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Flood Risk Assessment and Drainage Statement

Site reference

Athlone House,
Hampstead Lane
London
N6 4NX

Client

Engineers HRW

Date

April 2016

Report No.

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Some of the information presented within this report is based on third party information which is believed to be correct; no liability will be accepted for any discrepancies in accuracy, mistakes or omissions in such information. The report also assesses the flood risk in relation to the requirements of the Environment Agency and as such assesses the site for a specific flood event and not all flood events.

Contents

Executive Summary

This Flood Risk Assessment (FRA) and drainage statement is to support proposed restoration of Athlone House, Hampstead, London and finds the following –

SOURCE OF FLOODING	RISK
Fluvial	***Low , the site is defined as flood zone 1, which is land considered to be at low risk of flooding.***
Overland Flow to the Site	***Low – Levels to the south, west and east fall away from Athlone House. To the north is Hampstead Lane which prevents overland flows from entering the site.***
Rising Groundwater	***Low – It is considered that the development is not at risk of rising groundwater levels given the ground strata Claygate Member does not lend itself to the free movement of water.***
The Local Sewerage Network	***Low – The foul sewer in Hampstead lane is small diameter and in the order of 4.0m deep and is maintained by Thames Water. Surcharge of this sewer would not be problematic to the site. As a precautionary measure it is recommended an anti backflow valve is installed to provide protection to the basement of the development.***
Reservoirs, Canals And Other Artificial Sources	**Low- There are no artificial water sources that present a threat to the development. There is a pond to the west, however, this is at a significantly lower elevation and distance from Athlone House**

- ***Nature Of Development***

The proposed development consists of the refurbishment and extention of Athlone House, Hampstead Lane, London

- ***Flood Risk***

Reference to the Environment Agency flood maps show the site is classified as flood zone 1 which is land at low risk flooding.

- ***Proposed surface water drainage***

SuDS techniques employed by the proposed development include –

Disposing of surface water using infiltration techniques cannot be utilised because of the impermeable underlying ground strata. There is an existing system which takes the runoff from the main building drainage system through an existing connection to the ornamental lake/pond which has an existing overflow to the Western Hampstead Heath ditch system. The proposed drainage system will reuse the existing system and use an attenuation tanked storage to maintain a controlled and regular flow to the offsite watercourse avoiding significant peak rate discharges.
The discharge will be limited to the greenfield runoff rate of 10.6 l/s. Applying this runoff rate to the proposed developed area would result in a storage requirement in the order of 199 cum to accommodate a 1 in 100 year storm with an additional allowance of 30% climate change.

Proposed SuDS features

Tanked cellular storage
Tanked permeable paving
Rain gardens
Rain water butts
Swales to access road

- **Maintenance**

The end owner will be provided with a SuDS maintenance manual that will detail the type and frequency of maintenance to keep the system maintained.

- **Foul drainage**

The proposed development will discharge into the existing non adopted sewer connection subject to a satisfactory CCTV survey to assess line level and condition. An Section 106 indirect connection consent will be required from Thames Water utilities.

1.0 Introduction

1.1 Commission

Engineers HRW has commissioned Infrastruct CS Ltd to prepare this Flood Risk Assessment (FRA) to support the restoration of Athlone House, Highgate which is an ornate large house dating from 1870. A plan showing the proposed development is contained in Appendix A of this report

1.2 Guidance

- This FRA has been compiled in accordance with the recommendations of The National Planning Policy Framework and the associated guidance document. Reference has been made to the London Borough of Camden 'Managing Flood Risk' document.

1.3 SUDS Approving Bodies & Regional Policy

The Flood and Water Management Act 2010 and the London Plan July 2011 encourages the use of sustainable drainage in new developments and re-developments. The recommendations of these documents will be taken into consideration. Policy 5.13 of the London Plan requires that surface water runoff is managed in a sustainable manner and where possible should aim to achieve greenfield run off rates for the developed site.

1.4 Aims and Objectives

The purpose of this FRA is to assess the risk of the site flooding and the impact any changes or development on the site will have on flood risk to adjacent areas. This flood risk assessment is prepared to good practice as outlined in The National Planning Policy Framework.

2.0 Site Details

2.1 Location

Althone House is located large gardens adjacent to the B519 Hampstead Lane, Highgate. To the west is Kenwood House and grounds which is a former stately home now managed by English Heritage. Beyond to the south is Hampstead Heath.

