Flood Risk Assessment
&
SUDS Statement

in connection with the proposed development at

8 Kentish Town Road
London
NW1 9NX

for

Kentish Town Spaces (UK) Ltd

LBH4535fra Ver. 1.0

July 2018

LBH WEMBLEY
ENGINEERING

Version	Date	Comment	Authorised
			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
0.1	May 2018	Draft Issue to Client	SRLB
1.0	20th July 2018	Final Issue	SRLB Digitally signed by Seamus DN: cn=Seamus, o=LBH WEMBLEY, ou=Lefroy-Brooks, email=seamus@LBHGEO.co.uk , c=GB Date: 2018.07.21 14:24:18 +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

Contents

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 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 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. LBH WEMBLEY should in all such altered circumstances be commissioned to review and update this report accordingly.

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.

1. Introduction

1.1 Background

It is proposed to construct a single storey basement beneath the existing three storey terraced building at No. 8 Kentish Town Road.

This Flood Risk Assessment (FRA) has been prepared, alongside a Basement Impact Assessment (LBH4535 Ver. 1.1), in support of a forthcoming planning application to the London Borough of Camden.

An FRA is required in order to assess the potential for the development to increase flood risk elsewhere through the addition of hard surfaces and the potential effect of the new development on surface water run-off, in addition to assessing the site vulnerability to flooding from other sources including groundwater and overland runoff, rivers and the sea.

The purpose of this report is to assess the existing flood risk, including mitigation measures and whether the site is suitable for residential usage. The report identifies whether there are any flooding or surface water management issues, whether the site lies within an area that is at risk of flooding or whether the development may increase flood risk due to increased run-off. This is achieved through Identification of the sources of flooding which may affect the site, and includes the following:-

- An appraisal of the availability and adequacy of existing information
- A qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere
- An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels

The report will demonstrate to the Local Planning Authority (LPA) that the applicant is considering flood risk to the development from all sources and how this will be managed. The assessment also considers the disposal of drainage water, potential impacts on adjacent land and climate change effects.

The assessment has been based on existing reports and archive information together with information from historical maps and photographs.

1.2 Site-Specific Flood Risk Assessment

The London Borough of Camden requires the submission of a site-specific Flood Risk Assessment for applications for basements within flood risk areas identified on “Map 6: Historic flooding and Local Flood Risk Zones”, where Kentish Town Road is highlighted as previously flooding in 1975.

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."

2. The Site

2.1 Site Location

The site is situated on the eastern side of Kentish Town Road, approximately 30m north-east of Camden Town Underground Station.

The site may be located approximately by postcode NW1 9NX or by National Grid Reference 528955, 183985.

Location Plan

2.2 Topographical Setting

The site lies on a gentle north-east slope from Regents Park to the River Fleet, approximately 300m from the site.

Street level at the front of the site appears to be situated at approximately +26m OD.

2.3 Site Description

The site is currently occupied by a three storey terraced building, which directly fronts onto the east side of Kentish Town Road.

The property is adjoined to the north and south by terraced properties No. 6 and No. 10-12 Kentish Town Road. The ground floor covers the entirety of the site and is bound to the rear by No 3a. and No. 5 Camden Road.

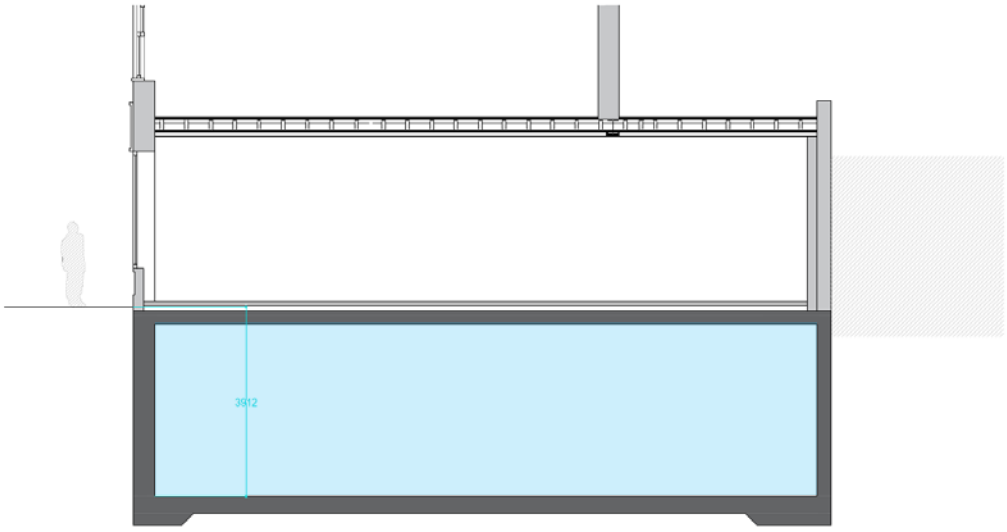
The ground floor was previously a hair salon, however it is currently vacant. The first, second and third floors are in use as residential flats.

