



GEO-ENVIRONMENTAL CONSULTING

BEK Geo-Environmental Consulting

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Our Ref: BEK/23152/240202/RSL

02 February 2024

R.S. LANDSCAPES LTD

Shepherd Hey Barn
Ashworth Road
Heywood
OL11 5UN

Proposed Detailed Drainage Strategy – Shepherd Hey Barn off Ashworth Road, Heywood

BEK Enviro (BEK) has been instructed by R.S Landscapes Ltd to provide a Detailed Drainage Strategy for the proposed development at Shepherd Hey Barn off Ashworth Road, Heywood.

Existing Site

At present the application site comprises of farm house building and concrete and brick outbuilding. The site is accessed via the north of the site via Ashworth Road.

At the time of writing a CCTV Survey was not available, as such it is not fully understood where the existing building discharges surface water.

Due to the rural nature of the site, there are no public sewers within the vicinity.

The nearest watercourse is located approximately 250m east of the site

- Redline Boundary Area= 0.200Ha

Development Proposals

Development proposals comprise of demolition of the existing concrete outbuilding, to make way for the erection of a residential extension.

Hierarchy of Surface Water Disposal

In accordance with the NPPF and the Non-Statutory Technical Standards for SUDS: Practice Guidance the discharge of surface water shall comply with the drainage hierarchy detailed within the National Planning Policy Framework, Planning Practice Guidance and within Building Regulations Part H and specifies the following methods in order of preference:

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

Infiltration

BEK Envirol Ltd undertook on-site Percolation Testing dates 22/11/2023 the findings of the tests are provided below for reference:

Two infiltration test pits were excavated at Land at Shepherds Hey Barn, Heywood with infiltration testing undertaken in one pit. A second pit was excavated but due to the clayey soils identified and the lack of infiltration in Test Pit 1, no additional testing was undertaken. The test failed to reach 75% effective depth therefore infiltration is not considered viable for the disposal of surface water.

Taking the above into consideration the use of infiltration methods is not considered to be appropriate.

Watercourse

Due to the fact that infiltration testing was unsuccessful, surface water flows from the proposed development site have been discharged to the nearest watercourse, which is located approximately 250m east of the site.

Greenfield Runoff Rates

Greenfield runoff rates have been calculated using a total area of 0.20 Hectares, the 1 in 2 year (QBar) discharge rate has been provided below:

- Existing 1 in 2 Year Discharge Rate (QBar) = 0.228l/s

Proposed Discharge Rates

Restricting flows to the existing 1 in 2 year event (QBar) resulted in an aperture within the flow control device of less than 50mm, which would increase the risk of siltation and blockage of the unit and is not considered acceptable.

As such, the aperture was modelled using an aperture of 50mm, which resulted in a discharge rate of 5.4l/s during the 1 in 100 year + 50% climate change event.

- Proposed discharge rate = 5.4L/S

Proposed Drainage Strategy

Surface water flows from the proposed building roof area are collected via a network of rainwater down pipes, before being directed to the watercourse located at the east of the site.

Flows have been restricted to no more than 5.4l/s by means of an orifice flow control chamber, for all events up to and including the 100 year + 50% climate change event.

Flows in excess of this will be attenuated within the piped network.

Car parking areas are to be surfaced in permeable gravel or similar material that will not require positive drainage infrastructure.

- Proposed Impermeable Area = 0.014Ha

Proposed Discharge Rates

Return Period	Proposed Discharge Rate (l/s)
1 Year	1.6
30 Year	3.1
100 Year + 50% Climate Change	5.4

Flow Control Chamber

- S4
- Rigistorm Oriflow Chamber or Similar
- Chamber Dia = 900mm
- Aperture = 50mm

