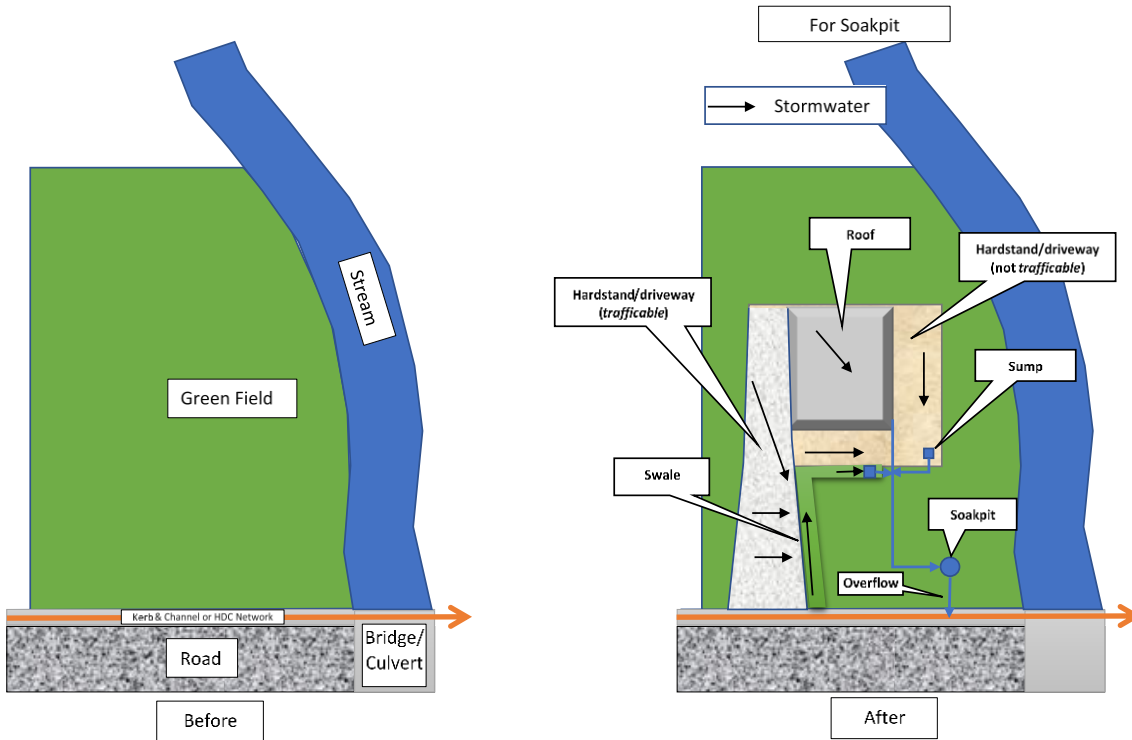


# Discharging Stormwater into ground (Soakpit)

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

- i. Develop a drainage plan for stormwater and submit the layout
- ii. Perform a soakage test at the location where the soakpit is going to be built, take photos, prepare log of soil profile and submit
- iii. If soakage is good, design soakpit and submit all the design documents

i. A drainage plan can be made like below showing all the stormwater flow path withing the property



ii. How to perform soakage test

The soakage test can be done by following two methods. Constant head and Falling head method. Follow the guideline to do the test and fill up the form W1 or W2 to get percolation or soakage rate. During the process prepare a log of soil profile and take pictures. An example picture and a simple soil profile of a pit is given below.

# WORKSHEET 1. FALLING-HEAD PERCOLATION TEST

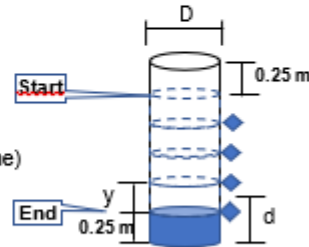
# W1

Site Address: \_\_\_\_\_ Completed by: \_\_\_\_\_

Date of test: \_\_\_\_\_ Signature: \_\_\_\_\_

**Attach the following:**

- Log of hole showing depth and soil type
- Site-plan showing the location of the hole
- Graph of water level against time  
(tick when attached)



