-</u>	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	0.6	0.62 1.09	2.22	! =	0.13	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> =	= 2/3 t <sub>c</sub>		=	0.08	hrs
					NO GOOD use	

0.17 hrs

MAVI	EN ASSOCIA	ATES	Job Number 194006	Sheet 22	Rev 1
ob Title alc Title	Clevedon Meadows TP108 Calculation PR Catchment 23		Author ML	Date 1/11/2024	Checked JD
. Data Catchment Area	A=	0.042683	km2( 100ha =1km2)		
Runoff curve number	CN=	92.1	(from worksheet 1)		
Initial abstraction	la=	1.2	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

21.9 mm

3. Average recurrence interval, ARI

4. 24 hour rainfall depth, P24

(yr)

282.32 (mm)

2. Calculate storage, S =(1000/CN - 10)25.4

5. Compute c\* = P24 - 2la/P24 - 2la+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> 1.966 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  260.8

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$  11132.13 (m3)

M A E N	AVEN ASSO	CIATES	1	lumber 4006	Sheet 23	Rev 1
Job Title Calc Title	TP108 Cald	Clevedon Meadows TP108 Calculation PR Catchment 24			Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial Ab	estraction (la)				
Soil name and classification	Cover description hydrol	(cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		ed Lots (70/30)		90.8	0.76	69.12
С		osed Roads		94.4	0.17	15.82
C C		sting Lots		90.8	0.00	0.00
C	EXI	sing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.929	84.94
CN (weighted) =	total product = total area	84.94 0.929	•	91.4	-	
la (average) =	5 x pervious area = total area	5 x	0.2535 0.929	1.4	mm	
2. Time of Concentrat	ion					
Channelisation factor	C =	0.6	.(From Tabl	e 4.2)		
Catchment length	L =	0.09	km (along o	drainage path	۱)	
Catchment Slope	Sc=	0.02	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN	91.4 200- 91.4	.=	0.84	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.20 1.10	3.23	=	0.06	hrs
SCS Lag for HEC-HMS	5 t <sub>p</sub> = 2	/3 t <sub>c</sub>		=	0.04	hrs
					NO GOOD	

use 0.17

hrs

MAV M A E N	EN ASSOCIA	TES	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
Data     Catchment Area	A=	0.009288	km2( 100ha =1km2)		
Runoff curve number	CN=	91.4	(from worksheet 1)		
Initial abstraction	la=	1.4	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

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)

0.163

0.85

**0.427** m3/s

0.268 (GIS)

23.7 mm

259.1 2406.13 (m3)

MAEN	MAVEN	ASSO	CIATES		lumber 4006	Sheet 25	Rev 1
Job Title Calc Title		Clevedon Meadows TP108 Calculation PR Catchment 25			ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nur	nber (CN) ar	nd initial Ab	straction (la)				
Soil name and classification	Cover		cover type, trea	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
С		Proposed Lots (70/30)			90.8	1.99	
C C			osed Roads isting Lots		94.4	1.27 0.00	
C			sting Roads		94.4	0.00	
			_				
* from Appendix B					Totals =	3.261	300.62
la (average) = 2. Time of Concentr	total area	ous area =	5	x 0.7879 3.261	<u>)</u> 1.2	! mm	
Channelisation factor		C =		6 (From Tabl			
Catchment length		L =	0.446	6 km (along o	drainage pat	h)	
Catchment Slope		Sc=	0.07	5 m/m (by eq	lual area me	thod)	
Runoff factor,	200 -		92.2 200- 92.2	_	0.86	<u>-</u>	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-CN) <sup>-0.55</sup> \$	Sc <sup>-0.30</sup>					
= 0	.14	0.6	0.59 1.09	9 2.18	3 =	0.12	hrs
SCS Lag for HEC-HM	1S	$t_{p} = 2/$	3 t <sub>c</sub>		=	0.08	hrs
						NO GOOD use	h

0.17

hrs

Μ	MAVE A E N	N ASSOCIA	ATES	Job Numbe 194006	r	Sheet 26	Rev 1
	ob Title Clevedon Meadows alc Title TP108 Calculation PR Catchment 25			Author ML		Date 1/11/2024	Checked JD
1.	Data Catchment Area	A=	0.032605	km2( 100ha =1km2)	)		
	Runoff curve number	CN=	92.2	(from worksheet 1)			
	Initial abstraction	la=	1.2	mm (from workshee	t 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet	1)		
2.	Calculate storage, S =(10	00/CN - 10)25.4		=	21.5	mm	
3.	Average recurrence inter-	/al, ARI		100 (y	r)		
4.	24 hour rainfall depth, P2	4		282.32 (r	mm)		
5.	Compute c* = P24 - 2Ia/F	24 - 2la+2S		0.87			

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$ 9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

6. Specific peak flow rate q\*

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub>

0.87 0.163 1.503 m3/s 0.268 (GIS) 261.2 8514.81 (m3)

MAEN	IAVEN ASSO	CIATES	1	lumber 4006	Sheet 27	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catch	lculation	1	thor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numl	ber (CN) and initial A	Abstraction (Ia)				
Soil name and classification C	hydr	n (cover type, treat ologic condition) osed Lots (70/30)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		oposed Roads		94.4	0.00	0.00 8.77
C		Existing Lots		90.8	0.00	
С		xisting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.093	8.77
CN (weighted) =  Ia (average) =	total product = total area  5 x pervious area =	8.77 0.093	•	94.4	mm	
	total area		0.093	_		
2. Time of Concentrat	ion					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.042	km (along o	drainage path	1)	
Catchment Slope	Sc=	0.24	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN	94.4 200- 94.4	=	0.89	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.12 1.06	1.53	=	0.02	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> =	2/3 t <sub>c</sub>		=	0.01	hrs
					NO GOOD	

F:\MAVEN\Projects\194006 Clevedon\DWG\Flood Report\Calcs\Clevedon Meadows - OLFP TP108 OLFP - Sections 14-34

use 0.17

hrs

MAV M A E N	EN ASSOCIATES	Job Number 194006	Sheet 28	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 26	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0.000	929 km2( 100ha =1km2)		
Runoff curve number	CN= 9	4.4 (from worksheet 1)		
Initial abstraction	la=	0.8 mm (from worksheet 1)		
Time of concentration	tc= 0	.17 hrs (from worksheet 1)		

15.1 mm

100 (yr)

2. Calculate storage, S =(1000/CN - 10)25.4

3. Average recurrence interval, ARI

4. 24 hour rainfall depth, P24 282.32 (mm)

4. 24 flodi faliliali deptil, i 24

5. Compute c\* = P24 - 2la/P24 - 2la+2S 0.90

6. Specific peak flow rate q\* 0.165

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$  267.3

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 248.29 (m3)

MAEN	MAVEN ASSC	CIATES		lumber 4006	Sheet 29	Rev 1
Job Title Calc Title	Clevedon I TP108 Cal PR Catch	culation	_	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial A	bstraction (la)				
Soil name and classification		(cover type, treat logic condition) sed Lots (70/30)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		posed Roads		90.8	1.99	180.86 111.00
C		xisting Lots		90.8	0.00	
С		isting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	3.168	291.86
CN (weighted) =	total product = total area	291.86 3.168	=	92.1	-	
la (average) =	<u>5 x pervious area</u> = total area		0.7739 3.168	1.2	mm	
2. Time of Concentrat	tion					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.387	km (along o	drainage patl	۱)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area met	hod)	
Runoff factor,	CN = 200 - CN	92.1 200- 92.1	.=	0.85	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.53 1.09	2.22	=	0.11	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	0.07	hrs
					NO GOOD	

use 0.17

hrs

MAV.	EN ASSOCIA	TES	Job Number 194006	Sheet 30	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 27		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.031677	km2( 100ha =1km2)		
Runoff curve number	CN=	92.1	(from worksheet 1)		
Initial abstraction	la=	1.2	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

100 (yr)

282.32 (mm)

0.87

0.163

**1.459** m3/s

0.268 (GIS)

21.7 mm

261.0

8266.82 (m3)

MAEN	MAVEN ASSO	CIATES		lumber 4006	Sheet 31	Rev 1
Job Title Calc Title	Clevedon M TP108 Calc PR Catchm	ulation	ation N		Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial Ab	straction (la)				
Soil name and classification		ogic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
C		ed Lots (70/30)		90.8	0.17	15.50
C C	·	osed Roads isting Lots		94.4	0.65 0.00	
C		sting Roads		94.4	0.00	
		-				
* from Appendix B				Totals =	0.825	77.30
a (average) = 2. Time of Concentra	<u>5 x pervious area</u> = total area <b>tion</b>	5 x	0.1494 0.825	0.9	mm	
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.106	km (along o	drainage patl	۱)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area met	:hod)	
Runoff factor,	CN =	93.7		0.88	_	
	200 - CN	200- 93.7				
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	00-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-HM	S t <sub>p</sub> = 2/	3 t <sub>c</sub>		=	0.03	hrs
					NO GOOD use 0.17	

MAVEN ASSOCIA		TES	Job Numbe 194006	r	Sheet 32	Rev 1	
Job Title Calc Title	TP108 C	Meadows alculation hment 28		Author ML		Date 1/11/2024	Checked JD
Data     Catchment Area	ı	A=	0.008254	km2( 100ha =1km2	)		
Runoff curve nu	mber	CN=	93.7	(from worksheet 1)			
Initial abstraction	n	la=	0.9	mm (from workshee	et 1)		
Time of concent	ration	tc=	0.17	hrs (from worksheet	t 1)		
Calculate storag	e, S =(1000/CN -	10)25.4		=	17.2 r	nm	
3. Average recurre	nce interval, ARI			100 ()	yr)		

5. Compute c\* = P24 - 2la/P24 - 2la+2S6. Specific peak flow rate q\*

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000xQ_{24}A$ 

4. 24 hour rainfall depth, P24

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub>

282.32 (mm)

0.89

0.164

0.383 m3/s 0.268 (GIS)

265.2

2188.96 (m3)

MAEN	MAVEN A	ssoci	IATES		lumber 4006	Sheet 33	Rev 1
Job Title Calc Title	TP	Clevedon Meadows TP108 Calculation PR Catchment 29			thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Nu	mber (CN) and i	nitial Abstr	action (la)				
Soil name and classification	Cover desc		ver type, treati c condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С			Lots (70/30)		90.8	1.34	121.41
C			ed Roads		94.4	0.85	
C C			ng Lots g Roads		90.8	0.00	
from Appendix B					Totals =	2.187	201.63
CN (weighted) =	total product total area	_	201.63 2.187 5 x		92.2	mm	
a (average) =	total area			.187			
				.187			
2. Time of Concenti	ration	C =	0.6	.167 (From Tabl	e 4.2)		
2. Time of Concents Channelisation factor Catchment length	ration	C = L =	0.981	(From Tabl km (along c	drainage patl		
la (average) =  2. Time of Concents  Channelisation factor  Catchment length  Catchment Slope  Runoff factor,	ration		0.981	(From Tabl km (along c m/m (by eq	•	:hod)	