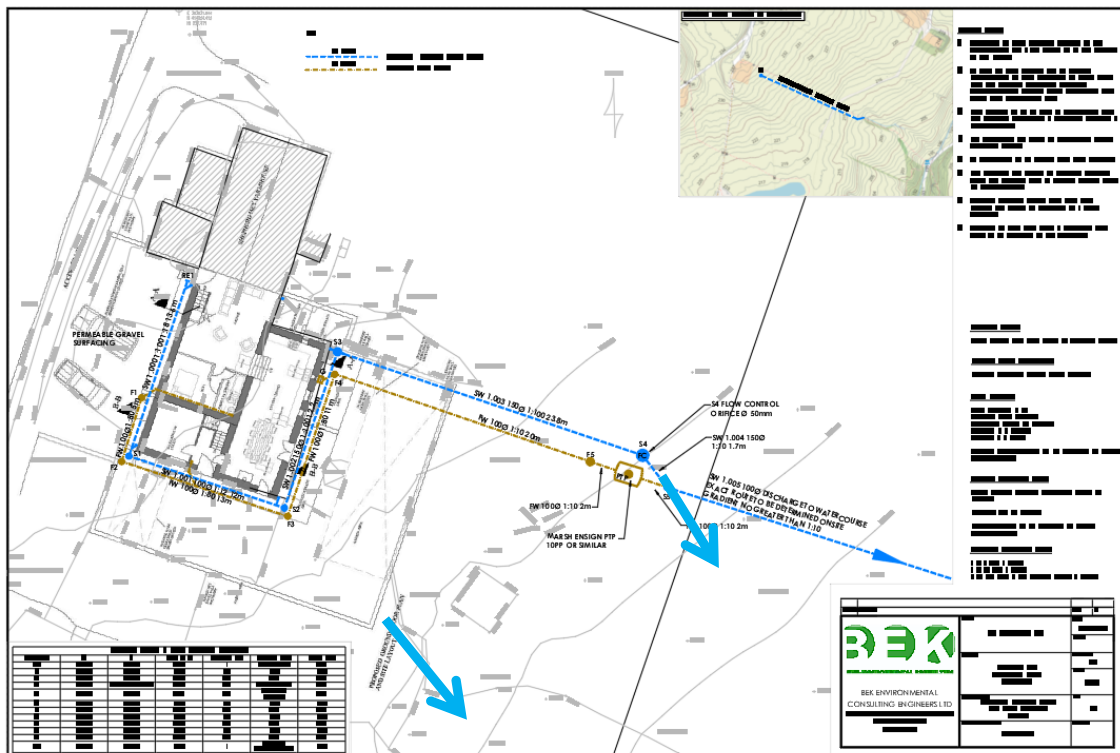
Exceedance Routes (Normal Conditions)

The proposed surface water drainage network has sufficient capacity to retain flows below ground level during all return periods up to the 1 in 100 year + 50% climate change event with no surface flooding.

Exceedance Routes (Total System Failure)

In the unlikely event of total system failure, surface water flows from the site will following topography south onto open agricultural fields. As such the risk associated with flooding to the proposed development and surrounding buildings is considered to be low.

Exceedance Route Total System Failure



Foul Flows

Foul flows from the proposed development site will be firstly treated within Package Treatment Plant, before directing clean effluent into the watercourse located at the east of the site.

Package Treatment Plant

- *Marsh Ensign or Similar*
- *Suitable for 10 Persons*

Septic Tanks and Treatment Plants

Permits and General Binding Rules Guidance

For small domestic Package Treatment Plants such as the one proposed, a Permit to Discharge is not required due to proposed effluent flows being less than 5m³.

As the 'operator' of a septic tank or small sewage treatment plant you must check you meet the general binding rules. You must apply for a permit if you do not.

You're an operator if any of the following is true:

- *you own the property that uses the system*
- *you own a property that shares the system with other properties - each property owner is an operator, and you're jointly responsible for complying with the general binding rules*
- *you have a written agreement with the property owner that says you're responsible for the system's maintenance, for example you're renting and it's in your tenancy agreement*

You must use a small sewage treatment plant. You must apply for a permit if you're discharging more than 5 cubic metres (5,000 litres) per day. Use the online calculator to work out how much you discharge per day.

