SUSTAINABLE DRAINAGE ASSESSMENT

COTEFIELD FARM RETAIL
BODICOTE, BANBURY OX15 4AQ

JNY9860
Sustainable Drainage
Assessment
1.1
19 June 2019

www.rpsgroup.com

Document Status					
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Contents

Appendices

1 INTRODUCTION

1.1 Context

This Sustainable Drainage Assessment (SDA) has been prepared by RPS Planning and Environment on behalf of Cotefield Holdings Limited. The assessment is in support of an outline planning application for the construction of a GFA food retail unit at Cotefield Business Park, with associated access, car parking, delivery area and landscaping. Hereafter referred to as the 'site'.

The SDA reviews existing surface water and foul water drainage arrangements at the site and presents a strategy for managing surface water and foul water from the developed site.

Cotefield Farm Retail is a greenfield site located on a parcel of land on the southern edge of the settlement of Bodicote, around 1km from Bodicote village centre, OX15 4AQ, within the Oxfordshire County Council authority area.

1.2 Approach

This proposed drainage strategy is informed by an assessment of surface water runoff from the existing parcel, a review of existing sewerage infrastructure in the vicinity of the site, and the projected foul water loadings from the proposed development.

The drainage strategy may be subject to revision as the proposals develop.

1.3 Information Source

The assessment has been undertaken in accordance with the guidance detailed within the National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG).

- Ordnance Survey (OS);
- British Geological Survey (BGS);
- Environment Agency (EA);
- Department for Environment, Food and Rural Affairs (DEFRA);
- The Building Regulations 2010, Part H Drainage and waste disposal;
- The SuDS Manual – CIRIA, November 2015;
- Oxfordshire County Council SuDS Guidance, November 2018;

It is to be noted that this SDA has been undertaken as a desktop study and no intrusive site investigations have been undertaken to inform this report.

2 PLANNING POLICY AND GUIDANCE

2.1 National Planning Policy Framework (NPPF)

The NPPF sets out Government policy on development and flood risk. It identifies how new developments are to take flood risk and climate change into account to ensure that developments not only remain safe from flooding but also do not increase flood risk elsewhere. The sequential test is used as the principal step to identify preferred locations, i.e. those not exposed to risk of flooding. Then, if development is deemed necessary in a flood zone, an exception test can be conducted through an appraisal of risk and appropriate reduction and management measures can be implemented.

The NPPF requires that the developer should prepare and submit an appropriate FRA to demonstrate how flood risk from all sources of flooding to the development itself and to others will be managed now and when taking future climate change into account.

The NPPF states that a FRA is required "for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding."

On the basis that the site is less than 1 ha and is located in Flood Zone 1, a detailed FRA is not required for this development.

2.2 Local Policy and Guidance

2.2.1 Cherwell District Council North Oxfordshire Local Plan (2011-2031)

The Cherwell Local Plan 2011-2031 Part 1 was formally adopted by Cherwell District Council on 20 July 2015.

The Plan provides the strategic planning policy framework and sets out strategic site allocations for the District to 2031.

Policy ESD 7: Sustainable Drainage Systems (SuDS) can be found in Section B – Policies for Developments in Cheerwell, and states that:

"All development will be required to use sustainable drainage systems (SuDS) for the management of surface water run-off. Where site specific Flood Risk Assessments are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems. In considering SuDS solutions, the need to protect ground water quality must be taken into account, especially where infiltration techniques are proposed. Where possible, SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. SuDS will require the approval of Oxfordshire County Council as LLFA and SuDS Approval Body, and proposals must include an agreement on the future management, maintenance and replacement of the SuDS features."

3 SITE DETAILS AND PROPOSED DEVELOPMENT

3.1 Site Location

The Cotefield Farm Retail site is located to the west of the A4260 Oxford Road, Bodicote, Banbury OX15 4AQ at Ordnance Survey National Grid Reference SP 468 374, as shown in **Figure 1**.

The site is approximately 0.57 hectares (ha) in area.

- OS X (Eastings) 446820
- OS Y (Northings) 237490

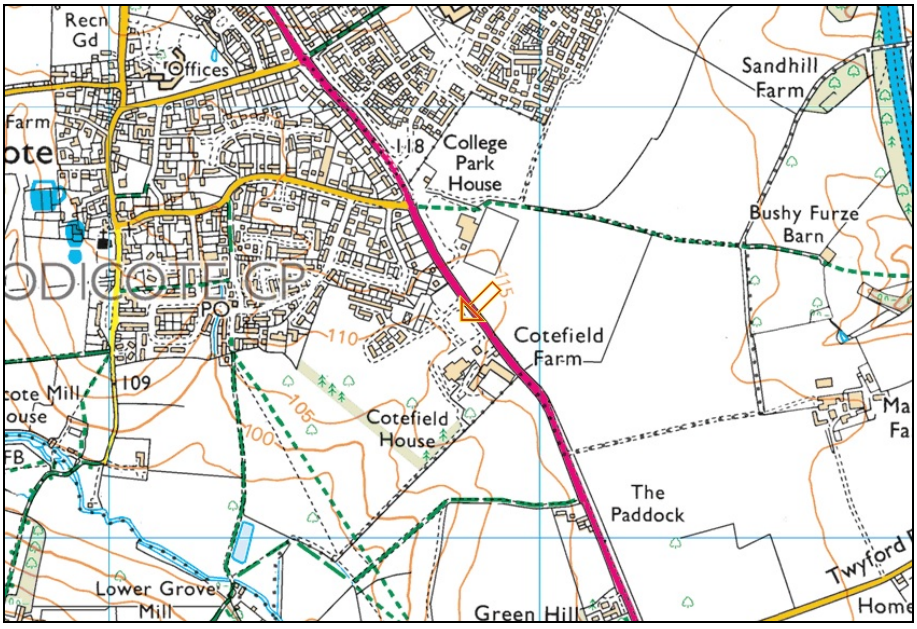


Figure 1: Site Location

3.2 Existing and Proposed Development

The site currently serves as overflow parking for the auction house at Cotefield Business Park and as a construction compound for the adjacent housing development. The site is bound to the south by units at Cotefield Business Park and to the north by the Cotefield Business Park access road.

The proposed food retail store will seek to serve Bodicote and the local area as a local supermarket, and capture pass-by trips for commuters along the A4260. As detailed in the RIA,

it is not thought likely that the catchment of the proposed store will extend very far north into Banbury and the size of store being proposed will cater for top-up and an element of main food shopping. The site will also serve as a local food store for the nearby Bankside development which is currently under construction, and Bankside Phase 2 should this be constructed.

The proposed development plan is included within **Appendix A** for reference.