= <u>0.20</u> hrs

= 0.13 hrs

OK use 0.20072199 hrs

= 0.14 0.6 0.99 1.09 2.22

SCS Lag for HEC-HMS....  $t_p = 2/3 t_c$ 

MAV M A E N	EN ASSOCIATI	ES Job Number 194006	Sheet 34	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 29	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0.0	021869 km2( 100ha =1km2)		
Runoff curve number	CN=	92.2 (from worksheet 1)		
Initial abstraction	la=	1.2 mm (from worksheet 1)		
Time of concentration	tc=	0.20 hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

100 (yr)

282.32 (mm)

0.163

0.87

**1.008** m3/s

21.5 mm

0.268 (GIS)

261.1 5711.01 (m3)

MAEN	MAVEN ASSOC	CIATES		lumber 4006	Sheet 35	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcu PR Catchmo	-	thor //L	Date 15/11/2024	Checked JD	
1. Runoff Curve Nun	nber (CN) and initial Abs	straction (la)				
Soil name and classification	Cover description (o	cover type, treati gic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		ed Lots (70/30)		90.8	0.67	60.72
С		osed Roads		94.4	0.14	
C		sting Lots		90.8	0.00	
С	EXIS	ting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.810	74.07
CN (weighted) =	total product = total area	74.07 0.810	=	91.4	<u>ı</u>	
la (average) =	5 x pervious area = total area	5 x	0.2218 0.810	1.4	1 mm	
2. Time of Concentra	ation					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.106	km (along o	drainage pat	h)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area me	thod)	
Runoff factor,	CN = 200 - CN	91.4 200- 91.4	=	0.84	<u> </u>	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.	.14 0.6	0.23 1.10	2.22	=	= 0.05	hrs

= 0.03 hrs

NO GOOD use 0.17

hrs

SCS Lag for HEC-HMS....  $t_p = 2/3 t_c$ 

MAEN	MAVEN	ASSOCIA	TES	Job Number 194006	Sheet 36	Rev 1
Job Title Calc Title	TP	vedon Meadows 108 Calculation R Catchment 30		Author ML	Date 1/11/2024	Checked JD
Data     Catchment A	rea	A=	0.008101	km2( 100ha =1km2)		
Runoff curve	number	CN=	91.4	(from worksheet 1)		
Initial abstra	ction	la=	1.4	mm (from worksheet 1)		
Time of cond	entration	tc=	0.17	hrs (from worksheet 1)		
2. Calculate sto	orage, S =(1000/	/CN - 10)25.4		= 2	23.8 mm	

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<sub>p</sub>=q\*A\*P<sub>24</sub>

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)

0.85

0.163

0.372 m3/s 0.268 (GIS)

259.0 2098.15 (m3)

MAEN	MAVEN ASSOC	IATES		lumber 4006	Sheet 37	Rev 1
Job Title Calc Title	Clevedon Mea TP108 Calcula PR Catchmer		thor ML	Date 15/11/2024	Checked JD	
1. Runoff Curve Num	ber (CN) and initial Abst	raction (Ia)				
Soil name and classification		ic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		Lots (70/30)		90.8	0.67	
<u>C</u>	<u> </u>	ed Roads		94.4	0.14	
C 		ing Lots ng Roads		90.8 94.4	0.00	
	EXISTI	ig Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.810	74.07
CN (weighted) =  a (average) =  C. Time of Concentrate	total product = total area  5 x pervious area = total area tion	74.07 0.810 5 x		91.4	· mm	
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.106	km (along o	drainage pat	h)	
	Sc=	0.07	m/m (by eq	ual area me	thod)	
Catchment Slope			=	0.84	Ļ	
	<u>CN</u> = 200 - CN	91.4 200- 91.4			_	
Catchment Slope Runoff factor, $t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	200 - CN				-	

0.03 hrs

hrs

NO GOOD use 0.17

SCS Lag for HEC-HMS....  $t_p = 2/3 t_c$ 

MAV M A E N	EN ASSOCIA	ATES	Job Number 194006	Sheet 38	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 31		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.008101	km2( 100ha =1km2)		
Runoff curve number	CN=	91.4	(from worksheet 1)		
Initial abstraction	la=	1.4	mm (from worksheet 1)		
Time of concentration	tc=	0.17	hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

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)

0.85

0.163

**0.372** m3/s

0.268 (GIS)

23.8 mm

259.0

2098.15 (m3)

MAEN	AVEN ASSO	CIATES		lumber 4006	Sheet 39	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 32		_	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial Ab	straction (la)				
Soil name and classification		ogic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
С		ed Lots (70/30)		90.8	0.67	60.72
C		osed Roads		94.4	0.14	
C 		isting Lots sting Roads		90.8	0.00	
	EAG	sting reduce		94.4	0.00	0.00
* from Appendix B				Totals =	0.810	74.07
CN (weighted) =	total product = total area	74.07 0.810	=	91.4	<u>.</u>	
la (average) =	5 x pervious area = total area	5 x	0.2218 0.810	<u>3</u> 1.4	mm	
2. Time of Concentrat	ion					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.106	km (along o	drainage pat	h)	
Catchment Slope	Sc=	0.07	m/m (by eq	ual area me	thod)	
Runoff factor,	CN = 200 - CN	91.4 200- 91.4		0.84	_	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					

= 0.03 hrs

NO GOOD use 0.17 hrs

SCS Lag for HEC-HMS....  $t_p = 2/3 t_c$ 

MAV M A E N	EN ASSOCIA	<b>TES</b>	Job Number 194006	Sheet 40	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 32		Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A=	0.008101	km2( 100ha =1km2)		
Runoff curve number	CN=	91.4	(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)25.4 = 23.8 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 0.85

6. Specific peak flow rate q\* 0.163

7. Peak flow rate, q<sub>p</sub>=q\*A\*P<sub>24</sub> 0.372 m3/s 0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-Ia)^2/(P_{24}-Ia)+S$  259.0

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 2098.15 (m3)

MAVEN	AVEN ASSO	CIATES		lumber 4006	Sheet 41	Rev 1
Job Title Calc Title	Clevedon M TP108 Calc PR Catchm	ulation	Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Numl	per (CN) and initial Ab	straction (la)		_		
Soil name and classification		ogic condition)	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		ed Lots (70/30) osed Roads		90.8 94.4	0.00 0.26	0.00 24.21
С		isting Lots		90.8	0.00	0.00
С	Exis	sting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.257	24.21
CN (weighted) =	total product = total area	24.21 0.257		94.4	-	
la (average) =	<u>5 x pervious area</u> = total area	5 x	0.0385 ).257	<u>5</u> 0.8	mm	
2. Time of Concentrat	ion					
Channelisation factor	C =	0.6	(From Tabl	e 4.2)		
Catchment length	L =	0.12	km (along o	drainage patl	٦)	
Catchment Slope	Sc=	0.08	m/m (by eq	ual area me	thod)	
Runoff factor,	CN = 200 - CN	94.4 200- 94.4	.=	0.89	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.25 1.06	2.13	=	0.05	hrs

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= 0.03 hrs

NO GOOD use 0.17

hrs

SCS Lag for HEC-HMS....  $t_p = 2/3 t_c$ 

MAV M A E N	EN ASSOCIATE	Job Number 194006	Sheet 42	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 33	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0.0	02565 km2( 100ha =1km2)		
Runoff curve number	CN=	94.4 (from worksheet 1)		
Initial abstraction	la=	0.8 mm (from worksheet 1)		
Time of concentration	tc=	0.17 hrs (from worksheet 1)		

3. Average recurrence interval, ARI

2. Calculate storage, S =(1000/CN - 10)25.4

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<sub>p</sub>=q\*A\*P<sub>24</sub>

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 

9. Runoff volume,  $V_{24} = 1000 \times Q_{24} A$ 

\_\_\_\_\_(yr)

282.32 (mm)

0.90

0.165

267.3

**0.119** m3/s 0.268 (GIS)

15.1 mm

685.54 (m3)

MAEN	MAVEN ASS	OCIATES		Number 4006	Sheet 43	Rev 1
Job Title Calc Title	TP108 C	n Meadows Calculation Chment 34	Author ML		Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial	Abstraction (la)				
Soil name and classification	hyc	on (cover type, treat drologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		posed Lots (70/30)		90.8	0.00	
<u>С</u> С		Proposed Roads		94.4	0.26	
C		Existing Lots Existing Roads		94.4	0.00	
	'	Existing Rodus			0.00	0.00
* from Appendix B				Totals =	0.257	24.21
CN (weighted) =	total product =	24.21		94.4		
la (average) = 2. Time of Concentrat	total area <u>5 x pervious area</u> total area <b>tion</b>			<u>5</u> 0.8	3 mm	
	5 x pervious area total area	= <u>5 x</u>	0.0385	_	3 mm	
2. Time of Concentrat	<u>5 x pervious area</u> total area <b>tion</b>	= 5 x	0.0385 0.257 _(From Tabl	_		
2. Time of Concentrat	5 x pervious area total area tion C	= 5 x = 0.6 = 0.091	0.0385 0.257 (From Tabl km (along o	le 4.2)	h)	
2. Time of Concentrate Channelisation factor Catchment length	5 x pervious area total area tion C :	= 5 x = 0.6 = 0.091	0.0385 0.257 _(From Tabl _km (along o _m/m (by ec	le 4.2) drainage pat	h) thod)	
2. Time of Concentrate Channelisation factor Catchment length Catchment Slope	5 x pervious area total area tion  C:  L =  Sc  CN =  200 - CN	=	0.0385 0.257 _(From Tabl _km (along o _m/m (by ec	le 4.2) drainage pat qual area me	h) thod)	
2. Time of Concentrate Channelisation factor Catchment length Catchment Slope Runoff factor,	$\frac{5 \times \text{pervious area}}{\text{total area}}$ $\frac{5 \times \text{pervious area}}{\text{total area}}$ $\frac{C}{C}$ $\frac{CN}{200 - CN}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$ $\frac{C}{C}$	=	0.0385 0.257 (From Table km (along of m/m (by ed	le 4.2) drainage pat qual area me 0.89	h) thod)	hrs