The existing ground floor level is set at approximately +26.2m OD, raised by approximately 100mm from the street level to the front of the property.

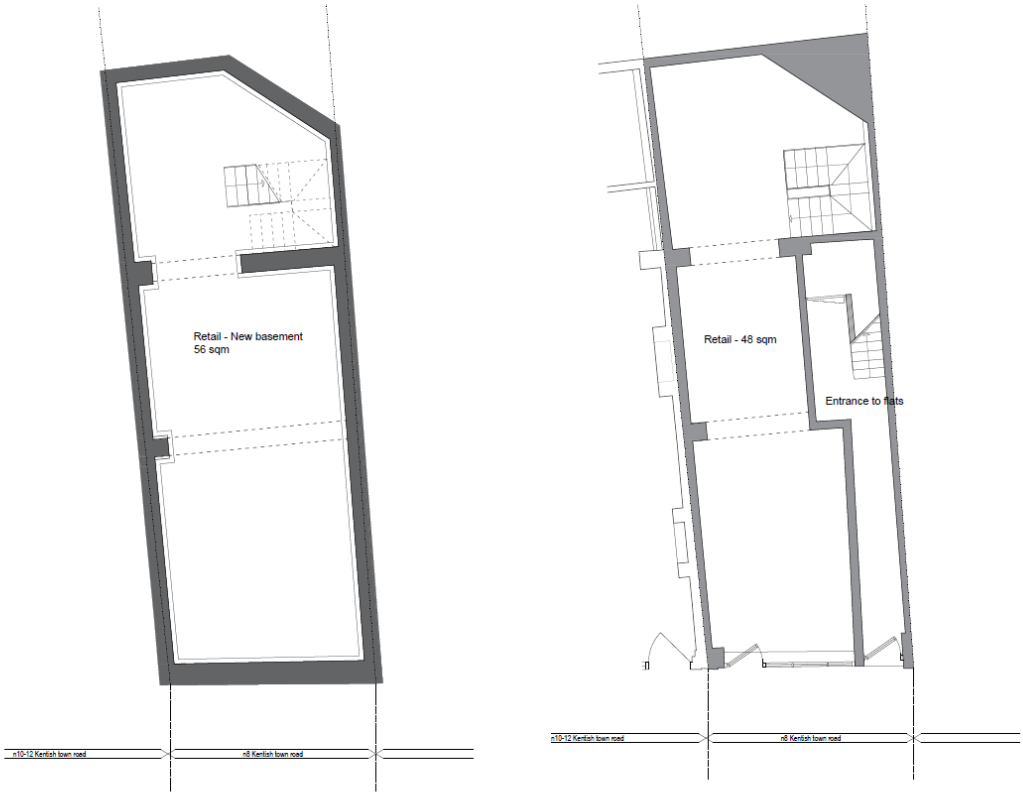
2.4 Proposed Development

It is proposed construct a basement beneath the extent of the footprint of the building..

The proposed basement excavation will extend to approximately 4m (+22m OD) depth beneath the ground floor.



Proposed section showing basement (highlighted in blue)



00 Basement floor plan

01 Ground floor plan

Plan showing proposed development

3. Background

The Department for Communities and Local Government have published their online Planning Practice Guidance (PPG) that supersedes the National Planning Policy Framework Technical Guidance of March 2012. The following section has been prepared in accordance with the PPG.

3.1 Existing Flood Alleviation Measures

No evidence of any existing alleviation measures in the vicinity of the site has been identified.

3.2 Flood Risk Vulnerability Classification

The upper floors of the property are in use residentially and therefore Table 2 of the Planning Practice Guidance (PPG) indicates that the site is classified as 'More Vulnerable'.

3.3 The Sequential Test

The PPG requires that the risk based sequential test should be applied at all stages of planning, which aims to steer new development to areas at the lowest probability of flooding (Flood Zone 1). It is also recognised that some areas will also be at risk of flooding from sources other than tidal and fluvial.

As shown on the Environment Agency (EA) flood map of flood risk from rivers and the sea, the site is locately entirely within Flood Zone 1. In addition, the EA flood map of surface water flood risk indicates the site to be up to a medium risk of surface water flooding, however there is not the opportunity to move the site to a lower probablity of surface water flooding.

3.4 The Exception Test

Table 3 of the PPG does not require the Exception Test to be applied given that in Flood Zone 1 "*Development is appropriate*".

