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Glenearn
7, Schofield Close
Barrow upon Humber
North Lincolnshire
DN19 7SJ

[redacted]

SURFACE WATER DISPOSAL SCHEME

FOR PROPOSED RE-LOCATION OF PUBLIC PARKING

at

DEEPDALE GARDEN CENTRE, BARTON upon HUMBER

for

DEEPDALE GARDEN CENTRE LIMITED

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- DEEPDALE GARDEN CENTRE CAR PARK EXTENSION - DRAINAGE DESIGN -

The car park extension amounts to an area of 960 square metres and the proposal is to leave it with a hardcore finish as against a hard impervious surface. However, it is known that the site lies over an aquifer and is categorised as being in a SPZ1 Zone. This therefore requires the surface water run off from the car park extension to be contained and treated through a petrol interceptor before discharge. This in turn requires to be attenuated as the flow will be concentrated at the point of discharge. The site is found to be clay over the limestone cap.

The proposal therefore is to construct the parking area by removing 300mm of top soil (spread over the garden centre site), laying HD visqueen on 50mm sand protection in a manner that continues up to the finished ground level. The first layer of stone will be 150mm thick and compacted, then a layer of geotextile is to be laid to form filter layer to stop fines getting into the system which is then capped with a further 150mm layer of compacted hardcore to finish ground level. It is to be noted that the underlying ground is clay.

The proposal is to limit the flow to ground to 3 litres/second (difficult to make a lower flow rate for a hydrobrake reliably) and this works out to require storage on site of 30.8cm allowing for 30% climate change - see Appendix A. To provide this storage it has been considered that half the requirement be provided by a crate system located within the proposed new polytunnel and the other half within the stone of the car park area. Before the runoff arrives at the crated storage area it will pass through a By-Pass Separator (Clearwater 1670sm) to provide a positive removal of contaminates prior to discharge to the 3 litre/second hydrobrake manhole and then on to the chalk layer found at 3.2m below GFL. The discharge to this is proposed to be via a 1.8 x 1.8 metre excavation filled with soakaway suitable stone (certified 30% voids).

In terms of the tests done, the first test hole was excavated down to 2.2m and the water in the test hole hardly moved in 24 hours - see Appendix B, so more reach was achieved and limestone/chalk was encountered at 3.2 metres depth. The testing was set up again and the 800 litres used resulted in a less than 4 minute discharge and then two more less than 5 minute discharges - see Appendix C. The software used for the calculation was manipulated to provide for a discharge of around 3 litres/second which due to the clay in the calculation can only be discharging through the base and this proved to be twice the requirement - see Appendix D. We therefore conclude that this solution will work well.

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- DEEPDALE GARDEN CENTRE CAR PARK EXTENSION - DRAINAGE DESIGN -

In terms of Environment Agency approval, referring to their publication 'The EA's Approach to Groundwater Protection', we follow this through initially looking at G9 to satisfy their requirements for deep infiltration for surface water:

- 'The discharge should be indirect' - satisfied as the discharge passes through the separator
- 'No other feasible options for discharge' - satisfied, there are no local SW drains or ditches
- 'The system is no deeper than required' - satisfied, we are entering at the top of the chalk, only clay above
- 'Acceptable pollution control measures in place' - satisfied, initially there is the filter layer in the construction and then the discharge passes through the separator
- 'Risk assessment to be undertaken regarding unacceptable discharges' - satisfied, the applicant will undertake the required risk assessment on the basis that he will not allow any HGVs onto the car park, only private vehicles for visitors and staff
- 'There are sufficient mitigating factors or measures to compensate for the use of deep structures' - satisfied, there will not be any deep structures, merely an excavation which will quickly be filled with suitable stone.

Once the proposed scheme is considered acceptable by the Local Flood Team, the applicant will enquire formally to the Environment Agency to confirm the requirement or not of a permit to discharge, but on the evidence of the Discharge of Clean Water section prior to G12 and within G12 in the EA document, it advises that 'some discharges to ground (such as roof drainage or highway drainage) may not require a permit' and follows on in G12 to advise that the discharge of clean roof water (previously referred to with highway drainage) to ground is acceptable both outside and within a SPZ1 provided that down-pipes are sealed against pollutants..... we will have achieved that by way of the interceptor. But the applicant will formally check with the EA.

