MLM

Multidisciplinary Consulting

MLM

www.mlm.uk.com

MLM

www.mlm.uk.com

Multidisciplinary Consulting

MLM Consulting Engineers Ltd
North Lodge, 25 London Road, Ipswich, Suffolk IP1 2HF

Tel: 01473 231100
Fax: 01473 231515
Email: james.calvert@mlm.uk.com

Land at West Road

Sawbridgeworth, Hertfordshire CM21 0BN

Flood Risk Assessment

Document Ref: SJC/615807/JRC
Revision: 0
Date: 28 February 2014

Prepare [redacted]

Checked: [redacted]

Project Revision Sheet

Revision No	Date	Status	Changes	Author	Approved
0	28/02/14	First issue	N/A	SJC	JRC

Contents

Appendices

Appendix A – Site Location

MLM Drawing 615807/100 – Site Location Plan
Environment Agency Flood Map Website Extract
Land Registry Plan

Appendix B – Existing Site

Topographical Survey
Calculations – Flow in watercourse adjacent to site
Calculations – Watercourse capacity adjacent to site
Calculations – Culvert capacity at West Road

Appendix C – Proposed Development

Greenfield Run-off Calculations
MLM Drawing 615807/110 – Surface Water Drainage Strategy (NOT INCLUDED)
Microdrainage Calculations

Appendix D – Thames Water

Asset Plan

1 Introduction

1.1 MLM Consulting Engineers Ltd has been appointed by Taylor Wimpey Strategic Land to undertake a Flood Risk Assessment (FRA) associated with the proposed development of land at West Road, Sawbridgeworth, Hertfordshire CM21 0BN.

1.2 The site is shown on the Environment Agency (EA) web based Flood Map for Planning to lie in flood zone 1 (low risk) immediately adjacent to a small area of Flood Zone 3 (the high probability flood area) associated with a culvert.

1.3 This report has been prepared for the sole use of Taylor Wimpey Strategic Land and the contents should not be relied upon by others without the express written authority of MLM Consulting Engineers Ltd. If any unauthorised third party makes use of this report they do so at their own risk and MLM owes them no duty of care or skill.

1.4 This Assessment is prepared in accordance with the National Planning Policy Framework (NPPF) and its Technical Guidance document dated March 2012. This assessment is produced to inform of flood risk issues and to support a planning application for the proposed residential development on the site.

2 Site Description and Proposal

Existing Site

2.1 The site of the proposed development is located on West Road, Sawbridgeworth, Hertfordshire. The site location plan is given in Appendix A. The nearest postcode is CM21 0BN and the approximate OS grid reference of the centre of the site is 547890, 215510.

2.2 The site lies to the west of Sawbridgeworth to the north of West Road. The site has a small frontage onto West Road and extends east behind residential properties on West Road and the Mandeville Primary School. To the north and west of the site lies open land used as playing pitches and farmland. A small watercourse, a tributary to the River Stort, forms the western boundary the site. The overall site area contained within the red line boundary is approximately 6.14 ha of which approximately 0.2 ha is the site access running north from West Road adjacent to and past the Mandeville Primary School.

2.3 A topographical survey of the site to OSGPS datum can be seen in Appendix A.

Proposed Development

2.4 It is proposed to develop the site for residential use.

2.5 Residential development is classified as 'more vulnerable' in accordance with Table 2 of the NPPF and is appropriate development in flood zone 1 in accordance with Table 3 of the NPPF.

3 Flood Risk

Flooding from Watercourse

3.1 The site lies adjacent to a small watercourse which runs along its western boundary. The watercourse flows in a southerly direction towards West Road to the south of the site where it is culverted beneath the highway to continue as an open watercourse flowing south then east towards the River Stort.

3.2 The banks are not of equal height on both sides of the watercourse. The banks to the west of the watercourse are significantly lower in height than those on the east (the side of the site) which is a reflection of the relative gradients of the land on either side falling towards the watercourse. This can be seen on Ordnance Survey (OS) mapping with contours to the east of the watercourse space more tightly together than those on the west.

3.3 An estimate of the flows in the watercourse adjacent to the site has been made using an estimate of the land upstream of the site as the small watercourse is not included on FEH data. The flows have been calculated as 0.64 m^3/s in a 100 year return period rainfall event inclusive of 20% climate change in accordance with the NPPF. This flow rate has been compared to the capacity of the watercourse, see calculations in Appendix B.

3.4 The capacity of the watercourse adjacent to the site is estimated at 1.77 m^3/s which shows that the watercourse has sufficient capacity for the likely flows and that they would not spill out of bank causing flood risk to the site, see calculation in Appendix B.

3.5 In addition an estimate of the flows in the watercourse at the culvert has been made using FEH data (this watercourse is included on the FEH CDROM). The peak flow is shown to occur in the 6 hour duration rainfall event and produce a run-off of 3.5 m^3/s in the 100 year return period event including 20% allowance for climate change. The capacity of the culvert beneath West Road is estimated as 2.077 m^3/s. The culvert therefore appears to not have sufficient capacity for the flows for the 100 year return period event inclusive of climate change and this agrees with the information shown on the EA flood maps which show flooding immediately upstream of the culvert.

