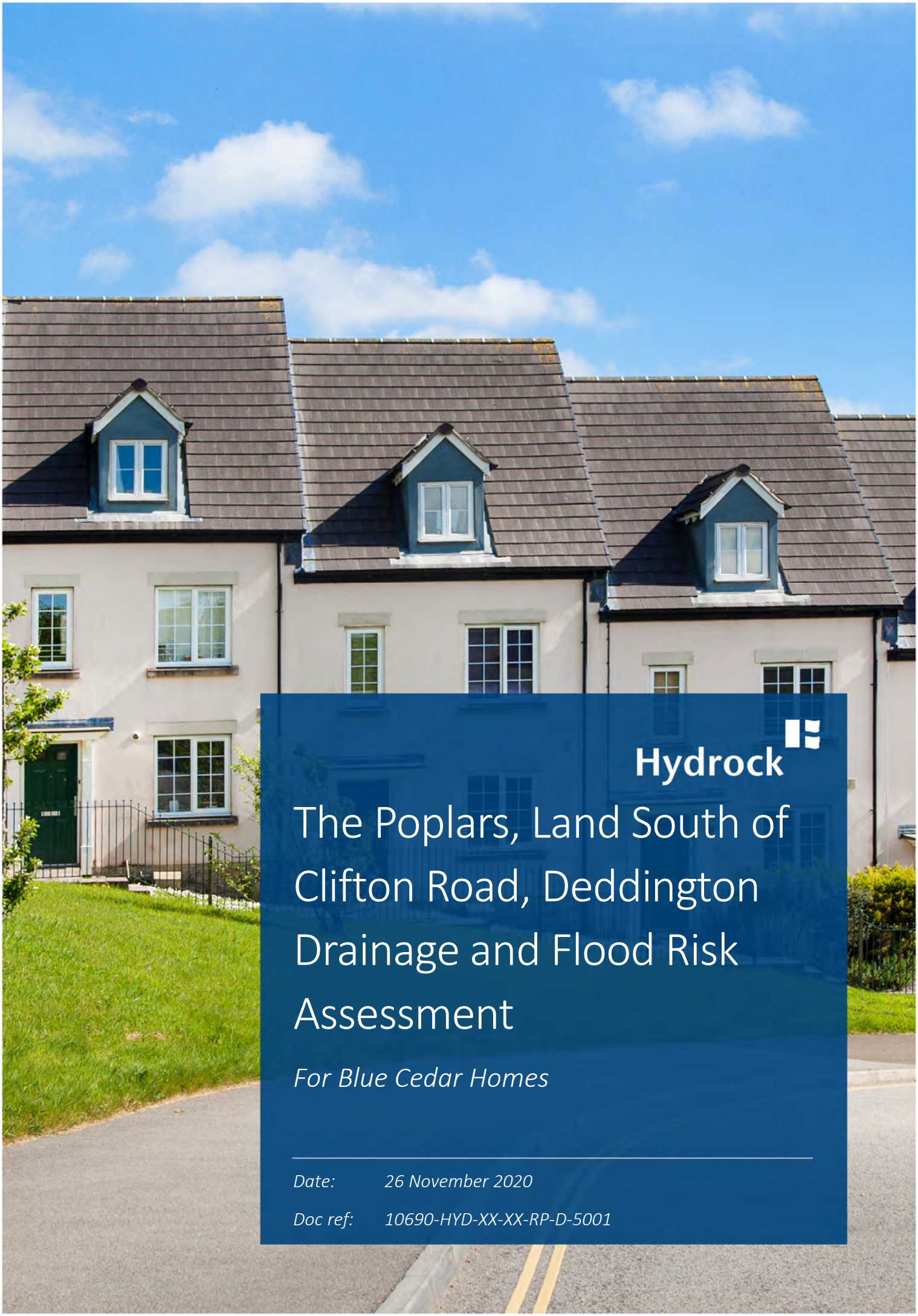

Hydrock

The Poplars, Land South of Clifton Road, Deddington Drainage and Flood Risk Assessment

For Blue Cedar Homes

Date: *26 November 2020*

Doc ref: *10690-HYD-XX-XX-RP-D-5001*

Project name	The Poplars, Land South of Clifton Road, Deddington
Design note title	Drainage and Flood Risk Assessment
Document reference	10690-HYD-XX-XX-RP-D-5001
Author	Rob Belcher BEng GMICE
Checked by	Richard Hughes
Revision	P03 - Following client comment
Date	26 November 2020

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2.1 Location and Setting 4
2.2 Topography 4
2.3 Proposed Development 4
3. Drainage Strategy 5
3.1 Existing Drainage 5
3.2 Proposed 5
4. Conclusion 7

1. INTRODUCTION

This Technical Note has been prepared by Hydrock on behalf of Blue Cedar Homes in support of a Planning Application to be submitted to Cherwell District Council for a proposed development at the The Poplars, Land South of Clifton Road, Deddington.

The following drainage report identifies the existing situation, development proposals and how surface and foul water is proposed to be dealt with as part of the development. As the development is less than 1 ha and within Flood Zone 1, a site specific flood risk assessment is not considered to be necessary.

Project name	The Poplars, Land South of Clifton Road, Deddington
Design note title	Drainage and Flood Risk Assessment
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4. Conclusion 7

2. SITE INFORMATION

2.1 Location and Setting

The existing 0.46ha site is located at The Poplars, Land South of Clifton Road, Deddington. OX15 0TH at a National Grid Reference of SP 47123 31742.

The site is currently comprised of entirely greenfield land. Directly north lies Clifton Road, to the east and south lies a continuation of greenfield with a few dwellings further east. A site with a recent consent for up to 15 dwellings is also located to the east of the site. Directly west of the development is a small pocket of approximately 7 residential dwellings.

A site location plan is included in Appendix A.

2.2 Topography

The site falls in a constant southerly direction from Clifton Road from a level of approximately 124.5mAOD to 123.5mAOD along the southern border.

A Topographical Survey of the site is included in Appendix A.

2.3 Proposed Development

The proposal includes the erection of 7 residential dwellings with associated areas of hardstanding and landscaping. The highway between plots 1 and 6 within the site is proposed to remain private, however is to be designed to adoptable standards. Drainage within this highway will also be constructed to an adoptable standard.

The proposed layout plans are included in Appendix B.

3. DRAINAGE STRATEGY

3.1 Existing

3.1.1 Surface water

Due to the undeveloped nature of the existing site, the lack of information recorded on the topographic survey and Thames Water records (Appendix A) identifying no assets within the development boundary it is assumed that the site is not currently served by a formal drainage network. It is therefore assumed that rainwater infiltrates the ground until the saturation point is met at which point surface water flows overland following the natural topography.

Following a desktop study, highway ditches are shown to be present along both sides of Clifton Road. Consultation with Cherwell District Council have identified that a culvert crosses Clifton Street to the west of the development site (Appendix B).

3.1.2 Foul water

Due to the undeveloped nature of the development it is assumed that no foul network is currently present on site. Thames Water records have been obtained (Appendix A) and indicate a public foul water sewer within Clifton Road located north of the development. The closest manhole to the development access is MH0702 and is shown to have an invert level of 122.18mAOD.

3.2 Proposed

3.2.1 Surface Water

The options for managing surface water have been reviewed in accordance with the following hierarchy, as discussed in Building Regulations Part H and Paragraph 080 of NPPG:

1. Infiltration to the ground using a soakaway or other suitable Sustainable Drainage System (SuDS).
2. If this is not feasible, discharge to a watercourse at a restricted rate, unless it does not affect flood risk e.g. if to the sea or an estuary.
3. Discharge at a restricted rate to a surface water sewer or drain.
4. Discharge at a restricted rate to a combined sewer system –only considered if the above have all been investigated and it has been proved that none of these options are suitable. The approval for this can only be given by the Water Authority.

Infiltration testing has been completed on site (Appendix A) and found that infiltration would provide a suitable method of surface water discharge. Hence, it is proposed that the impermeable areas on site drain towards soakaway features.

Results from the onsite testing (Appendix B) concluded an infiltration rate of 1.94x10-4m/s in the location of the proposed development and therefore this value has been used in order to calculate infiltration feature sizes.

The total roof impermeable area is proposed to drain via a new private network towards the permeable paved private drive adjacent to plot 4. The private permeable paving will drain its own area with the remaining additional impermeable areas draining towards an underground geocellular crate located within the private drive. Calculations have shown that the geocellular crate will need to be 5m x 10m x

1m in order to cater for all storms up to and including the 1 in 100yr event + 40% Climate change realised over this time.

The initial section of highway (between plots 1 and 7) is to remain private but constructed to adoptable standards and will drain its own area via permeable paving.

As mentioned before, further investigation is required of the existing ditch network near Clifton Road as if there is a ditch present on the southern edge, a new culvert will be required to allow access to the development site.

The proposed drainage strategy drawing and calculations are included in Appendix B.

3.2.2 Foul Water Strategy

In line with the Design and Construction Guidance, residential flows per dwelling equate to 4000 l/day. This therefore equates to a peak flow of 0.32 l/s.

It is proposed that foul flows connect into the existing Thames Water network located within Clifton Road to the north of the development. Confirmation that this is viable point of connection will need to be verified with Thames Water prior to any works occurring.

Due to a level difference between the existing invert level of the Thames Water foul sewer and the development site, a private package pumping station is proposed to be used to pump flows produced from plots 1, 2, 3, 4 & 5 via private rising main towards a gravity fed system in the highway adjacent to plot 6. The private pumping station would be located south of plot 4. Drainage within the highway adjacent to plot 6 will remain private but be designed and constructed to adoptable standards.

4. CONCLUSION

Although not specifically required due to the size of the development, the entirety of the site is confirmed to be within Flood Zone 1.

On site geotechnical and infiltration assessments has been carried out and identifies that the site is suitable for infiltration-based drainage. Therefore, it is proposed that surface water runoff is discharged either via permeable paving, lined soakaways and underground geocellular crates. Foul flows are proposed to either be drained under gravity or via a pumped solution towards the existing Thames Water foul network located in Clifton Road to the north of the development.

This report therefore demonstrates that the proposed development:

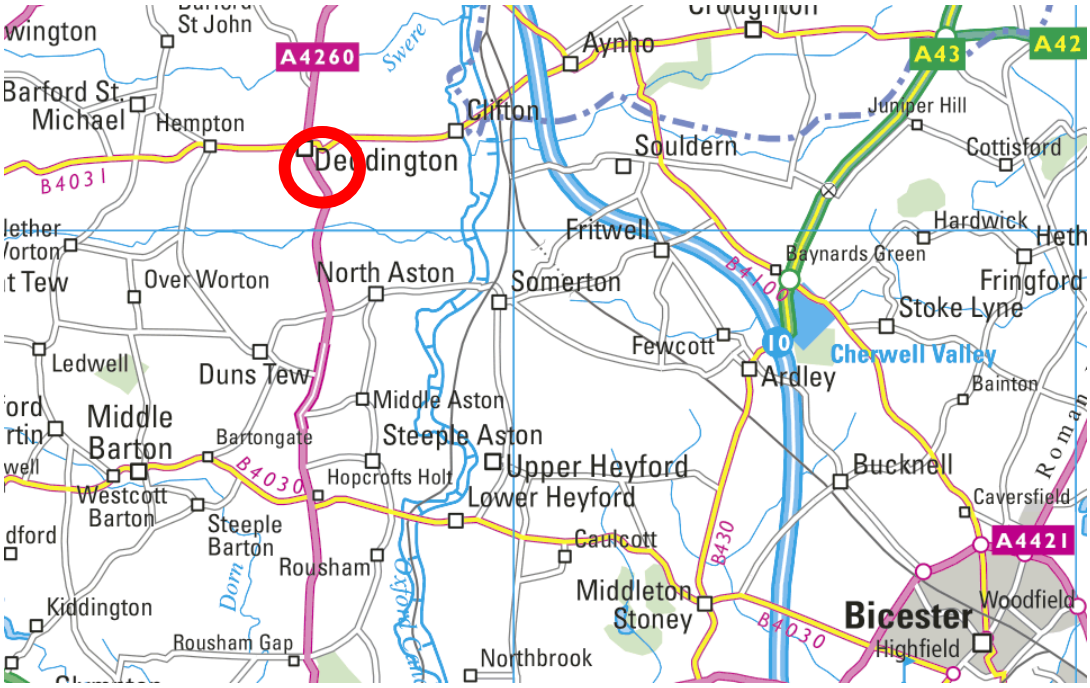
- Is suitable in the location proposed.
- Will not increase flood risk elsewhere as a result of the proposed development through the loss of floodplain storage or impedance of flood flows.
- Will put in place measures to ensure surface and foul water is appropriately managed.

