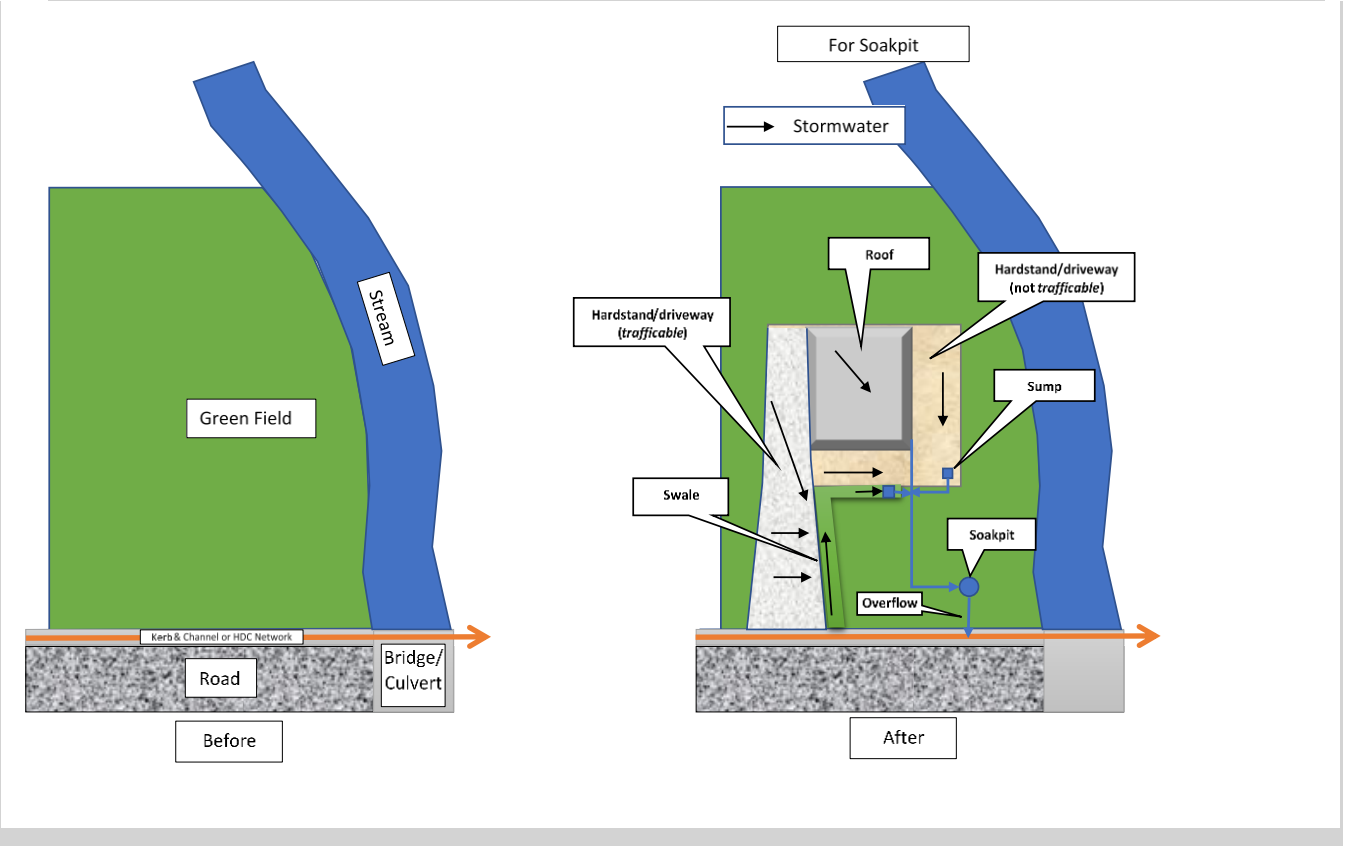
Discharging Stormwater into ground (Soakpit)

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

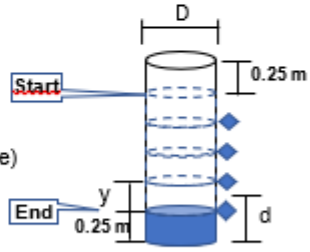
Site Address: _____ Completed by: _____

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)

(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. d needs to be in free draining layer. If not, then wall area can be ignored.
- y is the depth difference between last two points.

