



Development at Crockwell House Farm, Manor Road, Great Bourton - Phase 2

Drainage Statement

14th April 2021

1. Site

Cotswold Transport Planning have been commissioned to provide drainage consultancy by Ridge and Partners LLP at the behest of March Projects for Phase 2 of a development at Crockwell House Farm, Great Bourton.

The site is located off Manor Road, Great Bourton. The proposed development consists of demolishing existing barn buildings and constructing two residential dwellings with associated parking and landscaping. Access will be utilised from the previous phase 1 development.

The development will create approximately 580m² (0.058Ha) of impermeable area in a currently brownfield site.

2. Existing Site Conditions & Drainage

The site is brownfield with multiple existing barns and an access from Manor Road/Stanwell Lane.

British Geological Survey (BGS) mapping indicates the site to have bedrock of Dyrham Formation – Siltstone and mudstone interbedded. Soilscapes indicates the site to be Loamy freely draining soils.

Thames Water Asset Records indicate an existing 150mm dia foul sewer at the junction of Manor Road/Stanwell Lane.

The above geology details insinuate the area is of a permeable nature. Thames Water records also imply this due to a lack of surface water sewers in the area.

3. Site Infiltration Testing (BRE365)

Site infiltration testing was completed on 1st May 2020 as part of a GIR, Soiltechnics report ref STS5055. Multiple exploratory excavations were undertaken up to 2.3m deep.



No groundwater was found in any of the excavations. Each one comprised of made ground overlying the Dyrham Formation (Limestone).

All excavations remained stable for the duration of the investigation and testing.

Infiltration testing was undertaken in four of the trial pits, however insufficient infiltration in three of the pits was experienced in the allocated time on site. It is known that Limestone strata is dependant on fissures for infiltration and this causes rate variability.

TP04 experienced rates between 2.9×10^{-5} m/s and 6.58×10^{-5} m/s and as per other pits on site limestone rock (Dyrham Formation) was encountered, with lateral migration of water on the limestone.

It should be noted that Approximately 5m to the north of TP04, and 4.5m to the south of the proposed east dwelling there is an existing well, as indicated on the topographical survey.

Based on the site results infiltration will be a suitable method of stormwater management however, further location specific on-site testing within the Limestone layer is required for detail design prior to construction. For the purposes of this strategy the lowest rate, 2.9×10^{-5} m/s, will be taken as the design rate.

4. Proposed Stormwater Drainage

It is proposed each dwelling will have its own stormwater drainage system. For both, stormwater will be collected via traditional gravity system and outfall to a single soakaway. The Soakaway is to be designed in accordance with BRE 365 and located a minimum of 5m from any structure or building. It is proposed to utilise cellular soakaways (plastic crates) instead of granular soakaways to minimise space uptake.

Calculations have been run to size the soakaway to serve the eastern dwelling. Impermeable areas generated by the eastern dwelling and associated parking equate to 284m² and a cellular soakaway 4m x 4.5m x 0.8m deep is required. This provides storage for 13.3m³ for the 1 in 100 year + 40% CC event using the design infiltration rate, 2.9×10^{-5} m/s.

Calculations have been run to size the soakaway to serve the western dwelling. Impermeable areas generated by the eastern dwelling and associated parking equate to 296m² and a cellular soakaway 4m x 5m x 0.8m deep is required. This provides



storage for 13.6m³ for the 1 in 100 year + 40% CC event using the design infiltration rate, 2.9 x 10⁻⁵ m/s.

The stormwater systems have been:

- Designed with Microdrainage Source Control (2020.01)
- Run with a suitable return period – 100 year with 40% allowance for climate change.

Furthermore, exceedance flow routes have been assessed for an event beyond the 1 in 100 year plus 40% CC design. It is expected flows will travel south down the access road and enter Manor Road, then south towards Great Bourton to be intercepted by highway drainage.

Please refer to enclosed drainage plan and associated Microdrainage Source Control calculations.