Figure 2: Existing Site Aerial View

3.3 Waterbodies in the Vicinity of the Site

The Sor Brook at Bodicote, flows in a south-easterly direction, it is located 800m to the southwest of the site. The site is situated within its catchment area.

The Oxford Canal which runs in parallel to the River Cherwell are located 1700m to the east of the site.

3.4 Site Levels and Topography

LiDAR data has been used to provide an indication of the ground levels at the site to Ordnance Datum **(Figure 2)**.

Levels at the site are shown to range between approximately 114.75 metres Above Ordnance Datum (m AOD) on the top of the embankment adjacent to Oxford Road in the northeast to 110.2 m AOD to the south-west boundary (refer to **Appendix B**).

The ground levels at site fall from the bottom of the north-east embankment (112.5m AOD) to the southwest at approximately at 1:35 gradient and from the bottom of the southeast embankment (112.4m AOD) to north-west boundary at approximately 1:200.

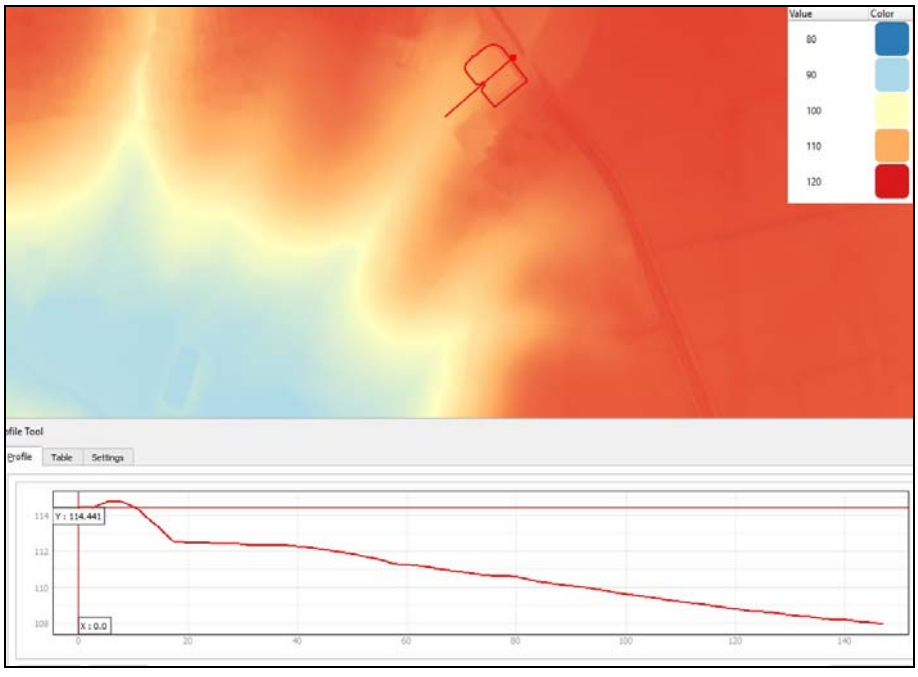


Figure 3: Digital Terrain Model

To the south of the site the industrial buildings are located on an elevated platform which falls in south-westerly direction from 116 to 114m AOD.

As shown on the longitudinal section the site is in a relatively high area gently falling to the southwest, the Sor Brook invert levels are around 91-90m AOD with 1m depth embankments.

3.5 Geology and Hydrogeology

Geological maps published by the British Geological Survey (BGS) indicate that the site is likely to be underlain by bedrock of Marlstone. Ferruginous Limestone and Ironstone. Sedimentary Bedrock formed approximately 174 to 191 million years ago in the Jurassic Period. No superficial deposits are recorded.

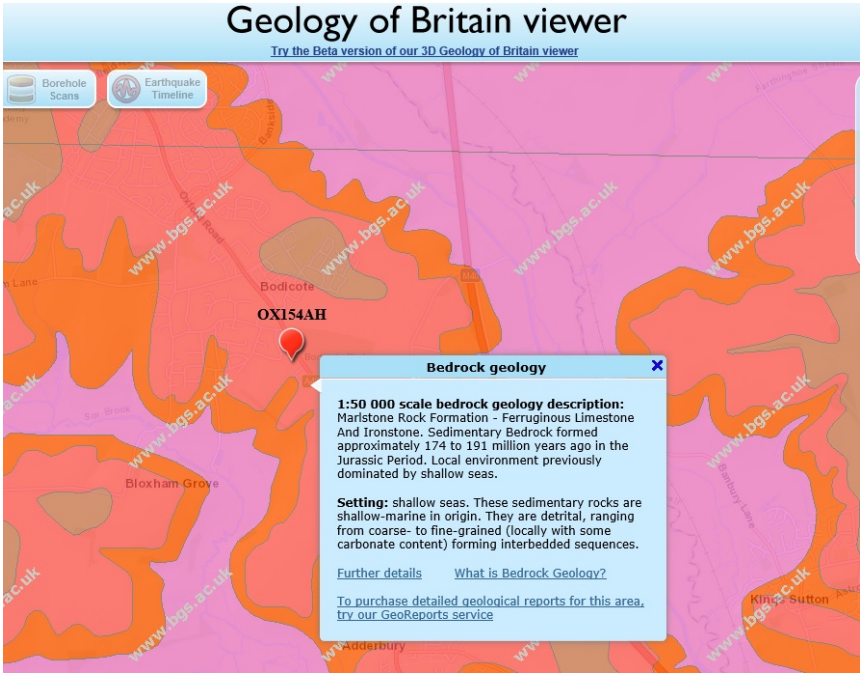


Figure 4: BGS Geology Map

The historical borehole data available on the BGS website around the site area confirms the presence of shallow topsoil/made ground layers with stiff and sandy Clays of the Marsltone Rock Bed underneath.

According to the Soilscapes maps produced by the National Soils Research Institute, soil conditions at the site and within the surrounding area are described as ‘Freely draining slightly acid but base-rich soils’.

EA Aquifer designations reflect the importance of aquifers in terms of groundwater as a resource and in their role in supporting surface water flows and wetland ecosystems. Aquifer maps are split into two different types of aquifer designations; superficial, which are permeable unconsolidated deposits and bedrock which are solid, permeable formations.

Environment Agency (EA) records indicate the presence of a Secondary A aquifer in the bedrock, the site is located within a Minor Aquifer Intermediate Groundwater Vulnerability Zone.