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- APPENDIX A -

STORAGE TANK CALCULATION SHEET

YourSpreadsheets™
2nd Floor, 52 Marcus Hill, London
www.YourSpreadsheets.co.uk
Tel: 020 7542 8734

Deepdale Car Park

		Revision	
Job No:	EDS477	Page:	1.00
Section: Attenuation tank	Prepared By: MU	Date:	04/03/2026

GENERAL DATA	
site location:	England and Wales
60 min rainfall depth of 5 year return period 'R' *[mm]* =	19
M5-60 to M5-2d rainfall ratio 'r' =	0.50
proposed discharge rate 'v_1' *[litre/s]* =	7.00
proposed discharge rate 'v_2' *[litre/s]* =	3.00
allowance for climate change:	30%

SUMMARY OF CALCULATIONS		
~~required storage volume for discharge rate 'v_1' =~~	~~17.12~~	~~m^3~~
required storage volume for discharge rate 'v_2' =	30.08	m^3

AREA DATA		impermeability *[%]*	effective area *[m^2]*
impermeable area 'A_1' *[m^2]* =	960	100.00	960
landscaping and/or green roof area 'A_2' *[m^2]* =	0	80.00	0
other partially permeable area 'A_3' *[m^2]* =	0	20.00	0
AREA DRAINED TO ATTENUATION TANK =			960 m^2

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_1

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D Z2	M10-D rainfalls *[mm]*	M10-D inflow *[m^3]*	M20-D Z2	M20-D rainfalls *[mm]*	M20-D inflow *[m^3]*	M30-D Z2	M30-D rainfalls *[mm]*	M30-D inflow *[m^3]*	outflow from attenuation tank *[m^3]*	required storage *[m^3]*
5	0.39	7.41	1.20	11.60	11.14	1.38	13.33	12.80	1.46	14.04	13.48	2.10	11.38
10	0.54	10.26	1.22	16.29	15.63	1.41	18.83	18.07	1.49	19.90	19.10	4.20	14.90
15	0.65	12.35	1.23	19.74	18.95	1.42	22.86	21.95	1.51	24.20	23.23	6.30	16.93
30	0.82	15.58	1.24	25.11	24.11	1.44	29.19	28.02	1.53	30.96	29.72	12.60	**17.12**
60	1.00	19.00	1.24	30.63	29.40	1.45	35.77	34.33	1.54	38.04	36.52	25.20	11.32
120	1.19	22.61	1.24	36.45	34.99	1.44	42.47	40.77	1.54	45.21	43.40	50.40	0.00
240	1.38	26.22	1.24	42.10	40.42	1.44	48.92	46.96	1.53	52.10	50.01	100.80	0.00
360	1.51	28.69	1.23	45.70	43.87	1.43	53.16	51.03	1.52	56.64	54.37	151.20	0.00
600	1.68	31.92	1.21	50.39	48.37	1.41	58.61	56.26	1.50	62.43	59.93	252.00	0.00
1440	2.03	38.57	1.19	59.88	57.49	1.39	69.48	66.70	1.47	73.87	70.92	604.80	0.00

** Z2 is a growth factor from M5 rainfalls*

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_2

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D Z2	M10-D rainfalls *[mm]*	M10-D inflow *[m^3]*	M30-D Z2	M30-D rainfalls *[mm]*	M30-D inflow *[m^3]*	M50-D Z2	M50-D rainfalls *[mm]*	M50-D inflow *[m^3]*	outflow from attenuation tank *[m^3]*	required storage *[m^3]*
5	0.39	7.41	1.20	11.60	11.14	1.46	14.04	13.48	1.60	15.45	14.83	0.90	13.93
10	0.54	10.26	1.22	16.29	15.63	1.49	19.90	19.10	1.65	22.04	21.16	1.80	19.36
15	0.65	12.35	1.23	19.74	18.95	1.51	24.20	23.23	1.67	26.87	25.79	2.70	23.09
30	0.82	15.58	1.24	25.11	24.11	1.53	30.96	29.72	1.70	34.50	33.12	5.40	27.72
60	1.00	19.00	1.24	30.63	29.40	1.54	38.04	36.52	1.72	42.58	40.88	10.80	**30.08**
120	1.19	22.61	1.24	36.45	34.99	1.54	45.21	43.40	1.72	50.70	48.67	21.60	27.07
240	1.38	26.22	1.24	42.10	40.42	1.53	52.10	50.01	1.72	58.46	56.12	43.20	12.92
360	1.51	28.69	1.23	45.70	43.87	1.52	56.64	54.37	1.71	63.60	61.06	64.80	0.00
600	1.68	31.92	1.21	50.39	48.37	1.50	62.43	59.93	1.69	70.07	67.26	108.00	0.00
1440	2.03	38.57	1.19	59.88	57.49	1.47	73.87	70.92	1.65	82.66	79.35	259.20	0.00

** Z2 is a growth factor from M5 rainfalls*

FORM COMPLETED BY EARN DESIGN SERVICES LIMITED (mike@earndesign.co.uk)
FOR DEEPDALE GARDEN CENTRE FOR PROPOSED NEW CAR PARK AREA