5. Water Quality

All stormwater gullies, inspection chambers and manholes are recommended to contain silt traps and/or catch pits to reduce sediment in the system.

It is recommended, as good practise, that the properties utilise rainwater butts for water quality. These can also provide a small reduction in the runoff volume entering the stormwater system.

The cellular soakaways are to have non-woven geotextile membranes. This will provide filtration and further water quality benefits to stormwater discharging to ground.

6. Maintenance Regime

Maintenance of SuDS features are essential to ensure that the stormwater drainage system operates effectively and that flooding of the site and surrounding areas is prevented.

The responsibility of maintaining the stormwater system and soakaway would be the individual property owner or a management company.

A full maintenance regime should be carried out to ensure that all aspects of the drainage system remain operational.



7. Proposed Foul Water Drainage

It is proposed to drain the foul sewerage via traditional gravity system to an existing on-site foul manhole. The existing foul chamber is assumed to connect to the Thames Water foul manhole, ref 5602, in Manor Road.

Connection to the existing foul chamber will be subject to a CCTV survey confirming condition and outfall.

Anticipated foul flows have been calculated using DCG principles of 4000 litres per day per dwelling. This equates to a foul discharge rate of 0.1 l/s from site for a single property.

Connection to the existing 150mm dia foul sewer, direct or indirect, will be subject to a S106 agreement with Thames Water.

8. Supporting Information

- Thames Water Asset Location Records
- CTP-20-269 C002 Phase 2 Drainage Strategy.
- Microdrainage Source Control Calcs - 100 year with 40% allowance for climate change.

Asset location search



Property Searches

Cotswold Transport Planning
CTH House CTH House

CHELTENHAM
GL50 3QQ

Search address supplied Crockwell House Farm
Manor Road
Great Bourton
Banbury
OX17 1QT

Your reference CTP-20-269

Our reference ALS/ALS Standard/2020_4197930

Search date 12 June 2020

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0845 070 9148

Search address supplied: Crockwell House Farm, Manor Road, Great Bourton, Banbury, OX17 1QT

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and



pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

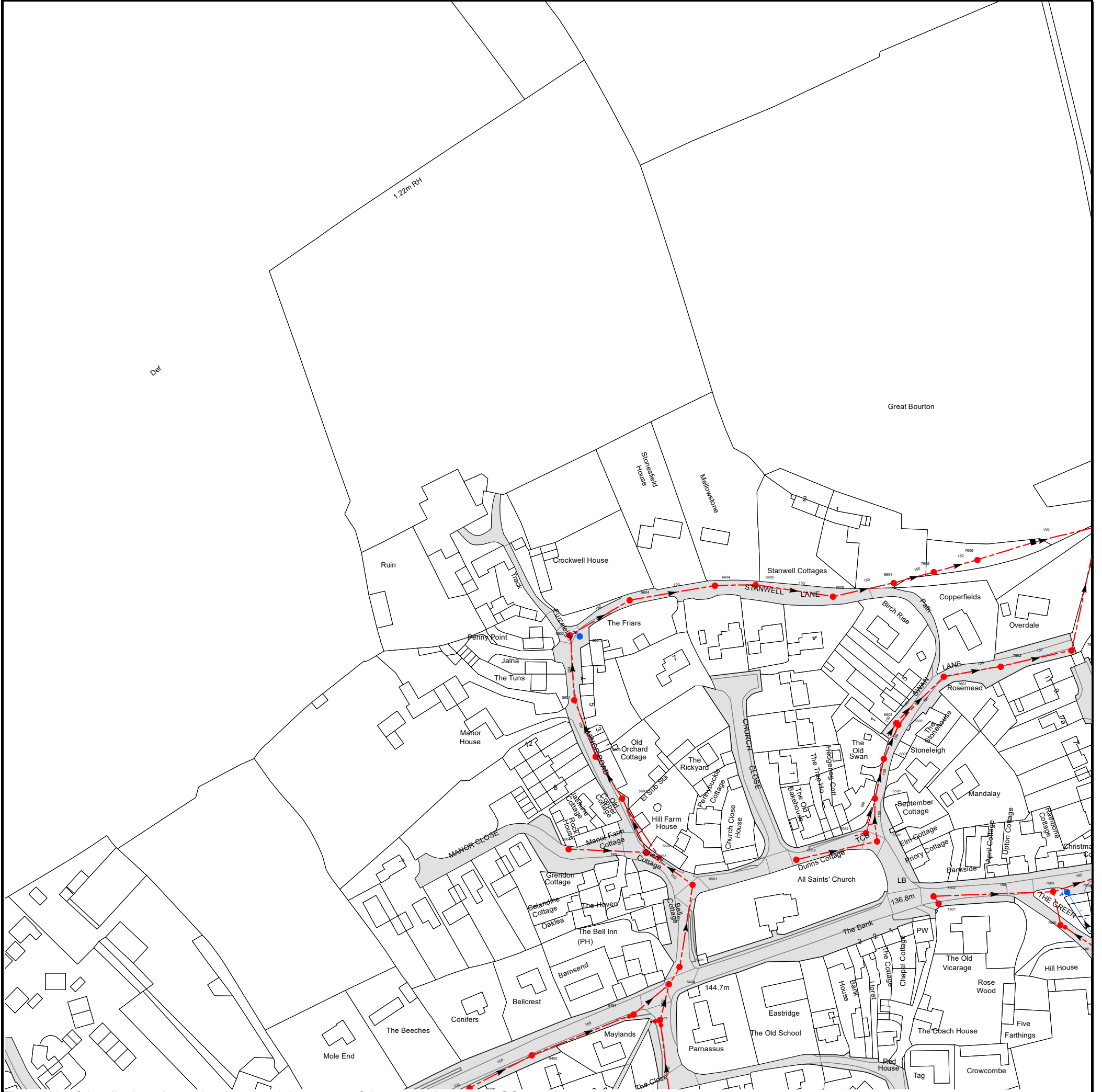
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2020_4197930



