SUDS Strategy

in connection with the proposed development at

46 Holmdale Road
London
NW6 1BL

for

Alex Wills & Artemis Doupa

LBH4507suds Ver. 1.0

May 2018

LBH WEMBLEY

ENGINEERING

DOCUMENT CONTROL

Report Ref: LBH4507suds

Version	Date	Comment	Prepared	Supervised	Authorised
			Jessica Hand MSci (Hons) FGS	Darcy Kitson-Boyce MEng (Hons) GMICE FGS FRGS	Seamus Lefroy-Brooks BSc(hons) MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC RoGEP UK Registered Ground Engineering Adviser NQMS SQP DoWCoP QP DEFRA National Expert Panel Member
1.0	15th May 2018	Issue to Client	Digitally signed by Jessica Hand DN: cn=Jessica Hand, o, ou, email=Jessica@lbhgeo.co.uk, c=GB Date: 2018.05.15 17:34:47 +01'00'	Digitally signed by Darcy Kitson-Boyce DN: cn=Darcy Kitson-Boyce, o=LBH WEMBLEY Geotechnical and Environmental, ou, email=darcy@LBHgeo.co.uk, c=GB Date: 2018.05.16 09:31:09 +01'00'	Seamus Lefroy-Brooks Digitally signed by Seamus Lefroy-Brooks Date: 2018.05.15 17:50:18 +01'00'

LBH WEMBLEY Engineering
Unit 12 Little Balmer
Buckingham Industrial Park
Buckingham
MK18 1TF

Tel: 01280 812310

email: enquiry@lbhgeo.co.uk
website: www.lbhgeo.co.uk

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Foreword - Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH WEMBLEY Engineering disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY Engineering has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future and any such reliance on the report in the future shall again be at the client's own and sole risk.

THIRD PARTY INFORMATION

The report may present an opinion based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

DRAWINGS

Any plans or drawings provided in this report are not meant to be an accurate plan, but are used to present the general relative locations of features on, and surrounding, the site.

1. Introduction

1.1 Background

It is proposed to extend and deepen the existing partial basement present at this three storey terraced Victorian property to provide further habitable space.

It is also proposed to construct a single storey infill extension to the rear of the building.

1.2 Brief

LBH WEMBLEY have been appointed by Alex Wills and Artemis Doupa to prepare a SUDS Strategy for submission to London Borough of Camden in support of a planning application (Ref: 2018/0599/P).

1.3 Planning Policy

The Camden Local plan provides guidance for water and flooding under Policy CC3, where the council will seek to ensure a development reduces the risk of flooding where possible and will require a development to :

a. *incorporate water efficiency measures;*
b. *avoid harm to the water environment and improve water quality;*
c. *consider the impact of development in areas at risk of flooding (including drainage);*
d. *incorporate flood resilient measures in areas prone to flooding;*
e. ***utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible;*** *and*
f. *not locate vulnerable development in flood-prone areas.*"

Additionally, the Camden Planning Guidance for Sustainability (CPG3) (July 2015, updated March 2018) states:

"*All developments are expected to manage drainage and surface water on-site or as close to the site as possible, using Sustainable Drainage Systems (SUDS) and the hierarchy set out below.*

The Council will expect plans and application documents to describe how water will be managed within the development, including an explanation of the proposed SUDS, the reasons why certain SUDS have been ruled out and detailed information on materials and landscaping.

The Council will expect developments to achieve a greenfield surface water run-off rate once SUDS have been installed. As a minimum, surface water run-off rates should be reduced by 50% across the development."

1.4 Report Structure

This report describes the site characteristics, following which consideration is given to the feasibility of SUDS techniques for this site. Finally, the recommended SUDS strategy to mitigate the risk of flooding across the site is presented in accordance with the 2015 CIRIA C753 SUDS Manual.

The assessment has been based on information held in public records together with archive information.

2. Surface Water Management (SWM)

2.1 Site Location

2017 Map

The site is situated on the western side of Holmdale Road, approximately 60m south of the junction with Mill Lane.

