Job No.:
Job Name: **The Steddles, Yapton**

Average soil infiltration rate
For carpark and roof design soakaway blanket

Test	Result
Location 1 Min.	3.95E-06
Location 2 Min.	6.75E-06
Location 3 Min.	2.97E-06
Min	2.97E-06
FOS	3.00
Use infiltration rate	9.90E-07 Min

Area drainage to the soakaway

Ref.	Area (m2)	Ref.	Area (m2)
Unit 1	85	Access Road	545
Unit 2	86		
Unit 3	86		
Unit 4	95		
Unit 5	95		
Unit 6	52.5		
Unit 7	52.5		
Unit 8	86.5		
Unit 9	98		
Unit 10	98		
Unit 11	87		

Location	Stratum	Trial Pit Base Depth	Infiltration Rate (m/sec)	Notes
SA201 Test 1	Silt	0.6m	3.95 x 10^{-6}	Final data point extrapolated. Indicative only
SA201 Test 2		0.6m	9.02 x 10^{-6}	Test complete
SA201 Test 3		0.6m	8.92 x 10^{-6}	Test complete

Location	Stratum	Trial Pit Base Depth	Infiltration Rate (m/sec)	Notes
SA202 Test 1	Silty Clay	0.6m	6.75 x 10^{-6}	Test complete
SA202 Test 2	Silty Clay	0.6m	1.44 x 10^{-5}	Test complete
SA202 Test 3	Silty Clay	0.6m	1.07 x 10^{-5}	Test complete

Location	Stratum	Trial Pit Base Depth	Infiltration Rate (m/sec)	Notes
SA203 Test 1	Silty Clay	0.6m	4.14 x 10^{-6}	Final data point extrapolated. Indicative only
SA203 Test 2	Silty Clay	0.6m	2.97 x 10^{-6}	Final data point extrapolated. Indicative only
SA203 Test 3	Silty Clay	0.6m	5.73 x 10^{-6}	Test complete

TABLE 25.2 Suggested factors of safety, F, for use in hydraulic design of infiltration systems (designed using Bettess (1996). Note: not relevant for BRE method)

Size of area to be drained	Consequences of failure		
	No damage or inconvenience	Minor damage to external areas or inconvenience (eg surface water on car parking)	Damage to buildings or structures, or major inconvenience (eg flooding of roads)
< 100 m²	1.5	2	10
100–1000 m²	1.5	3	10
> 1000 m²	1.5	5	10

Soakaway Design

Job No.:
Job Name: **The Steddles, Yapton**
Car park + driveway + roofs (whole site incl access road)

Area	1466.5	m2	Roofs	921.5	m2				
Run off Coeff	1	m2	Road	545	m2				
	1466.5	m2							
100 year return period + 40%CC + 10% urban creep			Storm duration (Min.)			Intensity (i)	D (Hrs)	N	r
R5	0.03473	m	5			0.41676776	0.083333	0.1	0.023153764
R10	0.04304	m	10			0.25824426	0.166667	0.1	0.028693807
R15	0.04871	m	15			0.1948374	0.25	0.1	0.0324729
R30	0.06003	m	30			0.12006695	0.5	0.1	0.040022318
R60	0.07380	m	60			0.07379929	1	0.1	0.049199527
R120	0.09053	m	120			0.04526663	2	0.1	0.060355509
R240	0.11088	m	240			0.02771885	4	0.1	0.073916923
R360	0.12475	m	360			0.02079193	6	0.1	0.083167729
R600	0.14465	m	600			0.01446481	10	0.1	0.096432056
R1440	0.18617	m	1440			0.00775704	24	0.1	0.124112671