NO GOOD use 0.17

hrs

MAV M A E N	EN ASSOCIAT	Job Number 194006	Sheet 44	Rev 1
Job Title Calc Title	Clevedon Meadows TP108 Calculation PR Catchment 34	Author ML	Date 1/11/2024	Checked JD
Data     Catchment Area	A= 0	0.002565 km2( 100ha =1km2)		
Runoff curve number	CN=	94.4 (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)25.4 = 15.1 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 0.90

6. Specific peak flow rate q\* 0.165

7. Peak flow rate,  $q_p = q^*A^*P_{24}$  0.268 (GIS)

8. Runoff depth,  $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$  267.3

9. Runoff volume, V<sub>24</sub> = 1000xQ<sub>24</sub>A 685.54 (m3)

MAEN	IAVEN ASSO	CIATES		lumber 4006	Sheet 1	Rev 1
Job Title Calc Title	Clevedon M TP108 Calc PR Catchm	ulation	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial Ab	estraction (Ia)				
Soil name and classification	Cover description hydrol	(cover type, treat	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		Proposed Roads			3.58	
C C		oosed Roads		94.4	1.04	
C		kisting Lots sting Roads		90.8 94.4	0.00	
* from Appendix B				Totals =	4.617	422.91
CN (weighted) =	total product = total area	<u>422.91</u> 4.617	-	91.6	_	
la (average) =	<u>5 x pervious area</u> = total area		1.0743 4.617	<u>1</u> .2	. mm	
2. Time of Concentrat	tion					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.476	km (along d	Irainage path	)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area metl	nod)	
Runoff factor,	CN =	91.6 200- 91.6		0.85	<u>-</u>	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.61 1.10	2.46	; =	0.14	hrs
SCS Lag for HEC-HMS	$t_p = 2t$	/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

M A E N  Job Title Calc Title	Clevedon I	Meadows Iculation		194006 Author ML		2 Date 15/11/2024	1 Checked JD
	PR Catch	ment 35					
Data     Catchment Area		A=	0.046165	km2( 100ha =1km	2)		
Runoff curve numb	er	CN=	91.6	(from worksheet 1	)		
Initial abstraction		la=	1.2	mm (from workshe	eet 1)		
Time of concentrat	ion	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate storage,	S =(1000/CN - 10	)25.4		=	23.3	mm	
Average recurrence	e interval, ARI			100	(yr)		
4. 24 hour rainfall dep	oth, P24			282.32	(mm)		
5. Compute c* = P24	- 2la/P24 - 2la+2	S		0.86			
6. Specific peak flow i	rate q*			0.163			
7. Peak flow rate, q <sub>p</sub> =	q*A*P <sub>24</sub>			2.122	m3/s	0.268 (GIS)	
8. Runoff depth, Q <sub>24</sub> =	= (P <sub>24</sub> -la) <sup>2</sup> /(P <sub>24</sub> -la)	+S		259.7			
9. Runoff volume, V <sub>24</sub>	= 1000xQ <sub>24</sub> A			11987.45	(m3)		

M A E N	IAVEN ASS	OCIATES		Number 4006	Sheet 3	Rev 1
Job Title Calc Title	TP108 C	n Meadows Calculation chment 36	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numl	per (CN) and initial	Abstraction (la)				
Soil name and classification		on (cover type, trea drologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		Proposed Lots (70/30)			4.11	372.83
C C	F	Proposed Roads Existing Lots		94.4	1.15 0.00	
C		Existing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	5.260	481.72
CN (weighted) =	total product = total area	<u>481.72</u> 5.260	_	91.6	-	
la (average) =	5 x pervious area		1.4049 5.260	<u>)</u> 1.3	mm	
2. Time of Concentrat	ion					
Channelisation factor	С	= 0.6	(From Table	e 4.2)		
Catchment length	L:	0.527	km (along d	Irainage path	)	
Catchment Slope	Sc	= 0.05	m/m (by eq	ual area metl	nod)	
Runoff factor,	CN =	91.6 200- 91.6	_	0.84	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.66 1.10	2.46	s =	0.15	hrs
SCS Lag for HEC-HMS	5 t <sub>p</sub>	= 2/3 t <sub>c</sub>		=	0.10	hrs
						-
					NO GOOD	
					use	

MAEN	MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 4	Rev 1
Job Title Calc Title			e TP108 Calculation ML		Date 15/11/2024	Checked JD	
Data     Catchment Are.	a	A=	0.052596	km2( 100ha =1km	2)		
Runoff curve no	umber	CN=	91.6	(from worksheet 1	)		
Initial abstraction	on	la=	1.3	mm (from workshe	eet 1)		
Time of concer	tration	tc=	0.17	hrs (from workshe	et 1)		
Calculate stora	ge, S =(1000/0	CN - 10)25.4		=	23.3	mm	
3. Average recurre	ence interval, A	ARI		100	(yr)		
4. 24 hour rainfall	depth, P24			282.32	(mm)		
5. Compute c* = F	P24 - 2Ia/P24 -	2la+2S		0.86			
6. Specific peak fl	ow 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, 0	$Q_{24} = (P_{24} - Ia)^2 / ($	P <sub>24</sub> -la)+S		259.4			
9. Runoff volume,	$V_{24} = 1000xQ_2$	<sub>24</sub> A		13645.92	(m3)		

MAEN	MAVEN ASSO	CIATES		lumber 1006	Sheet 5	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catchr	lculation	1	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial A	Abstraction (la)				
Soil name and classification		n (cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		osed Lots (70/30)		90.8	0.52	47.65
С		oposed Roads		94.4	0.12	
C C	_	Existing Lots xisting Roads		90.8 94.4	0.00	0.00
* from Appendix B				Totals =	0.646	59.12
la (average) = 2. Time of Concentrat	total area <u>5 x pervious area</u> =  total area			_ 1.4	mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.075	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area metl	nod)	
Runoff factor,	CN = 200 - CN	91.5 200- 91.5	-	0.84	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.18 1.10	2.46	=	0.04	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> =	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

MAE	MAVE	EN ASSOCIA	TES	Job Number 194006		Sheet 6	Rev 1
Job Title Calc Title		Clevedon Meadows TP108 Calculation PR Catchment 36A		TP108 Calculation MI		Date 15/11/2024	Checked JD
1. Data Catchme	nt Area	A=	0.006463	km2( 100ha =1km	2)		
Runoff cu	urve number	CN=	91.5	(from worksheet 1	)		
Initial abs	straction	la=	1.4	mm (from workshe	eet 1)		
Time of c	concentration	tc=	0.17	hrs (from workshe	et 1)		
2. Calculate	e storage, S =(10	000/CN - 10)25.4		=	23.7	mm	
3. Average	recurrence inter	val, ARI		100	(yr)		
4. 24 hour r	ainfall depth, P2	24		282.32	(mm)		
5. Compute	c* = P24 - 2Ia/F	P24 - 2la+2S		0.86			
6. Specific p	oeak flow rate q	•		0.163			
7. Peak flov	v rate, q <sub>p</sub> =q*A*P	24		0.297	m3/s	0.268 (GIS)	
8. Runoff de	epth, Q <sub>24</sub> = (P <sub>24</sub> -	la) <sup>2</sup> /(P <sub>24</sub> -la)+S		259.1			
	olume, V <sub>24</sub> = 100	00xQ <sub>24</sub> A		1674.78	(m3)		

M A E N	IAVEN ASS	OCIATES		lumber 4006	Sheet 7	Rev 1
Job Title Calc Title	TP108 C	Meadows alculation hment 37	1	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numl	ber (CN) and initial	Abstraction (la)				
Soil name and classification		on (cover type, trea rologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		Proposed Lots (70/30)			3.06	
C C	<u>Р</u>	roposed Roads		94.4	0.92	
C	E	Existing Lots Existing Roads		94.4	0.00	
* from Appendix B				Totals =	3.978	364.46
la (average) = 2. Time of Concentrat	total area <u>5 x pervious area</u> total area  ion		. 0.9178 3.978	1.2	mm	
Channelisation factor	C =	0.6	(From Table	∋ 4.2)		
Catchment length	L =	0.421	_km (along d	Irainage path	)	
Catchment Slope	Sc=	= 0.05	m/m (by eq	ual area metl	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	91.6 200- 91.6	_	0.85	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.56 1.10	2.46	; =	0.13	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> =	2/3 t <sub>c</sub>		=	0.09	hrs
					NO GOOD use	
					0.17	hrs

MAX A E N	/EN ASSOCIA	ATES	Job Number 194006	Sheet 8	Rev 1		
b Title Ilc Title			le TP108 Calculation		Author ML	Date 15/11/2024	Checked JD
Data Catchment Area	A=	0.039775	km2( 100ha =1km2)				
Runoff curve number	CN=	91.6	(from worksheet 1)				
Initial abstraction	la=	1.2	mm (from worksheet 1)				
Time of concentration	tc=	0.17	hrs (from worksheet 1)				
Calculate storage, S =	(1000/CN - 10)25.4		= 23	.2 mm			
· ·			100 (yr)				
			282.32 (mm) 0.86				
Specific peak flow rate	; q*		0.163				
Peak flow rate, q <sub>p</sub> =q*A	*P <sub>24</sub>		<b>1.828</b> m3/s	0.268 (GIS)			
Runoff depth, $Q_{24}$ = (P	<sub>24</sub> -la) <sup>2</sup> /(P <sub>24</sub> -la)+S		259.7				
Runoff volume, V <sub>24</sub> = 1	1000xQ <sub>24</sub> A		10330.99 (m3)				
	b Title lc Title  Data Catchment Area  Runoff curve number Initial abstraction  Time of concentration  Calculate storage, S =  Average recurrence in  24 hour rainfall depth,  Compute c* = P24 - 21  Specific peak flow rate  Peak flow rate, q <sub>p</sub> =q*A  Runoff depth, Q <sub>24</sub> = (P	b Title Clevedon Meadows TP108 Calculation PR Catchment 37  Data Catchment Area A=  Runoff curve number CN=  Initial abstraction Ia=	b Title Clevedon Meadows Ic Title TP108 Calculation PR Catchment 37  Data Catchment Area A= 0.039775  Runoff curve number CN= 91.6  Initial abstraction Ia= 1.2  Time of concentration tc= 0.17  Calculate storage, $S = (1000/\text{CN} - 10)25.4$ 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, $Q_{24} = (P_{24} - Ia)^2/(P_{24} - Ia) + S$	## First Proof Clevedon Meadows Inc Title   Clevedon Meadows Inc Title   TP108 Calculation PR Catchment 37    Data   Catchment Area   A= 0.039775 km2( 100ha =1km2)    Runoff curve number   CN= 91.6 (from worksheet 1)    Initial abstraction   Ia= 1.2 mm (from worksheet 1)    Time of concentration   tc= 0.17 hrs (from worksheet 1)    Calculate storage, S = (1000/CN - 10)25.4   = 23    Average recurrence interval, ARI   100 (yr)    24 hour rainfall depth, P24   282.32 (mmm)    Compute c* = P24 - 2Ia/P24 - 2Ia+2S   0.86    Specific peak flow rate q*   0.163    Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>   1.828 m3/s    Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -Ia) <sup>2</sup> /(P <sub>24</sub> -Ia)+S   259.7	### Dititle   Clevedon Meadows   TP108 Calculation   PR Catchment 37   Date   15/11/2024    Data   Catchment Area   A= 0.039775 km2( 100ha =1km2)    Runoff curve number   CN= 91.6 (from worksheet 1)    Initial abstraction   Ia= 1.2 mm (from worksheet 1)    Time of concentration   tc= 0.17 hrs (from worksheet 1)    Calculate storage, S = (1000/CN - 10)25.4   = 23.2 mm    Average recurrence interval, ARI   100 (yr)    24 hour rainfall depth, P24   282.32 (mm)    Compute c* = P24 - 2la/P24 - 2la+2S   0.86    Specific peak flow rate q*   0.163    Peak flow rate, q <sub>p</sub> =q*A*P <sub>24</sub>   1.828 m3/s   0.268 (GIS)    Runoff depth, Q <sub>24</sub> = (P <sub>24</sub> -Ia) <sup>2</sup> /(P <sub>24</sub> -Ia)+S   259.7		