3.6 The approximate level of West Road at its low-point (where the watercourse is culverted beneath it) is shown on OS mapping to be 59.0 mAOD. Minimum on site levels are in the order of 60.0 mAOD. It is therefore evident that in the event of blockage of the culvert, or a significant rainfall event, the site would not flood as the water would flow (weir) over West Road and re-enter the watercourse to the south of the road.

Flooding from Overland Flow

3.7 A review of OS mapping and a visit to the site and surrounding area indicates that there are no significant areas likely to shed overland flows towards the site. Any overland flow from the higher land to the north and east of the site will be minimal as these areas are undeveloped and are currently used as playing fields. Overland flow would therefore be at greenfield run-off rates from these areas which would be picked up by on-site drainage or diverted around the proposed residential units to the watercourse at the west of the site. The site is therefore not considered to be at significant risk of flooding from overland flow.

Flooding from Groundwater

3.8 The on-line British Geological Survey geology maps indicate that the site lies on Lowestoft Formation (Diamicton) overlying London Clay. These deposits are usually of low permeability and therefore there is a low possibility that groundwater could rise within the underlying ground. If groundwater did express at the surface the topography of the site would mean that water would flow westwards towards the watercourse. Any such water would be collected within the on site drainage network and would not cause a significant risk to the proposed residential development at the site.

Flooding from Sewers

3.9 The Thames Water asset plans show that there are no sewers located in the vicinity of the site that could pose a flood risk to the proposed development. The sewers that are shown are located within West Road to the south of the site, the surface water sewers discharge to the watercourse to the south of West Road (downstream of the culvert) and therefore would not cause additional flood risk to the site through the backing up of surface water due to a lack of capacity or blockage of the culvert).

Flooding from Reservoirs, Canals and Other Artificial Sources

3.10 From our review of Ordnance Survey (OS) mapping of the site and surrounding area together with a review of the EA reservoir flood risk mapping, our assessment is that there is no reasonably foreseeable risk of flooding to the site from these sources.

Strategic Flood Risk Assessment

3.11 A review of the East Hertfordshire SFRA has not revealed any significant flood risks to the site. The report and maps show that the site is not at significant risk of flooding.

4 Surface Water Drainage

Existing Drainage

4.1 The site is greenfield and therefore the surface water discharge from the site will be at greenfield run-off rates. The greenfield run-off rate for the site has been calculated, for the site excluding the access road, using the ICP SUDS method in the Microdrainage software. The surface water run-off would discharge to the unnamed watercourse to the west of the site. The calculated discharge rates are:

Return Period (Yrs)	Discharge Rate (l/s)
1	14.3
30	38.2
100-	53.8

Proposed Drainage

4.2 Priority for surface water drainage should be given to infiltration drainage in accordance with the SUDS hierarchy. A review of BGS on line geology shows that the potential for infiltration drainage at the site is low due to the underlying soils being of low permeability. The presence of the watercourse adjacent to the site suggests that the soil is of low permeability and that surface water discharges from the site via this route. Intrusive site investigation will be required to confirm this assumption prior to detailed design of the surface water drainage strategy for the site.

4.3 The proposed surface water drainage strategy for the site is therefore to attenuate surface water run-off from the development and discharge the run-off to the adjacent watercourse at equivalent greenfield discharge rates above.

4.4 Outline calculations have been undertaken using Microdrainage software to determine the likely volume of attenuation required for surface water run-off from the site in the 100 year return period inclusive of 30% climate change. The discharge rate in this event would be the present day 100 year greenfield run-off rate of 53.8 l/s. This approach ensures that the development of the site does not increase off-site flood risk.

4.5 The volume of attenuation required for the site in this scenario, based on an impermeable area of 4.3 ha, is approximately 2,700 m^3.

4.6 Priority should be given to open forms of attenuation such as ponds, swales, basins etc. These can provide additional benefits to the site other than pure attenuation achieved in below ground attenuation systems.

5 Conclusions

5.1 The site lies in Flood Zone 1, the area at low risk of flooding, the proposed development is appropriate in accordance with the Technical Guidance to the NPPF.

5.2 Flows in the watercourse adjacent to the site do not pose a flood risk to the site.

5.3 Surface water run-off from the site will be attenuated on site and discharged to the adjacent watercourse at greenfield run-off rates, unless ground conditions are found to be suitable for infiltration drainage.

5.4 The development will not cause any increased flood risk to others and is therefore acceptable in flood risk terms.

Appendix A – Site Location

MLM Drawing 615807/100 – Site Location Plan
Environment Agency Flood Map Website Extract
Land Registry Plan

Project	Drawn/Design	Drawing No.	
LAND AT WEST ROAD SAWBRIDGEWORTH	JRC	615807/100	MLM
	Checked -		
Drawing Title	Approved -	Scale NTS @ A4	
SITE LOCATION PLAN	Date 27.02.14		

Rev	Date	Description	Made	Chk'd	Drawing Status:
.	.	.	.	.	INFORMATION

Environment Agency

Enter a postcode or place name:

CM21 0BN Go

Other topics for this area...

Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

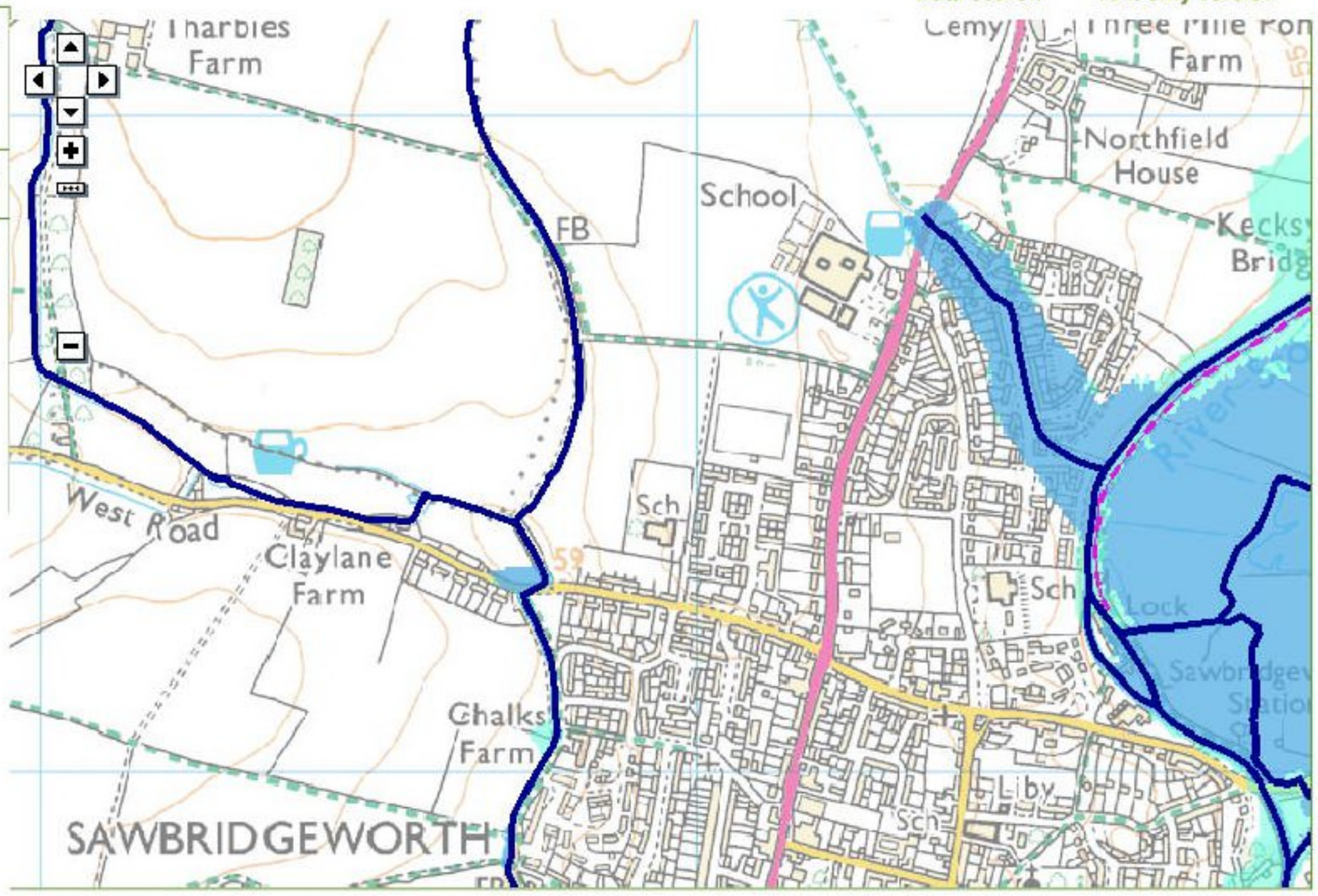
CM21 0BN at scale 1:10,000

Map legend

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

Flood Map for Planning (Rivers and Sea)

- Flood Zone 3
- Flood Zone 2
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers



More about flooding:

Understanding the Flood Map for Planning (Rivers and Sea)

A more detailed explanation to help you understand the flood map shown above.

Current flood warnings

We provide flood warnings online 24 hours a day. Find out the current flood warning status in your local area.