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 445538,245697

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any kind or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7602	131.5	130.02
7503	133.93	132.9
7505	135.58	133.99
7552	133.7	133.02
7603	127.93	126.44
7506	137.05	135.85
7791	n/a	n/a
5504	144.35	143.41
5602	141.89	139.54
5601	142	140.51
5651	141.77	140.43
5603	142.46	141.09
5503	142.78	141.47
5604	139.93	138.36
5502	143.26	141.82
551A	n/a	n/a
5501	144.77	143.39
6501	143.54	142.07
6604	136.61	135.72
6605	135.51	134.18
6503	140.77	139.86
6606	133.23	131.73
6592	n/a	n/a
6591	n/a	n/a
6502	138.8	137.63
6601	136.54	135.1
6691	n/a	n/a
6603	135.77	134.27
6602	135.44	133.94
7502	137.29	135.82
7605	126.08	123.82
7501	137.62	136.92
7601	132.37	131.04
7606	125.15	123.55
5401	147.61	146.47
5402	146.96	145.74
5403	145.32	144.01
5454	n/a	n/a
5404	145.06	143.62

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



0 45 90 180 270 360
Meters

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved



















Scale: 1:7158
Width: 2000m
Printed By: G1KANAGA
Print Date: 12/06/2020
Map Centre: 445538,245697
Grid Reference: SP4545NE

Comments:








ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

-  **Foul:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  Trunk Surface Water
-  Trunk Foul
-  Storm Relief
-  Trunk Combined
-  Vent Pipe
-  Bio-solids (Sludge)
-  Proposed Thames Surface Water Sewer
-  Proposed Thames Water Foul Sewer
-  Gallery
-  Foul Rising Main
-  Surface Water Rising Main
-  Combined Rising Main
-  Sludge Rising Main
-  Proposed Thames Water Rising Main
-  Vacuum





Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

-  Air Valve
-  Dam Chase
-  Fitting
-  Meter
-  Vent Column




Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

-  Control Valve
-  Drop Pipe
-  Ancillary
-  Weir





End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

-  Outfall
-  Undefined End
-  Inlet






Other Symbols

Symbols used on maps which do not fall under other general categories








-  Public/Private Pumping Station
-  Change of characteristic indicator (C.O.C.I.)
-  Invert Level
-  Summit

Areas

Lines denoting areas of underground surveys, etc.