Maintenance and Management

Following development, the drainage network serving the site will remain private, upon request from the LPA the developer is to provide evidence of the funding mechanism for the management and maintenance of the drainage system.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely



DAVID EMMOTT

BSc (Hons) MSc MEnvSc CEnv

Annex A – Development Proposals
Annex B – On-site Percolation Testing
Annex C – Greenfield Runoff Rates
Annex D – Proposed Surface Water & Foul Layout
Annex E – Typical Drainage Details
Annex F – Proposed SW Modelled Calculation Report

ANNEX A

Development Proposals

ANNEX B

On-Site Percolation Test Results



GEO-ENVIRONMENTAL CONSULTING

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Our Ref: BEK/23152/231123/RSL

23rd November 2023

R.S. LANDSCAPES LTD

Shepherd Hey Barn
Ashworth Road
Heywood
OL11 5UN

Shepherd Hey Barn - BRE 365 Infiltration Testing

BEK Enviro (BEK) has been commissioned by RS Landscapes Ltd to provide soil infiltration rates at the above site using the BRE 365 methodology (2016) to assess the viability of disposal of surface water from the site via infiltration.

Infiltration testing was undertaken in accordance with the requirements set out in BRE 365 (2016). A total of 2 No test pits were excavated at the site with infiltration testing undertaken in one of the pits. The tests were undertaken on 22nd November 2023.

In accordance with BRE 365 (2016) 'the trial pit should be 0.3 to 1 m wide and 1 to 3 m long. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material. The pit is filled with water and allowed to drain three times to near empty; each time recording the water level and time filling. The calculations for the soil infiltration rate is taken from the time taken for the water level to fall from 75% to 25% effective storage depth in the pit, using the lowest f value of the three test results for design.'

The trial pits were excavated using a tracked excavator to a maximum depth of 1.50 m with the sides trimmed square. Water was discharged into pit using a tractor and IBC. Photographs of the test pits and infiltration tests are included within Annex B with the location of the test pits shown within the figure below:



Figure 1: Infiltration Test Pit locations

The test pit dimensions are as follows:

Trial Pit No.	Length (m)	Width (m)	Depth (m)	Volume (m ³)
TP1	1.10	0.75	1.40	1.16
TP2	2.10	0.80	1.60	2.69

Table 1. Test Pit Dimensions

The ground conditions at the site were generally described as topsoil overlying slightly sandy gravelly clay with sandstone gravel, cobbles and boulders.

Water was discharged into Test Pit 1 (TP1) via an IBC however water was not discharged into TP2 due to the similar ground conditions identified and issues with moving plant around the site. The time taken for the water to infiltrate into the soil was recorded. The water only fell marginally within test pit TP1 therefore an infiltration rate was unable to be determined and it is considered that infiltration is not viable at the proposed development site as shown within Annex A of this report and the table below:

Infiltration Test Results

Trial Pit No.	Infiltration Test Number	Infiltration Rate (m/s)
TP1	1	Tested failed to reach 75% effective depth

Table 2: Infiltration Test Results

Conclusion

Two infiltration test pits were excavated at Land at Shepherds Hey Barn, Heywood with infiltration testing undertaken in one pit. A second pit was excavated but due to the clayey soils identified and the lack of infiltration in Test Pit 1, no additional testing was undertaken. The test failed to reach 75% effective depth therefore infiltration is not considered viable for the disposal of surface water.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'MBuckley', with a long horizontal flourish extending to the right.

Michael Buckley

BSc (Hons) MSc MEnvSci CEnv

ANNEX A

Infiltration Test Results



GEO-ENVIRONMENTAL CONSULTING ENGINEERS

Soakaway Testing

Project Name	Shepherds Hey Barn, Heywood	Location Reference:	TP1
Project Number	23152	Test Number:	1
Test Date	22/11/2023	Weather:	Rain

FIELD MEASUREMENTS

INFILTRATION CALCULATION

Elapsed Time, t (m)

Water Level (mBGL)

Calculation of Soil Infiltration Rate (f) as per BRE Digest 365 "Soakaway Design".

Using:

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

Where:

V_{p75-25}	The effective storage volume of water (m ³) in the trial pit between 75% and 25% effective depth	0.37
a_{p50}	The internal surface area of the trial pit (m ²) up to 50% effective depth and including the base area	2.49
t_{p75-25}	The time (s) for the water level to fall from 75% to 25% effective depth	0

Soakage Pit Length (m)	1.10
Soakage Pit Width (m)	0.75
Soakage Pit Depth (m)	1.40
Soakage Pit Area (m ³)	1.16

Start Water Level (mBGL)	0.5
Total Depth of Test (m)	0.90
75% Effective Depth (mBGL)	0.73
50% Effective Depth (m)	0.45
25% Effective Depth (mBGL)	1.18