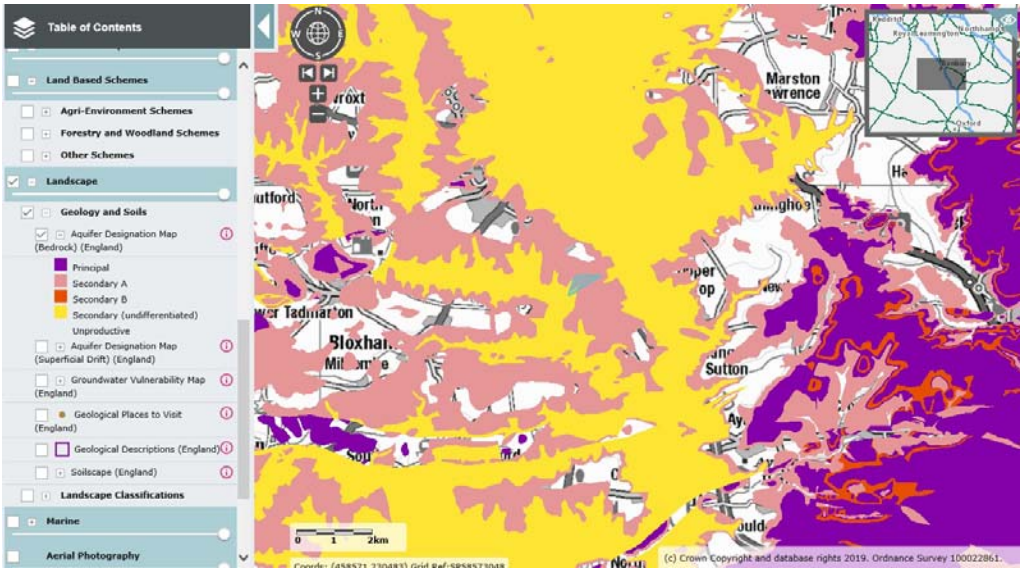


Figure 5: BGS Aquifer Map (Bedrock)

3.6 Flood Risk Assessment

According to the EA Flood Map for Planning, the proposed residential development is located in Flood Zone 1, i.e. there is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year (flooding from rivers is very unlikely).

The EA Flood Risk from Surface Water mapping indicates the proposed retail development to be at very low risk of surface water flooding.

According to a Sewer Flooding History Enquiry, there are no recorded flooding incidents due to surcharging of the public sewers at the proposed site.

4 SURFACE WATER DRAINAGE

4.1 Site Characteristics

The total area of the greenfield site is 0.58 ha. The proposed impermeable surface post development is intended be approximately 0.43 ha.

4.2 Drainage at the Existing Site

An extract of the public sewer record obtained from Thames Water is provided in **Figure 6**. Refer to **Appendix C** for full record.

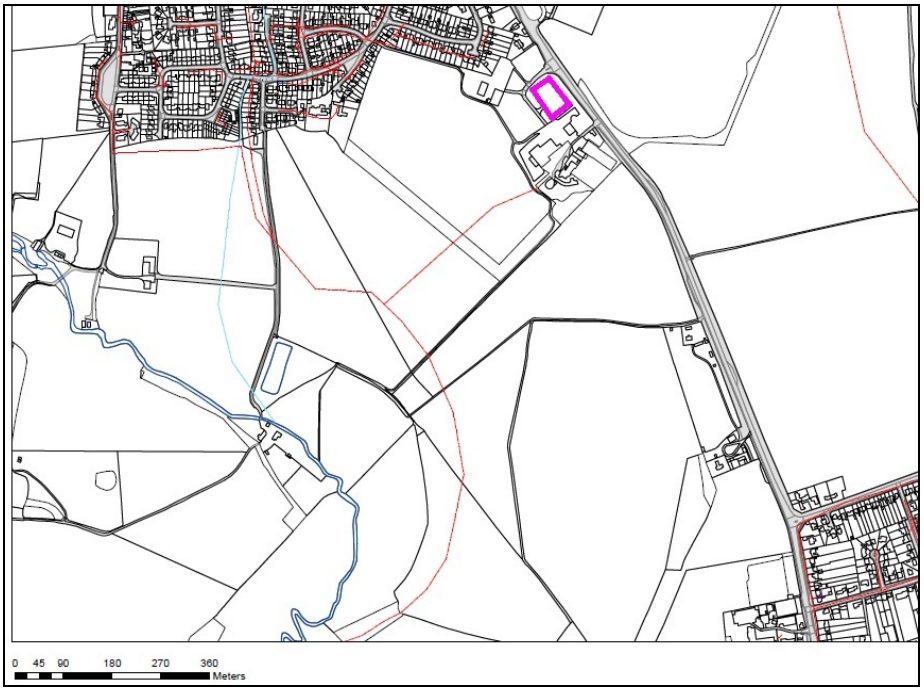


Figure 6: Thames Water Public Sewer Network

The public sewer record indicates a small foul water sewer to the south of the site serving the existing industrial building and running to the south-west where a trunk public foul sewer which collects the foul loads from Bodicote is located.

The public surface water trunk sewer discharging the runoff from Bodicote to the Sor Brook is located 750m to the southwest of the site.

There are highway drains and road gullies in the existing public roads around the site.

4.3 Surface Water Drainage at the Developed Site

4.3.1 Development Layout

The proposed food retail unit is located to the southwest of the site and the access road to the south; the loading bay for HGVs is located to the back of the building and the car parking bays to the front.

4.3.2 Disposal of Surface Water

In accordance with the NPPF Planning Practice Guidance, surface water runoff should be disposed of according to the following hierarchy:

1. Into the ground (infiltration)
2. To a surface water body
3. To a surface water sewer, highway drain, or another drainage system
4. To a combined sewer

BGS borehole records in the vicinity of the site indicate that the area is underlain by Freely draining slightly acid but base-rich soils (shown on BGS mapping to be the Marlstone Formation) which suggests that disposal of surface water by infiltration may be feasible.

The drainage strategy presented in this report assumes that disposal by infiltration is feasible. This will need to be proven by on-site percolation testing prior to the detailed design of the proposed drainage system.

If percolation testing demonstrates that disposal by infiltration is not feasible, the drainage strategy would need to be revised so that surface water runoff would discharge to a public surface water sewer serving the proposed/under construction residential developments to the southwest of the site.

The adoptable drainage network of the residential development to the southwest of the site has an allowance to receive future flows from the site. The maximum discharge rate would be 5 l/s.

4.3.3 Surface Water Discharge Rates

Surface water runoff generated at the existing site would be expected to flow overland to the south-west of the site.

The greenfield runoff rates from the existing site have been calculated using the ICP SuDS method within Micro Drainage and summarised in **Table 1**. Within the calculations, the Site has been represented as a greenfield catchment with a soil index value of 0.15.

Table 1: Greenfield Discharge Rates

Annual probability of rainfall event	Greenfield Runoff Rate (l/s)	Proposed Discharge Rate (l/s)
1 in 1	0.2	0.0
Qbar	0.2	0.0
1 in 30	0.5	0.0
1 in 100	0.7	0.0

Refer to **Appendix D** for the greenfield runoff rates calculations.