MAEN	IAVEN ASS	SOCIATES		Number 4006	Sheet 9	Rev 1
Job Title Calc Title	TP108 (	n Meadows Calculation chment 38	-	uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initia	l Abstraction (la)				
Soil name and classification		ion (cover type, trea drologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		Proposed Lots (70/30)			3.06	277.52
C C		Proposed Roads Existing Lots		94.4	0.74	70.23 0.00
C		Existing Roads		94.4	0.00	0.00
* from Appendix B				Totals =	3.800	347.75
CN (weighted) =  la (average) =  2. Time of Concentrat	total product = total area  5 x pervious area total area		<u>-</u>	91.5	mm	
2. Time of Concentrat	1011					
Channelisation factor	C	=0.6	<u>S</u> (From Tabl	e 4.2)		
			_	e 4.2) drainage path	)	
Channelisation factor	C	= 0.4	km (along c		,	
Channelisation factor Catchment length	C	= 0.4	km (along c 	drainage path	nod)	
Channelisation factor Catchment length Catchment Slope	C L So = 200 - CN	= 0.4 c= 0.05	km (along c 	drainage path ual area metl	nod)	
Channelisation factor Catchment length Catchment Slope Runoff factor,	$\frac{CN}{200 - CN} = \frac{CN}{200 - CN}$	= 0.4 c= 0.05	- km (along c j_m/m (by eq j_=	drainage path ual area metl 0.84	nod)	hrs
Channelisation factor  Catchment length  Catchment Slope  Runoff factor, $t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	$ \begin{array}{r} C \\ S_0 \\ \hline CN = \\ \hline 200 - CN \end{array} $ $ \begin{array}{r} 00 - CN)^{-0.55} Se^{-0.30} \\ 4 & 0.6 \end{array} $	= 0.4 c= 0.05 91.5 200- 91.5	- km (along c 5_m/m (by eq 5_=	drainage path ual area metl 0.84	0.12	•

MAEN	MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 10	Rev 1
Job Title Calc Title				Author ML		Date 15/11/2024	Checked JD
Data     Catchment Are	a	A=	0.038004	km2( 100ha =1km	2)		
Runoff curve no	umber	CN=	91.5	(from worksheet 1	)		
Initial abstraction	on	la=	1.2	mm (from workshe	eet 1)		
Time of concer	tration	tc=	0.17	hrs (from workshe	et 1)		
Calculate stora	ge, S =(1000/	CN - 10)25.4		=	23.6	mm	
<ol> <li>Average recurr</li> <li>24 hour rainfall</li> </ol>		ARI		100			
5. Compute c* = F	P24 - 2Ia/P24 -	· 2la+2S		0.86	,		
Specific peak fl	ow rate q*			0.163			
7. Peak flow rate,	q <sub>p</sub> =q*A*P <sub>24</sub>			1.746	m3/s	0.268 (GIS)	
8. Runoff depth, 0	$Q_{24} = (P_{24} - Ia)^2 /$	(P <sub>24</sub> -la)+S		259.4			
9. Runoff volume,	V <sub>24</sub> = 1000xC	<sub>24</sub> A		9856.62	(m3)		

M A E N	MAVEN ASS	SOCIATES	8		umber 006	Sheet 11	Rev 1
Job Title Calc Title	TP108 (	n Meadows Calculation chment 39			thor IL	Date 15/11/2024	Checked JD
1. Runoff Curve Numl	ber (CN) and initia	l Abstraction (la	)				
Soil name and classification		ion (cover type, t drologic condition		and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		posed Lots (70/3	30)		90.8	0.38	34.85
C C		Proposed Roads Existing Lots			94.4 90.8	0.36 0.00	33.60 0.00
C		Existing Roads			94.4	0.00	0.00
* from Appendix B					Totals =	0.740	68.45
CN (weighted) =  la (average) =  2. Time of Concentrate	total product = total area  5 x pervious area total area	0.5	.45 = 740 5 x 0.740	0.1151	0.8	mm	
Channelisation factor	C	_	0.6 /From	n Tabla	. 4. 2\		
			0.6 (Fror			`	
Catchment length	L				rainage path		
Catchment Slope Runoff factor,	CN = 200 - CN	9	2.5 = 2.5	(by equ	ial area meth	·	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>						
= 0.1		0.33 1	.09	2.46	=	0.07	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub>	= 2/3 t <sub>c</sub>			=	0.05	hrs
						NO GOOD	

MAVEN AS	SOCIA	TES	Job Number 194006		Sheet 12	Rev 1
TP108 C	alculation		Author ML		Date 15/11/2024	Checked JD
a	A=	0.007397	km2( 100ha =1km2)			
ımber	CN=	92.5	(from worksheet 1)			
n	la=	0.8	mm (from worksheet	t 1)		
tration	tc=	0.17	hrs (from worksheet	1)		
ge, S =(1000/CN - 1	0)25.4		=	20.5	mm	
depth, P24 24 - 2Ia/P24 - 2Ia+:	2S					
$q_p = q^*A^*P_{24}$			<b>0.341</b> m	3/s	0.268 (GIS)	
$P_{24} = (P_{24} - Ia)^2 / (P_{24} - Ia)^2$	ı)+S		262.4			
$V_{24} = 1000 x Q_{24} A$			1941.22 (m	า3)		
	Clevedon TP108 Ci PR Catc  a a a a a a a a a a a a a a a a a a	Clevedon Meadows TP108 Calculation PR Catchment 39  A = Imber CN= In Ia= Itration tc= Ige, S = (1000/CN - 10)25.4  Pence interval, ARI Idepth, P24 In Ia= In Ia= Itration tc= In In Ia= Itration tc= In I	TP108 Calculation PR Catchment 39  A = 0.007397  Imber CN= 92.5  In   Ia= 0.8  Itration tc= 0.17  Ige, S = (1000/CN - 10)25.4  In   Ia= 0.8  Itration tc= 0.4  Ige, S = (1000/CN - 10)25.4  Ige, S = (1000/CN - 10)25.4	Clevedon Meadows TP108 Calculation PR Catchment 39  A = 0.007397 km2( 100ha =1km2)  Imber CN= 92.5 (from worksheet 1)  In la= 0.8 mm (from worksheet 1)  In la= 0.17 hrs (from worksheet 1)  In la= 0.17 hrs (from worksheet 1)  In la= 0.8 mm (from worksheet 1)  In la= 0.17 hrs (from worksheet 1)  In la= 0.8 mm (fr	Clevedon Meadows TP108 Calculation PR Catchment 39  A = 0.007397 km2( 100ha =1km2)  Import	Clevedon Meadows TP108 Calculation PR Catchment 39  A = 0.007397 km2( 100ha =1km2)  Imber CN= 92.5 (from worksheet 1)  In la= 0.8 mm (from worksheet 1)  Itration tc= 0.17 hrs (from worksheet 1)  Itr

MAEN	MAVEN ASSO	CIATES		Number 4006	Sheet 13	Rev 1
Job Title Calc Title	Clevedon M TP108 Cal PR Catchi	culation	1	ithor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Nun	nber (CN) and initial A	bstraction (la)				
Soil name and classification		logic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	CN x area
C		sed Lots (70/30)		90.8	0.36	
C C		posed Roads existing Lots		94.4	0.28	
C		risting Roads		94.4	0.00	
* from Appendix B				Totals =	0.636	58.76
CN (weighted) =  la (average) =  2. Time of Concentra	total product = total area  5 x pervious area = total area	58.76 5 x	-	92.4 3 0.8	- mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L=	0.131	km (along o	Irainage path	)	
Catchment Slope	Sc=	0.05	m/m (by eq	ual area meth	nod)	
Runoff factor,	<u>CN</u> = 200 - CN	92.4 200- 92.4	. <del>=</del>	0.86	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/2	200-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.	14 0.6	0.26 1.09	2.46	s =	0.06	hrs
SCS Lag for HEC-HM	S t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	NO GOOD use 0.17	hrs