**Ensure the following procedures are followed:**

- Hole is kept full for 17 hours prior to test (for pre-soaking during wintertime)
- Hole is kept full for 4 hours prior to test (for pre-soaking summertime)
- Drop in water level is recorded at intervals of 30 minutes or less
- Test is continued for 4 hours or until hole is empty
- Stop test or refill hole when water level is 0.25m above the base of the bore
- Percolation rate is determined from the minimum slope of the curve  
(tick when complete)

**Test Details**

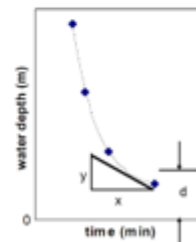
Bore dimensions:

a) diameter =  $D =$  \_\_\_\_\_ m b) length =  $L =$  \_\_\_\_\_ m d) width of bore =  $W =$  \_\_\_\_\_ m

(b) Water Depth(m)	Time (min)	Water Depth(m)	Time (min)

- > d is the distance between the midpoint of the last two readings and the base of the borehole.
- > y is the depth difference between last two points.
- > x is the time difference or interval between last two points.

Calculate water volume for the "y" section and fill the box  $V_y$ . Calculate bore wall area for "d" section and fill the box A1. Calculate bore base area and fill the box A2. Then add A1 & A2 to get AT. Fill the box AT. Fill the box X with time difference between last two points. Divide  $V_y$  by AT and X to get percolation rate P.



"d" section bore wall area =  $A1$  m<sup>2</sup> "d" section bore base area =  $A2$  m<sup>2</sup>

Percolation rate =  $\frac{V_y}{AT = A1+A2 \times X} = P$  L/m<sup>2</sup>/Min

## WORKSHEET 2. CONSTANT-HEAD PERCOLATION TEST

Site Address: \_\_\_\_\_

Completed by: \_\_\_\_\_

Date of test: \_\_\_\_\_

Signature: \_\_\_\_\_

**Attach the following:**

- Log of borehole showing depth, geological layers and water table
- Site-plan showing the location of the hole  
(tick when attached)

**Ensure the following procedures are followed:**

- Hole is pre-soaked for 10 minutes prior to test
- ~~Test~~ is continued for 10 to 15 minutes
- ~~Rockbores~~ are maintained full
- ~~Testpits~~ are maintained ½ full
- Bores within 10m of each other are tested simultaneously

**1. Test Details**

Bore dimensions:

a) diameter =  $D$  = \_\_\_\_\_ m b) length =  $L$  = \_\_\_\_\_ m d) width =  $W$  = \_\_\_\_\_ m

	F1
Time	Flowrate (L/s)

	F1
Time	Flowrate (L/s)

**Percolation Rate: L/m<sup>2</sup>/min**

\*Use the end-of-test flowrate. And fill the box F1. Then divide it by safety factor 1.4. The result is F2.