4. Hazard Identification

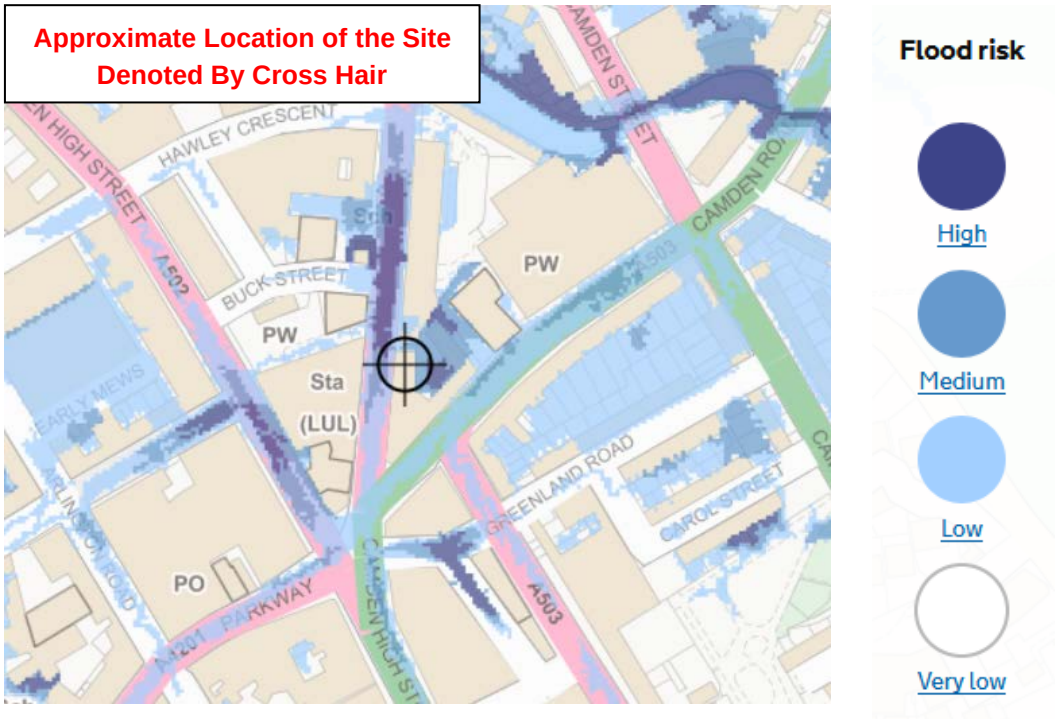
4.1 Flooding from Rivers and the Sea

All main rivers located within the London Borough of Camden are culverted and are incorporated into the Thames Water sewer network, as a result, the London Borough of Camden is located entirely within Flood Zone 1 This indicates that the assessed annual probability of flooding at the site is less than 1 in 1000 (<0.1%).

In addition, the Camden SFRA records that no flooding has occurred within the borough from fluvial or tidal sources.

4.2 Flooding from Land

The EA's Surface Water Flood Map indicates that the site itself is at very low of flooding from surface water (<0.1% AEP). However, surrounding the site there is between a low and high risk of surface water flooding (0.1% to above 3.3% AEP) at the front of the property on Kentish Town Road and in the courtyards to the rear of the property.



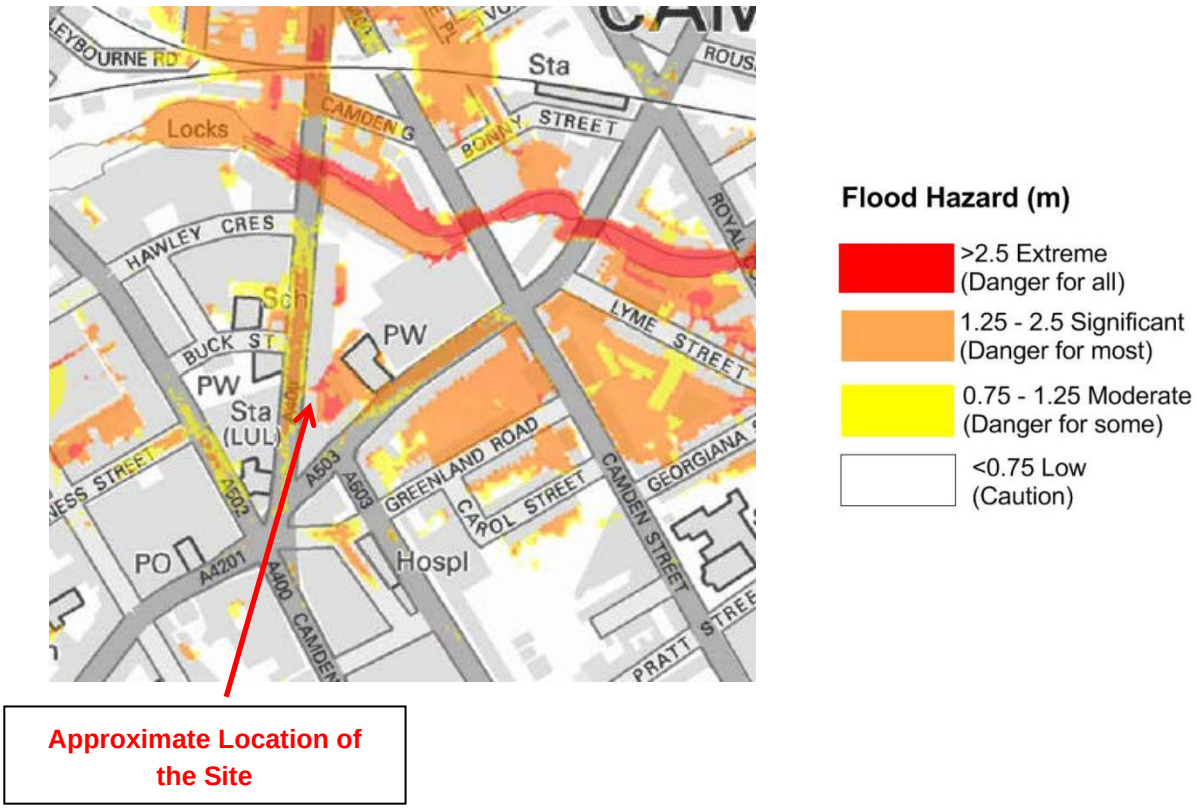
Extract of the EA's Surface Water Flooding map showing the flood risk from surface water