TP108 Calculation	MAEN	MAVEN	ASSOCIA	TES	Job Number 194006		Sheet 14	Rev 1
Runoff curve number CN= 92.4 (from worksheet 1)  Initial abstraction Ia= 0.8 mm (from worksheet 1)  Time of concentration tc= 0.17 hrs (from worksheet 1)  2. Calculate storage, S = $(1000/\text{CN} - 10)25.4$ = 20.9 mm  3. Average recurrence interval, ARI		TP	108 Calculation					Checked JD
Initial abstraction $la=0.8 \text{ mm (from worksheet 1)}$ Time of concentration $tc=0.17 \text{ hrs (from worksheet 1)}$ 2. Calculate storage, $S=(1000/\text{CN}-10)25.4$ $=20.9 \text{ mm}$ 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, $Q_{24}=(P_{24}-la)^2/(P_{24}-la)+S$ $=20.9 \text{ mm}$		1	A=	0.00636	km2( 100ha =1km	n2)		
Time of concentration tc= 0.17 hrs (from worksheet 1)  2. Calculate storage, S = $(1000/\text{CN} - 10)25.4$ = 20.9 mm  3. Average recurrence interval, ARI  4. 24 hour rainfall depth, P24	Runoff curve nu	mber	CN=	92.4	(from worksheet 1	)		
2. Calculate storage, S = $(1000/\text{CN} - 10)25.4$ = 20.9 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> 0.293 m3/s 0.268 (GIS) 8. Runoff depth, Q <sub>24</sub> = $(P_{24}-la)^2/(P_{24}-la)+S$ 262.0	Initial abstractio	n	la=	0.8	mm (from worksho	eet 1)		
3. Average recurrence interval, ARI  4. 24 hour rainfall depth, P24  5. Compute $c^* = P24 - 2Ia/P24 - 2Ia + 2S$ 6. Specific peak flow rate $q^*$ 7. Peak flow rate, $q_p = q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24} - Ia)^2/(P_{24} - Ia) + S$ (yr)  282.32  (mm)  0.87  0.163  0.268 (GIS)	Time of concent	ration	tc=	0.17	hrs (from workshe	et 1)		
4. 24 hour rainfall depth, P24	2. Calculate storaç	je, S =(1000/0	CN - 10)25.4		=	20.9	mm	
5. Compute $c^* = P24 - 2Ia/P24 - 2Ia + 2S$ 6. Specific peak flow rate $q^*$ 7. Peak flow rate, $q_p = q^*A^*P_{24}$ 8. Runoff depth, $Q_{24} = (P_{24} - Ia)^2/(P_{24} - Ia) + S$ 20.87  0.87  0.163  0.293  0.268 (GIS)	3. Average recurre	ence interval, <i>i</i>	ARI		100	(yr)		
6. Specific peak flow rate q* $0.163$ 7. Peak flow rate, $q_p = q^*A^*P_{24}$ $0.293$ 8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ $0.268 (GIS)$	4. 24 hour rainfall	depth, P24			282.32	(mm)		
7. Peak flow rate, $q_p = q^*A^*P_{24}$	5. Compute c* = P	24 - 2Ia/P24 -	2la+2S		0.87			
8. Runoff depth, $Q_{24} = (P_{24}-la)^2/(P_{24}-la)+S$ 262.0	6. Specific peak flo	ow rate q*			0.163			
	7. Peak flow rate,	q <sub>p</sub> =q*A*P <sub>24</sub>			0.293	m3/s	0.268 (GIS)	
9. Runoff volume, $V_{24} = 1000 \times Q_{24} A$ 1666.29 (m3)	8. Runoff depth, Q	$_{24} = (P_{24} - Ia)^2 / ($	P <sub>24</sub> -la)+S		262.0			
	9. Runoff volume,	V <sub>24</sub> = 1000xQ	<sub>24</sub> A		1666.29	(m3)		

M A E N	AVEN ASSO	CIATES		Number 94006	Sheet 15	Rev 1
Job Title Calc Title	Clevedon M TP108 Cal PR Catchi	culation	1	uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial A	bstraction (la)				
Soil name and classification	Cover description hydro	(cover type, tre	atment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		sed Lots (70/30	)	90.8	0.36	32.32
C C	_	posed Roads Existing Lots		94.4	0.16 0.00	
C		risting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	0.511	46.97
la (average) = 2. Time of Concentrat	5 x pervious area = total area	5	x 0.106 0.511	<u>8</u> 1.0	mm	
Channelisation factor	C =	0.	6 (From Tab	le 4.2)		
Catchment length	L =		_	drainage path	)	
Catchment Slope	Sc=	0.0	<u>5</u> m/m (by ed	qual area metl	nod)	
Runoff factor,	CN = 200 - CN	91. 200- 91.	9 =	0.85	<u>.</u>	
	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20}$			9 2.4	6 =	0.05	hrs
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/20}$ $= 0.14 \text{ C L}^{0.66} \text{ (CN/20)}$	4 0.6	0.21 1.0	5 2.4	•		•
			3 2.4	=		•

М				Job Number 194006	Sheet 16	Rev 1
	o Title Ic Title	Clevedon Meadows TP108 Calculation PR Catchment 41		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.005111	km2( 100ha =1km2)		
	Runoff curve number	CN=	91.9	(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 =(1	000/CN - 10)25.4		= 22.4	1 mm	
4.	Average recurrence inte 24 hour rainfall depth, P. Compute c* = P24 - 2la/	24		100 (yr) 282.32 (mm)		
	Specific peak flow rate q			0.163		
7.	Peak flow rate, q <sub>p</sub> =q*A*F	D <sub>24</sub>		<b>0.235</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24})$	-la) <sup>2</sup> /(P <sub>24</sub> -la)+S		260.5		
9.	Runoff volume, $V_{24} = 10$	00xQ <sub>24</sub> A		1331.52 (m3)		

M A E N	MAVEN ASSOC	CIATES		lumber 4006	Sheet 17	Rev 1
Job Title Calc Title	Clevedon Me TP108 Calcı PR Catchm	ulation	-	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numl	ber (CN) and initial Ab	straction (la)				
Soil name and classification	Cover description (	cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propose	ed Lots (70/30)		90.8	0.83	75.79
C C		osed Roads		94.4	0.36	
C		isting Lots sting Roads		90.8 94.4	0.00	
* from Appendix B				Totals =	1.191	109.39
CN (weighted) =  Ia (average) =	total product = total area  5 x pervious area = total area	109.39 1.191 5 x	•	91.9	mm	
2. Time of Concentrat	ion					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.225	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	91.9 200- 91.9	=	0.85	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	00-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.1	4 0.6	0.37 1.09	2.46	=	0.08	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> = 2/3	3 t <sub>c</sub>		=	0.06 NO GOOD use 0.17	hrs

	MAVEN ASSOCIATES		TES	Job Number 194006	Sheet 18	Rev 1
	Title c Title	Clevedon Meadows TP108 Calculation PR Catchment 42		Author ML	Date 15/11/2024	Checked JD
	Data Catchment Area	A=	0.011906	km2( 100ha =1km2)		
	Runoff curve number	CN=	91.9	(from worksheet 1)		
	Initial abstraction	la=	1.1	mm (from worksheet 1)		
	Time of concentration	tc=	0.17	hrs (from worksheet 1)		
2.	Calculate storage, S =(1	000/CN - 10)25.4		= 22.	5 mm	
4.	Average recurrence inter 24 hour rainfall depth, P2 Compute c* = P24 - 2Ia/	24		100 (yr) 282.32 (mm) 0.86		
6.	Specific peak flow rate q	*		0.163		
7.	Peak flow rate, q <sub>p</sub> =q*A*F	24		<b>0.548</b> m3/s	0.268 (GIS)	
8.	Runoff depth, $Q_{24} = (P_{24})$	-la)²/(P <sub>24</sub> -la)+S		260.5		
9.	Runoff volume, $V_{24} = 100$	00xQ <sub>24</sub> A		3101.16 (m3)		

M A E N	AVEN ASSO	CIATES		Number 4006	Sheet 19	Rev 1
Job Title Calc Title	Clevedon TP108 Ca PR Catch	lculation		uthor ML	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial A	Abstraction (la)				
Soil name and classification		n (cover type, trea ologic condition)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		osed Lots (70/30)		90.8	0.83	75.79
C C		oposed Roads Existing Lots		94.4	0.48	
C		xisting Roads		94.4	0.00	0.00
* from Appendix B				Totals =	1.314	121.02
la (average) =  2. Time of Concentrat	5 x pervious area = total area		0.2504 1.314	<u>l</u> 1.0	mm	
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =		_	, drainage path	)	
Catchment Slope	Sc=	0.05	_m/m (by eq	ual area metl	nod)	
Runoff factor,	CN = 200 - CN	92.1 200- 92.1	_	0.85	_	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	4 0.6	0.39 1.09	2.46	s =	0.09	hrs
SCS Lag for HEC-HMS	t <sub>p</sub> =	2/3 t <sub>c</sub>		=	0.06	hrs
					NO GOOD use	

MAEN	MAVEN	ASSOCIA	TES	Job Numbe 194006	er	Sheet 20	Rev 1
Job Title Calc Title	TP	vedon Meadows 108 Calculation R Catchment 43		Author ML		Date 15/11/2024	Checked JD
Data     Catchment Are	a	A=	0.013138	km2( 100ha =1km2	2)		
Runoff curve n	umber	CN=	92.1	(from worksheet 1)	)		
Initial abstraction	on	la=	1.0	mm (from workshe	et 1)		
Time of concer	ntration	tc=	0.17	hrs (from workshee	et 1)		
Calculate stora	ge, S =(1000/	CN - 10)25.4		=	21.7	mm	
<ol> <li>Average recurr</li> <li>24 hour rainfall</li> </ol>		ARI		100 (			
<ul><li>5. Compute c* = F</li></ul>	·	- 2la+2S		0.87	(111111)		
6. Specific peak f	ow rate q*			0.163			
7. Peak flow rate,	$q_p = q^*A^*P_{24}$			0.605	m3/s	0.268 (GIS)	
8. Runoff depth, 0	$Q_{24} = (P_{24} - Ia)^2 /$	(P <sub>24</sub> -la)+S		261.2			
9. Runoff volume	V <sub>24</sub> = 1000xG	1 <sub>24</sub> A		3431.37	(m3)		

MAEN	MAVEN ASSO	CIATES		lumber 1006	Sheet 21	Rev 1
Job Title Calc Title	Clevedon M TP108 Cal PR Catchi	culation	_	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Num	ber (CN) and initial A	bstraction (la)				
Soil name and classification	Cover description hydro	(cover type, treat	ment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С		sed Lots (70/30)		90.8	0.83	
C C		posed Roads		94.4	0.78	
C		xisting Lots risting Roads		90.8 94.4	0.00	0.00
* from Appendix B				Totals =	1.610	148.94
la (average) =	total area  5 x pervious area = total area		0.2502 1.610	0.8	mm	
2. Time of Concentra	tion					
Channelisation factor	C =	0.6	(From Table	e 4.2)		
Catchment length	L =	0.414	km (along d	rainage path	)	
Catchment Slope	Sc=	0.05	m/m (by equ	ual area metl	nod)	
Runoff factor,	CN = 200 - CN	92.5 200- 92.5	•	0.86	-	
$t_c = 0.14 \text{ C L}^{0.66} \text{ (CN/2)}$	00-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-HM	S t <sub>p</sub> = 2	2/3 t <sub>c</sub>		=	0.08	hrs