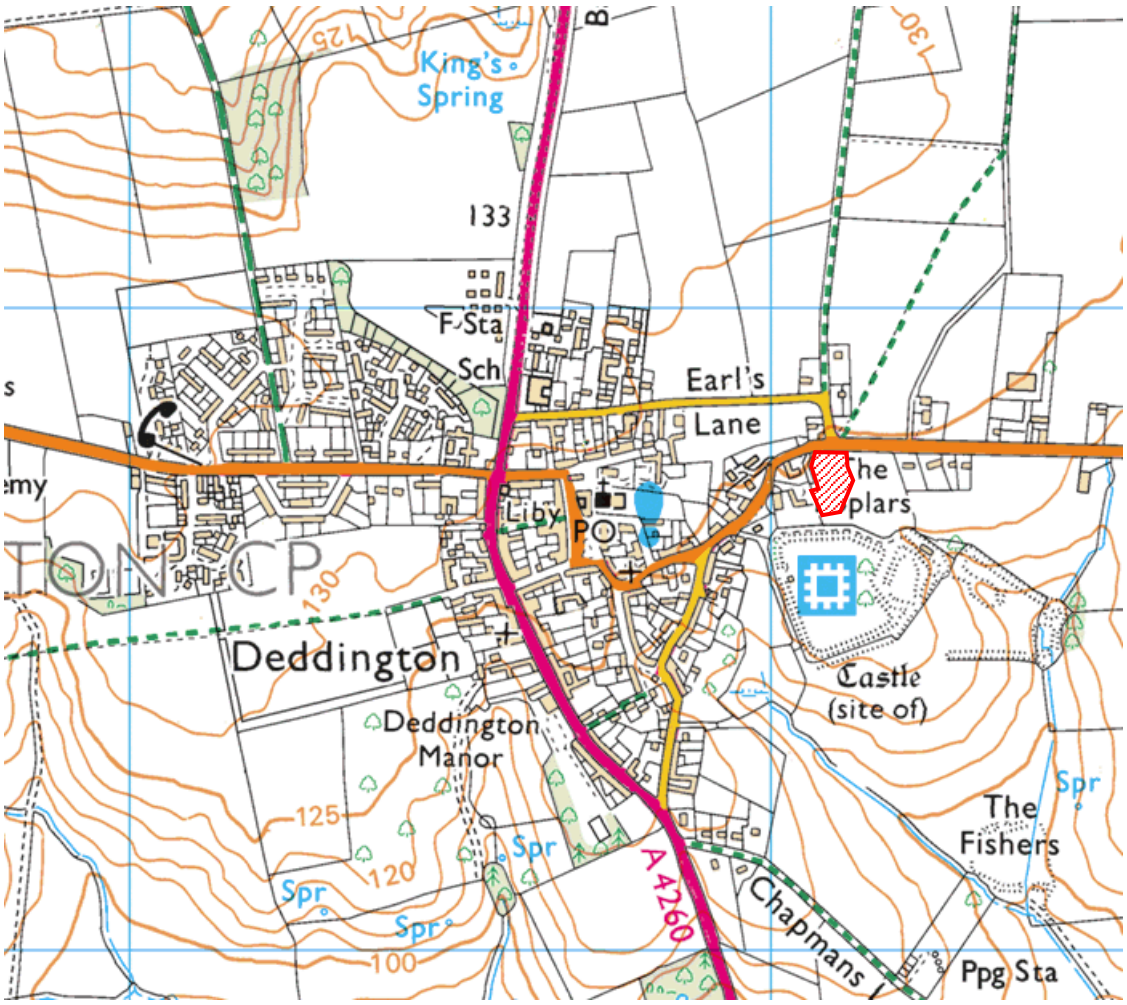
As such, the proposal is concluded to meet the flood risk requirements of the *NPPF*.

Appendix A – Existing Site

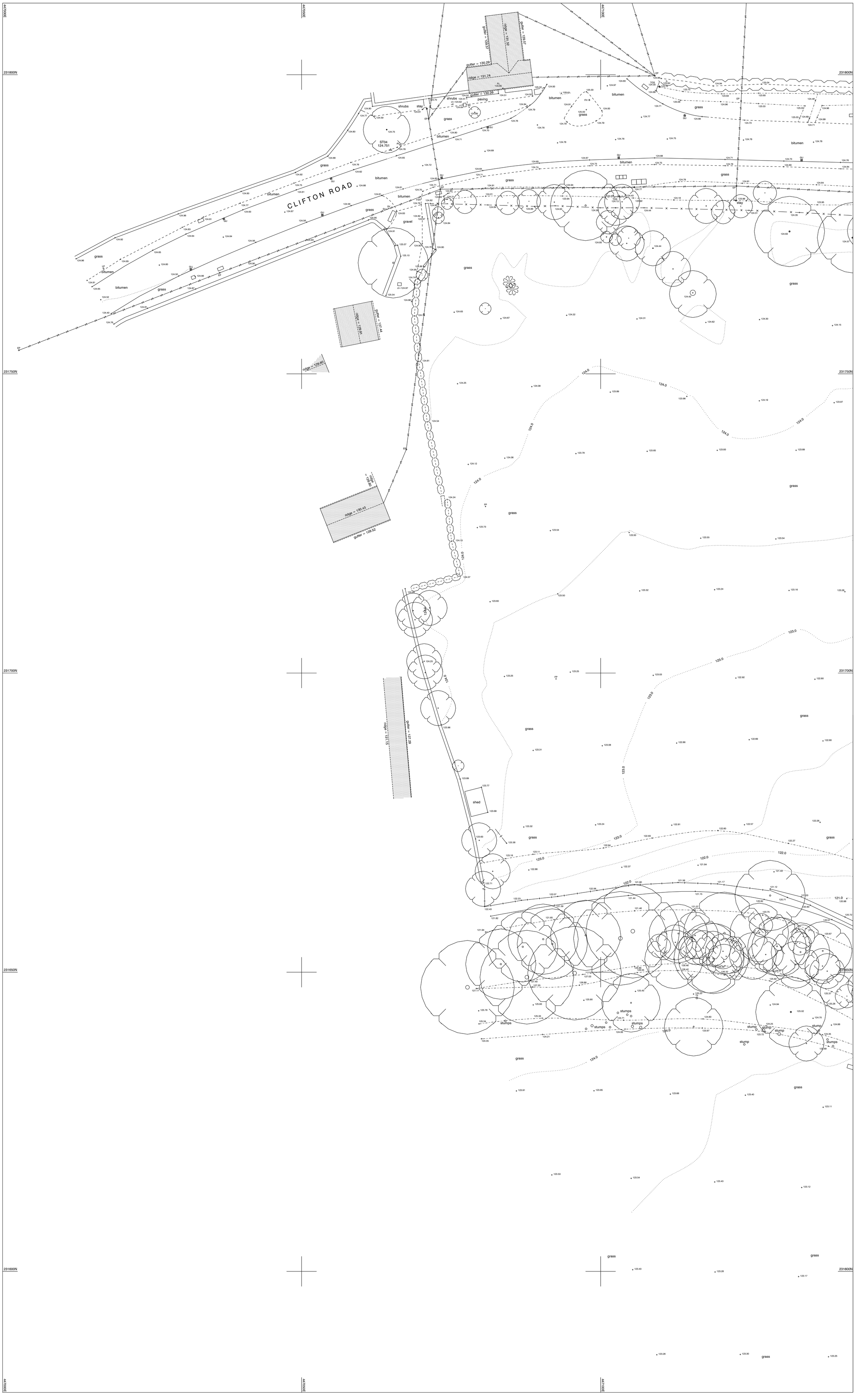
Reference	Title
N/A	Site Location Plan
Survey-130149s1	Topographical Survey (1)
Survey-130149s1	Topographical Survey (2)
N/A	Thames Water Records
314228 L01 (00)	Infiltration Test Results

CLIFTON ROAD, DEDDINGTON, OXFORDSHIRE – SITE LOCATION DETAILS





OS X (Eastings)	447138
OS Y (Northings)	231722
Nearest Post Code	OX15 0TH
Nat Grid	SP471317 / SP4713831722



Symbol & Abbreviation Key.

- BARBED WIRE FENCE
- POST & RAIL FENCE
- CLOSE BOARD FENCE
- RAILINGS
- CHAIN LINK FENCE
- OTHER FENCE
- KERB
- DROPPED KERB
- GULLY CHANNEL
- TOP / BOTTOM OF BANK
- FOLIAGE
- DITCH
- VERGE
- OVERHEAD CABLES
- GATE
- HEDGE
- TREE - BROAD LEAVED
- TREE - CONIFEROUS
- BUSH
- BUILDING
- BOREHOLE
- SURVEY STATION
- ORDNANCE SURVEY BENCH MARK

A/C	AIR CONDITIONING UNIT	KO	KERB OFFLET
AV	AIR VALVE	LC	LIGHTING COLUMN
BOL	BOLLARD	LP	LAMP POST
BH	BOREHOLE	NP	NAME PLATE
BL	BED LEVEL	NB	NOTICE BOARD
BM	BENCH MARK	PR	PIPE RISER
BT	BRITISH TELECOM	RP	RODDING POINT
CTV	CABLE TV	RS	ROAD SIGN
CL	COVER LEVEL	SP	SIGN POST
CR	CABLE RISER	SV	STOP VALVE
DP	DOWN PIPE	TL	TRAFFIC LIGHT
ER	EARTH ROD	TP	TELEGRAPH POLE
EP	ELECTRICITY POLE	TOF	TOP OF FENCE
EM	ELECTRICITY MARKER	TOH	TOP OF HEDGE
FB	FUSE BOX	TOR	TOP OF RAILINGS
FH	FIRE HYDRANT	TOS	SERVICE LEVEL
FP	FENCE POST	TOW	TOP OF WALL
FL	FLOOR LEVEL	UTL	UNABLE TO LIFT
GV	GAS VALVE	VM	VALVE MARKER
GM	GAS MARKER	VP	VENT PIPE
GU	GULLY	WL	WATER LEVEL
HM	HYDRANT MARKER	WM	WATER MARKER
IL	INVERT LEVEL	WO	WASH OUT

General.