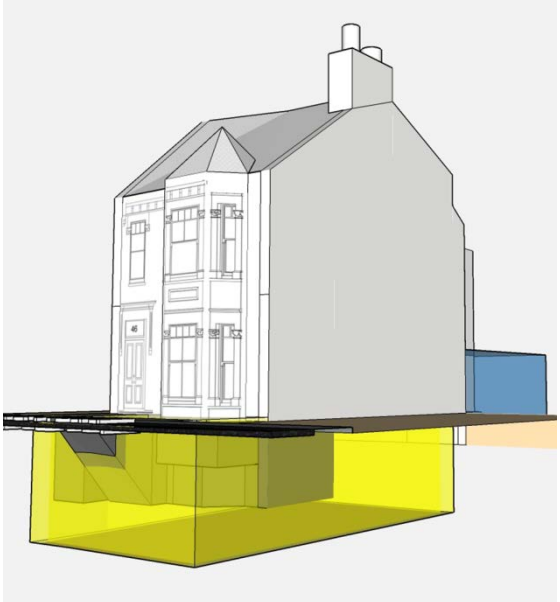
The site may be located approximately by postcode NW6 1BL or by National Grid Reference 525210, 185180.

2.2 Site characteristics

The site lies on the lower southwestern slopes of Hampstead Heath on land that that falls gently to the south.

Street level at the front of the site appears to be situated at approximately +58m OD.

The site is currently occupied by a Victorian, three storey terraced house with a partial basement beneath the front of the dwelling. A topographical survey undertaken by CSL Surveys (Ref: 22116RB F0, dated October 2016) indicates that the existing ground floor levelis at approximately +58.5m OD and the existing basement floor level is approximately +56.5m OD.



3D illustration showing the proposed development

Extracts from public sewer records have also been obtained from Thames Water[1] and are included within the Appendix. A 600mm diameter and 229mm combined sewer run along Holmdale Road falling southwards within the vicinity of the site. The nearest manholes for the 600mm and 229mm diameter combined sewers are referenced 211C and 211D with invert levels +55.01m OD and +50.28m OD respectively.

Rainfall incident on the roof is directed to the basement level where it will discharge via a gully within the front lightwell to the combined sewer. A gully is also present on the rear patio directing surface water runoff to the combined sewer. However, it is not clear from Thames Water records which combined sewer serves the property directly.

[1] *Thames Water, December 2017*, Asset Location Search, Ref: ALS/ALS Standard/2017_3709869

The Flood Risk Assessment[2] indicates that there is a low risk of flooding from all sources; however, given the potential increase of surface water flooding associated with climate change and the high vulnerability of basement developments, consideration of SUDS for the site is required.

The site is directly underlain by the London Clay Formation and therefore infiltration is not suitable for the proposed development.

Trees and hedgerows are currently present on the site in addition to a lawn in the rear garden, which support local habitat connectivity and biodiversity across the site.

2.2.1 Ground Investigation

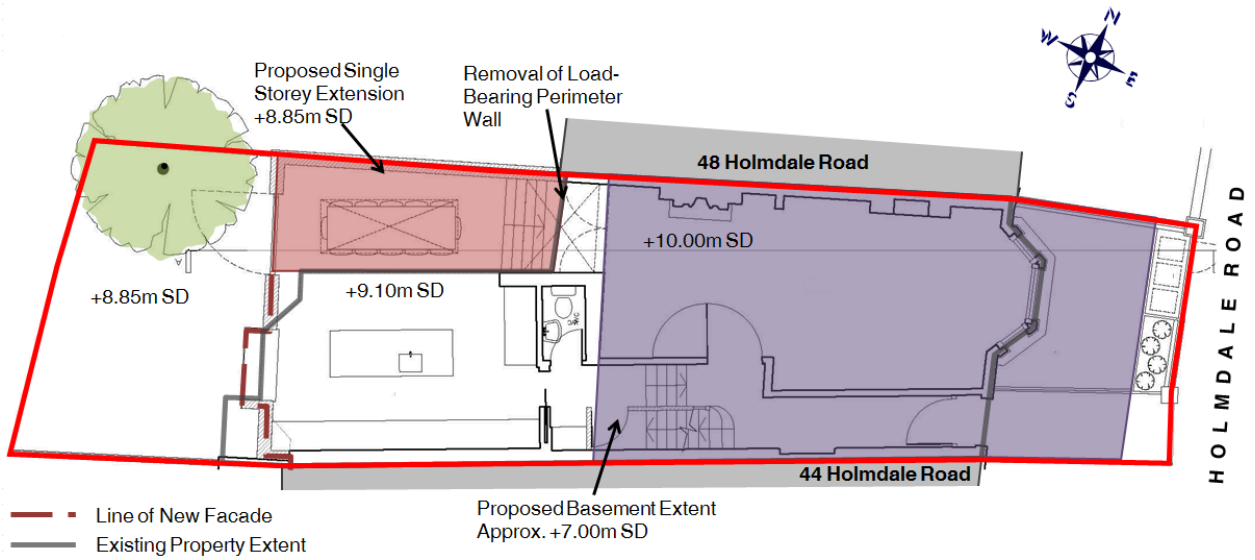
An investigation comprising two small diameter percussive boreholes was carried out in December 2017, in order to assess the ground conditions.