Time at 75% Effective Depth (minutes)	0
Time at 25% Effective Depth (minutes)	0

INFILTRATION RATE

Soil Infiltration Rate (f)

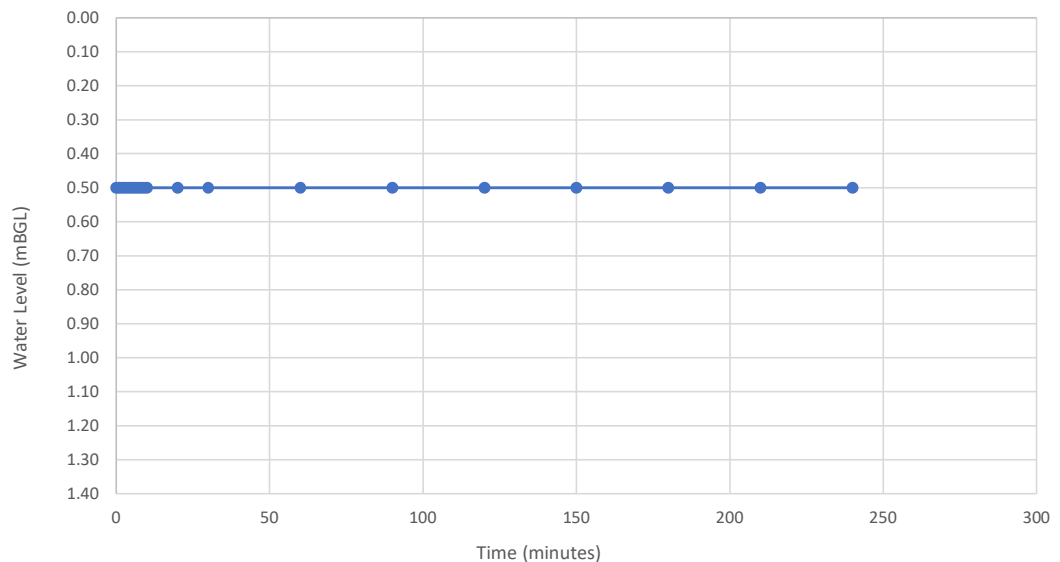
Test Failed to Reach 25% Effective Depth

m/s

Test Failed to Reach 25% Effective Depth

m/hour

Test Failed to Reach 25% Effective Depth



ANNEX B

Infiltration Test Photographs



P1: TP1



P2: TP1



P3: TP2



P4: TP2



This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.

Site:
Shepherds Hey Barn,
Heywood

Title:
Appendix B - Photographs

Comments:

Photographs 1 to 4

Project No: 23152	Created By: DE	Date: 22/11/2023
Client: R S Landscapes Ltd		

ANNEX C

Greenfield Runoff Rates

Calculated by: Christian

Site name: Shy

Site location: Be

SDS

Latitude: 53.62225° N

Longitude: 224574° W

The magff criteria will give a "magff" of 0.0219 (201), SDSMA75 (2015) - yff
standardised (2015) Tmagff may be used for setting a

Reference: 30b8102872
2015 - yff
J 0 2 0 2 4

Date:

Rff map h

IH124

SS

Total site area (ha): 01

NS

(1) $Q_{BAR} < 20 / / ?$

Wh $Q_{BAR} < 20 / /$ mi gge
rates are 20/s/et at

Megy

Q_{BAR} estimation method: Calculation SPRSAAR

SPR estimation method: Calculation SPRlyope

S

	Default	Ed
SOIL type:	5	5
HOST class:	N/A	N/A
SPR/SPRHOST:	053053	

(2) $Afw < 50 / ?$

Wh $flw < 50 / t$
for digschary 50 /
firm v g map b.
L w e fl w may b w h e
b g b y g p p p e
dra g n a m e .