4.3.4 Managing Surface Water within the Development

The surface water drainage system must be designed so that:

- Flooding does not occur on any part of the site for a 1 in 30 annual probability rainfall event, unless an area is designed to hold and/or convey water as part of the design;
- Flooding does not occur in any part of a building during a 1 in 100 annual probability event; and
- Flows resulting from rainfall in excess of a 1 in 100 annual probability rainfall event are managed in exceedance routes that minimise the risks to people and property, so far as is reasonably practicable.

The surface water storage facilities have been modelled using the MicroDrainage Source Control module. The required storage volume has been sized to store the 1 in 100 annual probability storm events including a 40% increase in rainfall intensity in order to allow for climate change in accordance with SuDS guidances.

Surface water disposal would be accomplished by a network of gravity surface water sewers ranging in diameter from 100 to 300mm outfalling to a 304m^3 (200 m^2 surface area by 1.6m deep) SuDS infiltration tank located beneath the parking area. The access road and car-parking areas will be designed with a 1:40 maximum gradient to allow the discharge of the surface water runoff to the gullies and drains located in the paved areas.

The tank would have a distributor filter trench with a 300mm dia. Perforated pipe and an open base to provide infiltration through the permeable layer below. A conservative infiltration rate of $1x10^{-05}$m/s (0.036 m/h) has been adopted for this assessment. However, BRE365 compliant testing would need to be undertaken to confirm actual infiltration rates prior to the detailed design of the surface water drainage system, and the attenuation volume revised accordingly.

No flow control devices would be required as all runoff is being contained and disposed of within the curtilage of the site.

Runoff attenuation and pollution control will be provided by a SuDS treatment train following a cascade in accordance with best design practice. Trapped water gullies and catchpit manholes with 450mm sumps would preventing silts accumulating in the infiltration structure. Suspended pollutants (solids or hydrocarbons) would be removed by geotextiles with a pore size of 75µm. A filtering system would be deployed to prevent pollution of the underlying aquifer comprising of two layers of geotextiles, around the geocellular crates and the surrounding gravels.

Refer to **Appendix E** for the indicative drainage strategy layout.

Refer to **Appendix F** for the hydraulic calculations to accompany the surface water design.

4.2 Maintenance of SuDS

It is anticipated that the on-site surface water pipe network and the infiltration geocellular storage tank would be maintained by a management company. An indicative maintenance schedule is presented in **Table 2** below:

Table 2: Illustrative Maintenance Schedule

Schedule	Required action	Frequency
Infiltration/Attenuation Storage tank		
Regular maintenance	Inspect and identify any areas that are not operating correctly	Monthly for 3 months, then annually
	Remove debris from the catchment surface	Monthly
	Remove sediment from internal forebays	Annually, or as required
Remedial action	Repair inlet/outlet and vents	As required
	Reconstruct infiltration structure and/or replace void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction)	As required
Monitoring	Inspect catchpit manholes and note rate of sediment accumulation	Monthly in the first year and then annually
	Inspect inlet/outlet and vents to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years, or as required
	Check infiltration tank to ensure emptying is occurring	Annually

5 FOUL WATER DRAINAGE

5.1 Drainage at the existing site

Thames Water public sewer record indicates a 150mm diameter foul sewer to the south of the site running from northeast to southwest towards the trunk foul public sewer which convey to the south the foul loads from Bodicote.

Site investigations do not indicate private foul sewers running across the site.

5.2 Foul Water Loadings

The peak foul flow rate from the proposed retail development is estimated to be 0.8-1.0 l/s using the methodology set out in Sewers for Adoption (7th Edition).

5.3 Connection to Public Sewer

The foul water discharge from the proposed retail building will connect via a new gravity sewer 100mm dia. connected to an existing/proposed public foul manhole.

It is expected that new adoptable foul manholes will be constructed in the proposed residential developments to the southwest of the site.

The adoptable drainage network of the residential development to the southwest of the site has an allowance to receive future foul loadings from the site, the discharge rate would be 1 l/s.

A sewer capacity check has been submitted to Thames Water to determine whether there is adequate capacity within the existing sewer network to service the development without the need for off-site reinforcement. A response is currently awaited.

The indicative foul drainage network is presented in **Appendix E.**

6 SUMMARY

This drainage assessment has been undertaken by RPS Planning & Environmental on behalf of Cotefield Holdings Limited in relation to the proposed retail development on a parcel of land on the southern edge of the settlement of Bodicote, OX15 4AQ.

The drainage assessment reviews existing surface water and foul water drainage arrangements at the site and presents a strategy for managing surface water and foul water from the developed site.

Surface Water

- Surface water from the existing site is believed to be directed overland to the lower areas to the southwest of the site.
- Post development it is proposed that surface water from impermeable surfaces will be disposed of by infiltration via an open geocellular attenuation/infiltration tank.
- The indicative surface water drainage scheme provides SuDS elements to control the disposal of runoff from the redeveloped site and to provide quality treatment via a SuDS treatment train
- If on site percolation testing demonstrates that disposal of surface water by infiltration is not possible, the drainage scheme will be modified so that surface water is discharged to a public surface water sewer, at a 5 l/s restricted rate.