This survey has been prepared with a scaling accuracy for a plot at a scale of 1:200.

All tree heights and spreads are approximate. We have tried to identify tree types, however if tree species are critical specialist advice should be gained.

Drainage pipe sizes have been measured from the surface. Chamber access has not been gained for safety reasons, therefore sizes should be regarded as approximate.

Some detail may have been omitted due to parked vehicles.

Notes.

Coordinates related to OS National Grid from ST01 by GPS (No scale factor added).
Levels related to GPS.

INDICATIVE ONLY

Rev	Details of Revision	Drawn	Date

Surveyed	Drawn	Date	Checked	Date	Approved	Date
AK	RW	08/04/13	SIH	08/04/13	RGT	08/04/13

Interlock Surveys Limited
St. Andrews House
Radford Semele
Leamington Spa
Warwickshire
CV31 1TF

T: 01926 330123
F: 01926 330120
E: info@interlocksurveys.co.uk

Client.

BANNER HOMES (MIDLANDS) LTD
5 BROOKLANDS
MOONS MOAT DRIVE
REDDITCH, WORCESTERSHIRE
B98 9DW

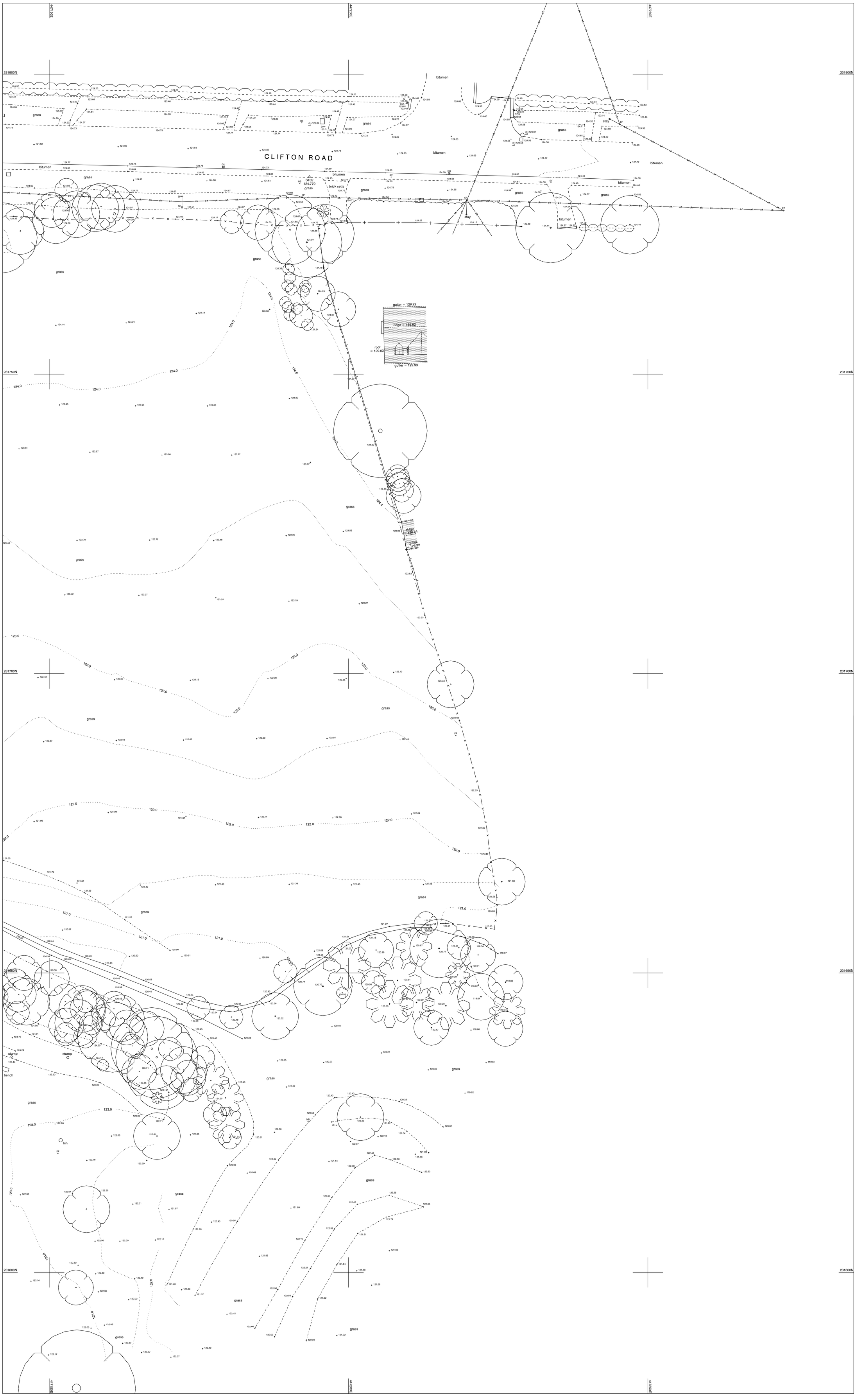
Title.

TOPOGRAPHICAL SURVEY

CLIFTON ROAD
DEDDINGTON
OXFORDSHIRE
OX15 0TP

Dwg No. **130149** Sheet **1 of 2**

Scale 1:200 A0 Sheet Rev. -



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Interlock Surveys Limited
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T: 01926 330123
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Client.

BANNER HOMES (MIDLANDS) LTD
5 BROOKLANDS
MOONS MOAT DRIVE
REDDITCH, WORCESTERSHIRE
B98 9DW

Title.

TOPOGRAPHICAL SURVEY

CLIFTON ROAD
DEDDINGTON
OXFORDSHIRE
OX15 0TP

Dwg No. **130149** Sheet **2 of 2**

Scale 1:200 A0 Sheet Rev. -

Asset location search

Property Searches

Hydrock Consultants
Over Court Barns
Over Lane
BRISTOL
BS32 4DF

Search address supplied Clifton Road, Deddington

Your reference 10690 Clifton Road

Our reference ALS/ALS Standard/2020_4273933

Search date 9 October 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

Asset location search

Thames Water Property Searches

Search address supplied: Clifton Road, Deddington,

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 searchprovides 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

Asset location search

Thames Water Property Searches

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

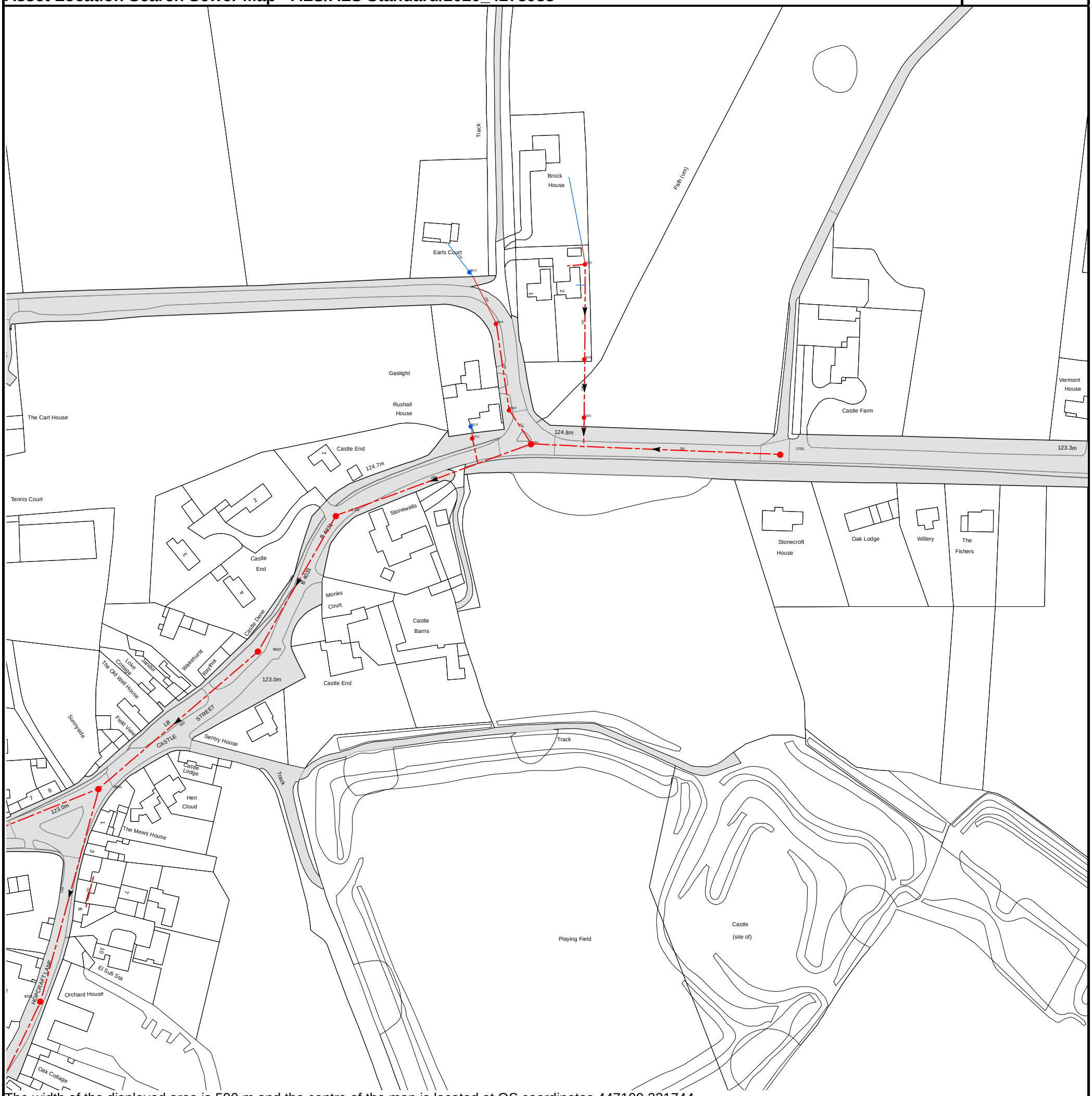
Clean Water queries

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_4273933



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 447109,231744

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.