©Crown copyright and database rights 2018

Hazard mapping created by the EA indicates the hazard to people following a methodology presented by Defra in its R&D report on Flood Risks to People[1].

[1] *Defra (2006) Defra Guidance Document FD2321/TR2: Flood Risks to People*

The following map indicates that even in the event of a 1 in 1000 rainfall event (<0.1%), the surface water flood hazard within the surrounding area of the site is classed up to Extreme (Danger for all) to the rear of the property, however the property itself is classed as Low (Caution)



Extract of Figure 3 ix: Hazard 1 in 1000 year flood event (Camden SFRA, 2014)

Historic flood records indicate that the London Borough of Camden experienced significant flooding in 1975 and 2002. Kentish Town Road was affected by surface water flooding during the 1975 flood event.

The report of the Floods Scrutiny Panel concluded that for the 1975 flood events, the sewer system capacity was exceeded, which resulted in surcharging of the sewer system at a number of locations.

Figure 6 of the SFRA indicates the site is located within Critical Drainage Area (Group 3_003), which is identified as an area at risk of surface water flooding.

4.3 Flooding from Groundwater

Groundwater flooding occurs when water levels within the ground rise above surface levels.

The British Geological Survey (BGS) records indicate that the site is underlain by the London Clay Formation, which the Environment Agency (EA) classifies 'Unproductive Strata'.

No groundwater was encountered during the investigation and no shallow groundwater table is considered to be present at this site.

The site does not lie within an area that is deemed to be at an increased susceptibility to elevated groundwater. It is however approximately 300m north of an Environment Agency groundwater flood incident on Pratt Street.

It is therefore concluded that the risk of groundwater flooding at the site is very low.

4.4 Flooding from Sewers

A sewer flooding history enquiry made to Thames Water[2] states "*The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers*".

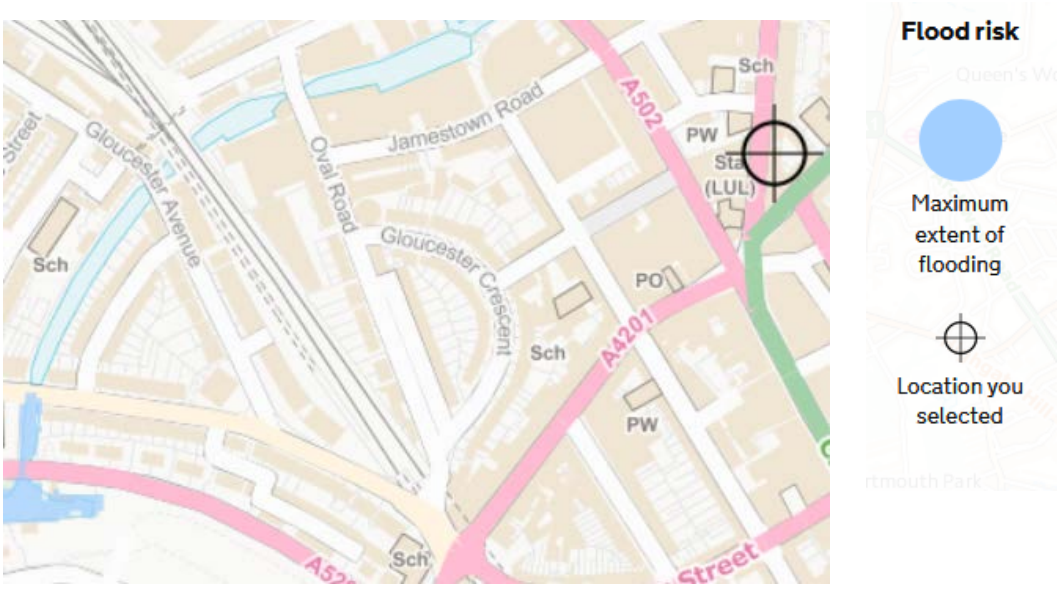
Additionally, the SFRA indicates the in the postcode NW1 9N only one property has experienced ineternal sewer flooding and no properties have experienced exterier sewer flooding.