Hygl characteristics

	D	Ed
SAAR (mm):	1170	1170
Hydrological region:	10	10
Growth curve factor 1 year:	087	087
Growth curve factor 30 years:	17	17
Growth curve factor 100 years:	208	208
Growth curve factor 200 years:	27	27

() $SPR / SPRHOST \leq 0 ?$

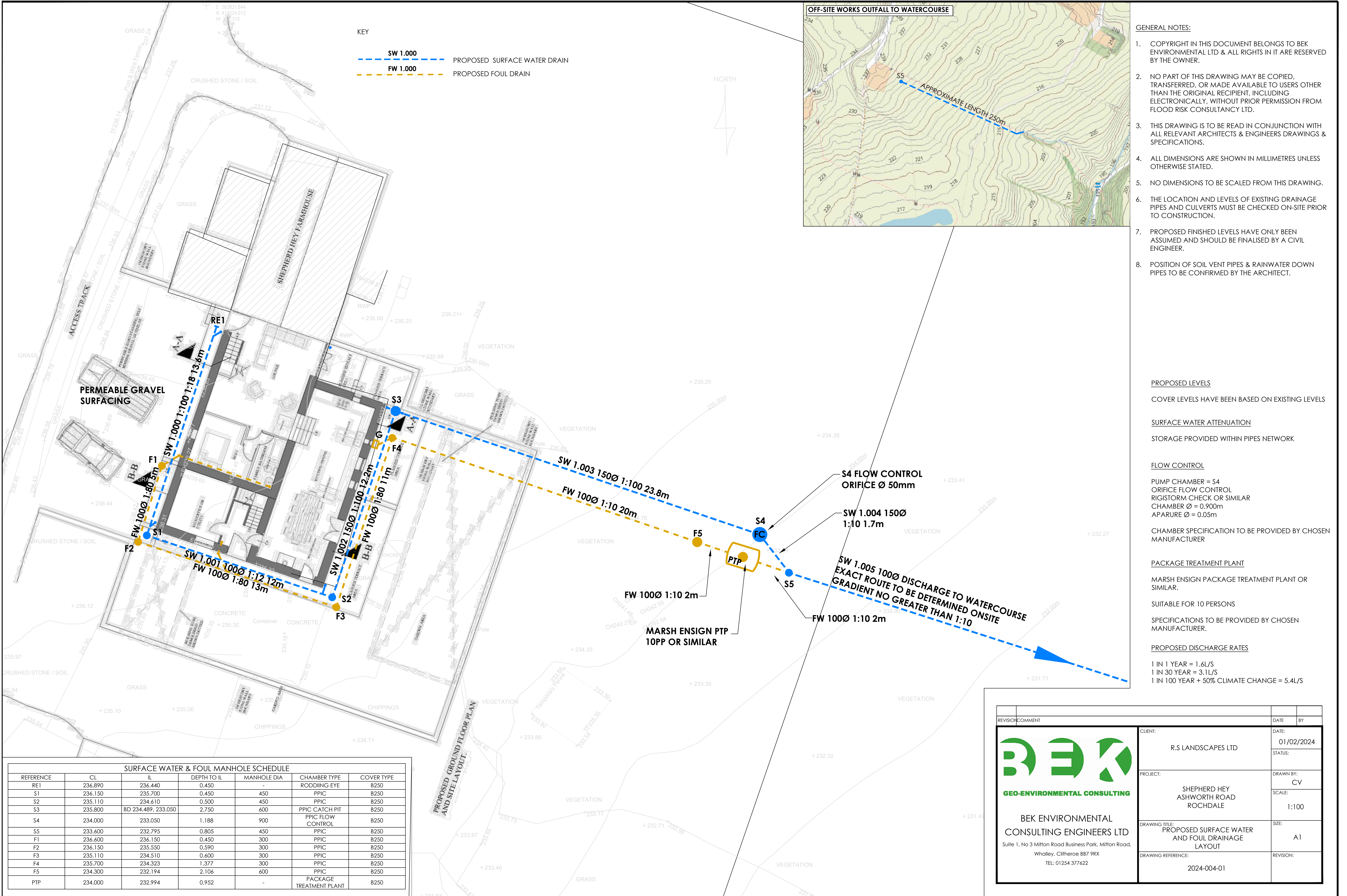
Wh g w a v w g e
use of a w a y o a k f s e
w o m l y b p p f
s u r f a c e

Q _{BAR} (l/s):	1.41	1	4
1 in 1 year (l/s):	0.99	0	9
1 in 30 years (l/s):	1.49	1	4
1 in 100 year (l/s):	2.83	2	8
1 in 200 years (l/s):	2.17	2	1

This report is prepared by RWallingford Ltd www.km.e
of the local authority of the United Kingdom
www.km/ms-n-nm.fmlmafgnfilnff f
these results are based on the following information
CE, ylnnygnnfngnnl fny
drawing me .