*** Legend Information:** Flood defences and the areas benefiting from them are gradually being added through updates. Please contact your local environment agency office for further details.

creating a better place

Author: The Environment Agency | enquiries@environment-agency.gov.uk
Last updated: 15th January2014

Land Registry
Official copy of title plan

Title number **HD373252**
Ordnance Survey map reference **TL4715NE**
Scale **1:2500**
Administrative area **Hertfordshire: East Hertfordshire**

This official copy issued on 12 October 2012 shows the state of this title plan on 12 October 2012 at 14:42:05. It is admissible in evidence to the same extent as the original (s.67 Land Registration Act 2002).
This title plan shows the general position, not the exact line, of the boundaries. It may be subject to distortions in scale. Measurements scaled from this plan may not match measurements between the same points on the ground. See Land Registry Public Guide 19 - Title Plans and Boundaries.
This title is dealt with by Land Registry, Birkenhead Office.

1777025002

Appendix B – Existing Site

Topographical Survey
Calculations – Flow in watercourse adjacent to site
Calculations – Watercourse capacity adjacent to site
Calculations – Culvert capacity at West Road


SITECH SURVEYING SERVICES
LAND AT WEST ROAD, SAWBRIDGEWORTH
CLIENT WSP ENVIRONMENT & ENERGY
THE SURVEY
SCALE 1:200
STANDARD REFERENCE
ABBREVIATIONS
WEST ROAD
TARMAC
CROPS

Flow in watercourse adjacent to site

Rural Runoff Calculator

ICP SUDS

ICP SUDS Input (FSR Method)

Return Period (Years)

Area (ha) 60.000

SAAR (mm) 600 Ma

Soil 0.400

Growth Curve (None)

Partly Urbanised Catchment (..

Urban 0.000

Regio Region 6 ..

Calcula

Results

QBAR rural 167.1

QBAR urban 167.1

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	167.1	414.3	142.0	315.6	414.3
Region 2	167.1	439.4	145.3	316.9	439.4
Region 3	167.1	347.5	143.7	293.7	347.5
Region 4	167.1	429.4	138.7	327.3	429.4
Region 5	167.1	594.8	145.3	401.4	594.8
Region 6/Region 7	167.1	532.9	142.0	378.6	532.9
Region 8	167.1	404.3	130.3	318.5	404.3
Region 9	167.1	364.2	147.0	294.6	364.2
Region 10	167.1	347.5	145.3	283.3	347.5
Ireland National	167.1	307.4	142.0	265.6	307.4
Ireland East	167.1	317.4	142.0	272.3	317.4
Ireland South	167.1	307.4	142.0	265.6	307.4
Ireland West	167.1	297.4	142.0	258.0	297.4
Ireland Greater Dublin	167.1	436.0	142.0	354.8	436.0

IH 124

ICP SUDS

ADAS 345

FEH

Greenfield Vo...

OK Cancel Help

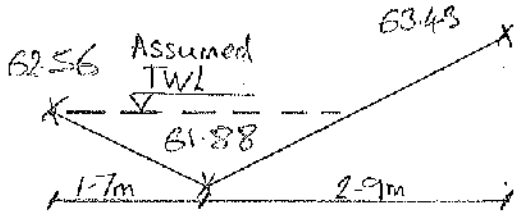
Enter Return Period between 1 and 1000

Project	Made	Ref.	MLM
WEST ROAD, SAWBRIDGEWORTH	JRC	6158O7	
	Checked		
Section		Sheet No.	www.mlm.uk.com
WATERCOURSE CAPACITY ADJACENT SITE	Date	1	

Rev	Data	Description	Made	Checked

Calculations to assess capacity of watercourse adjacent west boundary of site.

Assume in bank flows only - could spill if required.



Typical cross section

Use mannings equation to determine capacity of watercourse

$$Q = \frac{A R^{2/3} S_0^{1/2}}{n}$$

$A = 1.01 m^2$ $S_0 = 1:75 = 0.0133$

$P = 3.27 m^2$ $n = 0.03$ (grass lined ditch).

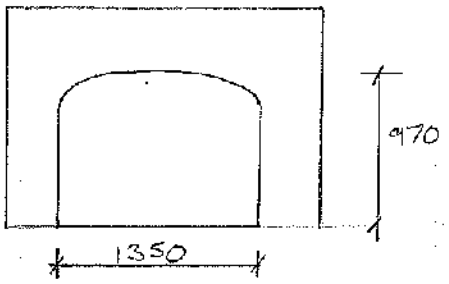
$$Q = \frac{1.01 \times \left(\frac{1.01}{3.27}\right)^{2/3} \times 0.0133^{1/2}}{0.03}$$

$Q = 1.774 m^3/s$

Project	Made	Ref.	MLM
West Road Sawbridgeworth	JRC	615807	
	Checked		
Section		Sheet No.	
culvert capacity at west road	Date	1	www.mlm.uk.com

Rev	Date	Description	Made	Checked

Calculations to assess capacity of culvert below west Road



Use mannings equation

$$Q = \frac{A\, R^{2/3}\, S_o^{1/2}}{n}$$

$A = 1.206m^2$ $S_o = 1:100$ (assumed)

$R = 4.268m$ $n = 0.025$ (masonary walls, natural floor).

$$Q = \frac{1.206 \times \left(\frac{1.206}{4.268}\right)^{2/3} \times 0.01^{1/2}}{0.025}$$

NB: S_o estimated from site visit and OS contours.

