

Our Reference: 2023-048-A

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Date: 22/09/23

Preliminary Drainage Strategy to Support the Development of a Battery Storage Site at Lower Jowkin Lane, Rochdale, Lancashire

Introduction

Flood Risk and Drainage Solutions Ltd have been commissioned by Shaw Energi to provide a Preliminary Drainage Strategy for the proposed Battery Storage Site located on land at Lower Jowkin Lane in Rochdale, Lancashire.

Existing Site

The existing site comprises of undeveloped agricultural land which is not considered to be positively drained.

Proposed Development Site



Development Proposals

Development proposals comprise of the erection of 2No large barns, access road and battery storage containers.

Existing Drainage

The site is not considered to be formally drained.

Hierarchy of Surface Water Disposal

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer
- Discharge to public combined sewer

Infiltration

Soilscape maps identify that the site is located on ground considered to be '*slowly permeable wet very acid upland soils with a peaty surface*'.

Borehole logs taken from BGS Online Service approximately 150m south of the site identifies that the underlying ground comprises of clay and shale down to a considerable depth.

Taking the above into consideration the use of infiltration methods such as soakaways is not considered viable for inclusion within the drainage strategy.

Watercourse

The nearest watercourse to the application site is Naden Brook which is located approximately 100m west.

It is understood that the owners of the application site also own the Cattery to the west. If the client considers it agreeable, the easiest route to watercourse would be to share an outfall via the existing surface water system currently serving the cattery.

Failing this, a new route to watercourse could be achieved via the Rake and then School Lane, this is to be verified during the Detailed Design Phase.

Taking the above into consideration disposal of surface water should be achieved by discharging to the watercourse Naden Brook.

Greenfield Ruoff Rates

Greenfield runoff rates have been calculated using the total redline boundary which equates to 0.595Ha using the IH124 Method.

- $Q_{bar} = 5.21/s$

Restricted Discharge Rates

Flows from the site should be restricted to no more than 5.2l/s during the 1 in 100 year + 50% climate change event.

Preliminary Surface Water Drainage Strategy

Surface water flows from the roof areas and access road (0.094Ha) are to be collected via rainwater down pipes and gullies before being discharged into Naden Brook either via the outfall serving the Cattery to the

west; or construction a new outfall along the route of the Rake then School Lane via a pumped rising main, before a gravity connection to watercourse.

Flows to be restricted via means of a pump chamber to no more than 5.2l/s, flows in excess of this to be attenuated within a geo-cellular tank located within the turning area south of the site.

Attenuation Tank

- *Geo-cellular Tank*
- *Area = 40m²*
- *Depth of Crate = 1.000m*

Preliminary Surface Water Discharge Rates

The preliminary surface water drainage strategy has been modelled using FLOW Software for the 1 year, 30 year and 100 year + 50% climate change the results are tabulated below for reference.

Proposed Discharge Rates

Return Period	Discharge Rates l/s
1 Year	5.2
30 Year	5.2
100 Year + 50% Climate Change	5.2

Attachments

- Desk Top Ground Conditions
- Greenfield Runoff Rates
- Preliminary Drainage Layout Drawing
- Modelled Surface Water Network Simulation Report

We trust that the above is acceptable and look forward to hearing from you in due course; however, should you have any queries, please do not hesitate to contact me.