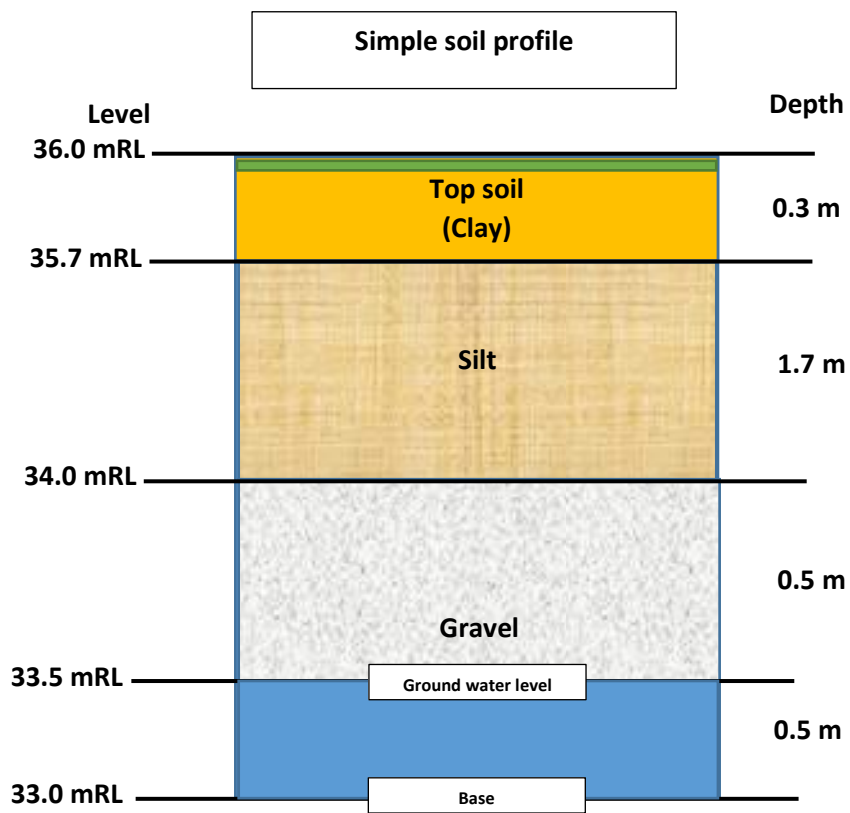
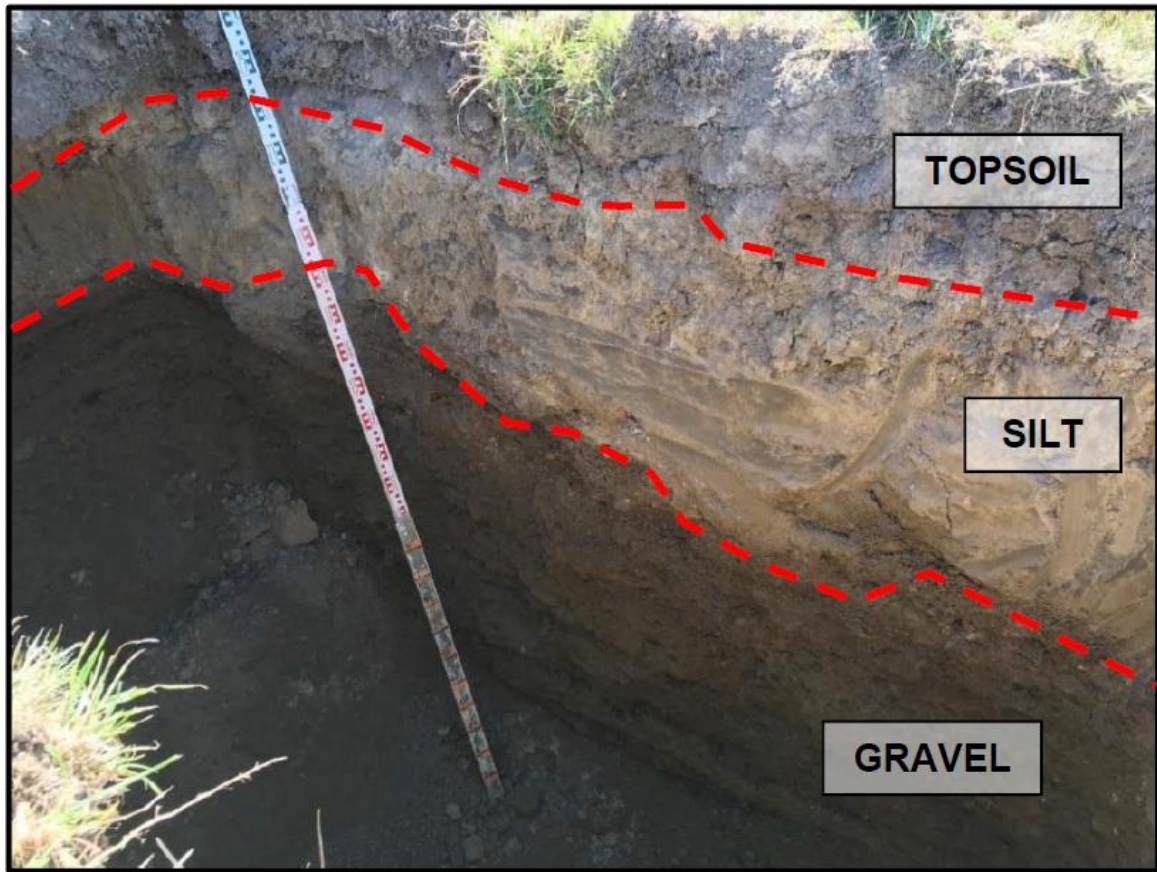
(a) Capacity of bore =  $\frac{\text{F1}}{1.4} = \text{F2}$  L/s

Calculate soak hole wall & base area and fill the box A1 & A3. Then divide A1 by 2 to get A2.