-  Agreement
-  Operational Site
-  Chamber
-  Tunnel
-  Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

-  Foul Sewer
-  Surface Water Sewer
-  Combined Sewer
-  Gully
-  Culverted Watercourse
-  Proposed
-  Abandoned Sewer

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.
- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

KEY:

- EXISTING
- THAMES WATER FOUL SEWER
- PROPOSED
- STORMWATER SEWER
 - STORMWATER INSPECTION CHAMBER
 - STORMWATER RODDING EYE
 - INDICATIVE RWP
 - CELLULAR SOAKAWAY
 - FOUL SEWER
 - FOUL INSPECTION CHAMBER
 - 219.750 INDICATIVE PLOT FFL

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS ARE IN METRES, UNLESS STATED OTHERWISE.
2. THIS DRAWING IS BASED ON THE ARCHITECTS LAYOUT RECEIVED FROM RIDGE AND PARTNERS LLP ON 29/03/2021.
3. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER 5 WORKING DAYS IN ADVANCE OF UNDERTAKING ANY WORK.
4. ALL PUBLIC THAMES WATER ASSETS ARE BASED ON ASSET RECORDS ISSUED ON 12/06/2020 REF: 2020_4197930

PROPOSED CELLULAR SOAKAWAY (AQUACELL OR SIMILAR APPROVED) 4 x 4.5 x 0.8m DEPTH
COVER LEVEL 102.00
TOP LEVEL 100.67
PIPE INVERT 100.52 (1500) AND 100.57 (1000)
BASE LEVEL 99.87
MAX STORAGE VOLUME - 13.3m³

PROPOSED CELLULAR SOAKAWAY (AQUACELL OR SIMILAR APPROVED) 4 x 5 x 0.8m DEPTH
COVER LEVEL TBC - MIN 101.20
TOP LEVEL 100.65
PIPE INVERT 100.50 (1500)
BASE LEVEL 99.85
MAX STORAGE VOLUME - 13.6m³

EARTHWORKS REQUIRED ALONG WESTERN BOUNDARY TO TIE INTO EXISTING LEVELS. EXACT REQUIREMENTS TO BE CONFIRMED AT DETAIL DESIGN BY ENGINEER.

EXISTING WELL

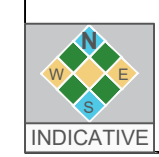
EXISTING FOUL CHAMBER. INVERT LEVELS TBC PRIOR TO THE START OF WORKS ON SITE. ASSUMED I.L. 99.54m AOD BASED ON 1.2m COVER.

OVERHEAD POWER CABLES

ASSUMED ROUTE OF EXISTING ONSITE PRIVATE SEWER. CONNECTION ASSUMED TO EXISTING THAMES WATER FOUL ASSET IN MANOR ROAD.

EXISTING FOUL CHAMBER. INVERT LEVELS TBC PRIOR TO THE START OF WORKS ON SITE. ASSUMED I.L. 99.65m AOD BASED ON 1.2m COVER.

PHASE 1 BARN CONVERSION



140421	FIRST ISSUE	NT	KT
Rev	Date	Drawn By	Checked By
CLIENT: MARCH PROJECTS			
PROJECT: PHASE 2 CROCKWELL FARM, MANOR ROAD, GREAT BOURTON			
TITLE: PROPOSED DRAINAGE STRATEGY			
STATUS: PLANNING			
SCALE @ A1:	DATE:	DRAWN:	CHECKED:
1:200	14/04/21	NT	KT
JOB NO:	DRAWING NO:	REVISION:	
CTP-20-269	C002	-	