The site is therefore considered to be at a very low risk of sewer flooding.

4.5 Flooding from Reservoirs, Canals and other Artificial Sources

The EA's Reservoir Flood Map identifies areas that could be flooded if a large reservoir were to fail or release the water it holds. The map shows that the site lies outside the area at risk of reservoir flooding, with the nearest area at risk of flooding located roughly 700m from the site, associated with the flooding of Grand Union Canal.

The SFRA has not identified any other significant artificial sources of flood risk within the borough that may adversely affect the site.



Extract of the EA's Reservoir Flooding map showing the maximum extent of flooding

©Crown copyright and database rights 2018

[2] *Thames Water, January 2018, Sewer Flooding History Enquiry, Ref: SFH/SFH Standard/2018_3799952*

5. Surface Water Management (SWM)

5.1 Site characteristics

Extracts from public sewer records have also been obtained from Thames Water[3] and are included within the Appendix. A combined sewer is present to the rear of the row of terraced buildings, discharging to a 229mm diameter combined sewer connecting from the rear of No. 12 Kentish Town Road. The sewer falls along the rear of Nos. 7-15 Camden Road before connecting to the combined sewer falling north-east along Camden Road.

Another combined sewer falls southwards along Kentish Town Road with local dimensions of 1168mm x 787mm.

The nearest manholes to No. 8 Kentish Town Road are referenced 9903 and 9939, with invert levels of +23.61m OD and +26.15m OD respectively.

Rainfall incident on the roof is collected via pipework down the rear of the property, where it discharges to the combined sewer.

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

The site is entirely hard surfaced with the ground floor of the property occupying the entirety of the site area.

5.2 Ground Investigation

An investigation comprising a small percussive diameter borehole and hand excavated trial pits were carried out in May 2018, in order to assess the ground conditions.

The investigation indicates that, beneath approximately 0.5m depth of made ground, the site is directly underlain by the London Clay Formation.

No shallow groundwater table is present beneath this site.

5.3 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.

5.3.1 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.

[3] *Thames Water, May 2018*, Asset Location Search, Ref: ALS/ALS Standard/2018_3799951

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 storage will be provided a green roof located on the flat roof above the rear extent of the ground floor.
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.

5.3.2 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.

5.3.3 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

5.3.4 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

5.4 Conceptual Drainage Plan

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

5.4.1 Feasible Discharge routes

The surface water runoff from the roof will be stored and directed to the combined sewer, to prevent surface water flooding on Kentish Town Road and alleviate pressure on the combined sewer serving the property.

5.4.2 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.	Y
Blue roofs	Roof design intended to store water providing attenuation storage.	N
Infiltration systems	Infiltration can contribute to reducing runoff rates and volumes while supporting base flow and groundwater recharge processes.	N
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	N

	reduce surface water runoff rates and volumes and/or treat pollution using engineered soils and vegetation.	
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.	N
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

5.4.3 Water Quantity

Runoff rates and volumes will be reduced by the incorporated green roof through the uptake of water into the soil substrate and plants, where the potential reduction will be a function of the soil moisture content, soil depth and roof gradient.

5.4.4 Water Quality

The soil and uptake zone of the green roof will filter airborne pollutants and pollutants within rainwater, reducing the amount of pollution delivered to the local drainage system.

5.4.5 Amenity

The proposed green roof will be over looked by the flats present on the upper floors of the property and the surrounding buildings, providing valuable amenity in a densely urban area.

5.4.6 Biodiversity

The green roof will act as a “stepping stone” or “island” habitat providing ecological value in a highly urbanised area.

It is recommended that a sufficient depth of substrate is used on the green roof (no less than 80mm) and the topography is varied (80mm-150mm) in order to provide a range of habitats for invertebrates.

