DRAINAGE REPORT

Project: New Stone Barn, Ramsden

Made by:	Date:	Project No:	Checked by:	Approved by:	Pages	Rev
M Taylor	07/05/21	2132		MT	3	

Item	Details and Design Rationale	References and output
Method of surface water discharge	Surface water flows from new developments should be dealt with in the following order of preference: 1. Soakaways (infiltration drainage), 2. Discharge to a water course, 3. Discharge to a sewer. In line with this protocol an infiltration test was carried out at the site to BRE365 on 7th April 2021 to establish if soakaways would function. Infiltration rates where found to be good, indicating that infiltration will work well. The infiltration test pit was 1300mmx500mmx510mm deep to represent the infiltration blanket structure which is proposed. The site previously served as a farm yard. Currently all surface water infiltrates within the site. Surface water discharge from the site will be at greenfield rate. The new roof area created by the proposed dwelling will discharge to a new infiltration blanket below the porous driveway, designed to accommodate the 100 year storm plus a 40% allowance for future climate change. All surface water run-off will be dealt with within the site and the area will continue to discharge at greenfield rates.	Building Control Hierarchy Infiltration Rate: $5.12x10^{-5}$ m/s

Calculations	**Soakaway:** Soakaway Contributing Area New Roof = 271m2 Driveway = 343m2 TOTAL = 614m2 Soakaway Dimensions = 20.3m x 16.9m x 0.35m Storage Void Ratio = 30% (Granular sub-base material – no fines) Infiltration Rates = $5.12x10^{-5}$ m/s Base infiltration reduced by 50% to account for silting Infiltration test result, infiltration rate calculation and soakaway design spreadsheet, to BRE Digest 365, are attached to this note.	Impermeable area= 614m2 100yr + 40% Utilisation Factor =0.44 <1 – OK Half Drain Time =0.46 hrs < 24 - OK
Groundwater clearance	Soakaways should also be designed to ensure a minimum of 1m of undisturbed ground is provided between the formation level and ground water level. Two boreholes drilled 300m east of the site for well investigations recorded no groundwater to a depth of 366 feet (111m). Another drilled 1km to the west struck groundwater at a depth of 85m. It is therefore concluded that ground water sits around 90 - 100m below ground level at the site.	Minimum groundwater clearance > 90m - OK

Exceedance	In any surface water design scenario it is possible that the peak design storm could be exceeded or the system could fail through damage or blockage. The exceedance flow route indicates how water will behave in this event, and must ensure that it is controlled and dispersed safely, avoiding risk to property or persons. The minimum deth of sub-base required for the structural integrity of the driveway is deeper that that required for the storage of the design storm (utilisation factor 0.44). This means that storms far in excess of the design event will be easily accommodated by the system. Any exceedance during very high order rainfall events will discharge safely along the driveway to the public highway. Given the constraints of the site and adjacent land this is the only available safe exceedance path.	

Enclosures:

BRE 365 Design Spreadsheet

Borehole Record

Maintenance Schedule

Drainage Drawings – 2132/01, Drainage Layout
2132/02, Drainage Details

Flow Drainage Design
1 St John's Close, Cherington, CV36 5HR
info@flowdrainagedesign.co.uk
Tel: 07837685280

New Stone Barn

		Revision	
Job No:	**2132**	Page:	**C/01**
Section: **Soakaway**	Prepared By:	**MT**	Date: **07/05/2021**

ALTERNATIVE SOAKAWAY SIZES

	trench soakaways		
width of trench *[mm]*:	**450**	**600**	**900**
required trench length *[m]*:	338.16	267.90	189.25
	ring soakaways		
diameter of ring *[mm]*:	1050	1350	1500
required pit diameter *[m]*:	3.55	3.41	3.32

** Based on effective depth and number of pits as in Soakaway Data table*

SUMMARY OF CALCULATIONS

critical design rainfall duration 't_{crit}' =	15	*min*
required storage volume 'V_{req}' =	13.46	m^3
provided storage volume 'V_{prov}' =	30.88	m^3
utilisation factor =	**0.44**	***.OK***
required time to discharge 50% 't_{50}' =	0.46	*hours*
utilisation factor =	**0.02**	***.OK***