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
081D	n/a	n/a
071A	n/a	n/a
081A	n/a	n/a
081B	n/a	n/a
0702	124.85	122.16
181C	n/a	n/a
181B	n/a	n/a
181A	n/a	n/a
2701	n/a	n/a
8501	121.52	117.9
9601	122.88	119.08
9602	123.01	120.21
0701	124.57	121.08
081C	n/a	n/a

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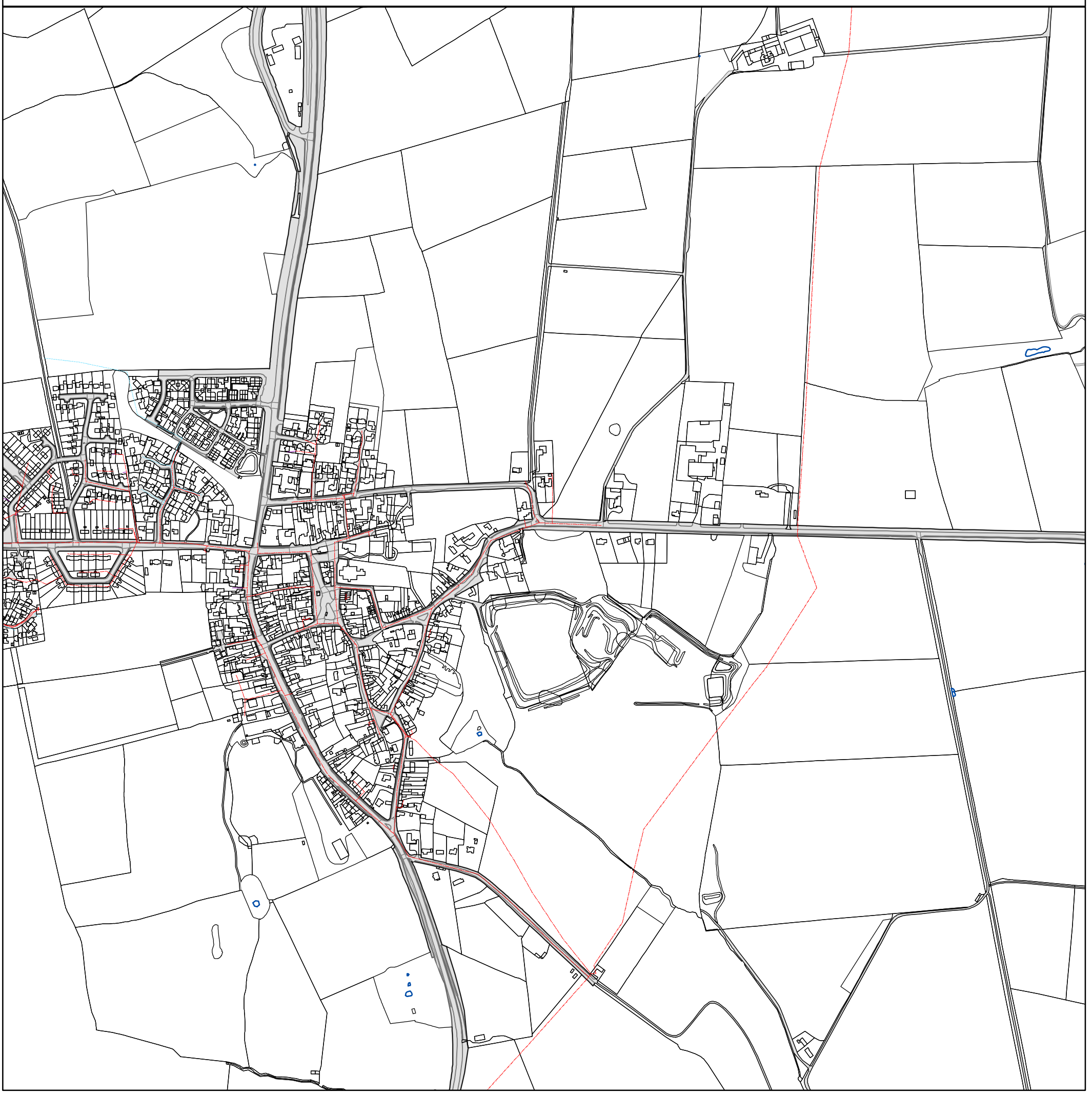
ALS/ALS Standard/2020_4273933



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:	12/10/2020
Map Centre:	447109,231743
Grid Reference:	SP4731NW

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
- Gulley
- 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 milimetres. 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.

Asset Location Search Water Map - ALS/ALS Standard/2020_4273933

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 447109, 231744.

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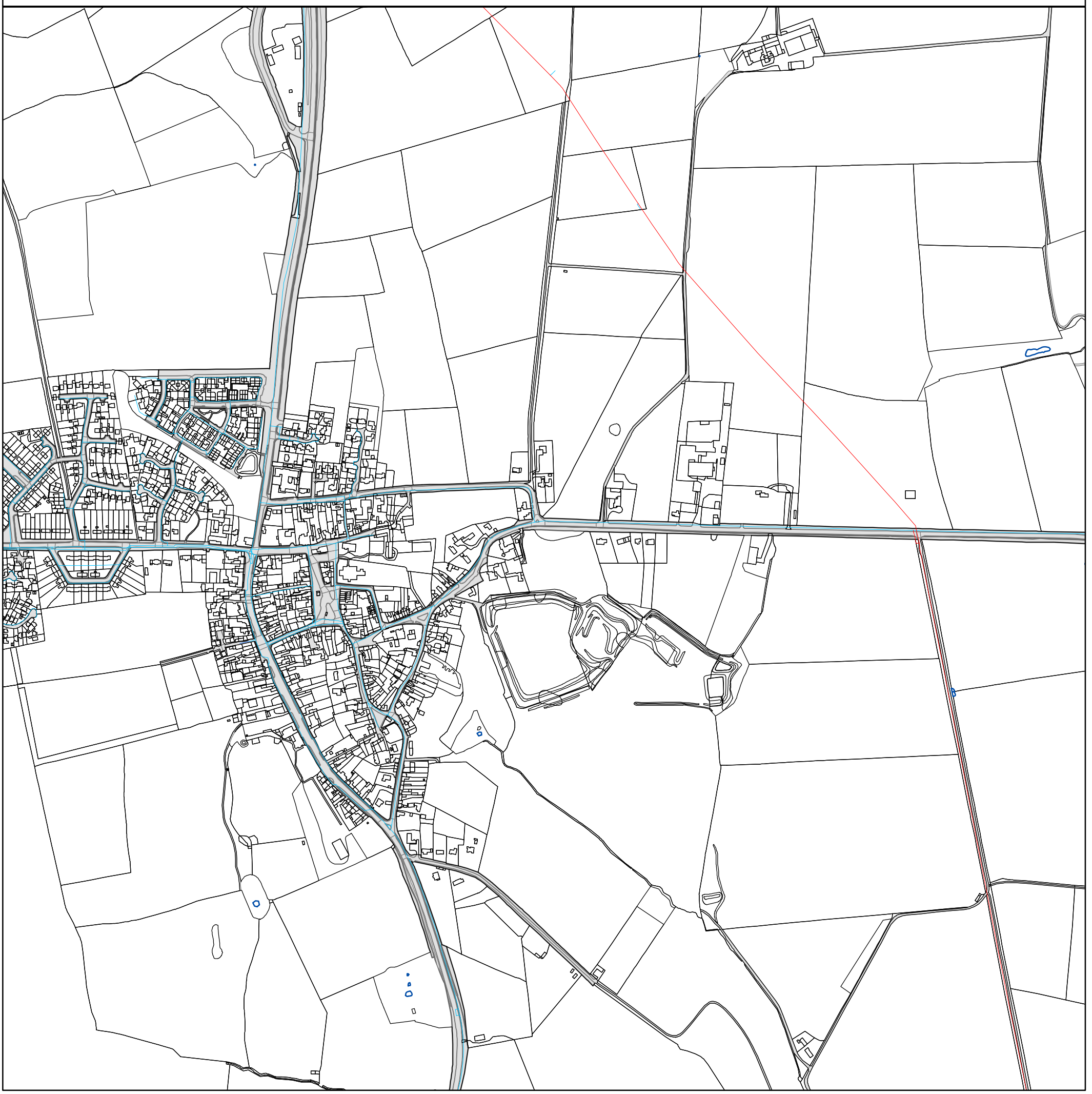
Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2020_4273933



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:	12/10/2020
Map Centre:	447109,231743
Grid Reference:	SP4731NW

Comments:

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

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Stillhouse Lane
Bedminster
Bristol
BS3 4EB
UK

Telephone: +44 (0)117 947 1006
www.rsk.co.uk

20th December 2018
314228 L01 (00)

Blue Cedar Homes Limited
220 Park Avenue
Aztec West
Almondsbury
Bristol
BS32 4SY

FACTUAL INFILTRATION TESTING REPORT, LAND SOUTH OF CASTLE STREET, DEDDINGTON

For the Attention of Jon Symons,

This letter presents the results of infiltration testing undertaken for the Land South of Castle Street, Deddington. RSK's service constraints are presented within **Appendix A**.

1. SITE DESCRIPTION AND SETTING

The site is situated on the eastern edge of Deddington, Oxfordshire and set within a mixed agricultural and residential setting. The site is accessed via a shared entrance from Castle Street in the north west corner. The site comprises a single large grassed field, with a large mature trees and shrubs along the northern and southern boundaries, occasional mature trees also lie along the eastern boundary. **Figure 1** shows the site location.

The residential village of Deddington is located to the west of the site, including a primary school offsite to the north-west. Agricultural fields are located south beyond the ruin of Deddington Castle, residential housing is to the east and north.

The northern two thirds of the site is generally level, with the southern third sloping gently downwards towards the south.

Based on a review of the British Geological Society (BGS) records for the site, the site is believed to be underlain by bedrock deposits of the Marlstone Rock Formation.

2. PROPOSED DEVELOPMENT

It is understood that the site is proposed to be developed for residential end use. A proposed layout plan has not been provided to RSK.

3. SITE INVESTIGATION METHODOLOGY

RSK carried out intrusive investigation work on 4th December 2018, to determine existing ground conditions and conduct trial pit soakaways. The works were undertaken to provide an indication of the likely infiltration rates at the site.

3.1 Methodology

A non-targeted investigation was undertaken for the site to provide general information for soakaway placement. A total of 3 No. trial pits were undertaken following the Client's requested methodology and given the area of the site.

The 3 No. trial pits were excavated (TP1 - TP3) using mechanical excavation techniques. The locations and depths of the soakaway test pits were chosen by RSK, in order to provide a general spread across the site.

3.2 Investigation Locations

The investigation and the soil descriptions were carried out in general accordance with BS5930: 2015 - Code of Practice for Ground Investigations. A photographic log of the investigation works is presented as **Appendix B** and the exploratory hole logs and other site work records are presented in **Appendix C**.

The locations of the intrusive investigations are shown in **Figure 2**.

3.3 Soil Sampling

No laboratory testing was required by the client, as such, no soil samples were taken during the investigation.

4. SITE GEOLOGY

A summary of ground conditions encountered during the intrusive works is outlined in the following sections. Generally, the site was underlain by Topsoil over bedrock deposits of the Marlstone Rock Formation. No Made Ground was encountered during the investigation.

The exploratory logs are summarised in **Table 1** and reported in detail in **Appendix C**. Exploratory hole locations are shown on the site plan in **Figure 2**.

Table 1: Geology at the site based on published data.

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Topsoil	TP1 - TP3	Ground level	0.30
Marlstone Rock Formation		0.30	>0.75 - >1.30

4.1.1 Topsoil

The Topsoil generally comprised a cohesive soil comprising a brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded, fine to coarse of limestone and quartzite. The base of the Topsoil was encountered at 0.30 m bgl in all locations.

4.1.2 Marlstone Rock Formation

This stratum was encountered from beneath the Topsoil in all locations and comprised a orangish brown slightly sandy slightly gravelly silty CLAY to depths of between 0.90 - 1.40 m bgl. The gravel is subangular to subrounded, fine to coarse of ironstone, limestone and quartzite. This layer was further underlain by a strong brownish grey LIMESTONE recovered as gravels and cobbles.

4.1.3 Groundwater

No groundwater was encountered during the intrusive investigation

4.1.4 Visual/olfactory evidence of soil contamination

No visual or olfactory evidence of soil contamination was encountered during the intrusive investigation.

5. INFILTRATION TESTING

Trial pit soakaway tests were carried out at each location, the results of which are summarised in **Table 2**. The test certificates are presented within **Appendix D**.