$Q = 2.077m^3/s$

Appendix C – Proposed Development

Greenfield Run-off Calculations
MLM Drawing 615807/110 – Surface Water Drainage Strategy (NOT INCLUDED)
Microdrainage Calculations

Site Greenfield Run-off Calculations

Rural Runoff Calculator

ICP SUDS

ICP SUDS Input (FSR Method)

Return Period (Years)	
Area (ha)	5.940
SAAR (mm)	600
Soil	0.400
Growth Curve	(None)

Ma

Partly Urbanised Catchment (..

Urban 0.000

Regio Region 6 ..

Calcula

Results

QBAR rural 16.9

QBAR urban 16.9

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	16.9	41.8	14.3	31.9	41.8
Region 2	16.9	44.4	14.7	32.0	44.4
Region 3	16.9	35.1	14.5	29.7	35.1
Region 4	16.9	43.4	14.0	33.1	43.4
Region 5	16.9	60.1	14.7	40.5	60.1
Region 6/Region 7	16.9	53.8	14.3	38.2	53.8
Region 8	16.9	40.8	13.2	32.2	40.8
Region 9	16.9	36.8	14.8	29.8	36.8
Region 10	16.9	35.1	14.7	28.6	35.1
Ireland National	16.9	31.0	14.3	26.8	31.0
Ireland East	16.9	32.1	14.3	27.5	32.1
Ireland South	16.9	31.0	14.3	26.8	31.0
Ireland West	16.9	30.0	14.3	26.1	30.0
Ireland Greater Dublin	16.9	44.0	14.3	35.8	44.0

IH 124

ICP SUDS

ADAS 345

FEH

Greenfield Vo...

OK Cancel Help

Enter Area between 0.000 and 99999999.999

MLM Consulting Engineers		Page 1
North Lodge 25 London Road Ipswich IP1 2HF	615807 West Road Sawbridgeworth	
Date 27/02/2014 14:20 File 615807-CALC-CIV-St...	Designed by J Calvert Checked by	
Micro Drainage	Source Control 2013.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	59.262	0.762	51.6	1713.7	O K
30 min Summer	59.350	0.850	51.6	1913.0	O K
60 min Summer	59.438	0.938	51.6	2110.6	O K
120 min Summer	59.513	1.013	51.6	2278.9	O K
180 min Summer	59.540	1.040	51.8	2340.9	O K
240 min Summer	59.547	1.047	51.9	2356.0	O K
360 min Summer	59.531	1.031	51.7	2319.5	O K
480 min Summer	59.510	1.010	51.6	2272.0	O K
600 min Summer	59.488	0.988	51.6	2222.8	O K
720 min Summer	59.465	0.965	51.6	2172.0	O K
960 min Summer	59.415	0.915	51.6	2058.9	O K
1440 min Summer	59.314	0.814	51.6	1832.4	O K
2160 min Summer	59.177	0.677	51.6	1524.0	O K
2880 min Summer	59.067	0.567	51.6	1275.1	O K
4320 min Summer	58.922	0.422	48.6	950.3	O K
5760 min Summer	58.842	0.342	44.0	768.7	O K
7200 min Summer	58.793	0.293	39.1	659.2	O K
8640 min Summer	58.760	0.260	35.0	585.8	O K
10080 min Summer	58.736	0.236	31.5	530.4	O K
15 min Winter	59.355	0.855	51.6	1924.4	O K
30 min Winter	59.456	0.956	51.6	2150.7	O K
60 min Winter	59.557	1.057	51.9	2377.2	O K
120 min Winter	59.644	1.144	52.9	2575.1	O K
180 min Winter	59.680	1.180	53.3	2654.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	218.779	0.0	1704.2	26
30 min Summer	123.463	0.0	1924.5	40
60 min Summer	69.673	0.0	2227.3	68
120 min Summer	39.318	0.0	2514.9	126
180 min Summer	28.135	0.0	2699.8	184
240 min Summer	22.188	0.0	2839.0	242
360 min Summer	15.877	0.0	3047.1	334
480 min Summer	12.521	0.0	3203.6	388
600 min Summer	10.415	0.0	3330.2	450
720 min Summer	8.960	0.0	3437.1	514
960 min Summer	7.050	0.0	3603.5	650
1440 min Summer	5.028	0.0	3848.4	916
2160 min Summer	3.586	0.0	4154.3	1304
2880 min Summer	2.822	0.0	4356.0	1672
4320 min Summer	2.009	0.0	4639.4	2376
5760 min Summer	1.579	0.0	4885.0	3064
7200 min Summer	1.310	0.0	5063.6	3752
8640 min Summer	1.125	0.0	5212.0	4496
10080 min Summer	0.988	0.0	5333.0	5240
15 min Winter	218.779	0.0	1910.2	26
30 min Winter	123.463	0.0	2155.8	40
60 min Winter	69.673	0.0	2495.8	68
120 min Winter	39.318	0.0	2817.8	124
180 min Winter	28.135	0.0	3024.8	182