GENERAL DATA

site location: **England and Wales**
soakaway type: **geocellular units**

impermeable area drained to soakaway 'A' *[m^2]* =	**614**
60 min rainfall depth of 5 year return period 'R' *[mm]* =	**20**
M5-60 to M5-2d rainfall ratio 'r' =	**0.50**
allowance for climate change:	**40%**

SOAKAWAY DATA

soakaway width 'W' [m] =	**16.90**
soakaway length 'L' [m] =	**20.30**
total depth from ground level 'D_b' *[m]* =	**0.30**
depth to drain invert level 'D_d' *[m]* =	**0.00**
soakaway effective depth 'D_{eff}' *[m]* =	0.30
free volume in infill aggregate *[%]* =	**30**

SOIL INFILTRATION DATA

allowance for infiltration through soakaway base: **50%**
available on-site infiltration test results: (●) Yes ( ) No
use soakage trial pit table below

internal surface area of trial pit 'a_{p50}' [m^2] =	1.06
storage volume between 75-25% 'V_p' [m^3] =	0.07
time for water to fall from 75-25% 't_p' [min] =	22.88
soil infiltration rate 'f' [m/s] =	5.12E-05

SOAKAGE TRIAL PIT DATA

soakage trial pit width 'W_t' *[m]* =	**0.50**
soakage trial pit length 'L_t' *[m]* =	**1.30**
total depth from ground level 'D_{tb}' *[m]* =	**0.51**
depth to pipe invert level 'D_{tp}' *[m]* =	**0.28**
soakage trial pit effective depth 'D_{teff}' *[m]* =	0.23
free volume in infill aggregate *[%]* =	**100**

NOTE: faces of excavation assumed to be vertical

REQUIRED STORAGE CAPACITY PER RAINFALL DURATION

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D Z2	M10-D rainfalls *[mm]*	M10-D inflow *[m^3]*	M50-D Z2	M50-D rainfalls *[mm]*	M50-D inflow *[m^3]*	M100-D Z2	M100-D rainfalls *[mm]*	M100-D inflow *[m^3]*	outflow from soakaway *[m^3]*	required storage *[m^3]*
5	0.39	7.80	1.21	13.18	8.09	1.61	17.59	10.80	1.86	20.28	12.45	2.81	9.65
10	0.54	10.80	1.22	18.49	11.36	1.66	25.07	15.39	1.92	29.07	17.85	5.61	12.24
15	0.65	13.00	1.23	22.42	13.77	1.68	30.58	18.77	1.96	35.64	21.88	8.42	**13.46**
30	0.82	16.40	1.24	28.47	17.48	1.71	39.22	24.08	2.00	45.95	28.21	16.83	11.38
60	1.00	20.00	1.24	34.72	21.32	1.73	48.44	29.74	2.03	56.84	34.90	33.67	1.23
120	1.19	23.80	1.24	41.32	25.37	1.72	57.39	35.24	2.01	67.13	41.22	67.33	0.00
240	1.38	27.60	1.23	47.51	29.17	1.71	66.06	40.56	1.99	76.86	47.19	134.66	0.00
360	1.51	30.20	1.22	51.56	31.66	1.70	71.83	44.10	1.97	83.22	51.10	201.99	0.00
600	1.68	33.60	1.21	56.88	34.92	1.68	78.95	48.48	1.94	91.31	56.07	336.66	0.00
1440	2.03	40.60	1.19	67.57	41.49	1.64	93.01	57.11	1.89	107.15	65.79	807.97	0.00

** Z2 is growth factor from M5 rainfalls*

SOAKAGE TRIAL PIT INFILTRATION TEST RESULTS

	water level measurement N°:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Soakage Trial 1	time *[min]* =	**0**	**2**	**5**	**10**	**14**	**20**													
	depth to water *[m]* =	**0.28**	**0.34**	**0.40**	**0.44**	**0.48**	**0.51**													
Soakage Trial 2	time *[min]* =	**0**	**2**	**6**	**10**	**14**	**19**	**30**												
	depth to water *[m]* =	**0.28**	**0.32**	**0.36**	**0.39**	**0.41**	**0.44**	**0.49**												
Soakage Trial 3	time *[min]* =	**0**	**3**	**10**	**25**	**32**	**36**													
	depth to water *[m]* =	**0.28**	**0.32**	**0.36**	**0.43**	**0.47**	**0.49**													

WELL RECORD

SHEET 1

R.A. LICENCE NO.

