# Discharging Stormwater onto surface (Tank)

Please perform following tasks and submit all the document to council along with the application

    i.   Prepare a drainage plan for stormwater and submit the layout

    ii. Calculate the greenfield flow and storage volume using the provided excel file

    iii. Calculate the orifice and tank size

    i.   A drainage plan can be made like below showing all the stormwater flow path withing the property
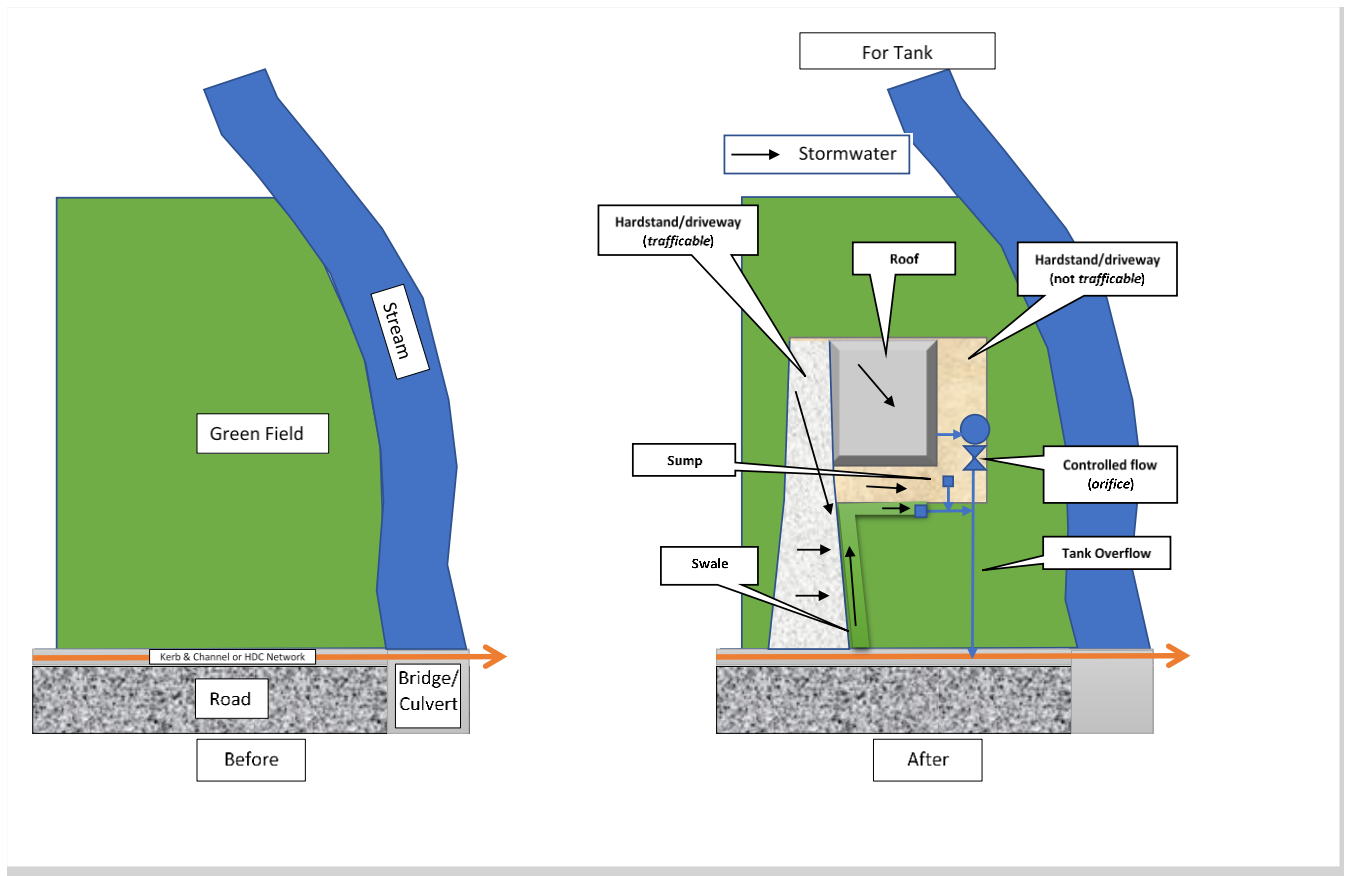
ii.   How to calculate greenfield flow and storage volume
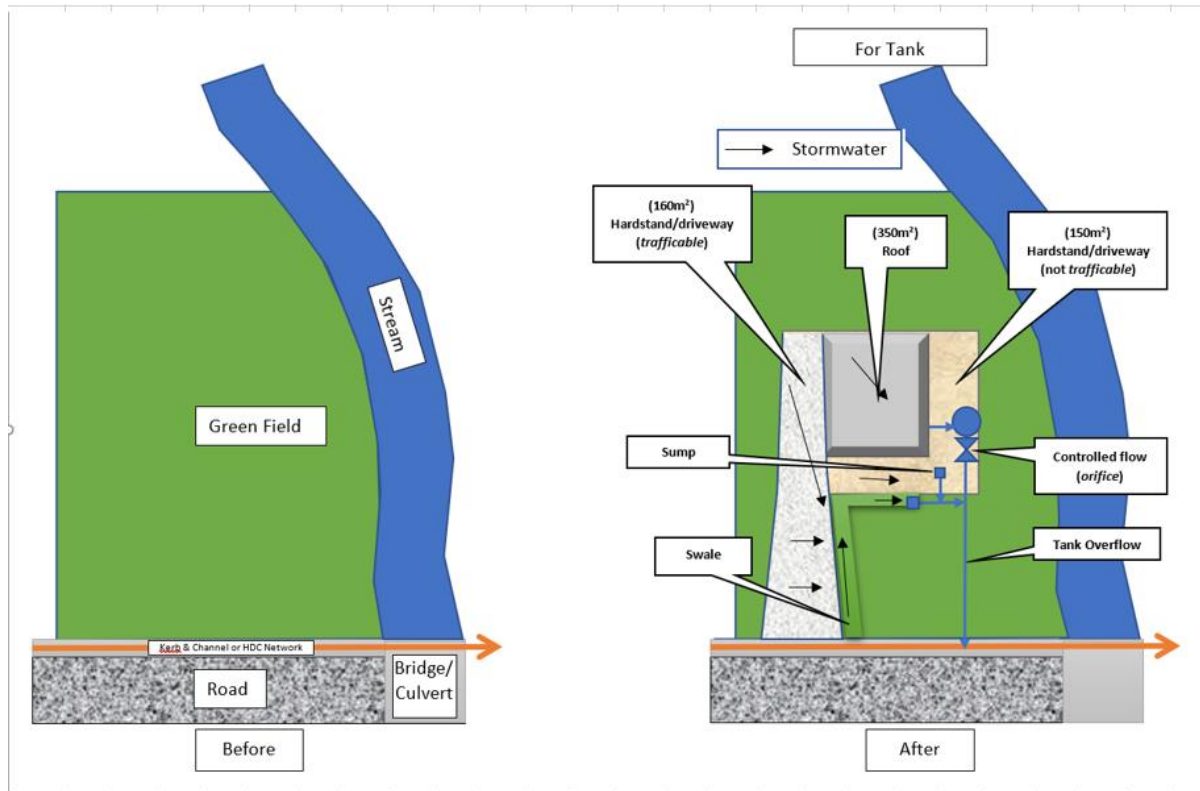
Example above on the right is used to calculate the greenfield flow and storage volume. By inputting all the required values in orange cells in the provided excel file, the excel will calculated the required greenfield flow and storage volume.