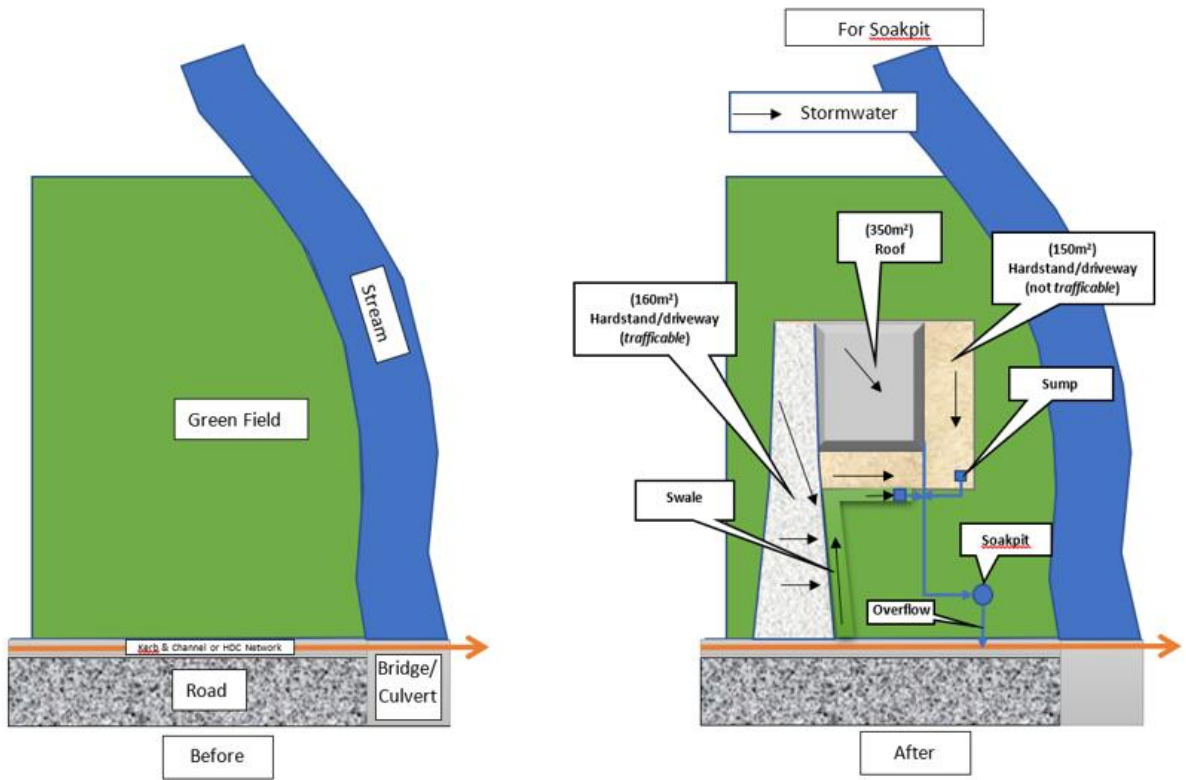
(b) wall area =  $\frac{\text{A1}}{2} = \text{A2}$  m<sup>2</sup> (c) base area =  $\text{A3}$  m<sup>2</sup>

Add A2 & A3 to get total area AT and fill the box AT. Divide F2 by AT and multiply by 60 to get percolation rate P.

(e) Percolation rate =  $\frac{\text{F2} \times 60}{\text{AT} = \text{A2} + \text{A3}} = \text{P}$  L/m<sup>2</sup>/Min



### iii. Soakpit Design Example



Input field	Date:	
Output field	Address:	