1. WELL IDENTITY

NATIONAL GRID REFERENCE SP 347 156

Well at Witney Road Nurseries

I.G.S. REF. No.

RIVER AUTHORITY

Town Ramsden

HYDROMETRIC AREA

County Oxon

SUB-CATCHMENT

Owner of well Mr F.J. Howse

Well made by -

Date of sinking 1976

Information from MAFF, Oxford

Date received March 1977

2. WELL DESCRIPTION

Level of ground surface ..... m.

above sea level (O.D.) ..... ft.

If well top is not at above* ..... m.

ground level how far below ..... ft.

Shaft ..... m. / ..... ft. deep; Diameter at top ..... mm. / ..... in.; at bottom ..... mm. / ..... in.

Bore 91 m. / ..... ft. deep; Diameter at top 100 mm. / ..... in.; at bottom 100 mm. / ..... in.

Details of headings .....

DETAILS OF PERMANENT LINING TUBES

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / ..... ft. above* / below surface

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / ..... ft. above* / below surface

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / ..... ft. above* / below surface

Details of well screen Gravel packed - no other details

DETAILS OF REST WATER LEVELS DURING CONSTRUCTION

Water struck at depths of ..... below well top

Rest level of water ..... m. / ..... ft. above* / below O.D.* / well top when bore ..... m. / ..... ft. deep. Date

Rest level of water ..... m. / ..... ft. above* / below O.D.* / well top when bore ..... m. / ..... ft. deep. Date

Rest level of water on completion of bore 85 m. / ..... ft. ~~above*~~ / below ~~O.D.*~~ / well top when bore 91 m. / ..... ft. deep. Date 1976

Method of drilling .....

Brief details of well development e.g. acid treatment etc. .....

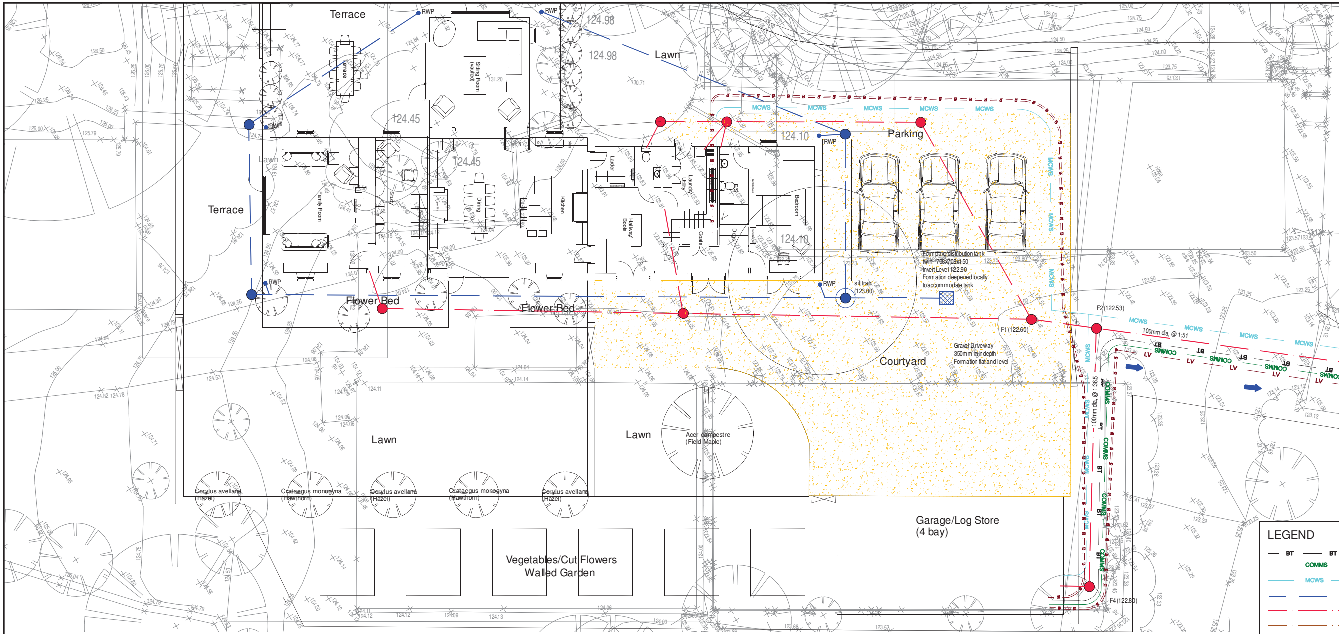
Surface Water Drainage System Maintenance Schedule