MAEN	MAVEN AS	SOCIA	TES	Job Number 194006	•	Sheet 22	Rev 1
Job Title Calc Title	TP108 Ca	Meadows alculation nment 44		Author ML		Date 15/11/2024	Checked JD
Data     Catchment Area		A=	0.016096	km2( 100ha =1km2)			
Runoff curve num	nber	CN=	92.5	(from worksheet 1)			
Initial abstraction		la=	0.8	mm (from worksheet	t 1)		
Time of concentra	ation	tc=	0.17	hrs (from worksheet	1)		
Calculate storage	, S =(1000/CN - 1	0)25.4		=	20.5	mm	
<ol> <li>Average recurren</li> <li>24 hour rainfall de</li> <li>Compute c* = P2</li> <li>Specific peak flow</li> <li>Peak flow rate, q<sub>p</sub></li> </ol>	epth, P24 4 - 2la/P24 - 2la+2 v rate q*	28		100 (y 282.32 (m 0.87 0.163	nm)	0.268 (GIS)	
<ol> <li>Runoff depth, Q<sub>24</sub></li> </ol>		)+S		262.4	0/0	0.200 (0.0)	
9. Runoff volume, V		,		4224.26 (n	า3)		

44.xlsx

M A E N	IAVEN ASSO	CIATES		lumber 4006	Sheet 23	Rev 1
Job Title Calc Title	Clevedon M TP108 Cald PR Catchn	culation	-	thor //L	Date 15/11/2024	Checked JD
1. Runoff Curve Numb	per (CN) and initial Ab	ostraction (la)				
Soil name and classification	Cover description hydro	(cover type, treation)	tment, and	Curve Number CN*	Area (ha) 10000m2=1h a	Product of CN x area
С	Propos	sed Lots (70/30)		90.8	4.11	372.83
С		posed Roads		94.4	1.15	
C C		xisting Lots isting Roads		74 94.4	1.74 0.00	
	<u> </u>			<del></del>		
* from Appendix B				Totals =	7.000	610.48
CN (weighted) =  la (average) =  2. Time of Concentrat	total product = total area  5 x pervious area = total area	610.48 7.000	Ī	87.2	mm	
		0.0		\		
Channelisation factor	C =		(From Table	•		
Catchment length	L =	0.677	_km (along d	rainage path	)	
Catchment Slope	Sc=	0.047	_m/m (by equ	ual area meth	nod)	
Runoff factor,	CN = 200 - CN	87.2 200- 87.2		0.77	-	
t <sub>c</sub> = 0.14 C L <sup>0.66</sup> (CN/20	(0-CN) <sup>-0.55</sup> Sc <sup>-0.30</sup>					
= 0.14	4 0.6	0.77 1.15	2.50	=	0.19	hrs
SCS Lag for HEC-HMS	S t <sub>p</sub> = 2	/3 t <sub>c</sub>		=	OK use 0.18717196	•

Σ		ASSOCIA	TES	Job Number 194006	Sheet 24	Rev 1
Jol	o Title Ci lc Title T	evedon Meadows P108 Calculation PR Catchment 45		Author ML	Date 15/11/2024	Checked JD
1.	Data Catchment Area	A=	0.069995	km2( 100ha =1km2)		
	Runoff curve number	CN=	87.2	(from worksheet 1)		
	Initial abstraction	la=	2.2	mm (from worksheet 1)		
	Time of concentration	tc=	0.19	hrs (from worksheet 1)		
2.	Calculate storage, S =(1000	/CN - 10)25.4		= 37.2	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+2S		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 <sub>24</sub> = (P <sub>24</sub> -la)	<sup>2</sup> /(P <sub>24</sub> -Ia)+S		247.2		
9.	Runoff volume, V <sub>24</sub> = 1000x	Q <sub>24</sub> A		17303.76 (m3)		

# APPENDIX C – OVERLAND FLOWPATH MANNINGS CALCULATIONS

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 1	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 1	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

## 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	122	l/s
	S =	Longitudinal Slope	0.008	m/m
	A =	Cross sectional area	0.254	m2
	P=	Wetted Perimeter	7.17	m
	R =	Hydraulic Radius	0.035410567	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=	<b>0.008</b> m/m
----	------------------

#### Section Location 1

Depth=	0.08 m
Width=	5.64 m
S=	0.008 m/m
A=	0.254 m <sup>2</sup>
P=	7.17 m
R=	0.035
n=	0.020

Velocity (V) 0.482 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.04

Channel Flow (Q) 122 l/sec

VxA

100 year peak discharge = 101 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 2	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 2	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

**0.003** m/m

## **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	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	

#### Longitudinal slope

S=

Section 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

Depth x Velocity (D.V) 0.32

Channel Flow (Q) 3030 l/sec

VxA

R(2/3) S(1/2)/ n

100 year peak discharge = 2968 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 3	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 3	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

## 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	1871	l/s
	S =	Longitudinal Slope	0.005	m/m
	A =	Cross sectional area	2.086	m2
	P=	Wetted Perimeter	16.30	m
	R =	Hydraulic Radius	0.12795976	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=	<b>0.005</b> m/m
Section Location	3
Depth=	0.27 m
Width=	16.00 m
S=	0.005 m/m
A=	2.086 m <sup>2</sup>
P=	16.30 m
R=	0.128
n=	0.020
Velocity (V)	0.897 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.24
Channel Flow (Q) VxA	<b>1871</b> l/sec

100 year peak discharge =

1856 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN	ASSOCIATES	Job Number	Sheet	Rev
M A E N		194006	4	A
	on Meadows	Author	Date	Checked
	d Flowpath - Section 3A	ML	15/11/2024	JD

**0.003** m/m

## **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	I	R=A/P
Where	Q=	Channel Flow	1092	/s
	S =	Longitudinal Slope	0.003 ו	m/m
	A =	Cross sectional area	0.988 ו	m2
	P=	Wetted Perimeter	3.85 ı	m
	R =	Hydraulic Radius	0.256423566 1	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=

Section Location	3A
Depth=	0.38 m

 Width=
 3.73 m

 S=
 0.003 m/m

 A=
 0.988 m²

 P=
 3.85 m

 R=
 0.256 n=

 0.020

Velocity (V) 1.105 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.42

Channel Flow (Q) 1092 l/sec

VxA

100 year peak discharge = 1053 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A I	MAVEN ASSOCIATES	Job Number 194006	Sheet 5	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 3B	ML	15/11/2024	JD

## 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	1339	l/s
	S =	Longitudinal Slope	0.003	m/m
	A =	Cross sectional area	1.145	m2
	P=	Wetted Perimeter	4.10	m
	R =	Hydraulic Radius	0.279200195	m
	n =	Mannings n	0.02	

## Longitudinal slope

S=	<b>0.003</b> m/m	
Section Location	3B	
Depth=	0.43 m	
Width=	3.96 m	
S=	0.003 m/m	
A=	1.145 m <sup>2</sup>	
P=	4.10 m	
R=	0.279	
n=	0.020	
Velocity (V)	1.169 m/sec	
R(2/3) S(1/2)/ n		
Depth x Velocity (D.V)	0.50	
Channel Flow (Q) VxA	<b>1339</b> l/sec	
100 year peak discharge =	1330 l/sec C	K

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 6	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 4	Author	Date	Checked
Calc Titl€		ML	15/11/2024	JD

## 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	2698	l/s
	S =	Longitudinal Slope	0.007	m/m
	A =	Cross sectional area	2.448	m2
	P=	Wetted Perimeter	18.09	m
	R =	Hydraulic Radius	0.135360796	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=		0.007	m/m

## Section Location 4

Depth=	0.28 m
Width=	17.81 m
S=	0.007 m/m
A=	2.448 m <sup>2</sup>
P=	18.09 m
R=	0.135
n=	0.020

Velocity (V) 1.102 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.31

Channel Flow (Q) 2698 l/sec

VxA

100 year peak discharge = 2600 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 7	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 5	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

#### 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 254	16 l/s
	S =	Longitudinal Slope 0.00	)5 m/m
	A =	Cross sectional area 2.62	27 m2
	P=	Wetted Perimeter 18.2	29 m
	R =	Hydraulic Radius 0.14	14 m
	n =	Mannings n 0.0	)2

#### Longitudinal slope

S= <b>0.005</b> m/m
---------------------

#### Section 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)/ n

Depth x Velocity (D.V) 0.28

Channel Flow (Q) 2546 l/sec

VxA

100 year peak discharge = 2512 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 8	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 6	ML	15/11/2024	JD

## 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	279	l/s
	S =	Longitudinal Slope	0.009	m/m
	A =	Cross sectional area	0.403	m2
	P=	Wetted Perimeter	7.23	m
	R =	Hydraulic Radius	0.055778547	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=	<b>0.009</b> m/m
Section Location	6
Depth=	0.11 m
Width=	7.00 m
S=	0.009 m/m
A=	0.403 m <sup>2</sup>
P=	7.23 m
R=	0.056
n=	0.020
Velocity (V)	0.692 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.08

<sup>100</sup> year peak discharge = 260 l/sec OK

279 l/sec

Channel Flow (Q)

VxA

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	9	A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 7	Author	Date	Checked
Calc Titl€		ML	15/11/2024	JD

## 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	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

#### Longitudinal slope

3- <b>0.006</b> III/III	S= 0.006	m/m
-------------------------	----------	-----

#### Section Location

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 Velocity (D.V) 0.27

Channel Flow (Q) 2218 l/sec

VxA

100 year peak discharge = 2196 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 10	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 8	ML	15/11/2024	JD

**0.006** m/m

# **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	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=

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 l/sec

VxA

100 year peak discharge = 344 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 11	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 9	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

#### 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	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	

#### Longitudinal slope

S=	0.013	m/m

# Section 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 Velocity (D.V) 0.26

Channel Flow (Q) 1677 l/sec

VxA

100 year peak discharge = 1656 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES	Job Number	Sheet	Rev
	194006	12	A
Job Title Clevedon Meadows  Calc Title Proposed Overland Flowpath - Section 10	Author	Date	Checked
	ML	15/11/2024	JD

# 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	350	l/s
	S =	Longitudinal Slope	0.005	m/m
	A =	Cross sectional area	0.56	m2
	P=	Wetted Perimeter	7.52	m
	R =	Hydraulic Radius	0.074487896	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=	<b>0.005</b> m/m
Section Location	10
Depth=	0.13 m
Width=	6.60 m
S=	0.005 m/m
A=	0.56 m <sup>2</sup>
P=	7.52 m
R=	0.074
n=	0.020
Velocity (V)	0.625 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.08
Channel Flow (Q) VxA	<b>350</b> l/sec