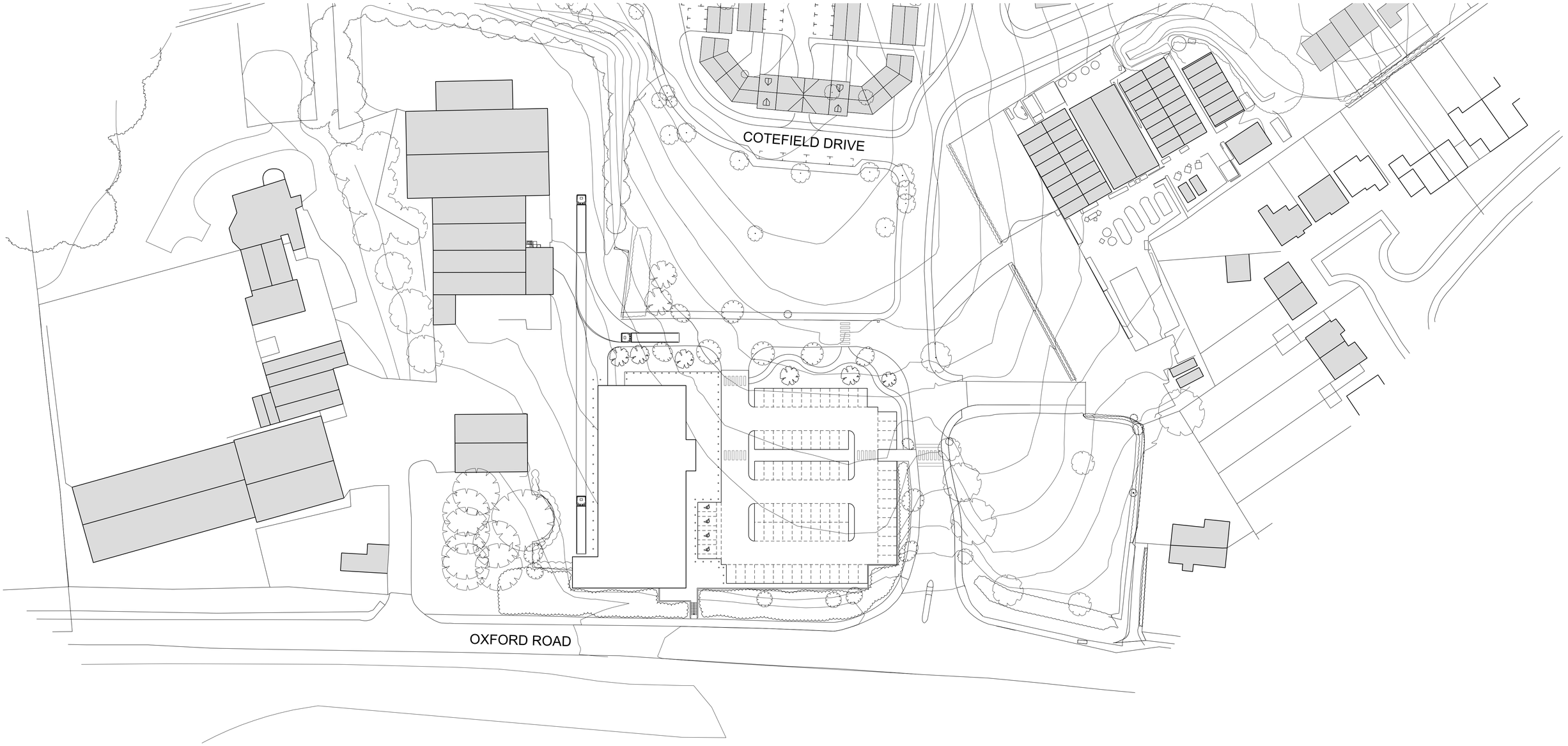
Foul Water

- Foul water will be directed to an existing/new public foul sewer located to the southwest of the site.

Appendices

Appendix A – Proposed Development Plan

DO NOT SCALE FROM THIS DRAWING - Figured dimensions only to be used for setting out.
Any dimensional discrepancies found on site are to be brought to the attention of the architect or contract adminstrator immediately. IF IN DOUBT ASK!



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Project:
Cotefield Farm

Drawing Title:
Proposed Site Plan

Client:
Will Bratt

Job No:
39042

Drawing No:
02

rev.
A

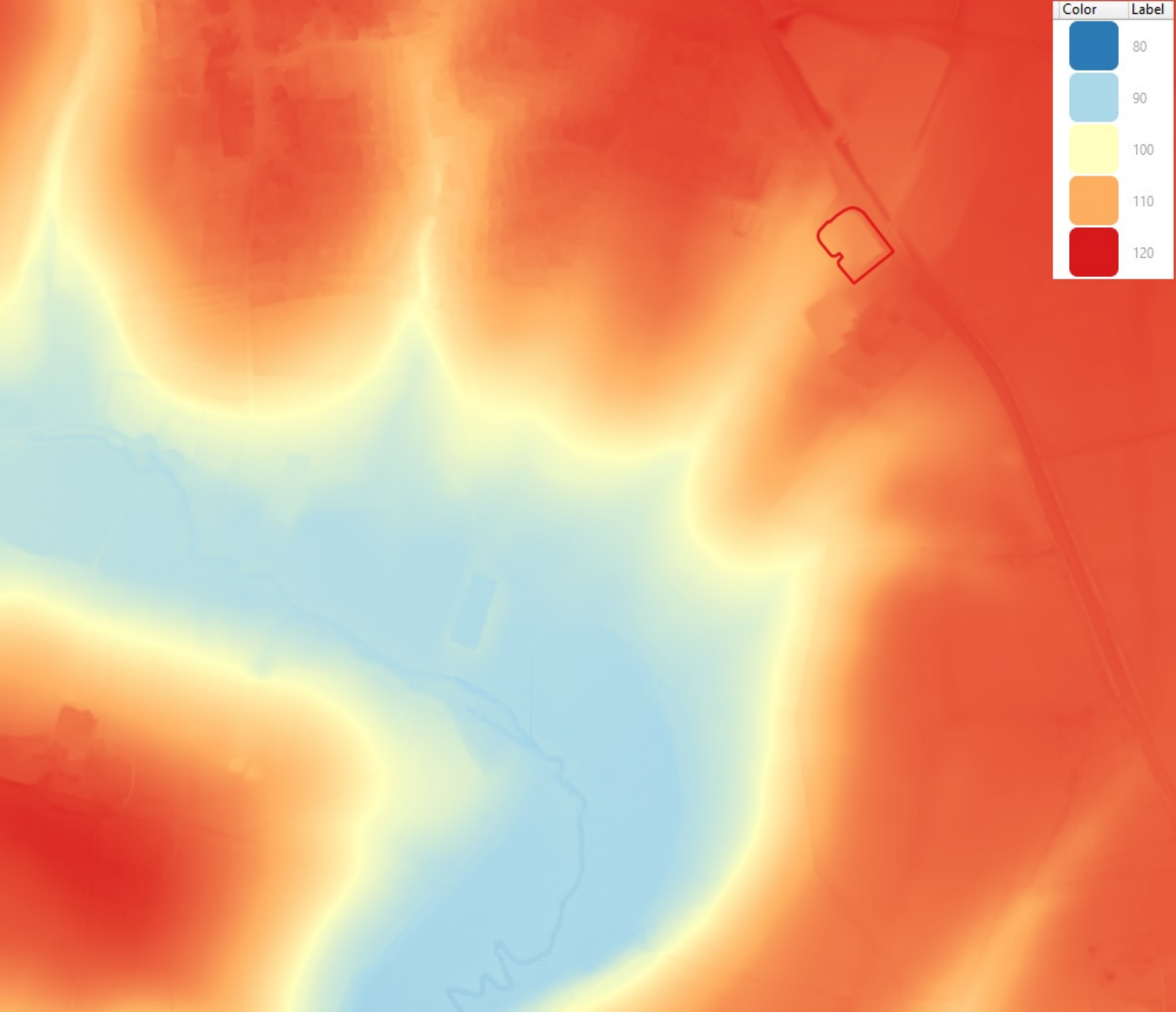
Date:
Jan 2019

Drawn:
KD

Checked:
BM

Scale:
1:500@A1

Appendix B – LiDAR Existing Levels


Color
Label
80
90
100
110
120

Appendix C – Thames Water Sewer Map

Asset location search

Thames Water Property Searches

RPS Planning & Development Ltd
Bastion House,140 Bastion House

LONDON
EC2Y 5DN

Search address supplied

Cotefield Farm
Oxford Road
Bodicote
Banbury
OX15 4AQ

Your reference JNY9786 Cotefield BP Bodicote

Our reference ALS/ALS Standard/2019_3973781

Search date 22 March 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

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

searchcode

Asset location search

Property Searches

Search address supplied: Cotefield Farm, Oxford Road, Bodicote, Banbury, OX15 4AQ