DRAINAGE DESIGN
1 St John's Close, Cherington
Warwickshire, CV36 5HR
t: 07837 685280
e: info@flowdrainagedesign.co.uk
w: www.flowdrainagedesign.co.uk

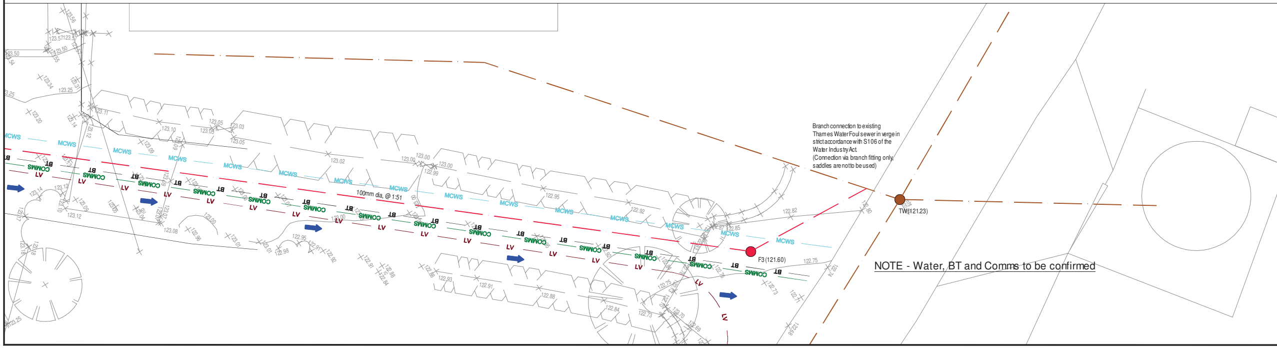
Project: New Stone Barn, Ramsden

Made by:	Date:	Project No:	Checked by:	Approved by:	Pages	Rev
M Taylor	07/05/21	2132		MT	1	

Item	Maintenance Operation	Frequency
Pipe network and chambers	CCTV camera survey, flush, descale, repair as necessary	5 years (or when evidence of failure is witnessed)
Silt traps	Remove silt and debris from sump Inspect chamber and repair as necessary	Annual (at the end of autumn to ensure leaf fall is dealt with as soon as possible)
Soakaway	Camera from silt trap to distribution tank to check integrity. Inspect ground over soakaway for signs of subsidence. Lift and repair/replace driveway sub-base as necessary.	5 years (or when evidence of failure is witnessed)
Porous Paving	Inspect for areas of silt build up or subsidence within the pavement. Lift, clean and relay surface materials as necessary.	Annual



Drainage and Utilities Layout
Scale 1:100 @ A1



NOTES

1. This drawing to be read in conjunction with all relevant documents and specifications.
2. Dimensions not to be scaled.
3. The Contractor shall carryout a level check of the existing drainage and confirm the results to the Engineer for confirmation of the design, prior to the laying of any new drainage.
4. Covers & frames to existing chambers to be adjusted to suit new levels.
5. All manhole chamber covers to be installed parallel to final kerbs, edgings, paving joints or building lines.
6. This drawing details all below ground drainage up to finished floor level. For details of drainage above finished floor level, refer to Architect's drawings.
7. External private pipework may be either VC, thermoplastic structured wall sewer pipe, or PCV-u to BSEN13476 160, and shall comply with WIS 4-35-01. Pipes shall be BSi Kitemarked, or have equivalent third party certification.
8. All open drainage connections, svp's, gullies, manholes, etc. shall be protected throughout the construction period to prevent the ingress of debris to the systems.
9. All drainage to be laid within ±10mm of the design invert levels and shall have a positive fall towards the outfall, no backfalls are permitted.
10. Pipe bedding and surround to be Type S (granular).