**This calculation sheet is only applicable for Amberley unless it is advised by HDC otherwise**

**Link to get Intensities** <https://hirds.niwa.co.nz/>

**Intensities HIRDS v4 Scenario RCP8.5 for the period 2081-2100 (mm/hr)**

Table. 1	min	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
	ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h
1.58	2	0.63	20.10	15.00	12.80	9.72	7.37	4.58	3.24	2.18	1.38	1.02	0.81
2	2	0.50	22.80	17.00	14.40	11.00	8.32	5.16	3.65	2.45	1.55	1.14	0.91
5	5	0.20	32.70	24.20	20.50	15.60	11.70	7.23	5.09	3.41	2.15	1.58	1.25
10	10	0.10	40.60	30.00	25.40	19.20	14.40	8.85	6.22	4.15	2.61	1.92	1.51
20	20	0.05	49.10	36.20	30.60	23.00	17.30	10.60	7.40	4.93	3.09	2.27	1.79
30	30	0.03	54.30	40.00	33.80	25.40	19.10	11.60	8.12	5.41	3.38	2.48	1.96
40	40	0.03	58.20	42.80	36.10	27.20	20.30	12.40	8.65	5.75	3.59	2.63	2.08
50	50	0.02	61.30	45.10	38.00	28.50	21.30	13.00	9.06	6.02	3.75	2.75	2.17
60	60	0.02	63.80	46.90	39.50	29.70	22.20	13.50	9.40	6.24	3.89	2.85	2.25
80	80	0.01	67.90	49.80	42.00	31.50	23.50	14.20	9.93	6.59	4.10	3.00	2.37
100	100	0.01	71.10	52.20	43.90	32.90	24.60	14.90	10.40	6.86	4.27	3.12	2.46
250	250	0.00	84.50	61.80	51.90	38.70	28.80	17.40	12.10	7.96	4.94	3.61	2.84

**Return period (years)**

**type, Area & "C" value contributing to Soakpit**

Roof Area	A1	350	m <sup>2</sup>
"C" for Roof	C1	0.90	
Hardstand & Driveway Area	A2	160	m <sup>2</sup>
"C" for Hardstand	C2	0.85	
Area of Green field	A3		m <sup>2</sup>
"C" for Green area	C3		
Other Areas	A4	150	m <sup>2</sup>
Other "C"	C4	0.6	
Total Area	TA	510	m <sup>2</sup>
Gross C	Ct	0.82	

**Surface type**

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 metalised pavements	0.50
Bush, pasture and berms on poor draining soils	0.30
Bush, pasture and berms on good draining soils	0.20

**Percolation test result**

percolation rate	P	15.34	l/m <sup>2</sup> /min
------------------	---	-------	-----------------------

Put the percolation rate value found from (box P) of Sheet W1 or W2 provided to perform percolation test

**Soakpit design**

Type	R	
depth	d	3.00 m
width	w	2.00 m
length/Diameter	L or D	2.00 m
Base Area	a	4.00 m <sup>2</sup>
protrusion depth in Gravel	Pd	0.50 m
soakage area	Sa	8.00 m <sup>2</sup>
Storage in Soakpit	Vss	4.56 m <sup>3</sup>
Flow through soakpit	Qs	0.00205 m <sup>3</sup> /sec

Input is "C" for Cylindrical and "R" for Square or Rectangular Soakpit

**Design Check**

ok ponding volume **0.001** m<sup>3</sup>  
Currently less than 0.39 m<sup>3</sup> ponding is allowed

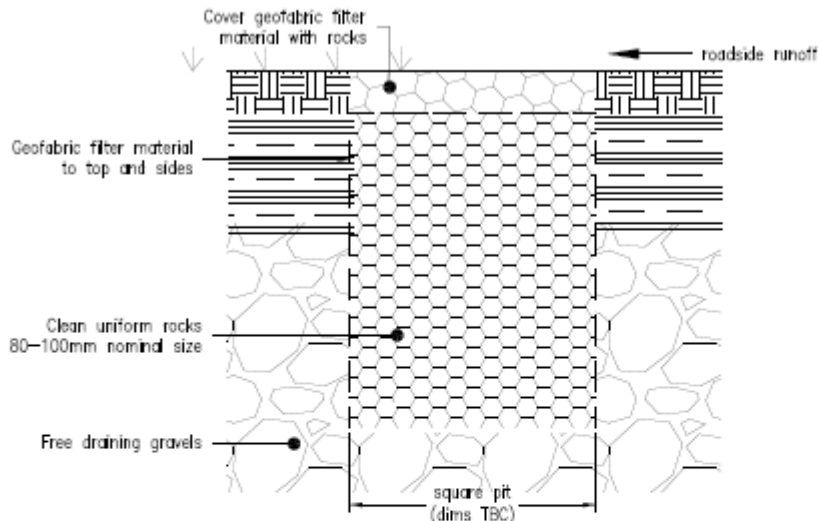
**Increase the dimensions (depth, width & length in run39, 40 & 41) of the Soakpit so that the ponding volume can be close to zero or less. Soakpit drainage is dependant on percolation rate. Lower the rate higher the dimensions. Also depends on modified/developed area, more area will need bigger soakpit.**