5.4.7 Maintenance

Suds Component	Maintenance	
Green Roofs	Regular inspections (Annually or after storms)	• Inspect all components including soil substrate, vegetation, drains, irrigation systems, membranes and roof structure for proper operation, integrity of waterproofing and structural stability. • Inspect soil substrate for evidence of erosion channels and

		identify any sediment sources. • Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system. • Inspect underside of roof for evidence of leakage.
	Regular maintenance (Biannually)	• Remove debris and litter to prevent clogging of inlet drains and interference with plant growth. • During establishment (ie year one), replace dead plants as required (Monthly) • Post establishment, replace dead plants as required • Remove nuisance and invasive vegetation, including weeds. • Mow grass as required, and clippings should be removed.
	Remedial action (As required)	• If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion should be controlled. • If drain inlet has settles, cracked or moved, investigate and repair as appropriate.

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.

5.5 Outline Design

5.5.1 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	1.4	0.2
1 in 30 year	3.9	0.5
1 in 100 year	5.4	0.7

5.6 Existing runoff rate

The existing site is currently approximately 60m^2 impermeably surfaced.

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=60m^2. As a result the hard-standing areas will experience a runoff rate of 0.2l/s and a runoff volume over the 6 hour period of 4.3m^3.

5.7 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.

5.7.1 Attenuation storage

In order to limit the discharge rate to the surface water sewer serving the site to the greenfield rate of 5.4l/s/ha, attenuation storage is to be included as a SUDS element.

HR Wallingford's Surface water storage volume estimation tool was used for a minimum site area of 100m^2 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.

5.7.2 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 incident rainfall on the mansard roof is directed to the green roof above the ground floor level. Any excess drainage from the green roof will be collected and discharged to the combined sewer serving the property.

If it is identified that the combined sewer running along the rear boundaries of the terrace properties lies within the area of the proposed basement, the sewer will require diverting.

6. Risk Estimation

6.1 Probability of Site Flooding

The overall risk of flooding at this site is classed as ‘low’, however some areas adjacent to the site are up to a ‘high’ risk of surface water flooding.

6.2 Climate Change

The predicted effects of climate change - more intense summer rainfall events and higher winter rainfall - could increase the risk of surface water flooding.

The Environment Agency Flood Map and Flood Zones do not currently take account of possible future climate change impacts. The potential extent of an extreme flood shown on the Flood Map might in future become more 'normal' as a result of climate change.

6.2.1 Adjustment for Potential Flooding from the Sea

The site is not considered to be at risk of flooding from tidal sources and no adjustment is required.

6.2.2 Adjustment for Potential Flooding from the Land and Rivers

The EA published revised guidance on climate change allowances for flood risk assessment in 2016, anticipating the total percentage change over the next 100 years. The range for peak rainfall intensity is estimated between 10% and 40% across England, with a range of 25% and 70% for peak river flows in the Thames (using 1961-1990 baseline).

6.3 Residual Risk

In the case of the site, the risk of fluvial flooding is low. There is however always a residual risk of flooding. The residual risk at the site is considered to be surface water flooding, or where the effects of climate change are greater than modelled.

6.3.1 Residual Risk Classification

Flood risk to people and property associated with new developments can be managed but it can never be completely removed; a residual risk will always remain after flood management or mitigation measures have been put in place.

Development should not be sited where risk unduly threatens public safety and/or structural integrity of buildings and infrastructure. Consideration of the depth of flooding, rate of inundation and safe access/egress are required to assess these risks.

7. Risk Evaluation

The risk of flooding from various sources has been assessed and the principal risk associated with the site is surface water flooding. At present day levels, there is an annual risk from 1% to above 3.3% within the vicinity of the site.

There is negligible risk of tidal and fluvial flooding at the site.

Given the absence of a shallow groundwater and the presence of impermeable London Clay, the risk of groundwater flooding at the site is assessed as very low.

There will not be any increase in the impermeable area as a result of the development, and therefore an increase in surface water run-off is not anticipated.

8. Flood Risk Mitigation

Surface water flooding is the principal risk to the site, and the new development will need to provide sufficient disposal and drainage of the surface water to manage the surface water run-off. The use of Sustainable Urban Drainage Systems (SUDS) is to be utilised to manage the storage and discharge of run-off.

To mitigate the existing and future risk of surface water flooding to the site and the surrounding area, the proposed green roof will provide an overall betterment of the existing surface water drainage regime for the site.

9. Conclusion

This assessment has shown that there is a potential risk of surface water flooding at the site but that the following steps will be taken to mitigate the risk.

- Reduce the surface water flood risk through additional drainage measures
- Incorporate Sustainable Urban Drainage Systems (SUDS) for the management of run-off

By adopting the above measures, flood risk and its associated hazard to occupants and users of the proposed building can be reduced and mitigated.