The investigation indicates that, beneath a limited thickness of made ground, the site is directly underlain by the London Clay Formation.

No shallow groundwater table is present beneath this site.

2.3 Proposed Development

It is proposed to deepen the existing basement by approximately 1.1m and to extend this laterally beneath the front half of the existing house footprint, as well as extending and deepening the front lightwell. A single storey infill extension is also proposed to the rear of the property.



Plan showing the proposed layout

[2] *LBH Wembley, January 2018,* Flood Risk Assessment, Ref: LBH4507FRA

2.4 SWM objectives for the development

The drainage strategy follows the guidance from the 2015 CIRIA C753 SUDS Manual; the principle of SUDS design is that surface water runoff is managed for maximum benefit. The types of benefits that may be achieved by utilising SUDS are categorised by the design objectives outlined in the following section.

2.4.1 Water quantity

The design objective is to control the quantity of runoff to support the management of flood risk and maintain and protect the natural water cycle.

In order to ensure that the surface water runoff from a developed site does not have a detrimental impact on people, property and the environment, it is important to control the rate and volume of the discharge from the site.

Sustainable Urban Drainage Systems (SUDS) should be incorporated into the design of a development unless there are practical reasons for not doing so. In aiming to achieve greenfield runoff rates, surface water runoff should be managed using the following techniques, as outlined in order of priority by the following drainage hierarchy:

SUDS Drainage Hierarchy	Suitable for the site? (Y/N)	Comment
Store rainwater for later use	N	There is very limited space for a gravity driven system within the property or a pumped solution within the garden.
Use infiltration techniques	N	The site is directly underlain by the London Clay, inhibiting infiltration on the site.
Attenuate rainwater in ponds or open water features for gradual release	N	No ponds of open water features nearby.
Attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Attenuation within a pumping chamber within the front garden will store run-off from the rear garden and front lightwell.
Discharge rainwater direct to a watercourse	N	No nearby watercourse.
Discharge rainwater to a surface water sewer/drain	N	No surface water sewer is serving the site.
Discharge rainwater to the combined sewer	Y	Discharge to existing combined sewer serving the site.

The hierarchy above seeks to ensure that surface water runoff is controlled as near to its source as possible to mimic natural drainage systems and retain water on or near to the site.

Before disposal of surface water to the public sewer is considered, all other options set out in the above hierarchy need to be exhausted.

2.4.2 Water quality

The water quality design objective is to manage the quality of runoff to prevent pollution, supporting the management of water quality in the receiving surface waters and groundwater and design system resilience to cope with future change.

Surface water runoff will need treatment where necessary to meet the appropriate water quality requirements for the method of discharge.

2.4.3 Amenity

The amenity design objective is to create and sustain better places for people by implementing the following criteria for the site:

- Maximise multi-functionality
- Enhance visual character
- Deliver safe surface water management systems
- Support development resilience/adaptability to future change
- Maximise legibility
- Support community environmental learning

2.4.4 Biodiversity

The biodiversity design objective is to create and sustain better places for nature by implementing the following criteria for the site:

- Support and protect natural local habitats and species
- Contribute to the delivery of local biodiversity objectives
- Contribute to habitat connectivity
- Create diverse, self-sustaining and resilient ecosystems

2.5 Conceptual Drainage Plan

The following sections set out the presently envisaged proposals for drainage components.