**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. No responsibility is accepted by Hurunui District Council or its staff or employees for the accuracy of information provided by third parties and/ or the use of any part of this calculation in any other context or for any other purposes. Any kind of modification of the sheet is not allowed without permission from HDC.**

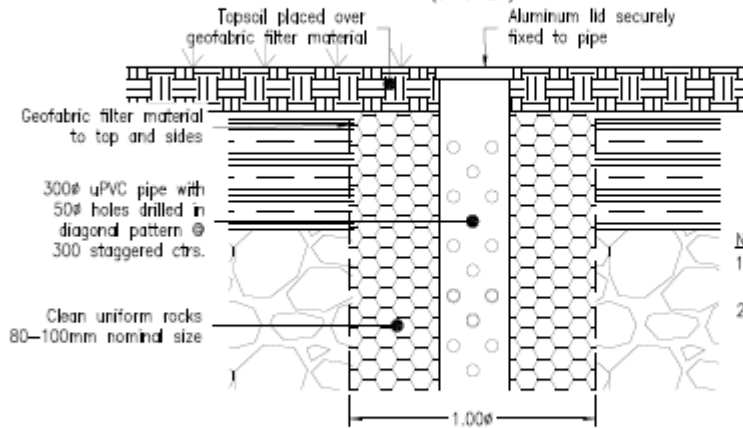
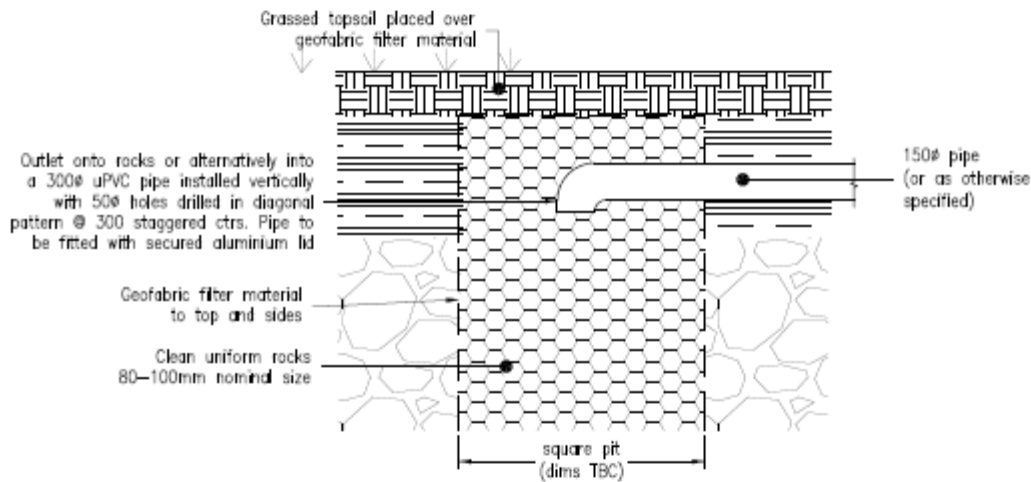
## Summery

A soakpit of 3 height/depth, 2m width and 2m length is needed for a roof area of 350m<sup>2</sup> with hardstand and driveway area of 310m<sup>2</sup>. However, a ponding of 0.001m<sup>3</sup> of water expected at the location of soakpit. Typical soakpit is shown below taken from Development Engineering Standard





RURAL ROAD SOAKPIT



URBAN SOAKPITS

**NOTES**

1. Soakpits to be sized as per approved design.
2. Pre-entry sumps with submerged outlet as per D09 required for urban road soakpits and private soakpits draining non-roof areas