<sup>\*</sup> Refer TP108 Modelling for Flow rates

100 year peak discharge =

344 l/sec OK

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 13	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 11	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

**0.013** m/m

# **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	666	l/s
	S =	Longitudinal Slope	0.013	m/m
	A =	Cross sectional area	0.654	m2
	P=	Wetted Perimeter	8.66	m
	R =	Hydraulic Radius	0.075545801	m
	n =	Mannings n	0.02	

#### Longitudinal slope

S=

Section Location	11
Depth=	0.14 m
Width=	8.39 m
S=	0.013 m/m
A=	0.654 m <sup>2</sup>
P=	8.66 m
R=	0.076
n=	0.020
Velocity (V)	1.018 m/sec
R(2/3) S(1/2)/ n	

Depth x Velocity (D.V) 0.14

Channel Flow (Q) 666 l/sec

VxA

100 year peak discharge = 621 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 14	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 12	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

# 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	335	l/s
	S =	Longitudinal Slope	0.005	m/m
	A =	Cross sectional area	0.526	m2
	P=	Wetted Perimeter	6.87	m
	R =	Hydraulic Radius	0.076620539	m
	n =	Mannings n	0.02	

# Longitudinal slope

S=	<b>0.005</b> m/m
Section Location	12
Depth=	0.13 m
Width=	6.60 m
S=	0.005 m/m
A=	0.526 m <sup>2</sup>
P=	6.87 m
R=	0.077
n=	0.020
Velocity (V)	0.637 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.08
Channel Flow (Q) VxA	<b>335</b> l/sec
100 year peak discharge =	313 l/sec

<sup>\*</sup> Refer TP108 Modelling for Flow rates

OK

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 15	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 13	ML	15/11/2024	JD

**0.004** m/m

# **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	213	l/s
	S =	Longitudinal Slope	0.004	m/m
	A =	Cross sectional area	0.438	m2
	P=	Wetted Perimeter	7.23	m
	R =	Hydraulic Radius	0.060547415	m
	n =	Mannings n	0.02	

# Longitudinal slope

S=

Section Location	13	
Depth=	0.11 m	
Width=	7.00 m	
S=	0.004 m/m	
A=	0.438 m <sup>2</sup>	
P=	7.23 m	
R=	0.061	
n=	0.020	
Velocity (V) R(2/3) S(1/2)/ n	0.487 m/sec	
Depth x Velocity (D.V)	0.05	
Channel Flow (Q) VxA	<b>213</b> l/sec	
100 year peak discharge =	192 l/sec	OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A	MAVEN ASSOCIATES	Job Number 194006	Sheet 16	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 13A	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

# 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	80	l/s
	S =	Longitudinal Slope	0.005	m/m
	A =	Cross sectional area	0.208	m2
	P=	Wetted Perimeter	5.74	m
	R =	Hydraulic Radius	0.036236934	m
	n =	Mannings n	0.02	

S=	<b>0.005</b> m/m
Section Location	13A
Depth=	0.08 m
Width=	5.26 m
S=	0.005 m/m
A=	0.208 m <sup>2</sup>
P=	5.74 m
R=	0.036
n=	0.020
Velocity (V)	0.387 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.03
Channel Flow (Q) VxA	<b>80</b> l/sec
100 year peak discharge =	73 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 20	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 16A	ML	15/11/2024	JD

# 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

#### Longitudinal slope

S= **0.007** m/m

#### Section 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

Depth x Velocity (D.V) 0.32

Channel Flow (Q) 2902 l/sec

VxA

100 year peak discharge = 2845 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 21	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 17	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S= **0.008** m/m

#### Section 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 Velocity (D.V) 0.09

Channel Flow (Q) 447 l/sec

VxA

100 year peak discharge = 418 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 22	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 18	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S= 0.002 m/m

#### Section 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 Velocity (D.V) 0.04

Channel Flow (Q) 166 l/sec

VxA

100 year peak discharge = 161 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MA E N	VEN ASSOCIATES	Job Number 194006	Sheet 23	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title Mannin	gs Calculations - Section 19	ML	15/11/2024	JD

# 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	2956	l/s
	S =	Longitudinal Slope	800.0	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	

#### Longitudinal slope

S= **0.008** m/m

#### Section Location Section 19

Depth=	0.33 m
Width=	16.00 m
S=	0.008 m/m
A=	$3.137 \text{ m}^2$
P=	32.40 m
R=	0.097
n=	0.020

Velocity (V) 0.942 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.31

Channel Flow (Q) 2956 l/sec

VxA

100 year peak discharge = 2892 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAEN	MAVEN ASSOCIATES	Job Number 194006	Sheet 24	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title N	Iannings Calculations - Section 20	ML	15/11/2024	JD

# 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 19	95 l/s
	S =	Longitudinal Slope 0.00	06 m/m
	A =	Cross sectional area 0.4	71 m2
	P=	Wetted Perimeter 13.4	46 m
	R =	Hydraulic Radius 0.03	35 m
	n =	Mannings n 0.0	02

#### Longitudinal slope

S= **0.006** m/m

#### Section Location Section 20

Donth-	0.12 m
Depth=	0.12 111
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)/ n

Depth x Velocity (D.V) 0.05

Channel Flow (Q) 195 l/sec

VxA

100 year peak discharge = 174 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVE N	EN ASSOCIATES	Job Number 194006	Sheet 25	Rev A
	vedon Meadows	Author	Date	Checked
	Calculations - Section 21	ML	15/11/2024	JD

# 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 254	3 l/s
	S =	Longitudinal Slope 0.00	5 m/m
	A =	Cross sectional area 3.30	1 m2
	P=	Wetted Perimeter 32.4	3 m
	R =	Hydraulic Radius 0.10	2 m
	n =	Mannings n 0.0	2

#### Longitudinal slope

S= **0.005** m/m

#### Section 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 Velocity (D.V) 0.26

Channel Flow (Q) 2543 l/sec

VxA

100 year peak discharge = 2511 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 26	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 22	ML	15/11/2024	JD

# Calc 1: Capacity of Channel Flow (Q), Mannings formula

Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/P
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
	Q= S = A = P= R =	Q= Channel Flow S = Longitudinal Slope A = Cross sectional area P= Wetted Perimeter R = Hydraulic Radius

#### Longitudinal slope

S= **0.005** m/m

#### Section 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)/ n

Depth x Velocity (D.V) 0.02

Channel Flow (Q) 44 l/sec

VxA

100 year peak discharge = 30 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 27	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 23	ML	15/11/2024	JD

# 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

#### Longitudinal slope

S= **0.005** m/m

#### Section 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

Velocity (V) 0.711 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.23

Channel Flow (Q) 2075 l/sec

VxA

100 year peak discharge = 1966 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES	Job Number	Sheet	Rev
	194006	28	A
Job Title Clevedon Meadows	Author	Date	Checked
Calc Titl∈ Proposed Overland Flowpath - Section 24	ML	15/11/2024	JD

# 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	

S=	<b>0.005</b> m/m
Section 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 Velocity (D.V)	0.10
Channel Flow (Q)	<b>449</b> I/sec
VxA	
100 year peak discharge =	427 l/sec OK
100 year peak discharge -	421 1/3eC OK
* Refer TP108 Modelling for Flow rates	
_	

MAE	MAVEN ASSOCIATES	Job Number 194006	Sheet 29	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 25	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

# 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	1521 l/s	;
	S =	Longitudinal Slope	0.008 m	/m
	A =	Cross sectional area	1.485 m	2
	P=	Wetted Perimeter	13.53 m	
	R =	Hydraulic Radius	0.109723659 m	
	n =	Mannings n	0.02	

#### Longitudinal slope

VxA

S=	<b>0.008</b> m/m
Section Location	25
Depth=	0.22 m
Width=	13.27 m
S=	0.008 m/m
A=	1.485 m <sup>2</sup>
P=	13.53 m
R=	0.110
n=	0.020
Velocity (V) R(2/3) S(1/2)/ n	1.024 m/sec
Depth x Velocity (D.V)	0.23
Channel Flow (Q)	<b>1521</b> l/sec

100 year peak discharge =

1503 l/sec

OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES	Job Number	Sheet	Rev
	194006	30	A
Job Title Clevedon Meadows	Author	Date	Checked
Calc Titl∈ Proposed Overland Flowpath - Section 26	ML	15/11/2024	JD

**0.014** m/m

# **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	67 l/s
	S =	Longitudinal Slope	0.014 m/m
	A =	Cross sectional area	0.12 m2
	P=	Wetted Perimeter	4.12 m
	R =	Hydraulic Radius	0.029097963 m
	n =	Mannings n	0.02

# Longitudinal slope

S=

_	******
Section Location	26
Depth=	0.06 m
Width=	4.00 m
S=	0.014 m/m
A=	0.12 m <sup>2</sup>
P=	4.12 m
R=	0.029
n=	0.020
Velocity (V)	0.559 m/sec
R(2/3) S(1/2)/ n	
(-,-) - ()	
Depth x Velocity (D.V)	0.03
Boput X Volodky (B.V)	0.00
Channel Flow (Q)	<b>67</b> l/sec
VxA	01 1/360
VAC	
100 year peak discharge =	43 l/sec OK
. oo year pear doonargo	.5 ,,555

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAEN	MAVEN ASSOCIATES	Job Number 194006	Sheet 31	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Titl∈ Prop	oosed Overland Flowpath - Section 27	ML	15/11/2024	JD

**0.008** m/m

# **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	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	

#### Longitudinal slope

S=

Section 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
Velocity (V)	1.020 m/sec
R(2/3) S(1/2)/ n	

Depth x Velocity (D.V) 0.22

Channel Flow (Q) 1504 l/sec

VxA

100 year peak discharge = 1459 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 32	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 28	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

# 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	391 l/s	
	S =	Longitudinal Slope	0.005 m/	m
	A =	Cross sectional area	0.613 m <sup>2</sup>	2
	P=	Wetted Perimeter	7.99 m	
	R =	Hydraulic Radius	0.076759329 m	
	n =	Mannings n	0.02	

S=	<b>0.005</b> m/m
Section Location	28
Depth= Width= S= A= P= R= n=	0.14 m 7.72 m 0.005 m/m 0.613 m <sup>2</sup> 7.99 m 0.077 0.020
 Velocity (V) R(2/3) S(1/2)/ n	0.638 m/sec
Depth x Velocity (D.V)  Channel Flow (Q)  VxA	0.09 <b>391</b> l/sec
100 year peak discharge =	383 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES	Job Number	Sheet	Rev
	194006	33	A
Job Title Clevedon Meadows	Author	Date	Checked
Calc Titl∈ Proposed Overland Flowpath - Section 29	ML	15/11/2024	JD