2.5.1 Feasible Discharge routes

The surface water runoff from the front lightwell and rear garden will be stored and directed to the combined sewer, to prevent surface water flooding in front lightwell and in the rear garden.

2.5.2 Feasible Drainage Components

SUDS Component	Description	Suitable for the site? (Y/N)
Rainwater harvesting	Collection of rainwater runoff from roofs or impermeable areas for reuse.	N
Green roofs	Vegetated areas installed on the top of buildings provide visual and ecological benefits in addition to surface water runoff reduction and enhanced building performance.	N
Blue roofs	Roof design intended to store water providing attenuation storage.	N
Infiltration systems	Infiltration can contribute to reducing runoff rates and	N

	volumes while supporting base flow and groundwater recharge processes.	
Proprietary treatment systems	Proprietary treatment systems are manufactured products which remove specified pollutants from surface water runoff.	N
Filter strips/drains	Filter strips are gently sloping strips of grass that provide treatment of runoff from adjacent impermeable areas. Filter drains are gravel or stone filled trenches which provide temporary subsurface storage for attenuation conveyance and filtration of surface water runoff.	N
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat, and attenuate surface water runoff.	N
Bioretention systems	Rain gardens or shallow landscaped depressions that may reduce surface water runoff rates and volumes and/or treat pollution using engineered soils and vegetation.	N
Trees	Trees aid surface water management through transpiration, inception, infiltration and phytoremediation.	N
Pervious Pavements	Pervious pavements facilitate the infiltration of surface water into a subsurface structure where filtration, adsorption, biodegradation or sedimentation may also provide treatment of the runoff.	N
Attenuation storage tanks	Attenuation storage tanks provide below-ground void space for the temporary storage of surface water before infiltration, controlled release or use.	Y
Detention basins	Attenuation storage in the form of dry landscaped depressions.	N
Ponds and wetlands	Permanent water filled ponds or wetlands that provide attenuation storage or treatment of surface water runoff.	N

2.5.3 Water Quantity

Attenuation storage provided by the proposed pumping chamber will allow long term storage of surface water runoff and controlled release to the nearby combined sewer.

The proposed components will meet the requirements in the case of a 1:100 year storm event + climate change (CC) to prevent flooding of the site or surrounding areas.

2.5.4 Water Quality

The proposed pumping chamber will allow for finer sediment to settle before the surface water discharges to the combined sewer.

2.5.5 Amenity

The attenuation storage proposed for the development will be designed with consideration of climate change allowance, providing resilience to future change.

2.5.6 Biodiversity

The proposed pumping chamber will not provide any biodiversity benefits directly, however, controlling the runoff across the site will maximise biodiversity on site and down gradient.

2.5.7 Maintenance

Suds Component	Maintenance	
Attenuation storage	Regular	• Inspect and identify any areas that are not operating correctly. If required, take remedial action (Monthly) • Remove debris from the catchment surface (Monthly) • Check surface of filter for blockage and remove and replace surface medium as necessary (Annually) • Remove sediment from pre-treatment structures and/or internal forebays (Annually)
	Remedial (As required)	• Repair inlets, outlet overflows and vents
	Monitoring	• Inspect all inlets, outlets, vents and overflows 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)

Maintenance plans and schedules should be prepared in the design phase for the specific maintenance needs of each SUDS component, and necessary adjustments made to suit requirements.

2.6 Outline Design

2.6.1 Greenfield runoff rate

$$Q_{bar}(m^3/s) = 0.00108(0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$$

Qbar - mean annual flood flow from a rural catchment (approximately 2.3 year return period).

AREA- area of the catchment in ha.

SAAR - standard average annual rainfall for the period 1941 to 1970 in mm (SAAR 41-70).

SPR - Standard Percentage runoff coefficient for the SOIL category.

