

Appendix C: Compost SRPs calculation

Summary

Designed: JYJC 15/10/2018
Reviewed: BESE 23/10/2018

Purpose:

To provide treatment (via Sediment Retention Pond) for the current and proposed activities in the Composting area. One SRP is for the treatment of stormwater runoff from the existing refueling station, and truck wash area. Another SRP is for the treatment of stormwater runoff from the proposed unsealed road and existing storage shed.

Assumptions:

1. Assume that there are drains that allow stormwater to flow into the ponds.
2. Contours are sourced from LINZ. Assume groundwater level is the nearby stream level at 1.5mRL. The paddock ground level is at 2.0mRL. This means there's only 0.5m live storage. Both scenarios have 0.5m live storage, therefore the pond sizes are extended to accommodate the flows if necessary.

Pond Dimensions	Proposed	
	SRP1	SRP2
Area of treatment (ha)	3.051	2.36
Min. pond storage (m3)	610	472
Live storage depth (m)	0.8	0.8
Dead storage depth (m)	0.4	0.4
Bottom L x W (m)	42 m x 10 m	32 m x 10 m
Top L x W (m) incl. freeboard 300mm	49.2 m x 17.2 m	39 m x 17 m
Primary spillway height (m)	1.2	1.15
Emergency spillway height (m)	1.5	1.45
Decants	3	2
No. of holes in each decant	136	157

Sediment Retention Pond 1 (SRP1)

SRP1 treats refuelling station, truck wash area and storage area.

Catchment information

Catchment area	30510	m ²	3.051	ha
Pond side slope	2	H:1V	Pond slope shall not exceed 4H:1V	
Pond inlet batter	2	H:1V		
Freeboard height	0.3	For primary spillway and emergency spillway		
% volume of catchment	2	WRC SRP factsheet - slopes<10% and <200m is 2%		

Basic measurements (base values)

Catchment area (m ²)	Min pond volume (m ³)	pond base length (m)	pond base width (m)	Depth of dead storage (m)	Depth of live storage (m)	CHECK L:W	CHECK total height
30510	610.2	42	10	0.4	0.8	4.2	1.2
0		ok	ok	Okay	Okay	Okay	Okay

Emergency spillway height: 1.5
 Top of pond height: 1.8
300mm freeboard above primary spillway

Measurements based on depth of storage and pond side slope

top of dead storage length (m)	top of live storage length (m)	top of emergency spillway length (m)	top of pond length (m)	top of dead storage width	top of live storage width	top of emergency spillway width (m)	top of pond width (m)
43.6	46.8	48	49.2	11.6	14.8	16	17.2

Volume measurement

Min dead storage volume (m ³)	Actual dead storage volume (m ³)	Min. live storage volume (m ³)	Actual live storage volume (m ³)	Total vol (m ³)
183	185.0	427.14	478.0	663.0
	Okay		Okay	(Using formula of truncated rectangular pyramid)

Decants

No. of decants	3	Number of decants are based on catchment size. Refer to E&SC guidelines from Env Waikato
Decants required for area	2.0	(Decants should produce 4.5L/s/decant and we should have a flow of 3L/s/ha)
Holes in decants	407	
Holes in each decant	136	

FOREBAY CALCULATION

Pond volume	610.2
side slope	1
Freeboard height	0.2
% volume of sediment storage	10

Basic measurements (base values)

Pond volume (m3)	Min forebay volume (m ³)	Depth of storage (m)	pond base length (m)	pond base width (m)
610.2	61.02	1	3	10
		Okay		

Level spreader height 1.6 100 mm higher than the emergency spillway invert

Measurements based on depth of storage and pond side slope

top of storage length (m)	top of pond length (m)	top of storage width (m)	top of pond width (m)
5	5.4	12	12.4
	ok		

Volume calculations

Min. storage volume (m3)	Actual storage volume (m3)
61.02	76.032
	Okay (Using formula of truncated rectangular pyramid)

Primary Spillway 1

Catchment area, A = 3.05 ha
Primary spillway diameter (mm) = Manhole riser and min. 300mm dia. outlet required

Emergency Spillway 1

Designed to convey 100 year flow event.