Bore dimensions: (Circular Shape) or, Pit dimensions: (Square Shape)

a) diameter = D =_____m

b) depth difference = y =_____m

c) midpoint distance from base = d =_____m

d) water volume = $0.785 \times D \times D \times y$ = Vx

e) wall area A1= $3.142 \times D \times d$ A1

f) base area AB= $0.78 \times D \times D$ AB

g) Total area AT= $A1 + AB$ AT

a) Length = L =_____m b) Width = W =_____m

c) depth difference = y =_____m

d) midpoint distance from base = d =_____m

e) water volume = $L \times W \times y$ = Vx

f) wall area A1 = $2 \times W \times d$ = A1

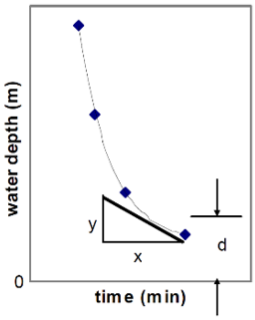
g) wall area A2 = $2 \times L \times d$ = A2

h) base area AB= $L \times W$ = AB

i) Total area AT= $A1 + A2 + AB$ = AT

- x is the time difference or interval between last two points in minutes.

Fill the box X with time difference between last two points. Divide Vy by AT and X to get percolation rate P.



Percolation rate = $\frac{\text{Vy X 1000}}{\text{AT} \times \text{X}}$ for "y" = P L/m²/Min

W2

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: (Circular Shape) or, Pit dimensions: (Square Shape)

a) diameter = D =_____m

b) water height from base= h =_____m

c) wall area = **3.142** X **D** X ***h*** = A1

d) base area = **0.78** X **D** X **D** = A2

e) Total area = **A1** + **A2** = AT

a) length = L =_____m b) width = W =_____m

c) water height from base= h =_____m

d) wall area1 = **2** X **L** X ***h*** = A1

e) wall area2 = **2** X **W** X ***h*** = A2

f) base area = **L** X **W** = A3

g) Total area = **A1**+ **A2**+**A3** = AT

Time	Flowrate (L/s)

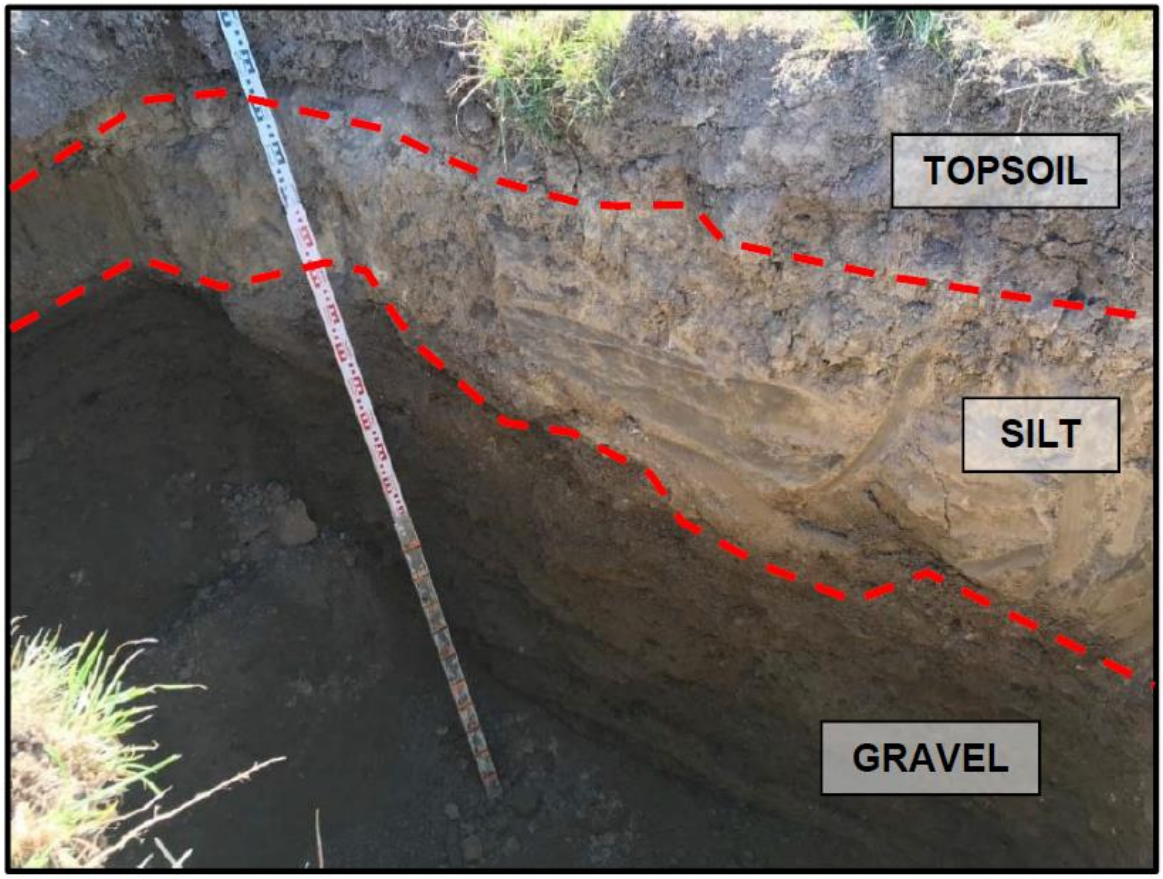
Time	Flowrate (L/s)