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- APPENDIX B -

FAILED POROSITY TEST at 2.2m

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[redacted]

[redacted]

[redacted]

SITE INVESTIGATIONS FOR SOAKAWAY TESTS FOR NEW DWELLINGS & COMMERCIAL/INDUSTRIAL BUILDINGS

HOW TO CONDUCT & COLLECT DATA TO DETERMINE SOIL INFILTRATION RATE

The method of determination must give representative results for the proposed site of the soakaway. This is achieved by:

Excavating a trial pit of sufficient size to represent a section of the design soakaway. (See additional information below for trial pit sizes)

Filling the pit three times in quick succession whilst monitoring the rate of seepage, to represent soil moisture conditions typical of the site when the soakaway becomes operative.

Examining site data to ensure that variations in soil conditions, areas of filled land, preferential underground seepage route, variations in the level of groundwater, and any geological and geotechnical factors likely to affect the long term percolation & stability of the area surrounding the soakaway have been assessed.

Groundwater should not rise to the level of the base of the soakaway , during annual variations in the water table.

---

1. The trial pit shall be excavated to the same depth of the anticipated full size soakaway below the invert of the Drain.
2. The trial pit was 1.1 x 0.6 x 2.2m dp
3. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material.
4. When there is no granular material needed, it is advised to place two pegs into the trial pit at the 75% Level & the 25% level. This allows the water level readings to be taken accurately.
5. The trial pit should be filled, and allowed to drain three times with readings taken as follows:
   The time in which the water level to lower to 75% full
   The time in which the water level to lower to 25% full.
6. When granular material is used, a full height, perforated vertical observation tube should be positioned in the pit so that water levels can be monitored with a dip tape.
7. The trial pit is filled on three occasions to give a true reading on the ground conditions. Therefore the soil infiltration rate will be taken as the worst of these three readings.

It should be possible to construct a suitably dimensioned pit with a backhoe or mini-excavator.
A lot of water will be required to determine the soil infiltration rate so a water bowser will be needed. The inflow should be rapid so that the pit can be filled full in a short time. (Care to be taken during inflow to prevent the pit walls collapsing.)

Address: Deepdale Garden Centre, Deepdale, Barton			Date: 24 - 26/02/26
TEST NUMBER	75%	25%	75% - 25%
1	12.50 Tues	9.10 Wed	20H 40M
2	14.05 Wed	8.30 Thurs	18H 25M
3			USE 20 hours avg.
Name: Bill Faulding	Signature [redacted]		Date: 26/02/26

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- APPENDIX C -

POROSITY TEST at 3.2m

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SITE INVESTIGATIONS FOR SOAKAWAY TESTS FOR NEW DWELLINGS & COMMERCIAL/INDUSTRIAL BUILDINGS

HOW TO CONDUCT & COLLECT DATA TO DETERMINE SOIL INFILTRATION RATE

The method of determination must give representative results for the proposed site of the soakaway. This is achieved by:

Excavating a trial pit of sufficient size to represent a section of the design soakaway. (See additional information below for trial pit sizes)

Filling the pit three times in quick succession whilst monitoring the rate of seepage, to represent soil moisture conditions typical of the site when the soakaway becomes operative.

Examining site data to ensure that variations in soil conditions, areas of filled land, preferential underground seepage route, variations in the level of groundwater, and any geological and geotechnical factors likely to affect the long term percolation & stability of the area surrounding the soakaway have been assessed.

Groundwater should not rise to the level of the base of the soakaway , during annual variations in the water table.

---

1. The trial pit shall be excavated to the same depth of the anticipated full size soakaway below the invert of the Drain.
2. The trial pit was 1.5 x 0.9 x 3.2m dp
3. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material.
4. When there is no granular material needed, it is advised to place two pegs into the trial pit at the 75% Level & the 25% level. This allows the water level readings to be taken accurately.
5. The trial pit should be filled, and allowed to drain three times with readings taken as follows:
   The time in which the water level to lower to 75% full
   The time in which the water level to lower to 25% full.
6. When granular material is used, a full height, perforated vertical observation tube should be positioned in the pit so that water levels can be monitored with a dip tape.
7. The trial pit is filled on three occasions to give a true reading on the ground conditions. Therefore the soil infiltration rate will be taken as the worst of these three readings.

It should be possible to construct a suitably dimensioned pit with a backhoe or mini-excavator.
A lot of water will be required to determine the soil infiltration rate so a water bowser will be needed. The inflow should be rapid so that the pit can be filled full in a short time. Care to be taken during inflow to prevent the pit walls collapsing.)