Table 2: Trial pit infiltration rates

Trial Pit	Test base depth (m bgl)			Length of test (minutes)			Infiltration rate (m/s)		
	1	2	3	1	2	3	1	2	3
TP1	1.05	1.05	-	26	32	-	$7.89x10^{-5}$	**$6.46x10^{-5}$**	-
TP2	1.58	1.57	-	16	16	-	**$1.19x10^{-4}$**	$1.26x10^{-4}$	-
TP3	1.46	1.46	1.42	9	11	12	$2.36x10^{-4}$	$2.11x10^{-4}$	**$1.91x10^{-4}$**

Notes: m bgl - metres below ground level
N/A - Infiltration rate could not be calculated as the required intercepts were not met.
* Infiltration was calculated via extrapolation, therefore, should be used as indicative only.
BOLD - Infiltration rate should be adopted in the area of this trial pit.

6. CONCLUSION

6.1 Soakaway design

Finished heights and final layout of the development is not known however, in general terms groundwater levels would need to be at least 1m below any infiltration feature. Infiltration rates less than 1.0×10^{-6} are considered not to be sufficient to offer an infiltration based solution, Infiltration rates may be sufficient however further drainage design works would be required to determine if this offers a suitable solution.

Yours sincerely

For RSK Environment Limited

[redacted]

Andy Denton

Geo-environmental Consultant

Sophie Penney

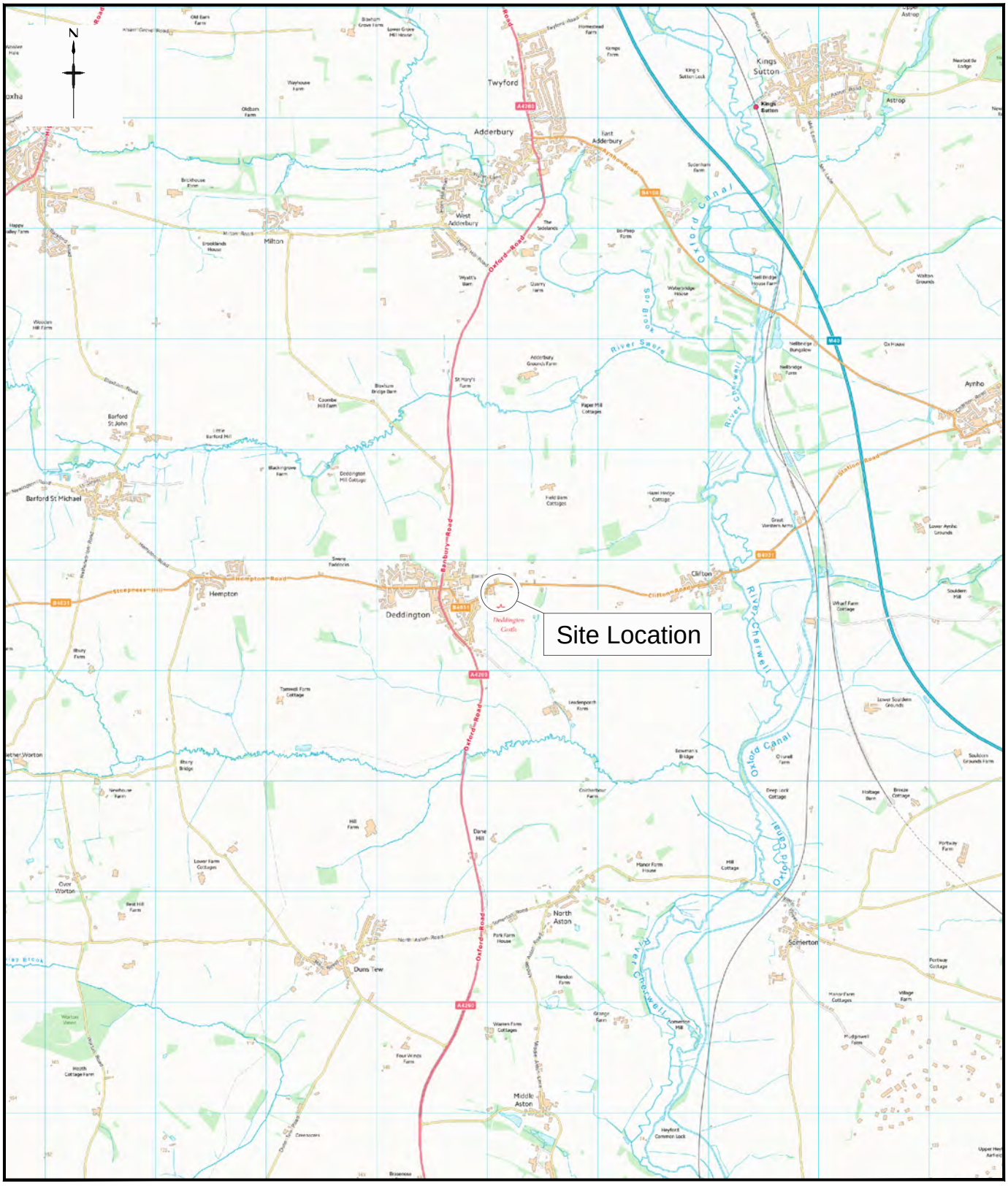
Principal Consultant

Enc.

Figure 1 - Site location plan
Figure 2 - Exploratory hole location plan

Appendix A - RSK service constraints
Appendix B - Photographic log
Appendix C - Exploratory logs
Appendix D - Infiltration testing certificates

Figures



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RSK

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Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client: BLUE CEDAR HOMES LIMITED

Project Title: CASTLE STREET, DEBBINGTON

Drawing Title: SITE LOCATION MAP

Rev	Drawn	Date	Checked	Date	Approved	Date
00	ASC	21.12.18	AD	21.12.18	KF	21.12.18

Dimensions	Scale	Original Size
m	1:50,000	A4

Project Number	Drawing File	Drawing Number
314228 - R02 (00)	314228 - SLP.dwg	FIGURE 1

LEGEND

- Site Boundary
- Trial Pit Location

Rev.	Date	Amendment	Drawn	Chkd.	Appd.

RSK

18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Tel: +44 (0) 1442 437500
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Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client

BLUE CEDAR HOMES LIMITED

Project Title

CASTLE STREET, DEBBINGTON

Drawing Title

EXPLORATORY HOLE LOCATION PLAN

Drawn	Date	Checked	Date	Approved	Date
ASC	21.12.18	AD	21.12.18	KF	21.12.18

Scale	Orig Size	Dimensions
1:1000	A3	m

Project No.	Drawing File
314228 - R02 (00)	314228 (R02-00) Fig 2.dwg

Drawing No.	Rev.
FIGURE 2	P1

Scale 1 : 1000

0 10 20 30 40 50m

Appendix A – Service constraints

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Blue Cedar Homes Limited (the "client") in accordance with the terms of a contract between RSK and the "client", dated 23 April 2018. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

Appendix B – Photographic log

Photo no. 1	**Date:** 04/12/18	
Description: View showing the full depth of TP1 with limestone gravel at the base.		

Photo no. 2	**Date:** 04/12/18	
Description: View showing the arisings from TP1.		

Photo no. 3	Date: 04/12/18	
Description: View showing the full extent of TP2 with limestone gravel at the base.		

Photo no. 4	Date: 04/12/18	
Description: View showing the arisings from TP2.		

Photo no.	Date:	
5	04/12/18	
Description: View showing the full extent of TP3 with limestone gravel at the base.		

Appendix C – Exploratory logs

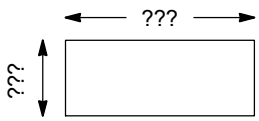
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Castle Street, Deddington	Blue Cedar Homes Ltd	TP1

Contract Ref:	Start:	Ground Level:	Co-ordinates:	Sheet:
Castle Street, Deddington	04.12.18	---	---	1 of 1
	End: 04.12.18			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Turf overlying brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of limestone and quartzite.	(0.30)	
							0.30	
						Orangish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of ironstone, limestone and quartzite.	(0.60)	
							0.90	
						Strong brownish grey LIMESTONE recovered as gravels and cobbles.	1.05	
						Trial pit terminated at 1.05m depth.		

Plan (Not to Scale)



General Remarks

All dimensions in metres | Scale: 1:25

Method Used:	Plant Used:	Logged By:	Checked By:
Hand dug	Hand tools	???	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 314228 CASTLE STREET, DEDDINGTON.GPJ - v8_07.
RSK Environment Ltd, The Old School, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117 947 1006 Fax: 0117 947 1009 Web: www.rsk.co.uk. | 12/12/18 - 09:35 | CR5 |

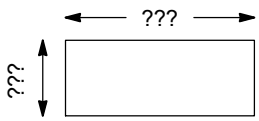
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Castle Street, Deddington	Blue Cedar Homes Ltd	TP2

Contract Ref:	Start:	Ground Level:	Co-ordinates:	Sheet:
Castle Street, Deddington	04.12.18	---	---	1 of 1
	End: 04.12.18			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Turf overlying brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of limestone and quartzite.	(0.30) 0.30	
						Orangish brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse of ironstone, limestone and quartzite.	(1.00) 1.30	
						Strong brownish grey LIMESTONE recovered as clayey gravels, cobbles and boulders.	(0.30) 1.60	
						Trial pit terminated at 1.60m depth.		

Plan (Not to Scale)



General Remarks

1. Hard digging from 1.00m depth.

All dimensions in metres | Scale: 1:25

Method Used:	Plant Used:	Logged By:	Checked By:
Hand dug	Hand tools	???	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 314228 CASTLE STREET, DEDDINGTON.GPJ - v8_07.
RSK Environment Ltd, The Old School, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117 947 1006 Fax: 0117 947 1009 Web: www.rsk.co.uk. | 12/12/18 - 09:35 | CR5 |

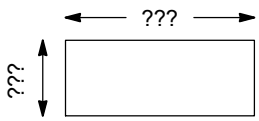
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Castle Street, Deddington	Blue Cedar Homes Ltd	TP3

Contract Ref:	Start:	Ground Level:	Co-ordinates:	Sheet:
Castle Street, Deddington	04.12.18	---	---	1 of 1
	End: 04.12.18			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Turf overlying brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse of limestone and quartzite.	(0.30) 0.30	
						Orangish brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse of ironstone, limestone and quartzite. . . . at 0.70m becoming very gravelly. . . . from 0.80m hard digging.	(1.10) 1.40	
						Strong brownish grey LIMESTONE recovered as clayey gravels, cobbles and boulders.	1.60	
						Trial pit terminated at 1.60m depth.		

Plan (Not to Scale)



General Remarks

All dimensions in metres | Scale: 1:25

Method Used:	Plant Used:	Logged By:	Checked By:
Hand dug	Hand tools	???	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 314228 CASTLE STREET, DEDDINGTON.GPJ - v8_07.
RSK Environment Ltd, The Old School, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117 947 1006 Fax: 0117 947 1009 Web: www.rsk.co.uk. | 12/12/18 - 09:35 | CR5 |

Appendix D – Infiltration test certificates

STRUCTURAL SOILS LTD

INSITU TESTING REPORT

1774

Report No. 748564R.01(00)

Date	06-December-2018	Contract	Castle Street, Deddington

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire
WA6 0AR
For the Attention of Romani Salama

Order received	03-December-2018	Client Reference	None
Testing Started	04-December-2018	Client Order No.	None
Testing Completed	04-December-2018	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

Not UKAS Accredited Tests

3no. Soakaway tests carried out at locations specified by client.