Runoff for the site		
Return Period	Greenfield runoff rate (l/s/ha)	Runoff volume in 6 hour storm event (m^3)
1 in 1 year	0.06	1.2
1 in 30 year	0.15	3.3
1 in 100 year	0.21	4.6

2.7 Existing runoff rate

The existing site is currently approximately 120m^2 impermeably surfaced and the remaining 35m^2 is soft landscaping.

The soft landscaped area will drain at greenfield runoff rates, while the runoff of the impermeable area can be calculated using the Modified Rational Method:

Q=2.78 x CiA

Where Q=flow (l/s), i= rainfall intensity (mm/hr), A= Contributing area (ha) and $C=C_vC_r$. Typically C_v=0.75 and C_r=1.3, therefore C=0.98.

For the case of the impermeable area on the existing site i=10.5 mm/hr, the rain intensity during a 1 in 100 year 6 hour event and A=120m^2. As a result the hard-standing areas will experience a runoff rate of 0.3l/s and a runoff volume over the 6 hour period of 7.4m^3.

The soft landscaped area is 35m^2, and will experience a runoff of 0.1l/s in a 1 in 100 year event, with a runoff volume over a 6 hour period of 2.1m^3.

The total runoff expected from the site during a 1 in 100 rainfall event is 0.4l/s and the runoff volume over a 6 hour period would be approximately 9.5m^3.

2.8 Proposed Runoff Volumes

Given that there will be no increase in impermeable area post-development it is envisaged that runoff rates from the site would remain unchanged.

Although no increase in runoff is anticipated as a result of the development, there is a potential increase in runoff associated with future climate change.

To mitigate the potential increase in runoff volume in the case of a storm event, the drainage strategy follows the guidance from the 2015 CIRIA C753 SUDS Manual.

2.8.1 Attenuation storage

In order to limit the discharge rate to the surface water sewer serving the site to the greenfield rate of 0.21l/s, attenuation storage is to be included as a SUDS element.

HR Wallingford's Surface water storage volume estimation tool was used to undertake attenuation storage volume calculations, using the site specific rainfall data from the Centre for Ecology and Hydrology (CEH) and an FEH/FSR Conversion Factor of 1.33; i.e. Flood Studies Report (FSR) rainfall data is 33% larger than Flood Estimation Handbook (FEH) rainfall data for this location. These calculations indicate that no attenuation storage is required to maintain greenfield runoff rates for the 1 in 100 year rainfall event in consideration of up to 40% climate change allowance.

2.8.2 Proposed Drainage Plan

Although attenuation storage is not required to meet greenfield runoff rates from the site in the case of a 1 in 100 year rainfall event with a 40% climate change allowance, it is proposed that runoff is to be collected from rear garden and the front lightwell via aco drains and a gravity driven piped system to a pumping chamber located in the front garden. The pumping chamber will be designed to pump the outflow to the combined sewer currently serving the property at greenfield rates.

Implementing the above SUDS techniques will provide an allowance of attenuation storage within the pumping chamber, therefore providing an overall betterment of the existing surface water drainage regime for the site.

APPENDIX

BURIED SERVICE PLANS

Asset location search

Property Searches

LBH Wembley Geotechnical & Environmental
Unit 12Little Balmer
BUCKINGHAM
MK18 1TF

Search address supplied 46
Holmdale Road
London
NW6 1BL

Your reference LBH4507

Our reference ALS/ALS Standard/2017_3709869

Search date 15 December 2017

Keeping you up-to-date

Knowledge of features below the surface is essential in every development. The benefits of this not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility for any commercial or residential project.

An asset location search provides information on the location of known Thames Water clean and/or wastewater assets, including details of pipe sizes, direction of flow and depth. Please note that information on cover and invert levels will only be provided where the data is available.