RESERVED COPYRIGHT

CTP House, Knapp Road
Cheltenham
Gloucestershire, GL50 3QQ

CROCKWELL HOUSE FARM
EAST PLOT CELLULAR SOAKAWAY
1 IN 100YR + 40% CC



Date 14/04/2021 19:34

Designed by NT

File CTP-20-269_East House

Checked by KT

Innovyze

Source Control 2020.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 214 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	100.284	0.414	0.5	7.1	O K
30 min Summer	100.396	0.526	0.5	9.0	O K
60 min Summer	100.491	0.621	0.6	10.6	O K
120 min Summer	100.543	0.673	0.6	11.5	O K
180 min Summer	100.541	0.671	0.6	11.5	O K
240 min Summer	100.529	0.659	0.6	11.3	O K
360 min Summer	100.498	0.628	0.6	10.7	O K
480 min Summer	100.467	0.597	0.5	10.2	O K
600 min Summer	100.437	0.567	0.5	9.7	O K
720 min Summer	100.408	0.538	0.5	9.2	O K
960 min Summer	100.355	0.485	0.5	8.3	O K
1440 min Summer	100.262	0.392	0.5	6.7	O K
2160 min Summer	100.151	0.281	0.4	4.8	O K
2880 min Summer	100.066	0.196	0.4	3.4	O K
4320 min Summer	99.959	0.089	0.4	1.5	O K
5760 min Summer	99.919	0.049	0.4	0.8	O K
7200 min Summer	99.911	0.041	0.3	0.7	O K
8640 min Summer	99.905	0.035	0.3	0.6	O K
10080 min Summer	99.901	0.031	0.2	0.5	O K
15 min Winter	100.336	0.466	0.5	8.0	O K
30 min Winter	100.464	0.594	0.5	10.2	O K
60 min Winter	100.574	0.704	0.6	12.0	O K
120 min Winter	100.643	0.773	0.6	13.2	O K
180 min Winter	100.648	0.778	0.6	13.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	137.178	0.0	18
30 min Summer	89.676	0.0	33
60 min Summer	55.837	0.0	62
120 min Summer	33.603	0.0	120
180 min Summer	24.646	0.0	160
240 min Summer	19.668	0.0	190
360 min Summer	14.244	0.0	256
480 min Summer	11.334	0.0	324
600 min Summer	9.486	0.0	392
720 min Summer	8.198	0.0	462
960 min Summer	6.508	0.0	598
1440 min Summer	4.694	0.0	864
2160 min Summer	3.380	0.0	1236
2880 min Summer	2.675	0.0	1588
4320 min Summer	1.921	0.0	2288
5760 min Summer	1.517	0.0	2936
7200 min Summer	1.263	0.0	3672
8640 min Summer	1.087	0.0	4400
10080 min Summer	0.957	0.0	5112
15 min Winter	137.178	0.0	18
30 min Winter	89.676	0.0	32
60 min Winter	55.837	0.0	62
120 min Winter	33.603	0.0	118
180 min Winter	24.646	0.0	172