Address: Deepdale Garden Centre, Deepdale, Barton			**Date:** 29/02/26
TEST NUMBER	**75%**	**25%**	**75% - 25%**
1	10.30	10.34	4 mins
2	11.05	11.10	5 mins
3	11.28	11.33	5 mins
Name: Bill Faulding	**Signature** [redacted]		**Date:** 29/02/26

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- APPENDIX D -

SOAKAWAY RESULT

Visual Soakaway Design 4.0

WEBCOM SYSTEMS
www.webcomsystems.co.uk

Project Details

Project Title: New Car Park Area at Deepdale Garden Centre, Deepdale, Barton upon Humber

Project Number: EDS477 ***Designer:*** Earn Design Services Limited [redacted]

Global Variables

Impermeable Area :-1248 m2

Soil Infiltration Rate :- 0.00079734219269103 m/sec

Storm Duration :- 15 minutes

Rainfall :- 0.0152 metres

Void Ratio :- 0.3

Volumetric Runoff Coeff :- 1.0

Factor of Safety :- 1

Ring soakaway failure depth :- 4 metres

Half Empty failure time (hrs) :- 24 hours

* Base has been included in design of trench soakaway *

* Base has been included in design of ring soakaway *

* Granular surround has NOT been included in ring soakaway design *

Soakaway has been designed as a filter trench with 15% of the impermeable area discharging to the overflow pipe. The AVERAGE flow discharging through the overflow pipe is 3.1616 litres/second.

Trench Soakaway

Length :- .2 metres ***Width :-***-1.36 metres ***Depth :-***3.2 metres

Half empty time :- -0.04 hours (decimal)

Surface area of exfiltration :- -3.98 metres squared

Precast Concrete Ring Soakaway

Ring Size (mm)	Depth (metres)	Half Empty Time (hours)
900	Fail	Fail
1050	Fail	Fail
1200	Fail	Fail
1350	Fail	Fail
1500	Fail	Fail
1800	3.12	0.12
2100	2.33	0.12
2400	1.78	0.12
2700	1.37	0.11

Variable Ring Soakaway Design

Diameter (mm)	Depth (metres)	Half Empty Time (hours)
1800	3.12	0.12

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- APPENDIX E -

PHOTOGRAPHS OF THE EXCAVATION BEING UNDERTAKEN

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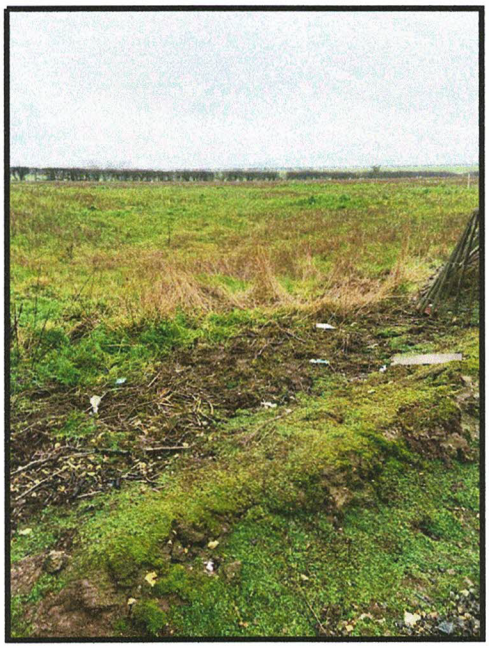

Before test

Location of test

Initial dig

Clay evident below top soil

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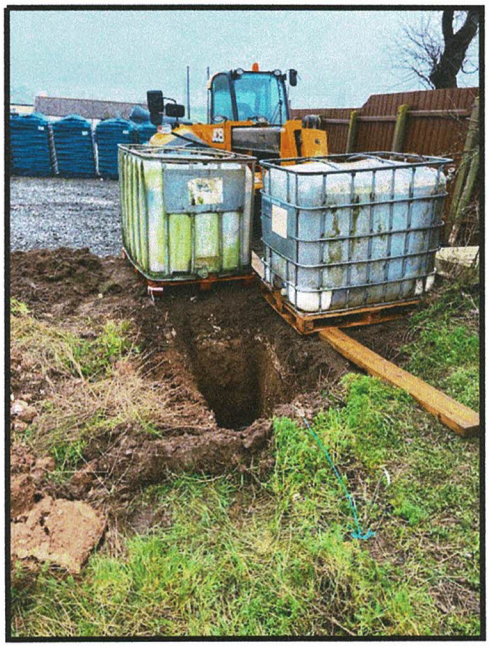

Circa 800 litres of water

Clay evident

Discharge system

Water fill prior to timing from 75%