iii.   Calculate the orifice and tank size

After getting the required flow and volume to attenuate, the orifice and tank size can be calculated. Based on required storage volume, tank size and dimensions can be selected. After selecting the tank, the total height needs to be inputted in the excel file. The orifice size depends on height from orifice to the overflow pipe. The orifice diameter decreases with the increase of height, but the height needs to less than the overflow pipe.

Link to get Intensities   https://hirds.niwa.co.nz/   **This calculation sheet is only applicable for Amberley unless it is advised by HDC otherwise**

Table.1 Rainfall intensities (mm/hr) :: RCP8.5 for the period 2081-2100
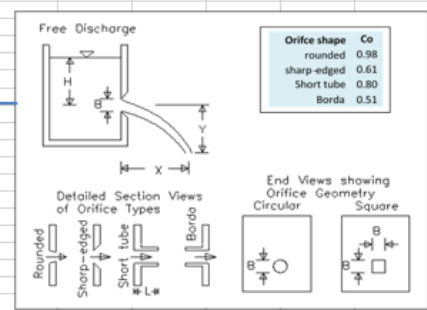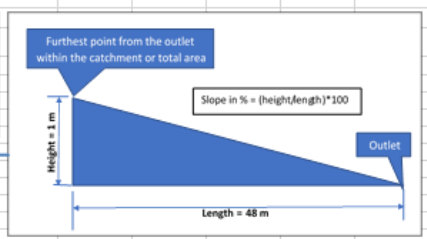
		min	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
ARI	**ARI**	**AEP**	10m	20m	30	1h	2h	6h	12h	24h	48h	72h	96h	120h
2	1.58	0.63	30.10	20.80	17.10	12.50	9.17	5.59	4.01	2.82	1.90	1.47	1.22	1.05
2	2.00	0.50	34.20	23.50	19.30	14.10	10.40	6.29	4.51	3.15	2.12	1.65	1.36	1.16
5	5.00	0.20	49.30	33.70	27.50	19.90	14.60	8.76	6.25	4.32	2.89	2.24	1.84	1.57
10	10.00	0.10	61.70	42.00	34.20	24.70	18.00	10.70	7.61	5.25	3.50	2.70	2.22	1.89
20	20.00	0.05	75.80	51.30	41.70	29.90	21.70	12.90	9.10	6.23	4.14	3.19	2.61	2.22
30	30.00	0.03	84.80	57.30	46.50	33.30	24.10	14.30	10.00	6.85	4.54	3.49	2.86	2.43
40	40.00	0.03	91.50	61.80	50.00	35.80	25.80	15.30	10.70	7.32	4.83	3.72	3.04	2.58
50	50.00	0.02	97.20	65.50	53.00	37.80	27.30	16.10	11.30	7.67	5.07	3.89	3.18	2.70
60	60.00	0.02	102.00	68.50	55.40	39.50	28.40	16.80	11.70	7.99	5.27	4.04	3.30	2.80
80	80.00	0.01	110.00	73.60	59.50	42.30	30.40	17.90	12.50	8.48	5.59	4.28	3.49	2.96
100	100.00	0.01	116.00	77.60	62.70	44.50	32.00	18.80	13.10	8.88	5.84	4.46	3.65	3.09
250	250.00	0.00	143.00	95.50	76.80	54.30	38.80	22.50	15.70	10.60	6.90	5.26	4.29	3.62

Rainfall Intensity HIRDS V4 RCP8.5 for the period 2081-2100

Column1	Column2	Column4	
Items	Symbol		*Proposed or Developing Condition*
Catchment Characteristics			
Roof	Ar (m2)	m²	196.00
Runoff Coeffient (Roof)	Cr		0.90
Road & Hard Stand	Ah (m2)	m²	8.00
Runoff Coeffient (Road & Hard Stand)	Ch		0.85
Other Area	Ao (m2)	m²	0.00
C for other areas	Co		0.00
Total Area	A (m2)	m²	204.00
Gross C	C		0.90
Ground Slope			
Length	L (m)	m	44.00
height	Hus (m)	m	7.00
Ground Slope s	S (%)	%	15.91
Ground Roughness	Manning's 'n'		0.00
Time of Travel		min	13
Rainfall Intensity HIRDS V4 (50yr ARI)	I(mm/h)	mm/hr	97.65
Green Field Flow Rate Required	Q (m3/s)	m³/s	0.0012
Storage Volume Required at greenfield f	Vd	m³	2.62
			Design / *Suggested*
Depth/Height of the tank (base to lid)	Td	m	2.10
Overflow pipe diameter	Opd	mm	100
Orifice to overflow height (center to ce	H	m	2.00
Height Check			ok
Orifice Coefficient	Co		0.80
Orifice Design Diameter (mm)	B	mm	17.00 / 17.77
Orifice flow	Qo	m³/sec	0.0011
Flow Check			ok
Tank design			**Design**
Tank Storage Capacity		m³	3.00
Number of Tanks			1
Tank storage required (depends on orifice size)		m³	2.8
Capacity Check			ok

Surface type / C value

Surface type	C value
Roofs	0.90
Chip seal, concrete, and asphaltic concrete pavements	0.85
Bare impermeable clay with no runoff control	0.70
Bare uncultivated soil with medium soakage	0.60
Unsealed metalled pavements	0.50
Bush, pasture and berms on poor draining soils	0.30
Bush, pasture and berms on good draining soils	0.20

Slope in % = (height/length)*100

Furthest point from the outlet within the catchment or total area

Height = 1 m   Length = 48 m   Outlet

Surface Condition	"n"
Paved	0.0150
Bare soil	0.0275
Poorly grassed	0.0350
Average grassed	0.0450
Densely grassed	0.0600