CTP House, Knapp Road
Cheltenham
Gloucestershire, GL50 3QQ

CROCKWELL HOUSE FARM
EAST PLOT CELLULAR SOAKAWAY
1 IN 100YR + 40% CC



Date 14/04/2021 19:34

Designed by NT

File CTP-20-269_East House

Checked by KT

Innovyze

Source Control 2020.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
240 min Winter	100.630	0.760	0.6	13.0	O K
360 min Winter	100.592	0.722	0.6	12.3	O K
480 min Winter	100.550	0.680	0.6	11.6	O K
600 min Winter	100.507	0.637	0.6	10.9	O K
720 min Winter	100.465	0.595	0.5	10.2	O K
960 min Winter	100.387	0.517	0.5	8.8	O K
1440 min Winter	100.253	0.383	0.5	6.6	O K
2160 min Winter	100.100	0.230	0.4	3.9	O K
2880 min Winter	99.992	0.122	0.4	2.1	O K
4320 min Winter	99.915	0.045	0.3	0.8	O K
5760 min Winter	99.906	0.036	0.3	0.6	O K
7200 min Winter	99.900	0.030	0.2	0.5	O K
8640 min Winter	99.896	0.026	0.2	0.4	O K
10080 min Winter	99.893	0.023	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
240 min Winter	19.668	0.0	202
360 min Winter	14.244	0.0	274
480 min Winter	11.334	0.0	350
600 min Winter	9.486	0.0	426
720 min Winter	8.198	0.0	500
960 min Winter	6.508	0.0	644
1440 min Winter	4.694	0.0	912
2160 min Winter	3.380	0.0	1296
2880 min Winter	2.675	0.0	1640
4320 min Winter	1.921	0.0	2200
5760 min Winter	1.517	0.0	2928
7200 min Winter	1.263	0.0	3640
8640 min Winter	1.087	0.0	4336
10080 min Winter	0.957	0.0	5072

CTP House, Knapp Road

CROCKWELL HOUSE FARM

Cheltenham

EAST PLOT CELLULAR SOAKAWAY

Gloucestershire, GL50 3QQ

1 IN 100YR + 40% CC

Date 14/04/2021 19:34

Designed by NT

File CTP-20-269_East House

Checked by KT



Innovyze

Source Control 2020.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.411	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.029

Time (mins) Area
From: To: (ha)

0 4 0.029

CTP House, Knapp Road
 Cheltenham
 Gloucestershire, GL50 3QQ

CROCKWELL HOUSE FARM
 EAST PLOT CELLULAR SOAKAWAY
 1 IN 100YR + 40% CC



Date 14/04/2021 19:34

Designed by NT

File CTP-20-269_East House

Checked by KT

Innovyze Source Control 2020.1

Model Details

Storage is Online Cover Level (m) 102.000

Cellular Storage Structure

Invert Level (m) 99.870 Safety Factor 1.5
 Infiltration Coefficient Base (m/hr) 0.10440 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.10440

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	18.0	18.0	0.800	18.0	31.6	0.801	0.0	31.6

CTP House, Knapp Road

CROCKWELL HOUSE FARM

Cheltenham

WEST PLOT CELLULAR SOAKAWAY

Gloucestershire, GL50 3QQ

1 IN 100YR + 40% CC

Date 14/04/2021 19:30

Designed by NT

File CTP-20-269_West House

Checked by KT



Innovyze

Source Control 2020.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 207 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	100.235	0.385	0.5	7.3	O K
30 min Summer	100.338	0.488	0.6	9.3	O K
60 min Summer	100.425	0.575	0.6	10.9	O K
120 min Summer	100.471	0.621	0.6	11.8	O K
180 min Summer	100.468	0.618	0.6	11.7	O K
240 min Summer	100.456	0.606	0.6	11.5	O K
360 min Summer	100.425	0.575	0.6	10.9	O K
480 min Summer	100.395	0.545	0.6	10.4	O K
600 min Summer	100.367	0.517	0.6	9.8	O K
720 min Summer	100.339	0.489	0.6	9.3	O K
960 min Summer	100.288	0.438	0.5	8.3	O K
1440 min Summer	100.198	0.348	0.5	6.6	O K
2160 min Summer	100.092	0.242	0.5	4.6	O K
2880 min Summer	100.014	0.164	0.4	3.1	O K
4320 min Summer	99.921	0.071	0.4	1.3	O K
5760 min Summer	99.896	0.046	0.4	0.9	O K
7200 min Summer	99.888	0.038	0.3	0.7	O K
8640 min Summer	99.883	0.033	0.3	0.6	O K
10080 min Summer	99.879	0.029	0.2	0.6	O K
15 min Winter	100.283	0.433	0.5	8.2	O K
30 min Winter	100.402	0.552	0.6	10.5	O K
60 min Winter	100.503	0.653	0.6	12.4	O K
120 min Winter	100.565	0.715	0.6	13.6	O K
180 min Winter	100.567	0.717	0.6	13.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	137.178	0.0	18
30 min Summer	89.676	0.0	33
60 min Summer	55.837	0.0	62
120 min Summer	33.603	0.0	120
180 min Summer	24.646	0.0	158
240 min Summer	19.668	0.0	190
360 min Summer	14.244	0.0	254
480 min Summer	11.334	0.0	324
600 min Summer	9.486	0.0	392
720 min Summer	8.198	0.0	460
960 min Summer	6.508	0.0	596
1440 min Summer	4.694	0.0	854
2160 min Summer	3.380	0.0	1232
2880 min Summer	2.675	0.0	1584
4320 min Summer	1.921	0.0	2248
5760 min Summer	1.517	0.0	2936
7200 min Summer	1.263	0.0	3672
8640 min Summer	1.087	0.0	4392
10080 min Summer	0.957	0.0	5136
15 min Winter	137.178	0.0	18
30 min Winter	89.676	0.0	32
60 min Winter	55.837	0.0	60
120 min Winter	33.603	0.0	118
180 min Winter	24.646	0.0	172