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
240 min Winter	59.692	1.192	53.5	2682.3	O K
360 min Winter	59.682	1.182	53.3	2660.3	O K
480 min Winter	59.651	1.151	53.0	2589.6	O K
600 min Winter	59.620	1.120	52.6	2520.0	O K
720 min Winter	59.590	1.090	52.3	2451.5	O K
960 min Winter	59.519	1.019	51.6	2293.5	O K
1440 min Winter	59.373	0.873	51.6	1963.8	O K
2160 min Winter	59.170	0.670	51.6	1507.4	O K
2880 min Winter	59.018	0.518	51.2	1164.7	O K
4320 min Winter	58.853	0.353	44.8	793.5	O K
5760 min Winter	58.780	0.280	37.6	629.4	O K
7200 min Winter	58.738	0.238	31.9	536.3	O K
8640 min Winter	58.711	0.211	27.7	474.1	O K
10080 min Winter	58.691	0.191	24.6	429.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	22.188	0.0	3180.7	238
360 min Winter	15.877	0.0	3413.8	348
480 min Winter	12.521	0.0	3589.0	448
600 min Winter	10.415	0.0	3730.7	478
720 min Winter	8.960	0.0	3850.3	554
960 min Winter	7.050	0.0	4036.5	706
1440 min Winter	5.028	0.0	4310.3	998
2160 min Winter	3.586	0.0	4653.8	1388
2880 min Winter	2.822	0.0	4880.2	1736
4320 min Winter	2.009	0.0	5199.9	2420
5760 min Winter	1.579	0.0	5471.8	3112
7200 min Winter	1.310	0.0	5672.2	3824
8640 min Winter	1.125	0.0	5839.2	4504
10080 min Winter	0.988	0.0	5977.4	5248

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	GB 547750 215350 TL 47750 15350
C (1km)	-0.024
D1 (1km)	0.285
D2 (1km)	0.277
D3 (1km)	0.273
E (1km)	0.319
F (1km)	2.514
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 4.300

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	1.450	4	8	1.450	8	12	1.400

Model Details

Storage is Online Cover Level (m) 60.000

Tank or Pond Structure

Invert Level (m) 58.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2250.0	1.500	2250.0

Hydro-Brake® Outflow Control

Design Head (m) 1.200 Hydro-Brake® Type Md5 SW Only Invert Level (m) 58.500
Design Flow (l/s) 53.8 Diameter (mm) 279

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.1	1.200	53.6	3.000	81.1	7.000	123.9
0.200	26.0	1.400	56.5	3.500	87.6	7.500	128.3
0.300	40.0	1.600	59.8	4.000	93.7	8.000	132.5
0.400	47.6	1.800	63.1	4.500	99.4	8.500	136.6
0.500	50.9	2.000	66.4	5.000	104.8	9.000	140.5
0.600	51.6	2.200	69.5	5.500	109.9	9.500	144.4
0.800	50.9	2.400	72.6	6.000	114.8		
1.000	51.5	2.600	75.6	6.500	119.4		

Appendix D – Thames Water

Asset Plan

Asset Location Search

Thames Water Property Searches
12Vastern Road
READING
RG1 8DB

Search address supplied	34 West Road Sawbridgeworth CM21 0BN
Your reference	615807
Our reference	ALS/ALS Standard/2014_2686026
Search date	14 February 2014

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

Asset Location Search

Search address supplied: 34, West Road, Sawbridgeworth, CM21 0BN

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

Waste Water Services

Please provide a copy extract from the public sewer map.

TL4715SE
TL4815NW
TL4815SW
TL4715NE
The following quartiles have not been printed as they contain no assets:

The following quartiles have been printed as they fall within Thames' sewerage area:

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.

Asset Location Search

TL4715SE	Affinity Water
TL4815NW	Affinity Water
TL4715NE	Affinity Water
TL4815SW	Affinity Water

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact the water company indicated below:

Following examination of our statutory maps, Thames Water has been unable to find any plans of water mains within this area. If you require a connection to the public water supply system, please write to:

New Connections / Diversions
Thames Water
Network Services Business Centre
Brentford
Middlesex
TW8 0EE

Tel: 0845 850 2777
Fax: 0207 713 3858
Email: developer.services@thameswater.co.uk

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0845 7823333

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.

