DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

Kaiapoi South - Stormwater Facility Sizing Calculations

Completed by:	Adam Lill	Date:	31-07-2024
Checked by:	Jamie Verstappen	Date:	31-07-2024
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Refer to Catchment Plan attached

Assumptions:
1. Critical storm duration is 24hrs, ARI 50 years
2. Discharge based on pre development flow rate
3. First flush treatment to be be provided with onsite basin
4. Site is zoned Residential Suburban
5. First flush basin to receive secondary treatment via constructed wetland
6. Detention storage to be provided by flooding wetland 0.5m above operating level

Stormwater flow and volume calculations using the requirements of Ecan consent CRC120223 and the Christchurch City Council Waterway, Wetlands & Drainage Guide (WWDG).

Area (Ha), A	Pre Development Peak Flow Runoff Coefficient, C_{pre}	Post Development Peak Flow Runoff Coefficient (50 year), C_{post}	First Flush Discharge Coefficent, C_{ff}
12.740	0.4	0.65	0.63

Rainfall intensity for 1 in 50 year, 24hr event: HIRDS RCP 8.5 2050-2081 5.88 mm/hr

d_{ff} = 25 mm

First Flush Volume = 10 x C_{ff} x A x d_{ff} WWDG Eqn 6.2

First Flush Volume = 2007 m³

Discharge over four days 5.81 l/s

Simplified Wetland Sizing WWDG Eqn 6-24

$A_s = Q \times t / y \times n$

Q =	502	m^3/day	Flow rate through the wetland (FFB Discharge)
t =	2	days	Hydraulic residence time WWDG 6.7.2
y =	0.25	m	Average operating water depth
n =	0.75		Wetland vegetation porosity WWDG 6.7.2

A_s = 5351 sq.m

Full Flood Volume calculation = 2.78CiA

	C_{post}	i	A	Q	
Lot Runoff	0.65	5.88	12.740	135.4	l/s
Storm Volume				**11695**	m³ for 24hrs

Discharge rate of storm volume at predevelopment rate

	C_{pre}	i	A	Q	
Catchment A	0.40	5.88	12.740	**83.3**	l/s
Discharge volume over 24hrs storm event				**7197**	**m³**

Full flood volume less discharge over storm event

V = 11695 -7197 = **4498 m³**

Required First Flush Volume	2007 m³
Required area of wetland	5351 m³
Volume of 0.5m additional ponding in wetland	2675 m³
Storage Provided by FFB and Wetland	4682 m³
Additional Storage Required	**-184 m³**