CTP House, Knapp Road

CROCKWELL HOUSE FARM

Cheltenham

WEST PLOT CELLULAR SOAKAWAY

Gloucestershire, GL50 3QQ

1 IN 100YR + 40% CC

Date 14/04/2021 19:30

Designed by NT

File CTP-20-269_West House

Checked by KT



Innovyze

Source Control 2020.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
240 min Winter	100.549	0.699	0.6	13.3	O K
360 min Winter	100.511	0.661	0.6	12.6	O K
480 min Winter	100.470	0.620	0.6	11.8	O K
600 min Winter	100.429	0.579	0.6	11.0	O K
720 min Winter	100.388	0.538	0.6	10.2	O K
960 min Winter	100.313	0.463	0.5	8.8	O K
1440 min Winter	100.184	0.334	0.5	6.3	O K
2160 min Winter	100.038	0.188	0.5	3.6	O K
2880 min Winter	99.941	0.091	0.4	1.7	O K
4320 min Winter	99.892	0.042	0.3	0.8	O K
5760 min Winter	99.883	0.033	0.3	0.6	O K
7200 min Winter	99.878	0.028	0.2	0.5	O K
8640 min Winter	99.874	0.024	0.2	0.5	O K
10080 min Winter	99.871	0.021	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
240 min Winter	19.668	0.0	198
360 min Winter	14.244	0.0	272
480 min Winter	11.334	0.0	350
600 min Winter	9.486	0.0	424
720 min Winter	8.198	0.0	498
960 min Winter	6.508	0.0	638
1440 min Winter	4.694	0.0	910
2160 min Winter	3.380	0.0	1276
2880 min Winter	2.675	0.0	1612
4320 min Winter	1.921	0.0	2204
5760 min Winter	1.517	0.0	2952
7200 min Winter	1.263	0.0	3648
8640 min Winter	1.087	0.0	4408
10080 min Winter	0.957	0.0	5152

CTP House, Knapp Road

CROCKWELL HOUSE FARM

Cheltenham

WEST PLOT CELLULAR SOAKAWAY

Gloucestershire, GL50 3QQ

1 IN 100YR + 40% CC

Date 14/04/2021 19:30

Designed by NT

File CTP-20-269_West House

Checked by KT



Innovyze

Source Control 2020.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.411	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.030

Time (mins) Area
From: To: (ha)

0 4 0.030

CTP House, Knapp Road
 Cheltenham
 Gloucestershire, GL50 3QQ

CROCKWELL HOUSE FARM
 WEST PLOT CELLULAR SOAKAWAY
 1 IN 100YR + 40% CC



Date 14/04/2021 19:30

Designed by NT

File CTP-20-269_West House

Checked by KT

Innovyze Source Control 2020.1

Model Details

Storage is Online Cover Level (m) 101.200

Cellular Storage Structure

Invert Level (m) 99.850 Safety Factor 1.5
 Infiltration Coefficient Base (m/hr) 0.10440 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.10440

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	20.0	20.0	0.800	20.0	34.4	0.801	0.0	34.4