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

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

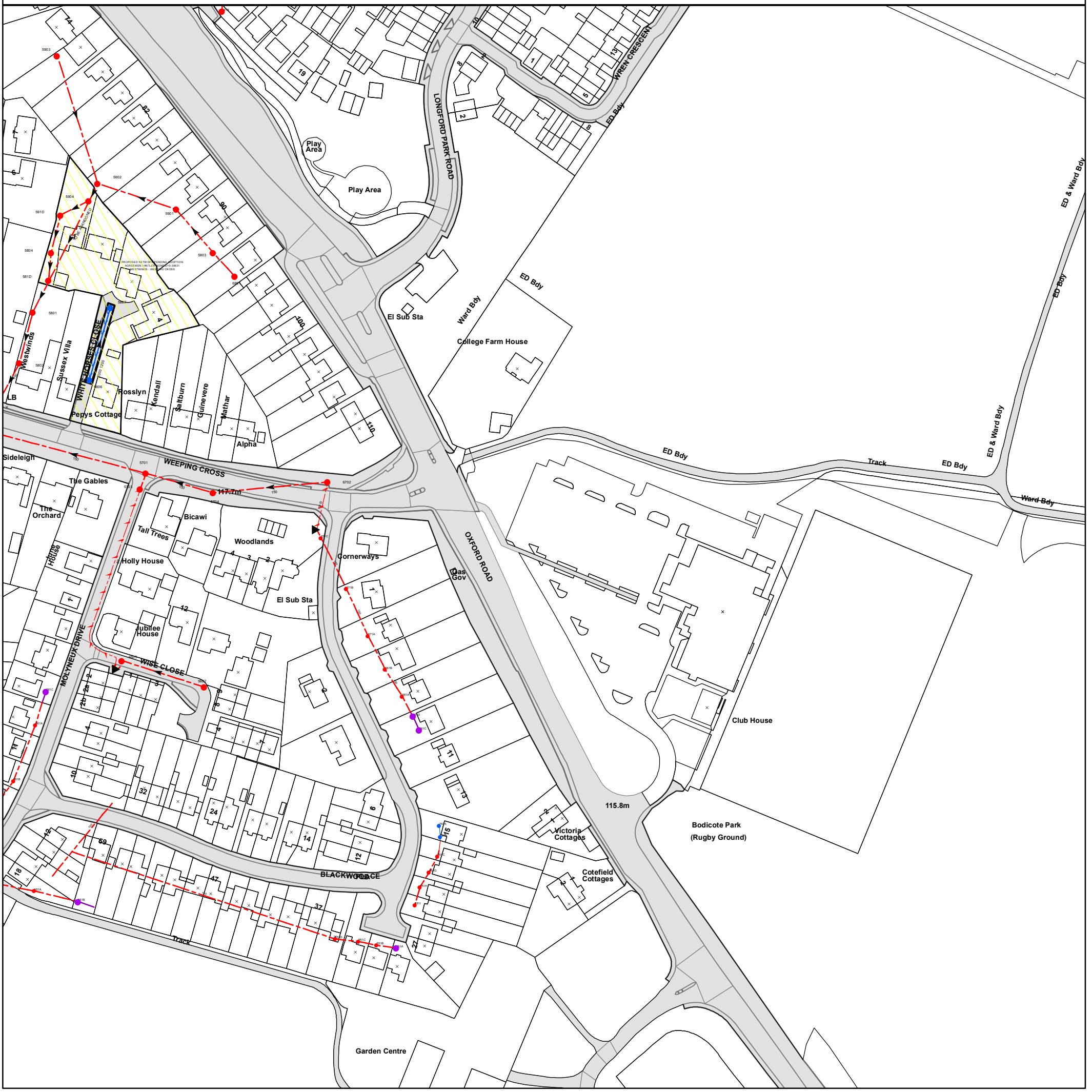
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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

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

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

ALS/ALS Standard/2019_3973781



0 10 20 40 60 80 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:	1:1792
Width:	500m
Printed By:	SAsirvat
Print Date:	22/03/2019
Map Centre:	446750,237750
Grid Reference:	SP4637NE

Comments:

ALS/ALS Standard/2019_3973781

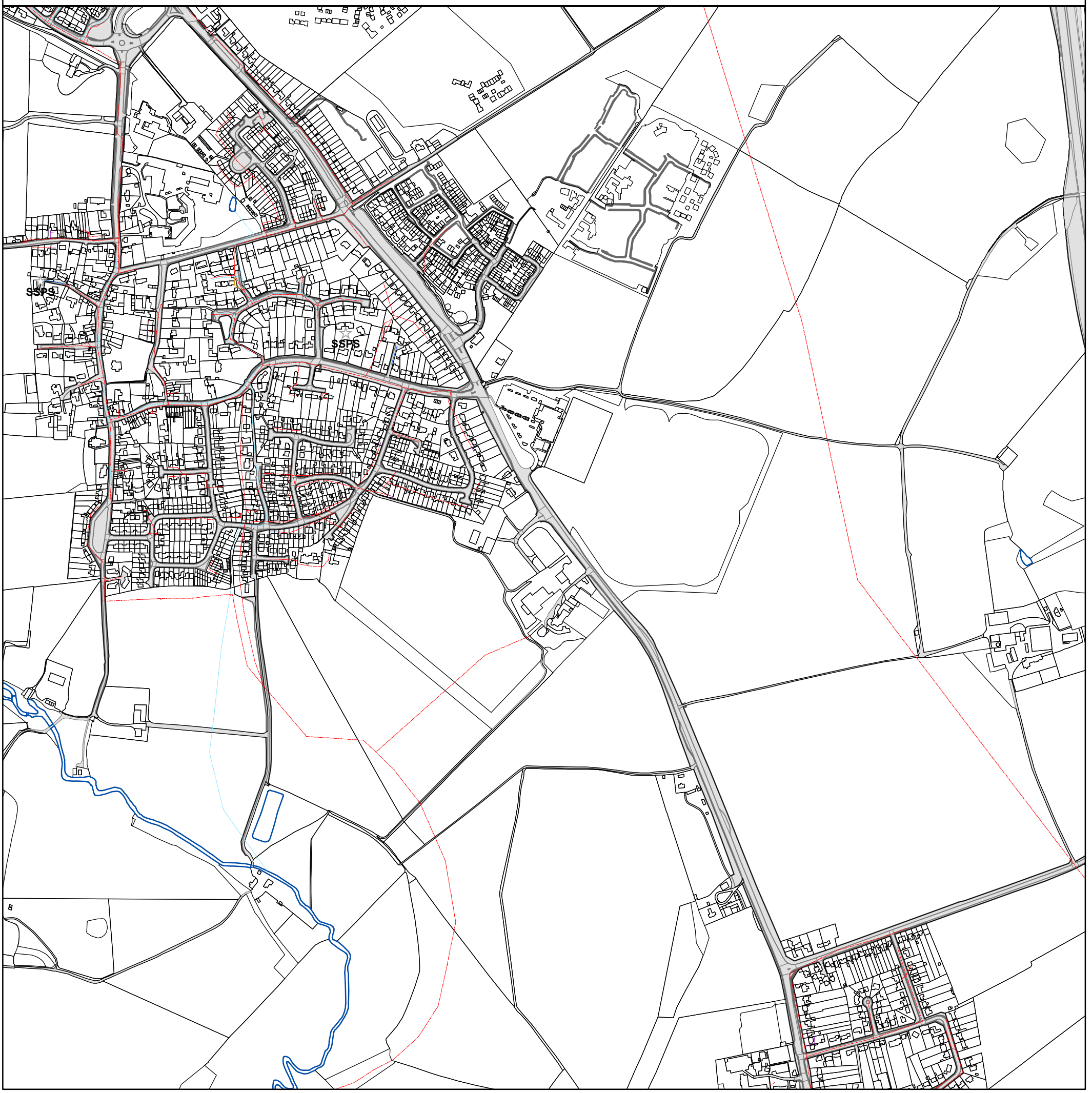
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
5603		
5701	117.46	115.19
5801	117.22	115.16
5902		
5602		
5803		
6702	117.8	116.37
5807		
591D		
5804		
551B		
651B		
651D		
661B		
661D		
671A		
561A		
691A		
761A		
761C		
651H		

REFERENCE	COVER LEVEL	INVERT LEVEL
5703	117.46	116.52
5802	116.82	
5903		
5901		
5704	117.63	115.66
6801		
5806		
5904		
581D		
551A		
651A		
651C		
661A		
661C		
561B		
671B		
561C		
671C		
761B		
651G		
651I		

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

ALS/ALS Standard/2019_3973781



Scale:	1:7158
Width:	2000m
Printed By:	SAsirvat
Print Date:	22/03/2019
Map Centre:	446821,237488
Grid Reference:	SP4637SE

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

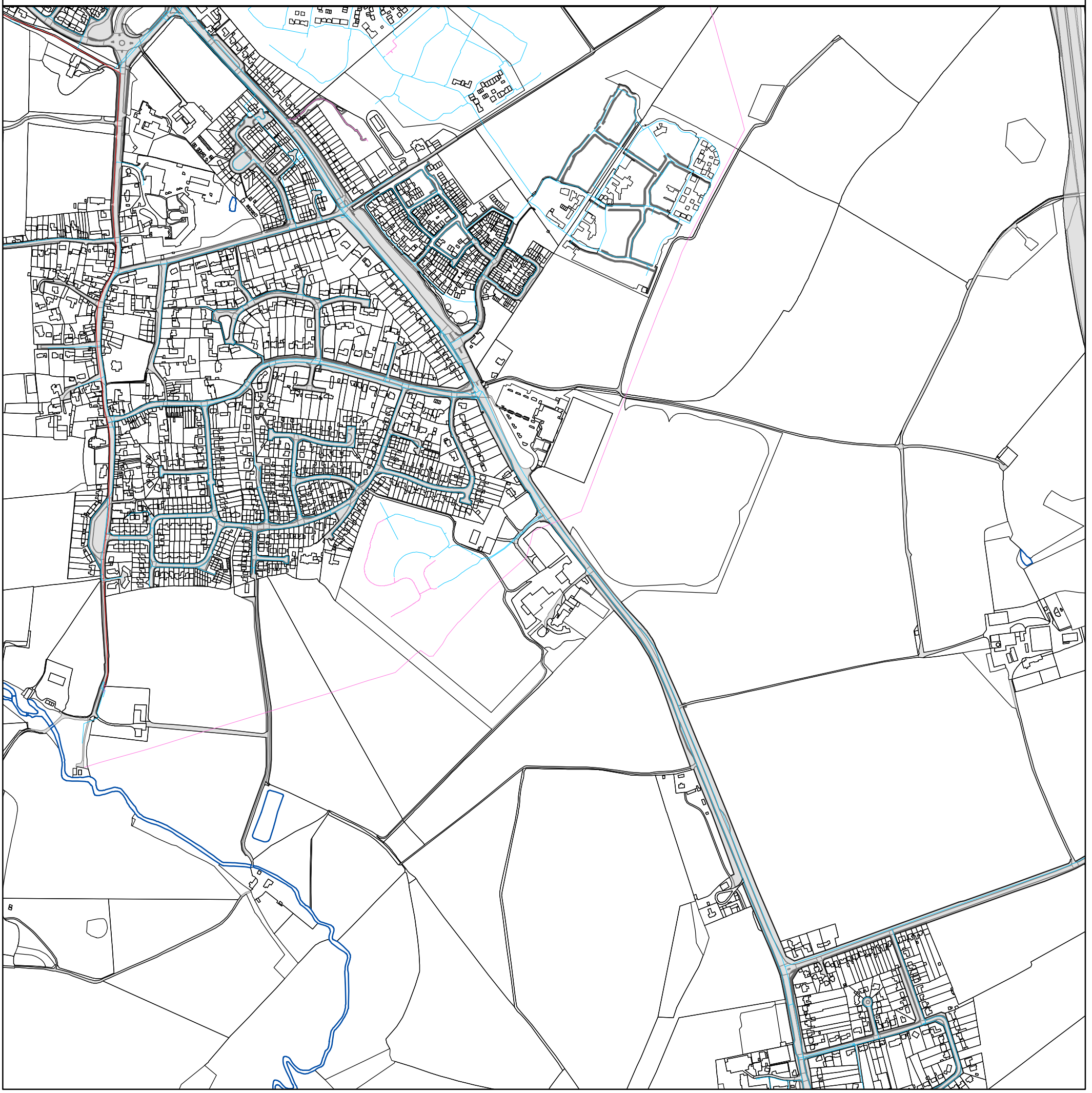
Abandoned Sewer

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.