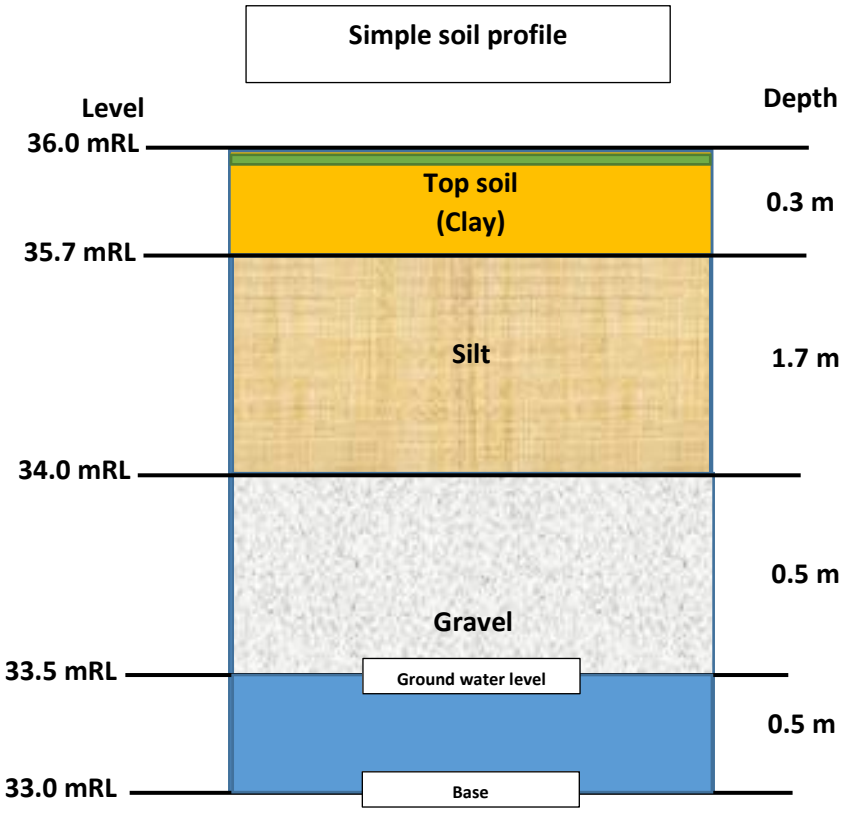
Percolation Rate: L/m^2/min

*Use the last flowrate in the test above and write it in the box F1. Then divide it by safety factor 1.4. The result is F2.