Inflow to attenuation system (total)		Roofs only flow in		Access Road flow in		hmax (m)		Max flow possible into storage	
I5	50.932 m3	32.004	m3	18.928	m3	0.098	m	53.44	OK
I10	63.119 m3	39.662	m3	23.457	m3	0.121	m	66.10	OK
I15	71.432 m3	44.886	m3	26.547	m3	0.137	m	74.68	OK
I30	88.039 m3	55.321	m3	32.718	m3	0.168	m	91.65	OK
I60	108.227 m3	68.006	m3	40.221	m3	0.205	m	111.88	OK
I120	132.767 m3	83.426	m3	49.341	m3	0.249	m	135.67	OK
I240	162.599 m3	102.172	m3	60.427	m3	0.299	m	162.98	OK
I360	182.948 m3	114.959	m3	67.990	m3	0.331	m	180.31	OK
I600	212.126 m3	133.293	m3	78.833	m3	0.372	m	202.84	OK
I1440	273.017 m3	171.555	m3	101.462	m3	0.437	m	238.32	OK

Outflow from Tank
f 9.90E-07 **m3/s** 3.56E-03 m3/h

Soakaway dims:
Plan area **545** m (Area of driveway to be used as storage blanket)
1 m
Proposed depth **0.5** m (below invert depth of inlet pipe)

Plane infiltration system
R 2.690826

As50 545 (Base area only)
Void ratio **95** % (Permavoid or simiar system) 0.95

Outflow from storage blanket:		Flow in direct (m3)	Flow from surface (m3)	Total in(m3)	Storage needed (m3)
O5	0.16 m3	32.004	18.928	**50.932**	50.771
O10	0.32 m3	39.662	23.457	**63.119**	62.795
O15	0.49 m3	44.886	26.547	**71.432**	70.947
O30	0.97 m3	55.321	32.718	**88.039**	87.068
O60	1.94 m3	68.006	40.221	**108.227**	106.284
O120	3.88 m3	83.426	49.341	**132.767**	128.882
O240	7.77 m3	102.172	60.427	**162.599**	154.829
O360	11.65 m3	114.959	67.990	**182.948**	171.294
O600	19.42 m3	133.293	78.833	**212.126**	192.703
O1440	46.62 m3	171.555	101.462	**273.017**	226.400

Storage required:		Time to half drain:	
S5	50.77 m3	ts50	13.07 hours
S10	62.80 m3	ts50	16.16 hours
S15	70.95 m3	ts50	18.26 hours
S30	87.07 m3	ts50	22.41 hours
S60	106.28 m3	ts50	27.36 hours
S120	128.88 m3	ts50	33.18 hours
S240	154.83 m3	ts50	39.86 hours
S360	171.29 m3	ts50	44.09 hours
S600	192.70 m3	ts50	49.60 hours
S1440	226.40 m3	ts50	58.28 hours

Storage provided **258.9** m3

Critical storm = **S1440**
Storage required = **257.82**
Time to half discharge= **58.28** Hours (Should be less than 24 hours)

Extra rain allowance over period after 24hrs		
Time period after 24hrs	34.28	Hrs
Ave daily rainfall	15	mm/m2 over 24hrs
Extra rainfall for period	21.42	mm/m2
Extra storage needed	**31.42**	**m2**

Soakaway Blanket size proposed is satisfactory

Box 4.13 *Determination of maximum depth of water for plane infiltration systems*

$$h = \frac{D}{n}(Ri - q)$$

Where:

- R ratio of the drained area to the infiltration area, $R = A_D/A_b$
- q infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety
- i,D intensity and duration of rainfall events with the required return period at the site location (m/h, h)
- A_b base area of infiltration system (m²)
- A_D area to be drained (m²)
- n porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests or else the guide values provided in the following table may be used.

Material	Porosity, n
Geocellular systems	0.9 – 0.95
Clean stone	0.4 – 0.5
Uniform gravel	0.3 – 0.4
Graded sand or gravel	0.2 – 0.3

A perforated concrete ring soakaway may be installed in a square or rectangular plan excavation and the gap between the rings and the soil filled with clean stone. Under these circumstances an effective porosity, n', applies.

$$n' = \frac{\pi r'^2 + n\left(WL - \pi r'^2\right)}{WL}$$

where r' is the radius of the ring sections (m)
W is the width of the excavation (m)
L is the length of the excavation (m)

ARUN DISTRICT COUNCIL Y/17/21/DOC