Asset Location Search

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: 0845 850 2777
Email: developer.services@thameswater.co.uk

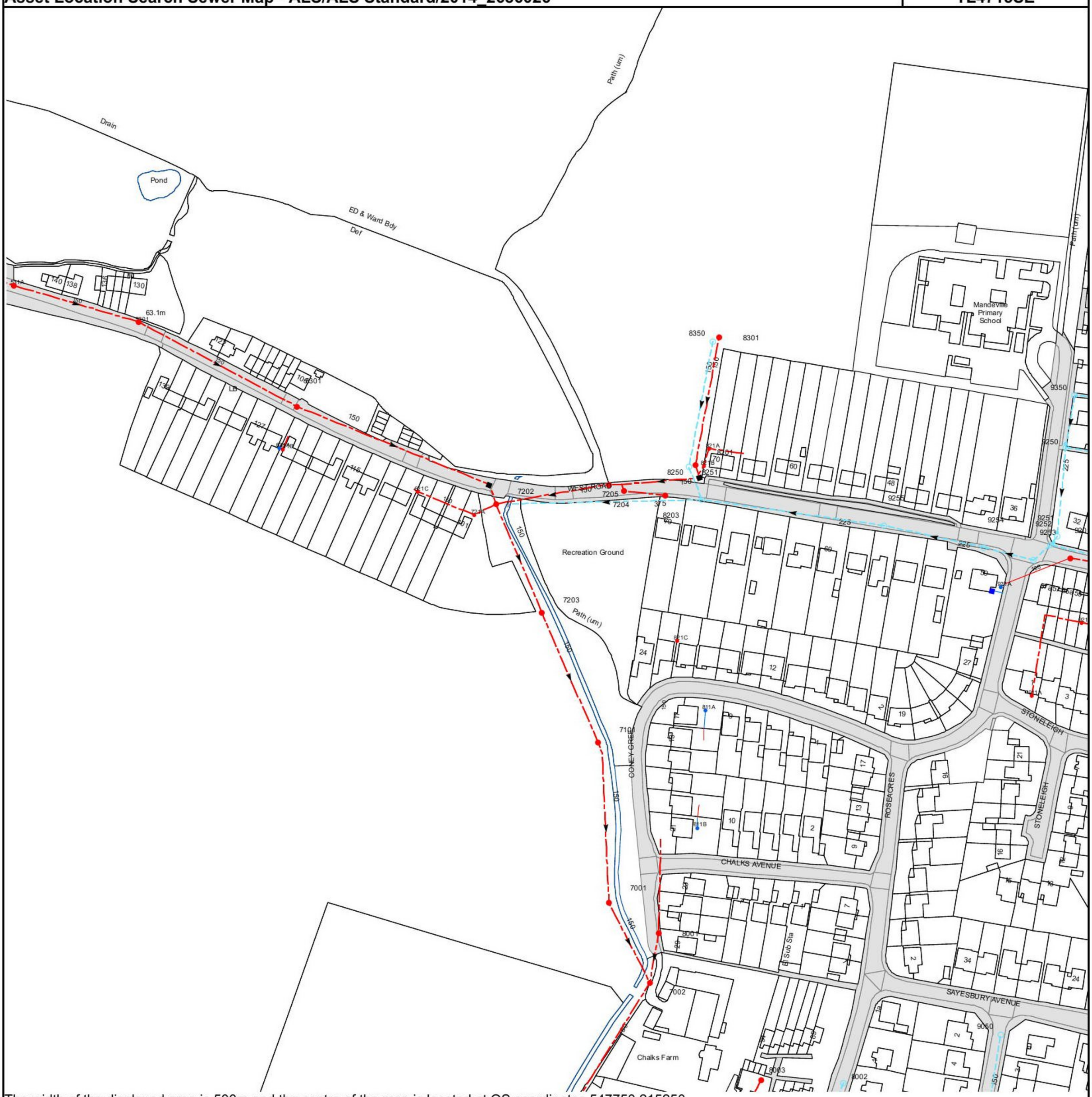
Clean Water queries

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: 0845 850 2777
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2014_2686026	TL4715SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 547750,215250

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.

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
8350	64.51	62.01
8301	64.54	62.36
9255	65.7	64.26
9254	68.16	66.65
921A	n/a	n/a
911A	n/a	n/a
9253	69.24	66.99
9252	69.65	67.2
9251	70.59	67.3
9250	71.32	67.81
9201	69.67	68.34
9350	71.36	69.24
921B	n/a	n/a
531A	n/a	n/a
5301	63.16	n/a
621A	n/a	n/a
621B	n/a	n/a
6301	61.59	59.77
621C	n/a	n/a
721A	n/a	n/a
7202	59.45	n/a
7203	n/a	n/a
7101	n/a	n/a
7204	56.63	55.71
7205	59.73	58.98
8203	60.05	59.27
821C	n/a	n/a
8250	61.94	59.26
8201	62	59.84
8251	60.82	58.72
821B	n/a	n/a
811A	n/a	n/a
821A	n/a	n/a
8002	n/a	n/a
8003	n/a	n/a
7002	57.94	56.21
8001	57.84	56.53
7001	n/a	n/a
811B	n/a	n/a
9050	67.97	66.66

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.

Asset Location Search Sewer Map - ALS/ALS Standard/2014_2686026	TL4815NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 548250,215750

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.