The results represent the ground conditions at the specified locations and depths at the time of testing.

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

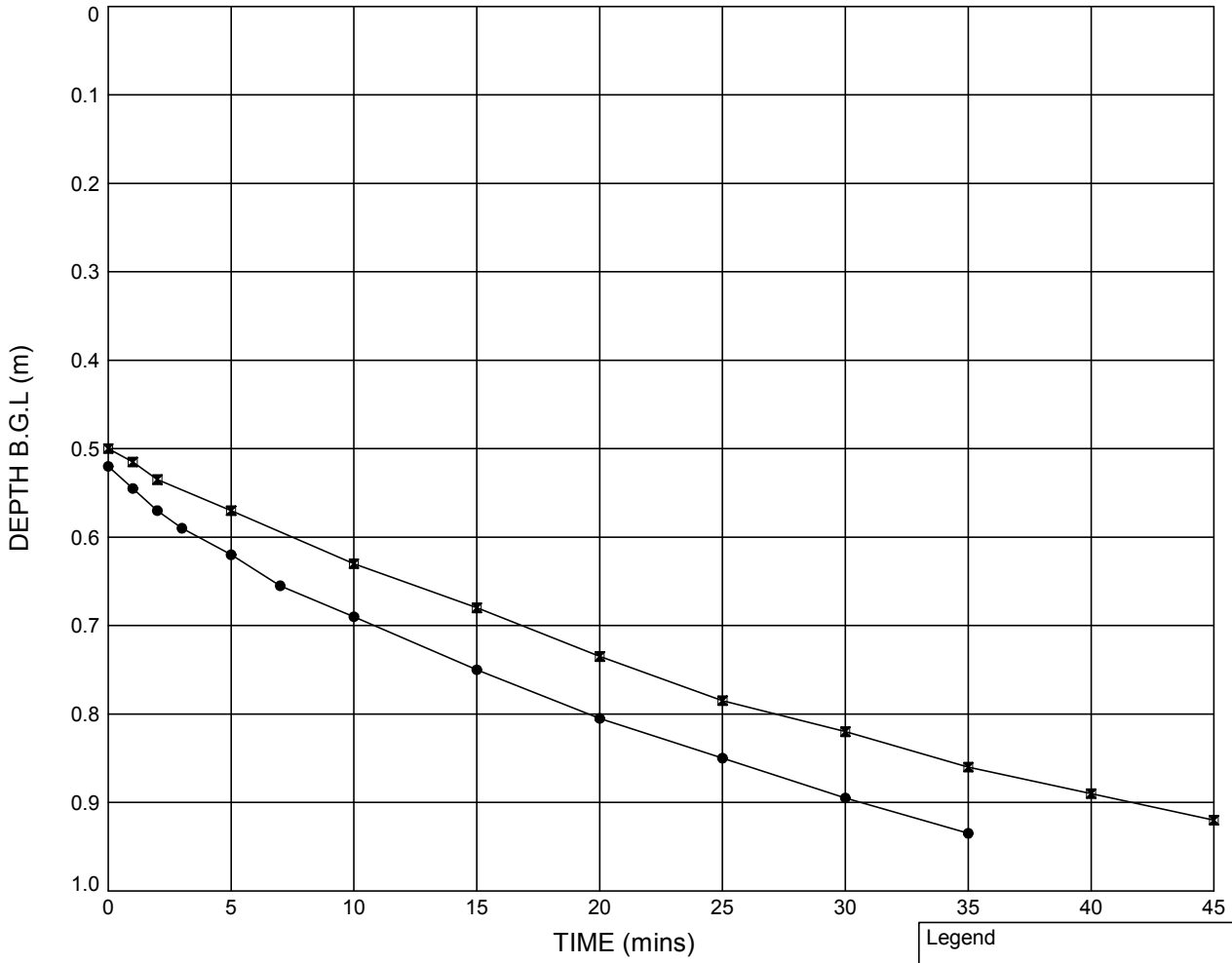
Structural Soils Ltd 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000. e-mail dimitris.xirouchakis@soils.co.uk

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP1**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME

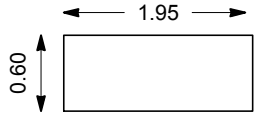


		Test 1	Test 2	
Pit start depth:	=	*1.05*	**1.05**	m
Pit final depth:	=	*1.05*	**1.04**	m
Effective depth, De	=	*0.53*	**0.54**	m
Effective storage volume, V_{p75-25}	=	*0.3101*	**0.3159**	m^3
Surface area, a_{p50}	=	*2.5215*	**2.5470**	m^2
Time, t_{p75-25}	=	*1558*	**1920**	secs
Infiltration rate, f	=	*$7.89x10^{-5}$*	**$6.46x10^{-5}$**	m/s

Legend

- Test 1 (04.12.18)
- Test 2 (04.12.18)

Plan (Not to scale)



No Bearing Taken

	Compiled By	Date	Checked By	Date
STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	[redacted]	06/12/18	[redacted]	
	Contract **Castle Street, Deddington**		Contract Ref: **748564**	

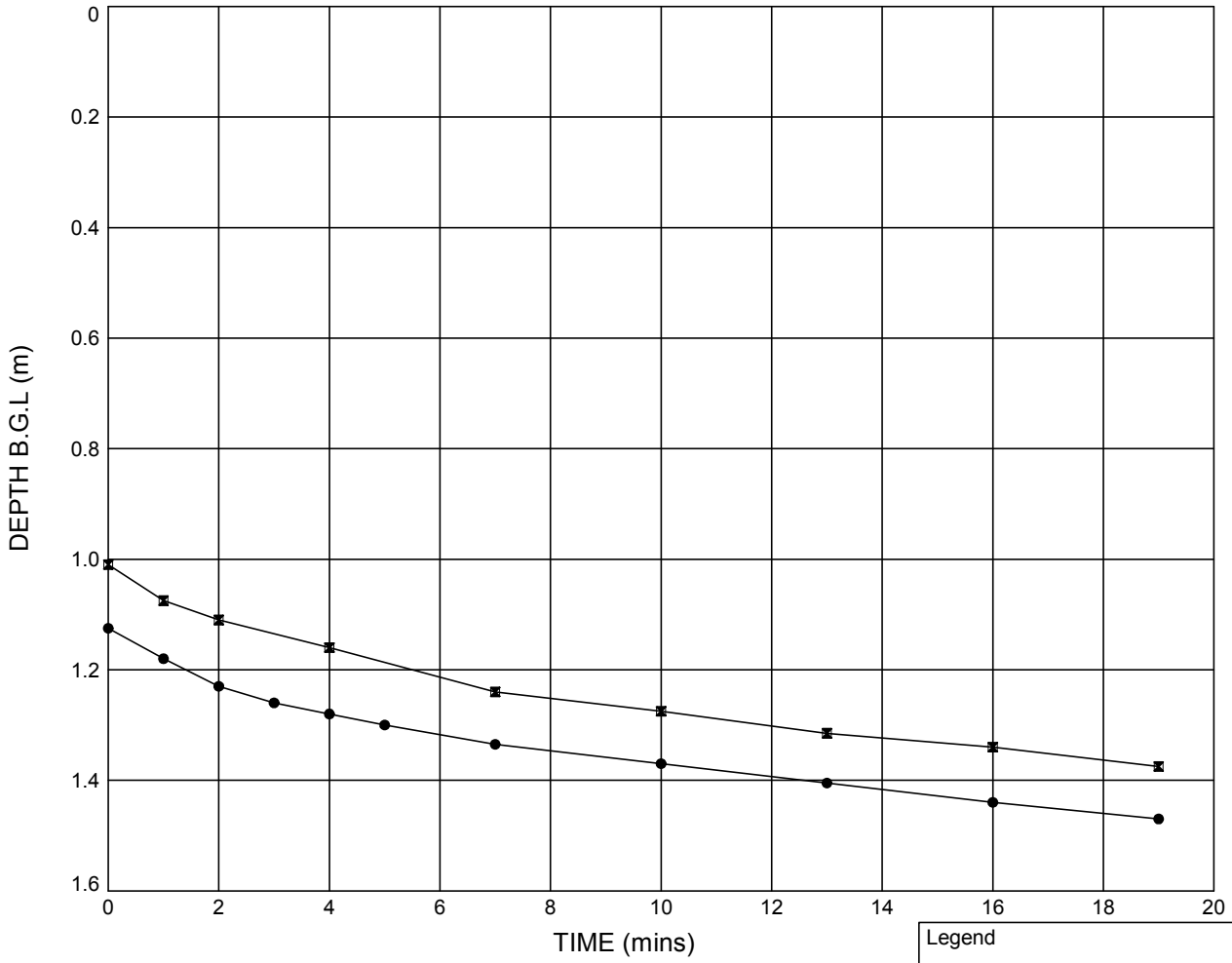
GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph I - TP SOAKAWAY - 2 - FINAL REPORT - A4P | 748564.GPJ - v8_07. | 06/12/18 - 09:11 | EH7 |

FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP2**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME

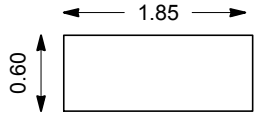


		Test 1	Test 2	
Pit start depth:	=	**1.58**	*1.58*	m
Pit final depth:	=	**1.57**	*1.48*	m
Effective depth, De	=	**0.45**	*0.47*	m
Effective storage volume, V_{p75-25}	=	**0.2470**	*0.2609*	m^3
Surface area, a_{p50}	=	**2.2003**	*2.2615*	m^2
Time, t_{p75-25}	=	**940**	*914*	secs
Infiltration rate, f	=	**$1.19x10^{-4}$**	*$1.26x10^{-4}$*	m/s

Legend

- Test 1 (04.12.18)
- Test 2 (04.12.18)

Plan (Not to scale)



No Bearing Taken

STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By	Date	Checked By	Date
	[redacted]	06/12/	[redacted]	
	Contract: **Castle Street, Deddington**		Contract Ref: **748564**	