Free Discharge

Orifce shape	Co
rounded	0.98
sharp-edged	0.61
Short tube	0.80
Borda	0.51

Detailed Section Views of Orifice Types   End Views showing Orifice Geometry

Rounded   Sharp-edged   Short tube   Borda   Circular   Square

Typical Tank Capacity & Height	
Capacity (m³)	Height (m)
30.00	3.10
25.00	2.80
10.00	2.90
5.00	2.65
4.00	2.20
3.00	1.76
2.00	1.74
1.00	1.42
0.45	0.82

This calculation is only to be used after the permit from Hurunui District Council as a design aid for soakpit and should not be used or relied upon by any other person or entity or for any other purposes.

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250	250.00	0.00	143.00	95.50	76.80	54.30	38.80	22.50	15.70	10.60	6.90	5.26	4.29	3.62

Rainfall Intensity HIRDS V4 RCP8.5 for the period 2081-2100

Column1	Column2	Column4	Proposed or Developing Condition	
Items	Symbol			
Catchment Characteristics				
Roof	Ar (m2)	m²	196.00	
Runoff Coeffient (Roof)	Cr		0.90	
Road & Hard Stand	Ah (m2)	m²	8.00	
Runoff Coeffient (Road & Hard Stand)	Ch		0.85	
Other Area	Ao (m2)	m²	0.00	
C for other areas	Co		0.00	
Total Area	A (m2)	m²	204.00	
Gross C	C		0.90	
Ground Slope				
Length	L (m)	m	44.00	
height	Hus (m)	m	7.00	
Ground Slope s	S (%)	%	15.91	
Ground Roughness	Manning's 'n'		0.00	
Time of Travel		min	13	
Rainfall Intensity HIRDS V4 (50yr ARI)	I (mm/h)	mm/hr	87.65	
Green Field Flow Rate Required	Q (m3/s)	m³/s	0.0012	
Storage Volume Required at greenfield	Vd		2.62	

Surface type	C value
Roofs	0.90
Chip seal, concrete, and asphaltic concrete pavements	0.85
Bare impermeable clay with no runoff control	0.70
Bare uncultivated soil with medium soakage	0.60
Unsealed metalled pavements	0.50
Bush, pasture and berms on poor draining soils	0.30
Bush, pasture and berms on good draining soils	0.20

Slope in % = (height/length)*100

Furthest point from the outlet within the catchment or total area

Height = 1 m · Length = 48 m · Outlet

Surface Condition	"n"
Paved	0.0150
Bare soil	0.0275
Poorly grassed	0.0350
Average grassed	0.0450
Densely grassed	0.0600

	Design	Suggested
Orifice Design		
Depth/Height of the tank (base to lid) — Td — m	2.10	
Overflow pipe diameter — Opd — mm	100	
Orifice to overflow height (center to ce...) — H — m	2.00	
Height Check	ok	
Orifice Coefficient — Co	0.80	
Orifice Design Diameter (mm) — B — mm	17.00	17.77
Orifice flow — Qo — m³/sec	0.0011	
Flow Check	ok	

	Design
Tank design	
Tank Storage Capacity — m³	3.00
Number of Tanks	1
Tank storage required (depends on orifice size) — m³	2.8
Capacity Check	ok

Typical Tank Capacity & Height	
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2.00	1.74
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0.45	0.82

Free Discharge

Orifce shape	Co
rounded	0.98
sharp-edged	0.61
Short tube	0.80
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Detailed Section Views of Orifice Types — Rounded, Sharp-edged, Short tube, Borda

End Views showing Orifice Geometry — Circular, Square

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Tank wall

U300 Uniseal fitting

90° x 90° PVC elbow

90mm PVC pipe

Leaf guard to be provided at roof level

Downpipe for roof drainage

Uniseal fitting to fit downpipe diameter

Inspection cover

Detention storage

MAIN OUTLET Inspection Tee with screw cap

PVC overflow pipe

Re-use outlet

Drainage outlet

Orifice

PVC overflow pipe

Tank wall

Inspection Tee with blank screw cap

Orifice

Brass back nut — 2 off.

NOTES:

1. Ensure ground beneath tank footing matches suppliers specifications

2. Fit Uniseal in accordance with manufacturers specifications

3. Fit debris protection to roof drainage in accordance with manufacturers specifications

4. Holes drilled through tank wall to be in accordance with manufacturers specification