KEY

- Proposed surface water sewer (dia, gradient)
- Proposed foul water sewer (dia, gradient)
- Existing Foul Sewer
- F3 (121.60) — Proposed Type 3 access chamber (Invert level shown)
- silt trap (123.00) — Proposed surface water silt trap (Invert level shown)
- TW (121.23) — Existing Thames Water Chamber
- Exceedance flow path

LEGEND

BT	TELECOMS CABLING (BT OPEN REACH)
COMMS	BROADBAND (GIGACLEAR)
MCWS	WATER MAIN
	SURFACE WATER DRAIN
	FOUL DRAIN (PROPOSED)
	FOUL DRAIN (EXISTING)
LV	LV CABLING (95mm Wavecon by SSE)
LV	90mm LV DUCT with draw rope (by builder) (for 35mm 3ph cable pulled by SSE)

Rev.	Description	Date	Chkd
P1	Preliminary Issue	06/05/21	MT

DRAINAGE DESIGN
1 St John's Close, Cherington
Shipston on Stour, CV36 5HR
t: 07837 685280, e: info@flowconstructiondesign.co.uk

Client : Richard Lord

Project : New Stone Barn Lower Farm

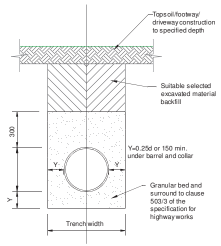
Title : Proposed Drainage and Utilities Layout

Project Engineer : M. Taylor Scale : 1:100

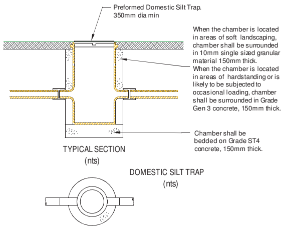
Project Director : Date : April 2021

Status : DRAFT

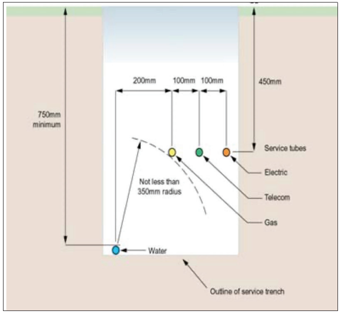
Drawing No. 2132/01 Rev P1



GRANULAR PIPE BEDDING DETAIL
(nts)



DOMESTIC SILT TRAP
(nts)



SERVICE TRENCH SECTION

DRAINAGE NOTES

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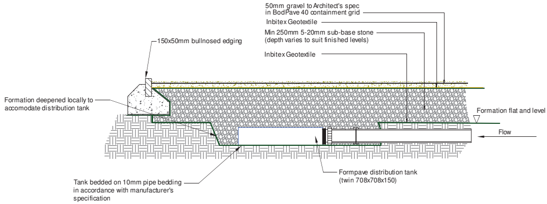
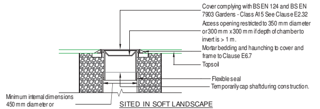
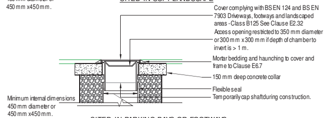


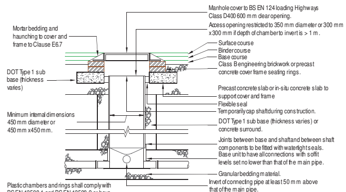
INFILTRATION BLANKET / DRIVEWAY CONSTRUCTION (SHOWING DEEPENING FOR DISTRIBUTION TANK)
(nts)



SITED IN SOFT LANDSCAPE



SITED IN PARKING BAYS OR FOOTWAYS



TYPICAL CHAMBER SECTION

Type 3 Flexible Material Inspection Chamber
Scale 1:25

Rev.	Description	Date	Chkd
P1	Preliminary Issue	06/05/2021	MT

flow
DRAINAGE DESIGN

1 St John's Close, Cherington
Shipston on Stour, CV36 5HR
t: 07837 685280, e: info@flowconstructiondesign.co.uk

Client : Richard Lord

Project : New Stone Barn
Lower Farm

Title : Proposed Drainage and Utilities Details

Project Engineer :	M. Taylor	Scale :	As Shown
Project Director :		Date :	May 2021
Status :	DRAFT		

Drawing No. 2132/02 Rev