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: 46, Holmdale Road, London, NW6 1BL

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

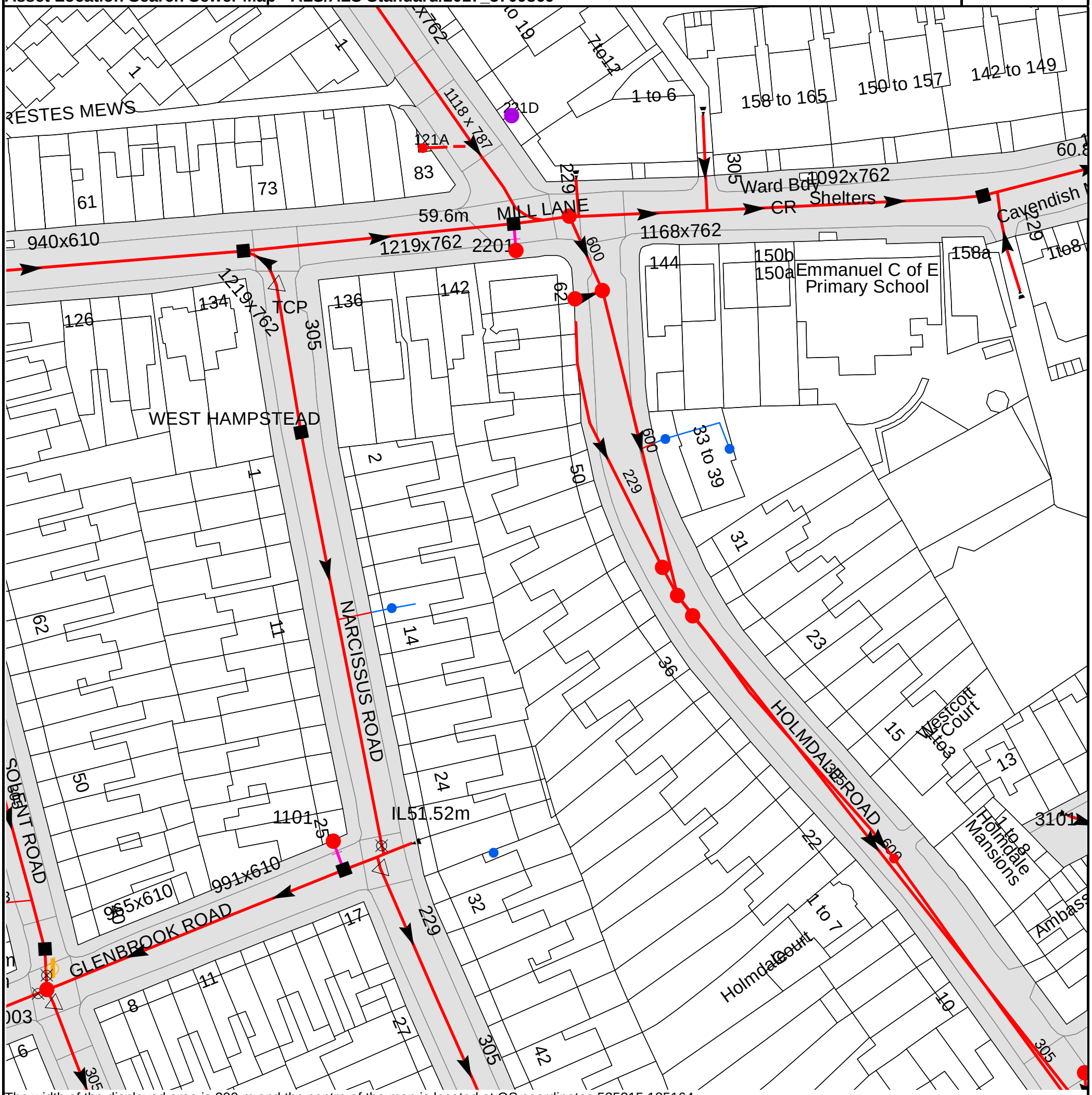
Clean Water queries

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

Asset Location Search Sewer Map - ALS/ALS Standard/2017_3709869



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 525215,185164

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

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
221C	n/a	n/a
221B	59.37	50.86
2201	n/a	n/a
221A	59.67	55.99
121A	n/a	n/a
221D	n/a	n/a
1003	54.13	n/a
1101	n/a	n/a
111A	n/a	n/a
211G	n/a	n/a
211C	57.96	55.01
211E	n/a	n/a
211D	57.8	50.28
211A	57.66	54.79
211F	n/a	n/a
211B	56.32	53.73
301C	55.2	52.17

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.