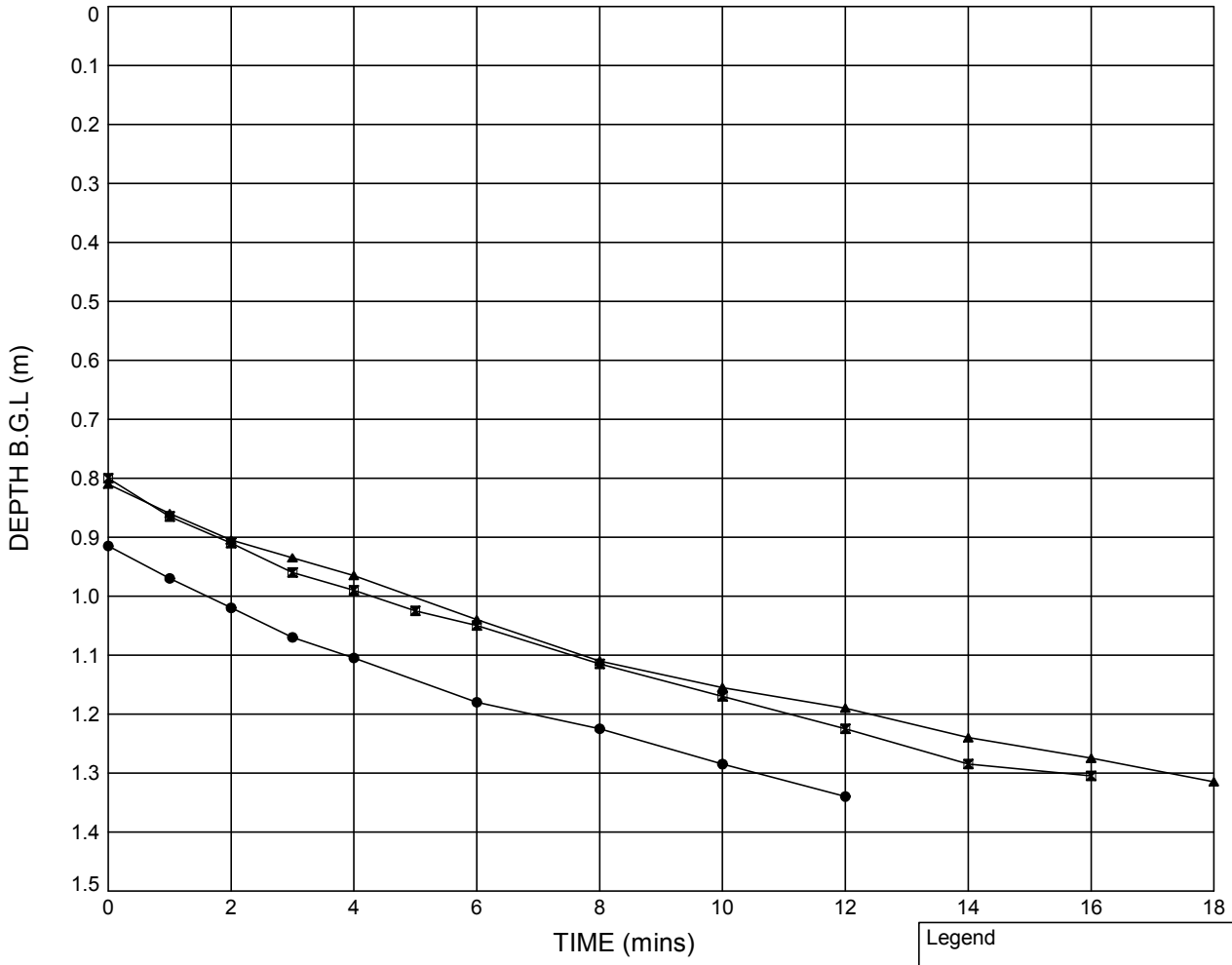
GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph I - TP SOAKAWAY - 2 - FINAL REPORT - A4P | 748564.GPJ - v8_07. | 06/12/18 - 09:12 | EH7 |

FULL SCALE SOAKAWAY TEST

In accordance with BRE Digest 365

Soakaway Test - Position ID : **TP3**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME

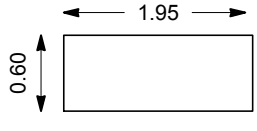


		Test 1	Test 2	Test 3	
Pit start depth:	=	*1.46*	*1.46*	**1.42**	m
Pit final depth:	=	*1.46*	*1.42*	**1.41**	m
Effective depth, De	=	*0.55*	*0.62*	**0.60**	m
Effective storage volume, V_{p75-25}	=	*0.3188*	*0.3627*	**0.3510**	m^3
Surface area, a_{p50}	=	*2.5598*	*2.7510*	**2.7000**	m^2
Time, t_{p75-25}	=	*527*	*626*	**679**	secs
Infiltration rate, f	=	$2.36x10^{-4}$	$2.11x10^{-4}$	$\mathbf{1.91x10^{-4}}$	m/s

Legend

- Test 1 (04.12.18)
- Test 2 (04.12.18)
- Test 3 (04.12.18)

Plan (Not to scale)



No Bearing Taken

STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By	Date	Checked By	Date
[redacted]	06/12/18	[redacted]	

Contract	Contract Ref:
Castle Street, Deddington	**748564**

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph I - TP SOAKAWAY - 2 - FINAL REPORT - A4P | 748564.GPJ - v8_07. | 06/12/18 - 09:15 | EH7 |

Appendix B – Proposed Site

Reference	Title
4192-3-110	Proposed Layout
10690-HYD-XX-XX-CA-D-1000	Geocellular Tank Soakaway
10690-HYD-XX-XX-CA-D-1001	Permeable paving
10690-HYD-XX-XX-DR-D-2200	Drainage Strategy Plan

Site Plan

Land South of Clifton Road
Deddington

Project	Stage	Drawing	Scale
4192	3	049	1:500 @ A1
Drawn	Checked	Date	
AS	MB	23.11.20	

bba architects & planners

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

Half Drain Time : 138 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	98.035	0.535	2.5	25.4	O K
30 min Summer	98.171	0.671	2.7	31.9	O K
60 min Summer	98.271	0.771	2.8	36.6	O K
120 min Summer	98.297	0.797	2.8	37.9	O K
180 min Summer	98.277	0.777	2.8	36.9	O K
240 min Summer	98.248	0.748	2.8	35.5	O K
360 min Summer	98.190	0.690	2.7	32.8	O K
480 min Summer	98.137	0.637	2.6	30.3	O K
600 min Summer	98.088	0.588	2.6	27.9	O K
720 min Summer	98.041	0.541	2.5	25.7	O K
960 min Summer	97.955	0.455	2.4	21.6	O K
1440 min Summer	97.815	0.315	2.3	15.0	O K
2160 min Summer	97.668	0.168	2.1	8.0	O K
2880 min Summer	97.583	0.083	2.0	3.9	O K
4320 min Summer	97.542	0.042	1.7	2.0	O K
5760 min Summer	97.534	0.034	1.3	1.6	O K
7200 min Summer	97.528	0.028	1.1	1.3	O K
8640 min Summer	97.524	0.024	1.0	1.1	O K
10080 min Summer	97.521	0.021	0.8	1.0	O K
15 min Winter	98.103	0.603	2.6	28.6	O K
30 min Winter	98.261	0.761	2.8	36.1	O K
60 min Winter	98.382	0.882	2.9	41.9	O K
120 min Winter	98.427	0.927	3.0	44.0	O K
180 min Winter	98.400	0.900	2.9	42.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.350	0.0	18
30 min Summer	91.106	0.0	32
60 min Summer	56.713	0.0	62
120 min Summer	34.106	0.0	108
180 min Summer	24.997	0.0	140
240 min Summer	19.934	0.0	172
360 min Summer	14.444	0.0	240
480 min Summer	11.493	0.0	310
600 min Summer	9.620	0.0	378
720 min Summer	8.314	0.0	442
960 min Summer	6.600	0.0	576
1440 min Summer	4.760	0.0	822
2160 min Summer	3.427	0.0	1172
2880 min Summer	2.712	0.0	1500
4320 min Summer	1.948	0.0	2200
5760 min Summer	1.538	0.0	2936
7200 min Summer	1.281	0.0	3632
8640 min Summer	1.102	0.0	4336
10080 min Summer	0.970	0.0	5000
15 min Winter	139.350	0.0	18
30 min Winter	91.106	0.0	32
60 min Winter	56.713	0.0	60
120 min Winter	34.106	0.0	116
180 min Winter	24.997	0.0	146

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	98.365	0.865	2.9	41.1	O K
360 min Winter	98.284	0.784	2.8	37.2	O K
480 min Winter	98.206	0.706	2.7	33.6	O K
600 min Winter	98.133	0.633	2.6	30.0	O K
720 min Winter	98.063	0.563	2.6	26.8	O K
960 min Winter	97.940	0.440	2.4	20.9	O K
1440 min Winter	97.745	0.245	2.2	11.6	O K
2160 min Winter	97.569	0.069	2.0	3.3	O K
2880 min Winter	97.543	0.043	1.7	2.0	O K
4320 min Winter	97.531	0.031	1.2	1.5	O K
5760 min Winter	97.524	0.024	1.0	1.1	O K
7200 min Winter	97.520	0.020	0.8	1.0	O K
8640 min Winter	97.518	0.018	0.7	0.8	O K
10080 min Winter	97.515	0.015	0.6	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	19.934	0.0	184
360 min Winter	14.444	0.0	260
480 min Winter	11.493	0.0	334
600 min Winter	9.620	0.0	406
720 min Winter	8.314	0.0	476
960 min Winter	6.600	0.0	608
1440 min Winter	4.760	0.0	854
2160 min Winter	3.427	0.0	1168
2880 min Winter	2.712	0.0	1464
4320 min Winter	1.948	0.0	2184
5760 min Winter	1.538	0.0	2904
7200 min Winter	1.281	0.0	3632
8640 min Winter	1.102	0.0	4328
10080 min Winter	0.970	0.0	5136

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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.410	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.105

Time (mins) From:	To:	Area (ha)
0	4	0.105

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 97.500 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.68760 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.68760

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	50.0	50.0	1.000	50.0	80.0	1.001	0.0	80.0

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

Half Drain Time : 6 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.873	0.173	26.5	9.0	Flood Risk
30 min Summer	99.883	0.183	27.9	9.6	Flood Risk
60 min Summer	99.859	0.159	24.3	8.1	Flood Risk
120 min Summer	99.819	0.119	18.2	5.7	Flood Risk
180 min Summer	99.795	0.095	14.6	4.3	Flood Risk
240 min Summer	99.780	0.080	12.2	3.3	Flood Risk
360 min Summer	99.761	0.061	9.3	2.2	Flood Risk
480 min Summer	99.751	0.051	7.8	1.5	Flood Risk
600 min Summer	99.746	0.046	6.5	1.3	Flood Risk
720 min Summer	99.743	0.043	5.7	1.1	Flood Risk
960 min Summer	99.738	0.038	4.5	0.9	Flood Risk
1440 min Summer	99.733	0.033	3.3	0.6	Flood Risk
2160 min Summer	99.728	0.028	2.4	0.5	Flood Risk
2880 min Summer	99.725	0.025	1.9	0.4	Flood Risk
4320 min Summer	99.721	0.021	1.3	0.3	Flood Risk
5760 min Summer	99.719	0.019	1.1	0.2	Flood Risk
7200 min Summer	99.717	0.017	0.9	0.2	Flood Risk
8640 min Summer	99.716	0.016	0.8	0.1	Flood Risk
10080 min Summer	99.715	0.015	0.7	0.1	Flood Risk
15 min Winter	99.888	0.188	28.7	9.9	Flood Risk
30 min Winter	99.885	0.185	28.3	9.8	Flood Risk
60 min Winter	99.848	0.148	22.6	7.5	Flood Risk
120 min Winter	99.801	0.101	15.5	4.6	Flood Risk
180 min Winter	99.777	0.077	11.8	3.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.350	0.0	12
30 min Summer	91.106	0.0	20
60 min Summer	56.713	0.0	36
120 min Summer	34.106	0.0	66
180 min Summer	24.997	0.0	96
240 min Summer	19.934	0.0	126
360 min Summer	14.444	0.0	186
480 min Summer	11.493	0.0	246
600 min Summer	9.620	0.0	306
720 min Summer	8.314	0.0	366
960 min Summer	6.600	0.0	490
1440 min Summer	4.760	0.0	720
2160 min Summer	3.427	0.0	1076
2880 min Summer	2.712	0.0	1460
4320 min Summer	1.948	0.0	2164
5760 min Summer	1.538	0.0	2840
7200 min Summer	1.281	0.0	3664
8640 min Summer	1.102	0.0	4272
10080 min Summer	0.970	0.0	5136
15 min Winter	139.350	0.0	13
30 min Winter	91.106	0.0	21
60 min Winter	56.713	0.0	36
120 min Winter	34.106	0.0	68
180 min Winter	24.997	0.0	98