APPENDIX

SEWER FLOODING HISTORY ENQURY

ASSET LOCATION SEARCH

Sewer Flooding
History Enquiry

Property Searches

LBH Wembley Geotechnical & Environmental

Little Balmer

Search address supplied	8 Kentish Town Road London NW1 9NX
Your reference	LBH4535
Our reference	SFH/SFH Standard/2018_3799952
Received date	**22 May 2018**
Search date	**22 May 2018**

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

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: 8,Kentish Town Road,London,NW1 9NX

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

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

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

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

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

0845 070 9148

Asset location search

Thames Water Property Searches

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

Search address supplied 8
Kentish Town Road
London
NW1 9NX

Your reference LBH4535

Our reference ALS/ALS Standard/2018_3799951

Search date 22 May 2018

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: 8, Kentish Town Road, London, NW1 9NX

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Asset location search

Thames Water Property Searches

Waste Water Services

Please provide a copy extract from the public sewer map.

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

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

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

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

For your guidance:

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

Clean Water Services

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

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

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

For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

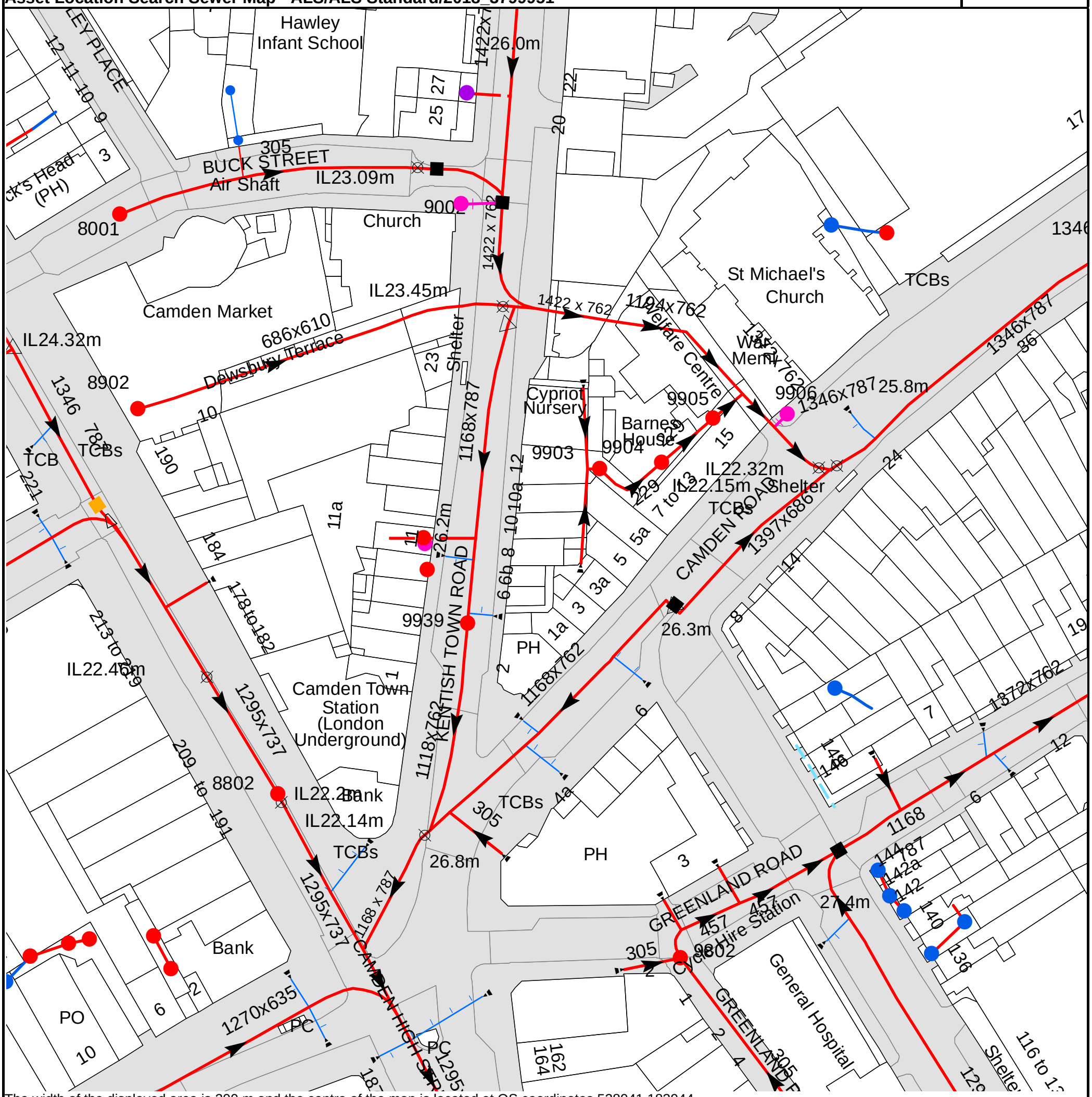
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3799951



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528941,183944

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
9903	26.24	23.61
9904	23.85	23.31
9905	23.84	23.13
9906	n/a	n/a
90AB	n/a	n/a
99AB	n/a	n/a
00AD	n/a	n/a
9802	26.55	23.53
08GJ	n/a	n/a
08GI	n/a	n/a
08GH	n/a	n/a
08GF	n/a	n/a
08GE	n/a	n/a
88DJ	n/a	n/a
88EF	n/a	n/a
88EG	n/a	n/a
88EE	n/a	n/a
88DI	n/a	n/a
8802	n/a	n/a
9939	26.15	22.47
9940	n/a	n/a
9942	n/a	n/a
9941	n/a	n/a
8902	27.29	24.65
8001	27.43	24.26
9002	n/a	n/a
801B	n/a	n/a
901A	n/a	n/a
801A	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.