# 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	1012 l/s	
	S =	Longitudinal Slope	0.007 m/	m
	A =	Cross sectional area	1.141 m <sup>2</sup>	2
	P=	Wetted Perimeter	11.67 m	
	R =	Hydraulic Radius	0.097797206 m	
	n =	Mannings n	0.02	

#### Longitudinal slope

	S=	0.007	m/m
Section	n Location	29	
	Depth=	0.2	m
	Width=	11.40	m
	S=	0.007	m/m
	A=	1.141	$m^2$
	P=	11.67	m
	R=	0.098	
	n=	0.020	
	Velocity (V)	0.887	m/sec
	R(2/3) S(1/2)/ n		
	Depth x Velocity (D.V)	0.18	

Channel Flow (Q) 1012 l/sec

VxA

100 year peak discharge = 1008 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES	Job Number	Sheet	Rev
	194006	34	A
Job Title Clevedon Meadows	Author	Date	Checked
Calc Titl∈ Proposed Overland Flowpath - Section 30	ML	15/11/2024	JD

# 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	423	l/s
	S =	Longitudinal Slope	0.008	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	

S=	<b>0.008</b> m/m
Continu Location	20
Section Location	30
Depth=	0.13 m
Width=	6.60 m
S=	0.008 m/m
A=	0.525 m <sup>2</sup>
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 Velocity (D.V)	0.10
Channel Flow (Q)	<b>423</b> l/sec
VxA	
100 year peak discharge =	372 l/sec OK
* Refer TP108 Modelling for Flow rates	

MAE	MAVEN ASSOCIATES	Job Number 194006	Sheet 35	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 31	ML	15/11/2024	JD

**0.008** m/m

372 l/sec

OK

# **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	299 l/s
	S =	Longitudinal Slope	0.008 m/m
	A =	Cross sectional area	0.426 m2
	P=	Wetted Perimeter	6.84 m
	R =	Hydraulic Radius	0.062326262 m
	n =	Mannings n	0.02

# Longitudinal slope

S=

Section Location	31
Depth=	0.13 m
Width=	6.60 m
S=	0.008 m/m
A=	0.525 m <sup>2</sup>
P=	6.84 m
R=	0.062
n=	0.020
Velocity (V)	0.702 m/sec
R(2/3) S(1/2)/ n	
Depth x Velocity (D.V)	0.08
Channel Flow (Q) VxA	<b>423</b> l/sec

100 year peak discharge =

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAE	MAVEN ASSOCIATES	Job Number 194006	Sheet 36	Rev A
Job Title	Clevedon Meadows Proposed Overland Flowpath - Section 32	Author	Date	Checked
Calc Title		ML	15/11/2024	JD

# 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	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	

S=	<b>0.009</b> m/m
Section Location	32
Geetion Location	02
Depth=	0.13 m
Width=	6.60 m
S=	0.009 m/m
A=	0.525 m <sup>2</sup>
P=	6.87 m
R=	0.076
n=	0.020
Velocity (V)	0.854 m/sec
R(2/3) S(1/2)/ n	0.00 1 11,1000
Depth x Velocity (D.V)	0.11
Channel Flow (Q)	<b>448</b> l/sec
VxA	
100 year peak discharge =	372 l/sec OK
- , ,	

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 37	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 33	ML	15/11/2024	JD

# 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	140 l/s
	S =	Longitudinal Slope	0.009 m/m
	A =	Cross sectional area	0.246 m2
	P=	Wetted Perimeter	5.91 m
	R =	Hydraulic Radius	0.041610284 m
	n =	Mannings n	0.02

	S=	0.009	m/m	
Section	Location	33		
	Depth= Width= S= A= P=	0.08 5.74 0.009 0.246 5.91	m m/m m <sup>2</sup>	
	R= n=	0.042 0.020		
	Velocity (V) R(2/3) S(1/2)/ n	0.569	m/sec	
	Depth x Velocity (D.V)	0.05		
	Channel Flow (Q) VxA	140	l/sec	
	100 year peak discharge =	119	l/sec	OK
	* Refer TP108 Modelling for Flow rates			

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 38	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Proposed Overland Flowpath - Section 34	ML	15/11/2024	JD

# Calc 1: Capacity of Channel Flow (Q), Mannings formula

	Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/F
Where	Q=	Channel Flow	155 l/s
	S =	Longitudinal Slope	0.011 m/m
	A =	Cross sectional area	0.246 m2
	P=	Wetted Perimeter	5.91 m
	R =	Hydraulic Radius	0.041610284 m
	n =	Mannings n	0.02

S=	<b>0.011</b> m/m	
Section Location	34	
Depth= Width= S= A= P= R=	0.09 m 5.94 m 0.011 m/m 0.246 m <sup>2</sup> 5.91 m 0.042 0.020	
n= Velocity (V) R(2/3) S(1/2)/ n	0.629 m/sec	
Depth x Velocity (D.V)  Channel Flow (Q)  VxA	0.06 <b>155</b> l/sec	
100 year peak discharge =	119 l/sec C	K

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 39	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 35	ML	15/11/2024	JD

# Calc 1: Capacity of Channel Flow (Q), Mannings formula

	Q=	(AR <sup>2/3</sup> S <sup>1/2</sup> )/n	R=A/F
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

#### Longitudinal slope

S= 0.003 m/m

#### Section Location Section 35

Depth=	0.35 m
Width=	16.00 m
S=	0.003 m/m
A=	$3.478 \text{ m}^2$
P=	32.43 m
R=	0.107
n=	0.020

Velocity (V) 0.618 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.22

Channel Flow (Q) 2148 l/sec

VxA

100 year peak discharge = 2122 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

M A E	MAVEN ASSOCIATES	Job Number 194006	Sheet 40	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 36	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S=	<b>0.009</b> m/m

#### Section 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

Depth x Velocity (D.V) 0.70

Channel Flow (Q) 2476 l/sec

VxA

100 year peak discharge = 2417 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	41	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 36 A	ML	15/11/2024	JD

# 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	334 l/s
	S =	Longitudinal Slope	0.005 m/m
	A =	Cross sectional area	0.525 m2
	P=	Wetted Perimeter	6.86 m
	R =	Hydraulic Radius	0.076 m
	n =	Mannings n	0.02

#### Longitudinal slope

S= **0.005** m/m

#### Section Location Section 36A

Depth=	0.15 m
Width=	0.12 m
S=	0.005 m/m
A=	0.525 m <sup>2</sup>
P=	6.86 m
R=	0.076
n=	0.020

Velocity (V) 0.637 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.19

Channel Flow (Q) 334 l/sec

VxA

100 year peak discharge = 297 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	42	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 37	ML	15/11/2024	JD

# 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 18	41 l/s
	S =	Longitudinal Slope 0.0	05 m/m
	A =	Cross sectional area 2.7	17 m2
	P=	Wetted Perimeter 32.	34 m
	R =	Hydraulic Radius 0.0	84 m
	n =	Mannings n 0.	02

#### Longitudinal slope

S= **0.005** m/m

#### Section 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)/ n

Depth x Velocity (D.V) 0.20

Channel Flow (Q) 1841 l/sec

VxA

100 year peak discharge = 1828 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	43	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 38	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

#### Section 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

Velocity (V) 0.673 m/sec

R(2/3) S(1/2)/ n

Depth x Velocity (D.V) 0.17

Channel Flow (Q) 1790 l/sec

VxA

100 year peak discharge = 1746 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	44	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 39	ML	15/11/2024	JD

# 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	344 l/s
	S =	Longitudinal Slope 0.0	008 m/m
	A =	Cross sectional area 0.6	365 m2
	P=	Wetted Perimeter 16	.86 m
	R =	Hydraulic Radius 0.0	039 m
	n =	Mannings n 0	.02

#### Longitudinal slope

S= **0.008** m/m

#### Section 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

Depth x Velocity (D.V) 0.08

Channel Flow (Q) 344 l/sec

VxA

100 year peak discharge = 341 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	45	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 40	ML	15/11/2024	JD

# Calc 1: Capacity of Channel Flow (Q), Mannings formula

	Q=	$(AR^{2/3}S^{1/2})/n$	R=A/P
Where	Q=	Channel Flow	305 l/s
	S =	Longitudinal Slope 0	0.005 m/m
	A =	Cross sectional area 0	.728 m2
	P=	Wetted Perimeter 1	7.80 m
	R =	Hydraulic Radius 0	0.041 m
	n =	Mannings n	0.02

#### Longitudinal slope

#### Section 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

Depth x Velocity (D.V) 0.07

Channel Flow (Q) 305 l/sec

VxA

100 year peak discharge = 293 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	46	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 41	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S= **0.005** m/m

#### Section 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 Velocity (D.V) 0.06

Channel Flow (Q) 242 l/sec

VxA

100 year peak discharge = 235 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAEN	MAVEN ASSOCIATES	Job Number 194006	Sheet 47	Rev A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 42	ML	15/11/2024	JD

# 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	574 l/s
	S =	Longitudinal Slope	0.005 m/m
	A =	Cross sectional area	1.114 m2
	P=	Wetted Perimeter	20.00 m
	R =	Hydraulic Radius	0.056 m
	n =	Mannings n	0.02

#### Longitudinal slope

S= **0.005** m/m

#### Section 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

Depth x Velocity (D.V) 0.28

Channel Flow (Q) 574 l/sec

VxA

100 year peak discharge = 548 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	48	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 43	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S= **0.010** m/m

#### Section 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)/ n

Depth x Velocity (D.V) 0.11

Channel Flow (Q) 635 l/sec

VxA

100 year peak discharge = 605 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	49	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 44	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S= **0.017** m/m

#### Section 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)/ n

Depth x Velocity (D.V) 0.14

Channel Flow (Q) 753 l/sec

VxA

100 year peak discharge = 743 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates

MAVEN ASSOCIATES		Job Number	Sheet	Rev
		194006	50	A
Job Title	Clevedon Meadows	Author	Date	Checked
Calc Title	Mannings Calculations - Section 45	ML	15/11/2024	JD

# 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	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

#### Longitudinal slope

S=	0.017	m/m

#### Section 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

Depth x Velocity (D.V) 0.16

Channel Flow (Q) 3266 l/sec

VxA

100 year peak discharge = 3201 l/sec OK

<sup>\*</sup> Refer TP108 Modelling for Flow rates