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
3603	65.52	62.72
3701	65.42	n/a
3850	64.35	62.94
3802	64.25	62.08
3801	n/a	n/a
361B	n/a	n/a
3750	64.93	63.92
3650	62.49	61.73
3550	60.27	59.23
3551	60.04	59.24
4701	61.56	59.71
4752	60.75	n/a
461A	n/a	n/a
461B	n/a	n/a
4702	61.12	59.62
4753	61.27	60.43
461C	n/a	n/a
4703	58.97	57.12
4750	59.33	n/a
451B	n/a	n/a
4601	56.93	55.28
4602	56.45	54.88
4650	56.45	55.85
4754	62.51	61.99
4651	n/a	55.65
4502	59.39	56.87
4556	n/a	n/a
4553	59.34	57.93
4554	55.27	54.77
3555	n/a	n/a
2502	66.75	65.77
351A	n/a	n/a
251A	n/a	n/a
251B	n/a	n/a
2504	n/a	n/a
3552	62.78	61.42
3502	61.89	58.75
2503	66.2	64.97
2501	67.18	66.11
2550	65.79	64.88
3501	n/a	n/a
3601	n/a	n/a
361A	n/a	n/a
3602	63.6	61.56
2601	65.66	63.44

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.

Asset Location Search Sewer Map - ALS/ALS Standard/2014_2686026

TL4815SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 548250,215250

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.

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
3351	61.96	61
3301	63.37	62.36
4350	61.78	60.99
4301	n/a	n/a
4458	n/a	n/a
341B	n/a	n/a
341A	n/a	n/a
4450	60.77	58.09
4459	55.24	53.68
4457	58.69	56.44
4451	59.9	58.76
021A	n/a	n/a
0357	71.29	69.38
0356	71.26	69.45
021B	n/a	n/a
021C	n/a	n/a
0355	71.6	69.66
0205	70.15	68.12
0452	71.32	69.93
031A	n/a	n/a
0303	71.68	69.3
0201	70.36	69.74
0353	71.57	70.03
0354	71.62	69.97
0250	70.18	68.87
0101	70.46	68.42
0203	70	67.6
0350	71.59	70.72
0351	71.63	70.1
0451	71.39	70.13
0251	71.23	68.91
0302	71.29	68.21
0352	71.63	69.38
0301	71.66	68.88
0450	71.17	69.58
0401	71.34	69.18
1450	71.26	69.92
1201	69.55	67.46
1250	69.66	68.92
121B	n/a	n/a
121C	n/a	n/a
1251	69.2	68.35
121D	n/a	n/a
1153	68.92	67.47
121A	n/a	n/a
1152	68.98	68.38
131A	n/a	n/a
2105	69.01	66.62
2152	68.5	65.79
2151	68.73	67.58
2202	69.34	67.61
2201	69.28	67.33
3105	65.73	64.46
2102	68.02	65.64
2103	n/a	n/a
3103	64.19	63.27
3104	66.28	64.27
221A	n/a	n/a
3352	63.37	62.47
3450	65.58	64.6
2450	67.01	65.77
241A	n/a	n/a
2401	67.75	66.22
241B	n/a	n/a
241C	n/a	n/a
111D	n/a	n/a
1050	69.23	68.71
1052	69.16	67.17
1001	69.17	65.99
1051	69.19	68.59
1151	69.15	68.41
111C	n/a	n/a
201B	n/a	n/a
201A	n/a	n/a
201C	n/a	n/a
2001	67.51	65.7
2002	67.55	65.99
2003	67.35	65.86
2050	67.08	65.94
2150	66.04	64.24
2101	65.98	63.58
2051	66.64	65.44
3050	66.49	65.46
3001	66.34	64.36
3106	65.56	63.17
3002	65.86	63.75
3051	65.53	64.38
3107	63.92	62.06
3004	65.39	64.36
3003	n/a	n/a
3052	65.02	63.75

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3006	63.24	61.59
3102	62.39	61.49
3054	62.79	62.04
3350	62.9	61.51
3250	63.09	62
4051	62.56	61.68
4003	62.61	60.2
4153	60.75	59.86
4052	62.46	61.36
4001	63.84	61.11
4050	62.86	61.93
4150	60.59	59.15
4152	60.39	57.85
4151	60.19	58.24
4002	61.3	59.11
0001	69.17	68.85
0050	n/a	67.2
0002	69.1	67.27
011A	n/a	n/a
0051	n/a	66.58
111A	n/a	n/a
111B	n/a	n/a

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 Stationary Office License Number 10019345

ALS/ALS%20Standard/2014_2686026

0 10 20 40 60 80
Meters

Scale:	1:1791
Width:	500m
Printed By:	mabdul
Print Date:	17/02/2014
Map Centre:	547750,215750
Grid Reference:	TL4715NE

Comments:

ALS/ALS%20Standard/2014_2686026

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

REFERENCE	COVER LEVEL	INVERT LEVEL

REFERENCE	COVER LEVEL	INVERT LEVEL

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.

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 0845 9200 800.

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 him 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.	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 he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
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