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

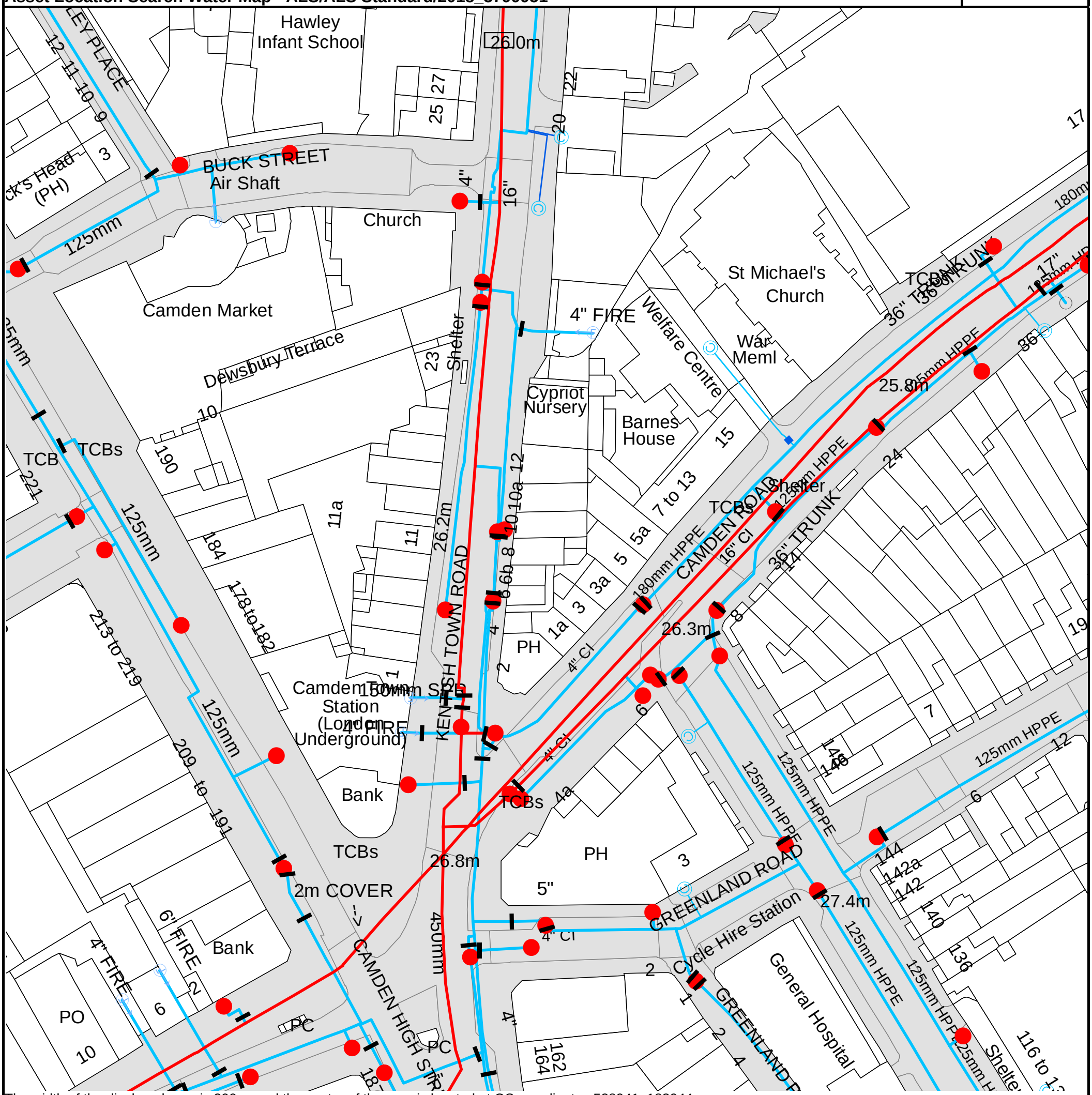
Proposed

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/2018_3799951



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528941, 183944.

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.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

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

3" SUPPLY

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

3" FIRE

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

3" METERED

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

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

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

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

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

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

Terms and Conditions

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

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

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

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

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

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

Ways to pay your bill

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

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

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