Rational method¹ to get flow Q:

Catchment area, A = 3.05 ha
Channel co-efficient, c = 0.6 Bare uncultivated soil with med. soakage
1% AEP, 10 min, i = 154 mm/hr from hirds v4 (CC 2031-2050)

Storm flowrate, Q_{storm} = 0.78 m3/s

Determine length of bottom width of the emergency spillway:

Emergency spillway design from TP10, pg 5-13

Q discharge through spillway 0.79 Okay
L horizontal bottom width spillway 4
h depth of flow at design flow 0.22
Z H:V side slope 3 (Recommended side slope)

Sediment Retention Pond 2 (SRP2)

SRP2 treating converted unsealed road area and storage unit area

Catchment information

Catchment area	23600	m2	2.36	ha
Pond side slope	2	H:1V	Pond slope shall not exceed 4H:1V	
Pond inlet batter	2	H:1V	Min. batter	
Freeboard height	0.3	For primary spillway and emergency spillway		
% volume of catchment	2	WRC SRP factsheet - slopes<10% and <200m is 2%		

Basic measurements (base values)

Catchment area (m ²)	Min pond volume (m ³)	pond base length (m)	pond base width (m)	Depth of dead storage (m)	Depth of live storage (m)	CHECK L:W	CHECK total height
23600	472	32	10	0.4	0.75	3.2	1.15
0				Okay	Okay	Okay	Okay

Emergency spillway height 1.45
Top of pond height 1.75
300mm freeboard above primary spillway

Measurements based on depth of storage and pond side slope

top of dead storage length (m)	top of live storage length (m)	top of emergency spillway length (m)	top of pond length (m)	top of dead storage width	top of live storage width	top of emergency spillway width (m)	top of pond width (m)
33.6	36.6 ok	37.8	39	11.6	14.6	15.8	17

Volume measurement

Min dead storage volume (m3)	Actual dead storage volume (m3)	Min. live storage volume (m3)	Actual live storage volume (m3)	Total vol (m3)
142	141.8 Okay	330.4	345.4 Okay	487.2 (Using formula of truncated rectangular pyramid)

Decants

No. of decants	2	Number of decants are based on catchment size. Refer to E&SC guidelines from Env Waikato
Decants required for area	1.6	(Decants should produce 4.5L/s/decant and we should have a flow of 3L/s/ha)
Holes in decants	315	
Holes in each decant	157	

FOREBAY CALCULATION

Pond volume	472
side slope H:1V	1
Freeboard height	0.2
% volume of sediment storage	10

Basic measurements (base values)

Pond volume (m3)	Min forebay volume (m ³)	Depth of storage (m)	pond base length (m)	pond base width (m)
472	47.2	1	2.5	10
		Okay		

Level spreader height 1.55 100 mm higher than the emergency spillway invert

Measurements based on depth of storage and pond side slope

top of storage length (m)	top of pond length (m)	top of storage width (m)	top of pond width (m)
4.5	4.9	12	12.4

Volume calculations

Min. storage volume (m3)	Actual storage volume (m3)
47.2	64.976
	Okay (Using formula of truncated rectangular pyramid)

Primary Spillway 2

Catchment area, A = 2.36 ha
Primary spillway diameter = 150 mm

Emergency Spillway 2

Designed to convey 100 year flow event.

Rational method¹ to get flow Q:

Catchment area, A = 2.36 ha
Channel co-efficient, c = 0.6 Bare uncultivated soil with med. soakage
1% AEP, 10 min, i = 154 mm/hr from hirds v4 (CC 2031-2050)

Storm flowrate, Qstorm = 0.61 m3/s

Determine length of bottom width of the emergency spillway:

Emergency spillway design from TP10, pg 5-13

Q discharge through spillway 0.67 Okay
L horizontal bottom width spillway 4
h depth of flow at design flow 0.2
Z H:V side slope 3 (Recommended side slope)