ANNEX D

Proposed Surface Water & Foul Drainage Layout



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 6. THE LOCATION AND LEVELS OF EXISTING DRAINAGE PIPES AND CULVERTS MUST BE CHECKED ON-SITE PRIOR TO CONSTRUCTION.
 7. PROPOSED FINISHED LEVELS HAVE ONLY BEEN ASSUMED AND SHOULD BE FINALISED BY A CIVIL ENGINEER.
 8. POSITION OF SOIL VENT PIPES & RAINWATER DOWN PIPES TO BE CONFIRMED BY THE ARCHITECT.

PROPOSED LEVELS
COVER LEVELS HAVE BEEN BASED ON EXISTING LEVELS

SURFACE WATER ATTENUATION
STORAGE PROVIDED WITHIN PIPES NETWORK

FLOW CONTROL
PUMP CHAMBER = S4
ORIFICE FLOW CONTROL
RIGISTORM CHECK OR SIMILAR
CHAMBER Ø = 0.900m
APARURE Ø = 0.05m
CHAMBER SPECIFICATION TO BE PROVIDED BY CHOSEN MANUFACTURER

PACKAGE TREATMENT PLANT
MARSH ENSIGN PACKAGE TREATMENT PLANT OR SIMILAR.
SUITABLE FOR 10 PERSONS
SPECIFICATIONS TO BE PROVIDED BY CHOSEN MANUFACTURER.

PROPOSED DISCHARGE RATES
1 IN 1 YEAR = 1.6L/S
1 IN 30 YEAR = 3.1L/S
1 IN 100 YEAR + 50% CLIMATE CHANGE = 5.4L/S

SURFACE WATER & FOUL MANHOLE SCHEDULE						
REFERENCE	CL	IL	DEPTH TO IL	MANHOLE DIA	CHAMBER TYPE	COVER TYPE
RE1	236.890	236.440	0.450	-	RODDING EYE	B250
S1	236.150	235.700	0.450	450	PPIC	B250
S2	235.110	234.610	0.500	450	PPIC	B250
S3	235.800	BD 234.489, 233.050	2.750	600	PPIC CATCH PIT	B250
S4	234.000	233.050	1.188	900	PPIC FLOW CONTROL	B250
S5	233.600	232.795	0.805	450	PPIC	B250
F1	236.600	236.150	0.450	300	PPIC	B250
F2	236.150	235.550	0.590	300	PPIC	B250
F3	235.110	234.510	0.600	300	PPIC	B250
F4	235.700	234.323	1.377	300	PPIC	B250
F5	234.300	232.194	2.106	600	PPIC	B250
PTP	234.000	232.994	0.952	-	PACKAGE TREATMENT PLANT	B250

REVISION	COMMENT	DATE	BY
 GEO-ENVIRONMENTAL CONSULTING BEK ENVIRONMENTAL CONSULTING ENGINEERS LTD Suite 1, No 3 Milton Road Business Park, Milton Road, Whalley, Clitheroe BB7 9RX TEL: 01254 377622		CLIENT:	R.S LANDSCAPES LTD
		PROJECT:	SHEPHERD HEY ASHWORTH ROAD ROCHDALE
		DRAWING TITLE:	PROPOSED SURFACE WATER AND FOUL DRAINAGE LAYOUT
		DRAWING REFERENCE:	2024-004-01
		DATE:	01/02/2024
		STATUS:	
		DRAWN BY:	CV
		SCALE:	1:100
		SIZE:	A1
		REVISION:	

ANNEX E

Typical Drainage Details

ANNEX F

Modelled Surface Water Calculation 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)	0.350
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

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	13.600	18.4	100	Circular	236.890	236.440	0.350	236.150	235.700	0.350
1.001	12.000	11.5	100	Circular	236.150	235.700	0.350	235.110	234.660	0.350
1.002	12.200	100.8	150	Circular	235.110	234.610	0.350	235.800	234.489	1.161
1.003	23.800	100.0	150	Circular	235.800	233.050	2.600	234.000	232.812	1.038
1.004	1.700	100.0	150	Circular	234.000	232.812	1.038	233.600	232.795	0.655