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

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

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

Weir

End Items

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

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

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

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

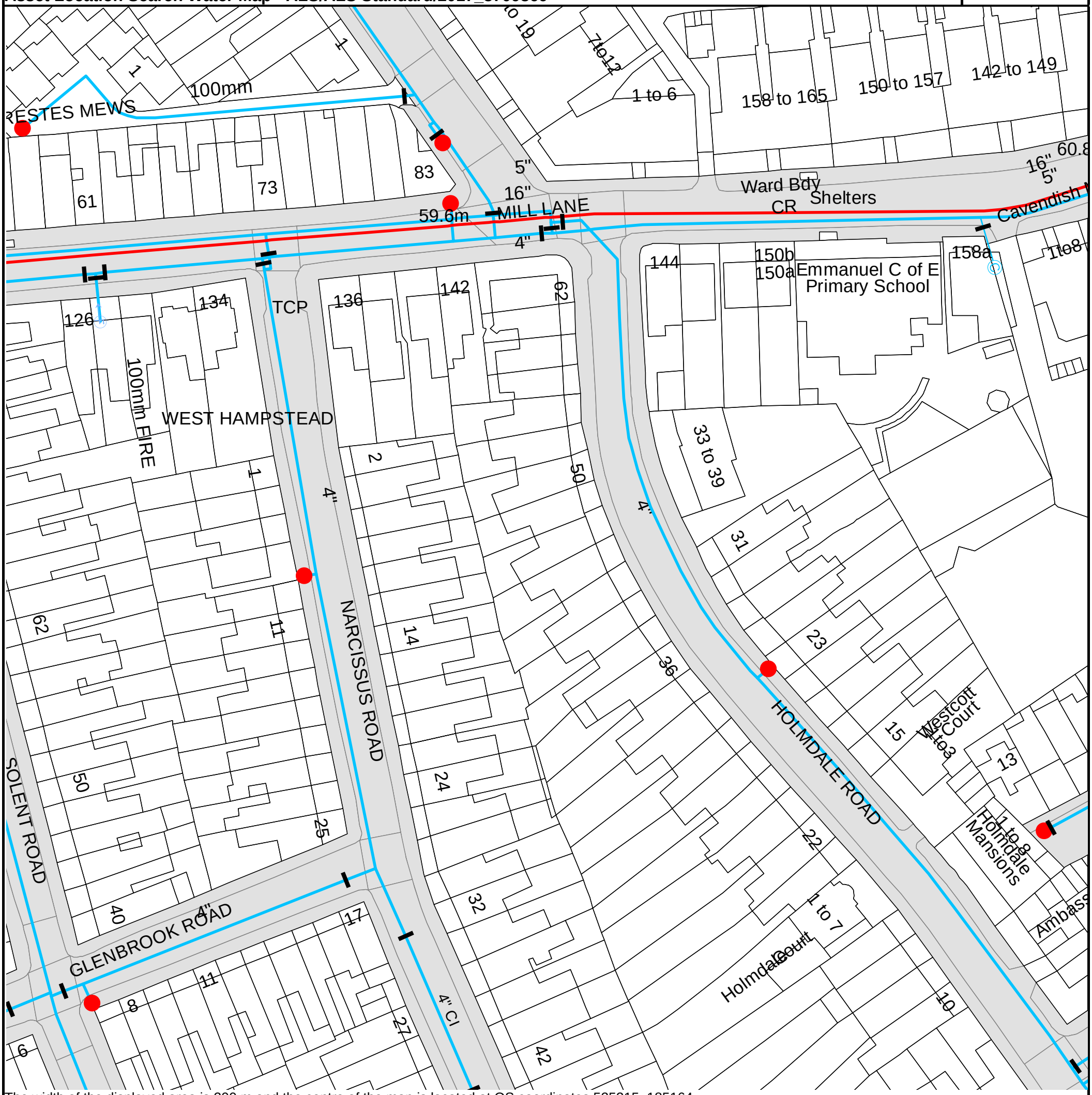
Proposed

Abandoned Sewer

Notes:

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

Asset Location Search Water Map - ALS/ALS Standard/2017_3709869



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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 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