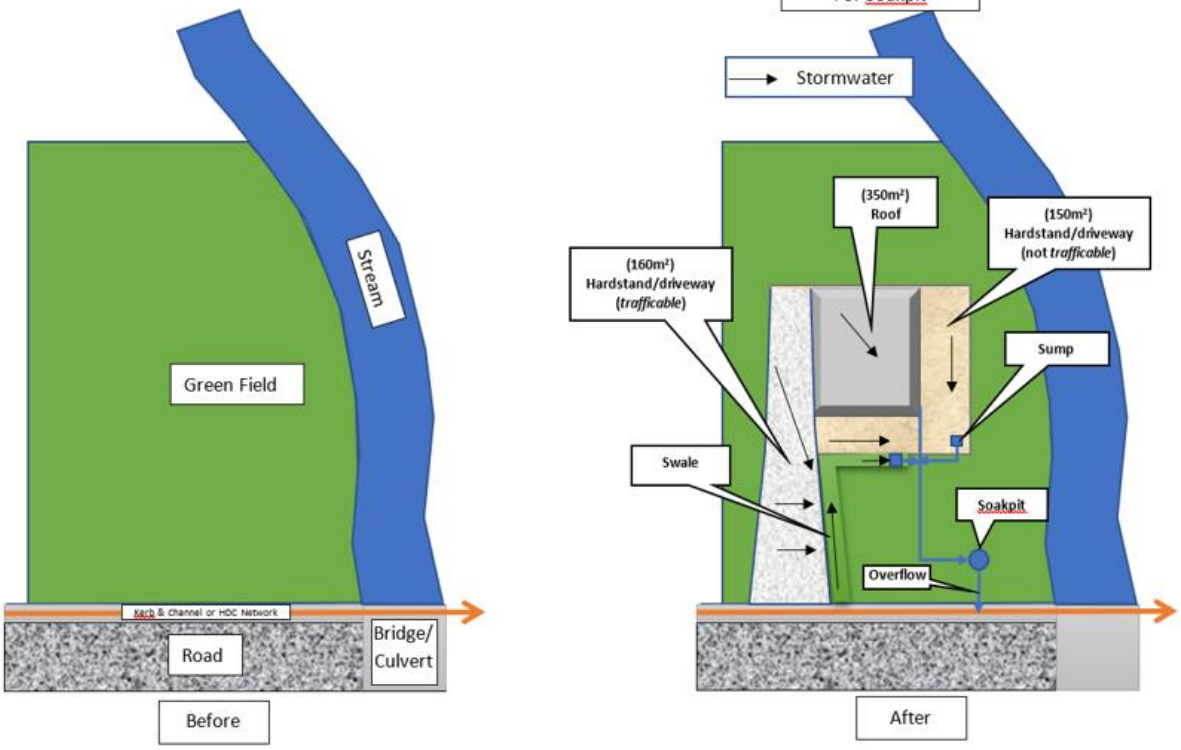
(a) Capacity of bore = $\frac{\text{F1}}{1.4}$ = F2 L/s

(e) Percolation rate = $\frac{\text{F2} \times 60}{\text{AT}}$ = P L/m^2/Min


TOPSOIL
SILT
GRAVEL


Simple soil profile
Level
Depth
36.0 mRL
Top soil
(Clay)
0.3 m
35.7 mRL
Silt
1.7 m
34.0 mRL
0.5 m
Gravel
33.5 mRL
Ground water level
0.5 m
33.0 mRL
Base

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)

Return period (years)	ARI	AEP	10 min	20 min	30 min	60 min	120 min	360 min	720 min	1440 min	2880 min	4320 min	5760 min	7200 min
	Table. 1		10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
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	0.67
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	0.75
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	1.03
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	1.25
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	1.47
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	1.61
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	1.71
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	1.78
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	1.85
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	1.95
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	2.02
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	2.33

type, Area & "C" value contributing to Soakpit

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

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*

Percolation test result

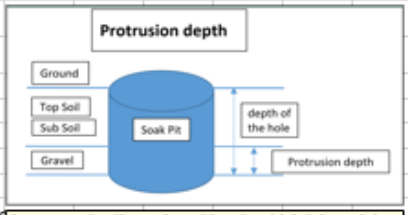
percolation rate	P	15.34	$l/m^2/min$

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

Soakpit design

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

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



Design Check

ok ponding volume ✓ 0.001 m^3

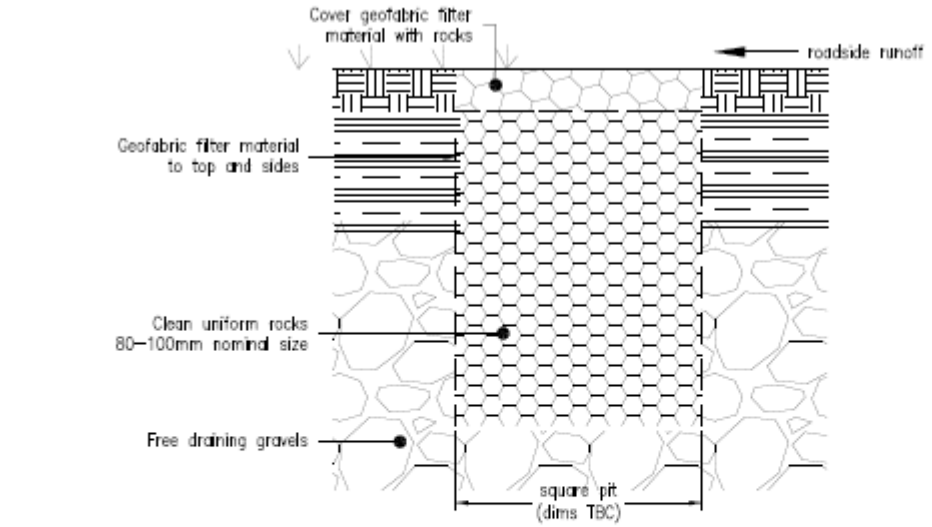
Currently less than 0.39 m^3 ponding is allowed