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE1	100	Manhole	Adoptable	S1	450	Manhole	Adoptable
1.001	S1	450	Manhole	Adoptable	S2	450	Manhole	Adoptable
1.002	S2	450	Manhole	Adoptable	S3	600	Manhole	Adoptable
1.003	S3	600	Manhole	Adoptable	S4	900	Manhole	Adoptable
1.004	S4	900	Manhole	Adoptable	S5	450	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
RE1	236.890	0.450	100	Manhole	Adoptable	0	1.000	236.440	100	Circular
S1	236.150	0.450	450	Manhole	Adoptable	1	1.000	235.700	100	Circular
						0	1.001	235.700	100	Circular
S2	235.110	0.500	450	Manhole	Adoptable	1	1.001	234.660	100	Circular
						0	1.002	234.610	150	Circular
S3	235.800	2.750	600	Manhole	Adoptable	1	1.002	234.489	150	Circular
						0	1.003	233.050	150	Circular
S4	234.000	1.188	900	Manhole	Adoptable	1	1.003	232.812	150	Circular
						0	1.004	232.812	150	Circular
S5	233.600	0.805	450	Manhole	Adoptable	1	1.004	232.795	150	Circular



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 S4 Online Orifice Control

Flap Valve	x	Invert Level (m)	232.812	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.050		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	236.464	0.024	1.6	0.0096	0.0000	OK
15 minute summer	S1	10	235.721	0.021	1.6	0.0033	0.0000	OK
15 minute summer	S2	10	234.649	0.039	2.5	0.0140	0.0000	OK
15 minute summer	S3	10	233.087	0.037	2.5	0.0105	0.0000	OK
15 minute summer	S4	13	232.933	0.121	2.4	0.0772	0.0000	OK
15 minute summer	S5	1	232.795	0.000	1.6	0.0000	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	RE1	1.000	S1	1.6	1.252	0.113	0.0174	
15 minute summer	S1	1.001	S2	1.6	1.398	0.089	0.0137	
15 minute summer	S2	1.002	S3	2.5	0.695	0.140	0.0434	
15 minute summer	S3	1.003	S4	2.4	0.497	0.135	0.2135	
15 minute summer	S4	Orifice	S5	1.6				1.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	236.478	0.038	4.0	0.0155	0.0000	OK
15 minute summer	S1	10	235.733	0.033	4.0	0.0053	0.0000	OK
15 minute summer	S2	10	234.674	0.064	6.2	0.0231	0.0000	OK
30 minute summer	S3	21	233.202	0.152	5.5	0.0429	0.0000	SURCHARGED
30 minute summer	S4	21	233.195	0.383	5.3	0.2435	0.0000	SURCHARGED
15 minute summer	S5	1	232.795	0.000	3.1	0.0000	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	RE1	1.000	S1	4.0	1.602	0.281	0.0340	
15 minute summer	S1	1.001	S2	4.0	1.805	0.223	0.0266	
15 minute summer	S2	1.002	S3	6.2	0.889	0.350	0.0850	
30 minute summer	S3	1.003	S4	5.3	0.520	0.300	0.4190	
30 minute summer	S4	Orifice	S5	3.1				3.3

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	10	236.496	0.056	7.7	0.0229	0.0000	OK
15 minute summer	S1	10	235.748	0.048	7.7	0.0076	0.0000	OK
15 minute summer	S2	10	234.707	0.097	12.0	0.0349	0.0000	OK
30 minute summer	S3	21	233.931	0.881	10.7	0.2493	0.0000	SURCHARGED
30 minute summer	S4	21	233.907	1.094	7.6	0.6961	0.0000	FLOOD RISK
15 minute summer	S5	1	232.795	0.000	5.2	0.0000	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	RE1	1.000	S1	7.7	1.882	0.542	0.0556	
15 minute summer	S1	1.001	S2	7.7	2.111	0.429	0.0438	
15 minute summer	S2	1.002	S3	12.0	1.037	0.679	0.1412	
30 minute summer	S3	1.003	S4	7.6	0.609	0.430	0.4190	
30 minute summer	S4	Orifice	S5	5.4				6.5