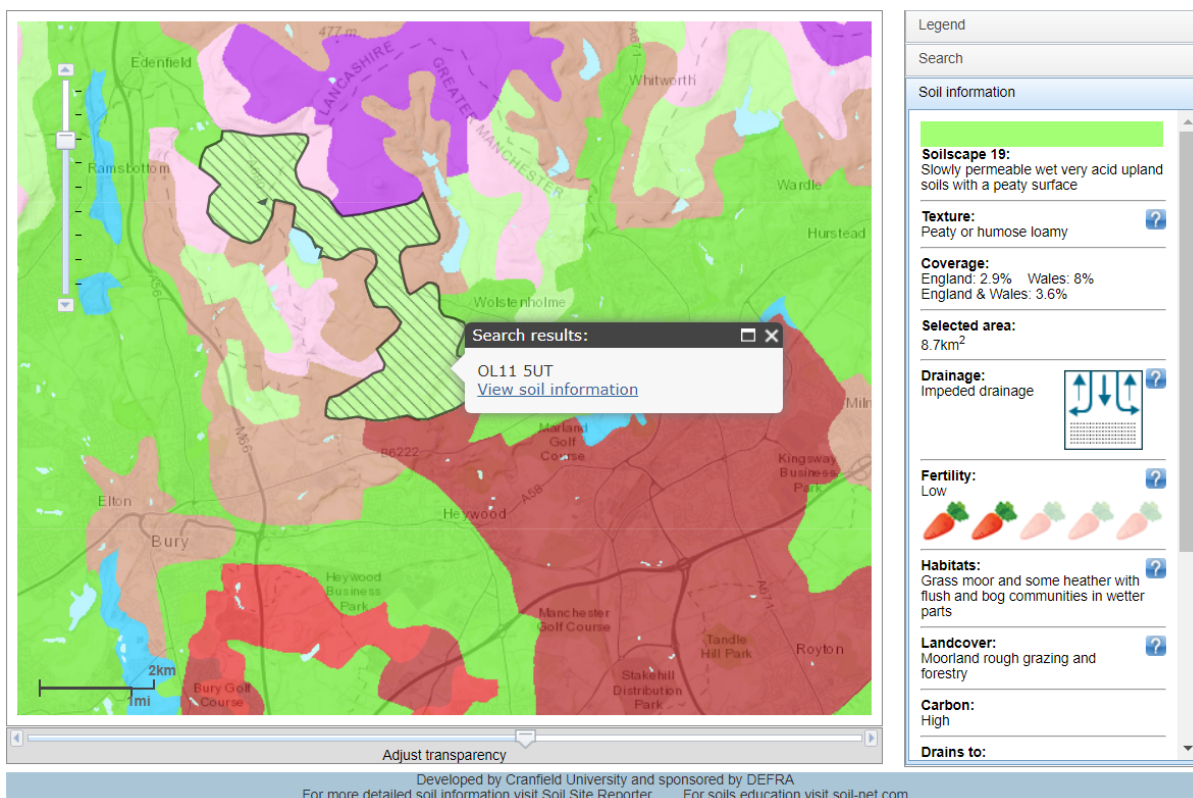
Yours Sincerely,



Chris Vose BSc

Managing Director
Flood Risk and Drainage Solutions Ltd

Desk Top Ground Conditions



CS 1140 (884) 2000 8/74

Institute of Geological Sciences
RECORD OF SHAFT OR BOREHOLE

Order or 1:10 000 Map Registration No.

SD 81/116

74

National Grid Reference

SD 81 SE 50

8550 1328

1-in or 1.50 000
New Series Map No.

Enter 'C' if
Confidential

Name and Number of Shell or Borehole:

For whom made MR. MILLS. LOWER JOWKIN FARM, JOWKIN LANE

Town or Village BANFORD, ROCHDALE County LANCASHIRE

Express site reference as a fixed point on I-in or I/10 000 Mips.

SD 9550 13.28°

Purpose for which made DOMESTIC WATER SUPPLY

Ground level at $\frac{\text{shaft}}{\text{base}}$ relative to O.D. _____ m. If not ground level give O.D. of beginning of $\frac{\text{shaft}}{\text{base}}$ _____ m.

Made by J. B. WHITTER, ATHERTON.

Date of sinking NOV. 1985

Information from 87 SMALLBROOK LANE, LEIGH, 0942 893660

Examined By

Specimen Numbers and Additional Notes

lining: 25 ft x 6 in plain steel plate surface.