Increase the dimensions (depth, width & length in row39, 40 & 41) of the Soakpit so that the ponding volume can be close to Zero or less. Soakpit drainage is dependent on percolation rate. Lower the rate higher the dimensions. Also depends on modified/developed area, more area will need bigger soakpit

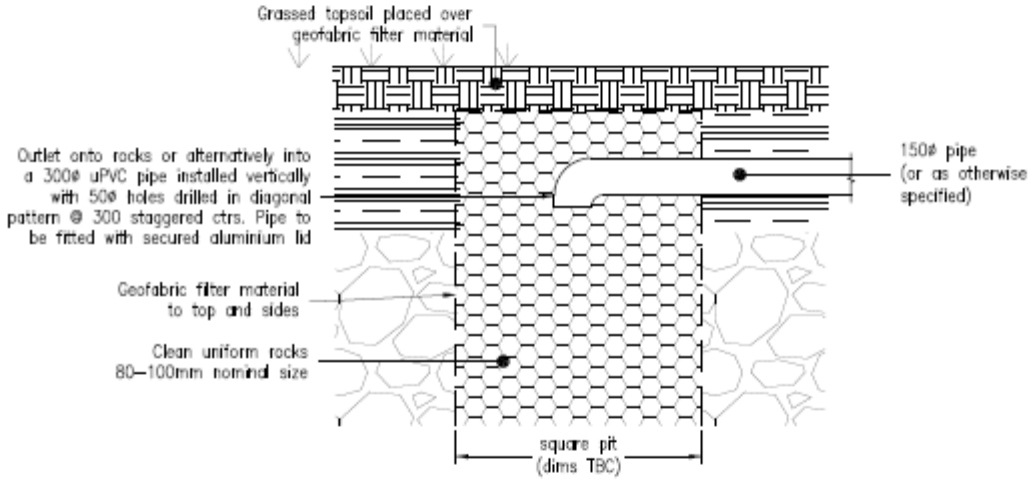
*This calculation is only to be used after the permit from Hurunui District Council as a design aid for soakpit and should not be used or relied upon by any other person or entity or for any other purposes.
No responsibility is accepted by Hurunui District Council or its staff or employees for the accuracy 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.

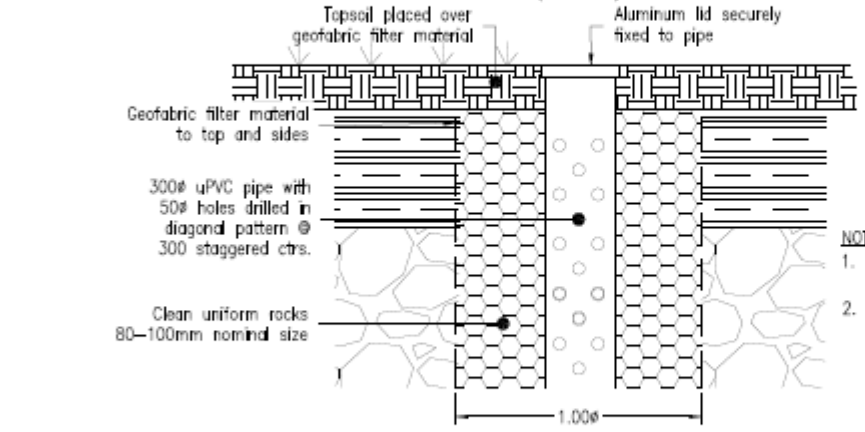
Summery

A soakpit of 3 height/depth, 2m width and 2m length is needed for a roof area of 350m2 with hardstand and driveway area of 310m2. However, a ponding of 0.001m3 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

HURUNUI District Council

DEVELOPMENT ENGINEERING STANDARD	Scale: NTS	Sht: A4
	Status: –	
SOAKPITS	Dwg No: D26	Rev: –