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

ALS/ALS Standard/2019_3973781



0 45 90 180 270 360
Meters

Scale:	1:7158
Width:	2000m
Printed By:	SAsirvat
Print Date:	22/03/2019
Map Centre:	446821,237488
Grid Reference:	SP4637SE

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**

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

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TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Appendix D – Greenfield Discharge Rates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.150
Area (ha)	0.570	Urban	0.000
SAAR (mm)	700	Region Number	Region 6

Results l/s

QBAR Rural	0.2
QBAR Urban	0.2
Q1 year	0.2
Q1 year	0.2
Q30 years	0.5
Q100 years	0.7

Appendix E – Indicative Drainage Strategy Layout

NOTES

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. This drawing is to be read in conjunction with all relevant scheme drawings.

Surface Water Drainage Key

- Proposed Surface Water Sewer
- Proposed Surface Water Manhole
- Proposed Surface Water Inspection Chamber
- Proposed Surface Water Geo-Cellular Infiltration-Attenuation Tank

Foul Water Drainage Key

- Proposed Foul Water Sewer
- Proposed Foul Water Manhole
- Proposed Foul Water Inspection Chamber
- Outline Site Boundary

Existing Private Water Main

Cotefield Drive

A4620 Oxford Road

Rev	Description	By	Check	Date
P1	Existing Private Water Main Added	HN	TP	19.06.19

MAKING COMPLEX EASY

20 Milton Park, Abingdon, Oxfordshire, OX14 4SH
T: +44(0)1235 432 190 **E:** transport@rpsgroup.com

Client: Client

Project: Cotefield Farm Retail, Bodicote

Title: Indicative Drainage Strategy Layout

Status	Drawn By	PM/Checked by
PRELIMINARY	HN	TP

Project Number	Scale @ A1	Date Created
JNY9860	1:250	03/05/2019

RPS Drawing/Figure Number: JNY9860-RPS-0500-001

Rev: P1

rpsgroup.com

Drawing Ref: P:\JNY9860 - Cotefield Farm Retail\Civils\Drawings\JNY9860-RPS-0500-001 (Proposed Drainage Plan).dwg

Appendix F – MicroDrainage Source Control Calculations

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

Half Drain Time : 1593 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.583	0.583	1.3	110.7	O K
30 min Summer	0.758	0.758	1.4	144.0	O K
60 min Summer	0.934	0.934	1.5	177.4	O K
120 min Summer	1.103	1.103	1.6	209.6	O K
180 min Summer	1.193	1.193	1.6	226.6	O K
240 min Summer	1.248	1.248	1.6	237.1	O K
360 min Summer	1.314	1.314	1.7	249.6	O K
480 min Summer	1.352	1.352	1.7	256.9	O K
600 min Summer	1.373	1.373	1.7	260.8	O K
720 min Summer	1.382	1.382	1.7	262.6	O K
960 min Summer	1.380	1.380	1.7	262.2	O K
1440 min Summer	1.340	1.340	1.7	254.6	O K
2160 min Summer	1.274	1.274	1.6	242.1	O K
2880 min Summer	1.211	1.211	1.6	230.1	O K
4320 min Summer	1.100	1.100	1.6	209.0	O K
5760 min Summer	1.004	1.004	1.5	190.8	O K
7200 min Summer	0.916	0.916	1.5	174.1	O K
8640 min Summer	0.836	0.836	1.4	158.8	O K
10080 min Summer	0.761	0.761	1.4	144.7	O K
15 min Winter	0.653	0.653	1.3	124.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.941	0.0	23
30 min Summer	90.734	0.0	38
60 min Summer	56.422	0.0	68
120 min Summer	33.903	0.0	126
180 min Summer	24.840	0.0	186
240 min Summer	19.808	0.0	246
360 min Summer	14.341	0.0	364
480 min Summer	11.407	0.0	484
600 min Summer	9.544	0.0	602
720 min Summer	8.247	0.0	722
960 min Summer	6.544	0.0	960
1440 min Summer	4.717	0.0	1242
2160 min Summer	3.395	0.0	1620
2880 min Summer	2.686	0.0	2020
4320 min Summer	1.928	0.0	2852
5760 min Summer	1.522	0.0	3640
7200 min Summer	1.267	0.0	4472
8640 min Summer	1.090	0.0	5272
10080 min Summer	0.960	0.0	6056
15 min Winter	138.941	0.0	23

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
30 min Winter	0.850	0.850	1.4	161.5	O K
60 min Winter	1.048	1.048	1.5	199.2	O K
120 min Winter	1.241	1.241	1.6	235.8	O K
180 min Winter	1.344	1.344	1.7	255.3	O K
240 min Winter	1.409	1.409	1.7	267.6	O K
360 min Winter	1.488	1.488	1.7	282.6	O K
480 min Winter	1.536	1.536	1.8	291.8	O K
600 min Winter	1.564	1.564	1.8	297.2	O K
720 min Winter	1.581	1.581	1.8	300.3	O K
960 min Winter	1.590	1.590	1.8	302.1	O K
1440 min Winter	1.558	1.558	1.8	296.1	O K
2160 min Winter	1.479	1.479	1.7	281.0	O K
2880 min Winter	1.400	1.400	1.7	266.0	O K
4320 min Winter	1.246	1.246	1.6	236.7	O K
5760 min Winter	1.107	1.107	1.6	210.4	O K
7200 min Winter	0.981	0.981	1.5	186.3	O K
8640 min Winter	0.865	0.865	1.4	164.3	O K
10080 min Winter	0.759	0.759	1.4	144.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.734	0.0	37
60 min Winter	56.422	0.0	66
120 min Winter	33.903	0.0	124
180 min Winter	24.840	0.0	184
240 min Winter	19.808	0.0	242
360 min Winter	14.341	0.0	358
480 min Winter	11.407	0.0	476
600 min Winter	9.544	0.0	590
720 min Winter	8.247	0.0	704
960 min Winter	6.544	0.0	930
1440 min Winter	4.717	0.0	1358
2160 min Winter	3.395	0.0	1692
2880 min Winter	2.686	0.0	2164
4320 min Winter	1.928	0.0	3072
5760 min Winter	1.522	0.0	3976
7200 min Winter	1.267	0.0	4824
8640 min Winter	1.090	0.0	5624
10080 min Winter	0.960	0.0	6456

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)	19.900	Shortest Storm (mins)	15
Ratio R	0.413	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.430

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.230	4	8	0.200

Model Details

Storage is Online Cover Level (m) 3.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	200.0	200.0	1.601	1.0	360.0
1.600	200.0	360.0	3.000	1.0	360.0