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	99.763	0.063	9.6	2.3	Flood Risk
360 min Winter	99.748	0.048	7.1	1.4	Flood Risk
480 min Winter	99.743	0.043	5.7	1.1	Flood Risk
600 min Winter	99.739	0.039	4.7	0.9	Flood Risk
720 min Winter	99.737	0.037	4.1	0.8	Flood Risk
960 min Winter	99.733	0.033	3.3	0.6	Flood Risk
1440 min Winter	99.728	0.028	2.4	0.5	Flood Risk
2160 min Winter	99.724	0.024	1.7	0.3	Flood Risk
2880 min Winter	99.721	0.021	1.3	0.3	Flood Risk
4320 min Winter	99.718	0.018	1.0	0.2	Flood Risk
5760 min Winter	99.716	0.016	0.8	0.1	Flood Risk
7200 min Winter	99.714	0.014	0.6	0.1	Flood Risk
8640 min Winter	99.713	0.013	0.5	0.1	Flood Risk
10080 min Winter	99.712	0.012	0.5	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	19.934	0.0	128
360 min Winter	14.444	0.0	184
480 min Winter	11.493	0.0	246
600 min Winter	9.620	0.0	308
720 min Winter	8.314	0.0	366
960 min Winter	6.600	0.0	480
1440 min Winter	4.760	0.0	712
2160 min Winter	3.427	0.0	1084
2880 min Winter	2.712	0.0	1496
4320 min Winter	1.948	0.0	2200
5760 min Winter	1.538	0.0	2976
7200 min Winter	1.281	0.0	3624
8640 min Winter	1.102	0.0	4344
10080 min Winter	0.970	0.0	5144

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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.410	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)
0	4	0.084

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Model Details

Storage is Online Cover Level (m) 100.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.68760	Width (m)	80.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	222.2	Slope (1:X)	50.0
Safety Factor	5.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	99.700	Membrane Depth (m)	250

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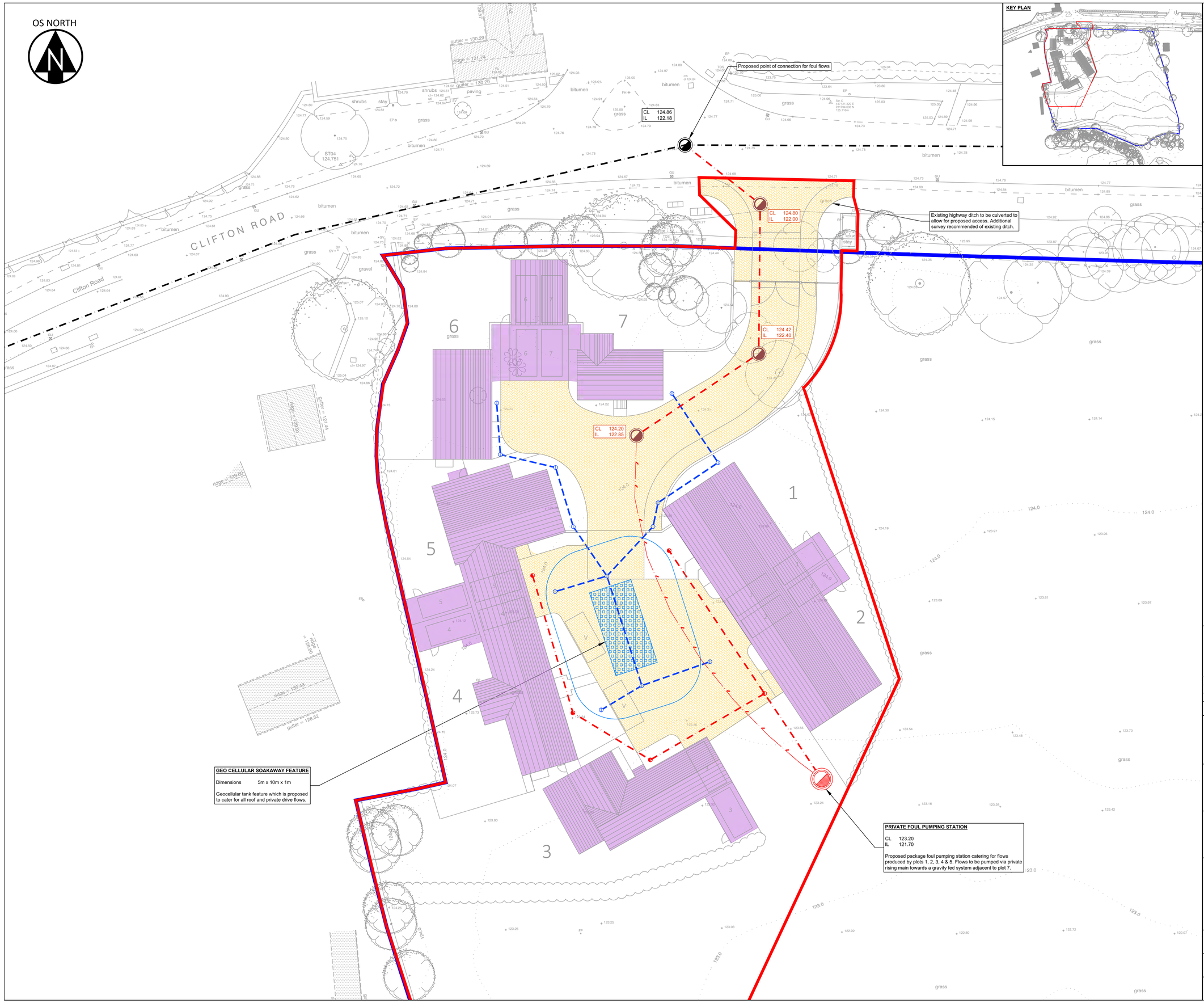
OS NORTH



KEY PLAN

KEY

EXISTING

- DEVELOPMENT BOUNDARY
- OWNERSHIP BOUNDARY
- THAMES WATER FOUL SEWER

PROPSED

- IMPERMEABLE ROOF
- PERMEABLE PAVING
- PRIVATE SURFACE WATER SEWER
- SURFACE INSPECTION CHAMBER (450 DIA)
- PRIVATE LINED SOAKAWAY
- GEOCELLULAR INFILTRATION CRATES
- 5m OFFSET FROM SOAKAWAY
- PRIVATE FOUL SEWER
- FOUL INSPECTION CHAMBER (450 DIA)
- FOUL MANHOLE CHAMBER (1200 DIA)
- PRIVATE FOUL RISING MAIN
- PRIVATE FOUL PUMPING STATION

GENERAL DRAINAGE NOTES:

1. ALL DRAINAGE INDICATED ON THIS PLAN IS DESIGNED IN ACCORDANCE WITH THE HYDROCK REPORT (REF: 10690-HYD-XX-XX-RP-D-5001).
2. USE OF THIS DRAWING DOES NOT ABSOLVE THE CLIENT FROM HIS RESPONSIBILITIES UNDER THE HEALTH AND SAFETY: THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015. THE PRINCIPAL DESIGNER IS REQUIRED TO CONTACT HYDROCK CONSULTANTS PRIOR TO PERMITTING THIS DRAWING TO BE USED IN CONNECTION WITH ANY CONSTRUCTION WORKS.
3. ALL PRIVATE DRAINAGE TO COMPLY WITH CURRENT BUILDING REGULATIONS, BS EN-752 DRAIN AND SEWER SYSTEMS OUTSIDE BUILDINGS AND OTHER RELEVANT BRITISH STANDARDS AND CODES OF PRACTICES.
4. ALL SEWERS TO BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE SHOWN.
5. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE EXISTING SERVICES ON SITE ACCURATELY.
6. THE CONTRACTOR SHOULD COMPLY WITH HS(G) 47 "AVOIDING DANGER FROM UNDERGROUND SERVICES" WHEN EXCAVATING AROUND EXISTING SERVICES.
7. THE CONTRACTOR IS TO VERIFY THE LINE, LEVEL AND DIAMETER OF EXISTING SEWERS BEFORE COMMENCING DRAINAGE WORKS.
8. ALL LEVELS ARE TO OS DATUM.
9. COMPLIANCE WITH HEALTH & SAFETY MATTERS ON ANY TRENCH/MANHOLE IS OBLIGATORY AND A PERMIT TO ENTER A CONFINED SPACE IS REQUIRED.

REVISIONS

Rev	Date	Description	By	Ckd	App
P03	26/11/20	UPDATED FOLLOWING REVISED LAYOUT	RHB	RJH	RJH
P02	13/11/20	UPDATED FOLLOWING REVISED LAYOUT	RHB	RJH	RJH
P01	30/10/20	INITIAL ISSUE	RHB	RJH	RJH

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e: bristol@hydrock.com

CLIENT
BLUE CEDAR HOMES

PROJECT
CLIFTON ROAD,
DEDDINGTON

TITLE
SURFACE & FOUL WATER DRAINAGE STRATEGY

HYDROCK PROJECT NO.	SCALE @ A1
C-10690	1 : 200

STATUS DESCRIPTION	STATUS
INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
10690-HYD-XX-XX-DR-D-2200	P03

Rob Belcher

From: Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
Sent: 26 October 2020 06:38
To: Rob Belcher
Subject: Re: Clifton Road, Deddington - Culvert
Attachments: SVC-SQL-UNI-01_CANONQXL05614_4776_001.pdf

Rob

Having researched this further I am aware of a large culvert crossing Clifton Road to west of your site but have no knowledge of any culvert within your site. But that's not to say there are none.

I have copied a couple of old maps. These don't suggest there is a watercourse, culverted or otherwise.

My advice would be to investigate further when you have cleared the site and are ready to start development. As well as Building Control Manager I am the Council's Flood Risk Manager. If you come across anything let me know and I can advise further.

Tony Brummell MSc CEng FICE FCIWEM MCIHT MCMI

Building Control Manager

Cherwell and South Northamptonshire Building Control Service

Cherwell District Council and South Northamptonshire Council

Direct Dial: 01295 221909

tony.brummell@cherwellandsouthnorthants.gov.uk

www.cherwell.gov.uk | www.southnorthants.gov.uk

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From: Rob Belcher <RobBelcher@hydrock.com>
Sent: 22 October 2020 10:30
To: Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
Subject: Clifton Road, Deddington - Culvert

Morning Tony,

Thanks for your time on the phone this morning.

Please see attached site layout and location plan. As mentioned on the phone, we are hoping to identify whether or not the culvert which runs underneath Earls Lane crosses south within the north-western most corner of our development site.

Any info you have which may be useful would be really helpful. Please don't hesitate to call or email.

Many thanks,

Rob Belcher BEng (Hons) GMICE
Assistant Engineer - Infrastructure

Following government advice, I am currently working from home. If we need to speak, drop me an email and I'll get back to you.
For wider information on working with Hydrock during COVID-19 visit hydrock.com/coronavirus.

Hydrock
Over Court Barns, Over Lane, Almondsbury, Bristol BS32 4DF
Tel: (01454) 619533 Internal Ext. 2207
hydrock.com

Six consecutive years in the 'Sunday Times 100 Best Companies to Work For' listing, and winner of the NCE100 'Health and Wellbeing Leader of the Year' award, 2019.

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