[illegible]

Calculated by:	Christian vose
Site name:	LOWER JOWKIN LANE
Site location:	ROCHDALE

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.61762° N
Longitude:	2.21849° W
Reference:	4164912311
Date:	Sep 13 2023 14:19

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.595
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Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1164	1164
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s):	5.21	5.21
1 in 1 year (l/s):	4.53	4.53
1 in 30 years (l/s):	8.85	8.85
1 in 100 year (l/s):	10.83	10.83
1 in 200 years (l/s):	12.34	12.34

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Preliminary Drainage Layout Drawing

Modelled Surface Water Network Simulation Report

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Depth (m)
✓ ROAD	0.039	4.00	162.750	Manhole	Adoptable	1200	1.350
✓ ROOF	0.055	4.00	162.750	Manhole	Adoptable	1200	1.350
✓ TANK			162.750	Manhole	Adoptable	450	1.450
✓ PUMP			162.750	Manhole	Adoptable	1200	1.550

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
✓ 1.000	ROAD	TANK	10.000	0.600	Colebrook-White	161.400	161.300	0.100	100.0	150	Circular	4.17	50.7
✓ 2.000	ROOF	TANK	10.000	0.600	Colebrook-White	161.400	161.300	0.100	100.0	150	Circular	4.17	50.7
✓ 1.001	TANK	PUMP	10.000	0.600	Colebrook-White	161.300	161.200	0.100	100.0	150	Circular	4.33	50.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	10.000	100.0	150	Circular	162.750	161.400	1.200	162.750	161.300	1.300
2.000	10.000	100.0	150	Circular	162.750	161.400	1.200	162.750	161.300	1.300
1.001	10.000	100.0	150	Circular	162.750	161.300	1.300	162.750	161.200	1.400

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	ROAD	1200	Manhole	Adoptable	TANK	450	Manhole	Adoptable
2.000	ROOF	1200	Manhole	Adoptable	TANK	450	Manhole	Adoptable
1.001	TANK	450	Manhole	Adoptable	PUMP	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	50	0	0

Node PUMP Online Pump Control

Flap Valve	x	Invert Level (m)	161.200	Switch off depth (m)	0.001
Replaces Downstream Link	✓	Switch on depth (m)	0.002		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	5.200	1.500	5.200

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	161.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	88

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	0.0	1.000	40.0	0.0	1.001	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 95.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	ROAD	10	161.470	0.069	7.0	0.1187	0.0000	OK
15 minute summer	ROOF	10	161.486	0.086	9.9	0.1669	0.0000	OK
60 minute summer	TANK	39	161.419	0.119	11.7	4.5359	0.0000	OK
60 minute summer	PUMP	39	161.411	0.211	8.5	0.2381	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	ROAD	1.000	TANK	7.0	1.047	0.393	0.0896	
15 minute summer	ROOF	2.000	TANK	9.9	1.232	0.557	0.1014	
60 minute summer	TANK	1.001	PUMP	8.5	1.324	0.482	0.1629	
60 minute summer	PUMP	Pump		5.2				12.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	ROAD	44	161.689	0.289	11.8	0.4933	0.0000	SURCHARGED
30 minute summer	ROOF	18	161.704	0.303	22.2	0.5905	0.0000	SURCHARGED
60 minute summer	TANK	44	161.687	0.387	26.0	14.7630	0.0000	SURCHARGED
60 minute summer	PUMP	45	161.675	0.475	8.1	0.5377	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	ROAD	1.000	TANK	10.6	0.900	0.597	0.1760	
30 minute summer	ROOF	2.000	TANK	20.0	1.136	1.126	0.1760	
60 minute summer	TANK	1.001	PUMP	8.1	1.200	0.455	0.1760	
60 minute summer	PUMP	Pump		5.2				29.0

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 95.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	ROAD	92	162.279	0.879	15.8	1.5022	0.0000	SURCHARGED
15 minute summer	ROOF	11	162.414	1.014	47.0	1.9723	0.0000	SURCHARGED
120 minute summer	TANK	94	162.277	0.977	34.7	37.2840	0.0000	SURCHARGED
120 minute summer	PUMP	94	162.266	1.066	7.5	1.2052	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	ROAD	1.000	TANK	14.3	0.856	0.808	0.1760	
15 minute summer	ROOF	2.000	TANK	41.3	2.348	2.328	0.1760	
120 minute summer	TANK	1.001	PUMP	7.5	1.338	0.425	0.1760	
120 minute summer	PUMP	Pump		5.2				72.3