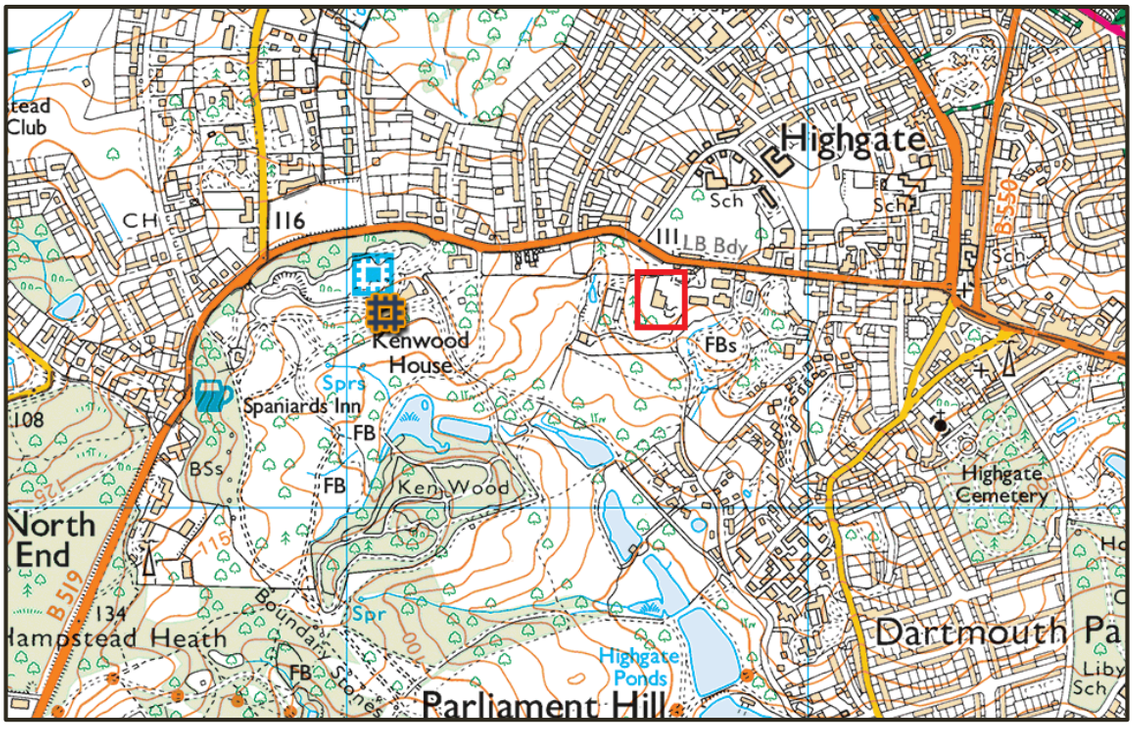


Fig 2.1 Site Location Plan

2.2 Grid Reference and postal address

The Ordnance Survey National grid reference for the centre of the site is 527681E, 187455N. Grid reference TQ276874. The postal address is Athlone House, 26 Hampstead Lane, London, N6 4NX.

2.3 Topography and site description

Athlone House is a large disused detached house situated in extensive grounds that also contain outhouses adjacent to the entrance on to Hampstead Lane. There are external areas of hardstanding and access road associated with the buildings. The grounds are generally laid to lawn with mature trees. There is a disused tennis court to the west along with a small lake/pond.

To the west and south the site is bounded by Hampstead Heath and Kenwood House grounds.

The topography generally slopes away to the west and east. The house has an elevation of approximately 112.60mAOD compared to the lower south west corner elevation of 93.40mAOD approx..

A copy of the topographic survey can be found within Appendix B.

2.4 Existing surface water drainage

Copies of the Thames Water public sewer asset records have been obtained and are contained in appendix D. These show that are no public surface water sewers within the vicinity of the site.

On the Hampstead Heath side of the Western Boundary runs a small watercourse/ditch that is fed from ponds further up towards Hampstead Lane. The watercourse runs away in a southerly direction. The runoff from the main building surface water drainage system has an existing piped connection to the ornamental lake/pond/which has an existing overflow to the Hampstead heath ditch system.

Approximately 200m to the east of the restoration site is an un-named watercourse that runs in a north south direction through a series of ornamental ponds.

Approximately 400m to the south of the development site are Hampstead ponds that are three freshwater swimming ponds.

The existing property appears to discharge surface water into a piped system that outfalls in the ornamental lake on the western boundary. This connection is subject to CCTV survey to confirm its line, level and condition.

2.5 Existing foul water drainage

The existing building is served by a private gravity system discharging into the Thames Water public sewer in Hampstead Lane. The public sewer in Hampstead Lane is a small diameter 230mm diameter foul sewer that runs in a east to west direction and is approximately 4.14m deep. There appears to be a gravity sewer connection from Athlone House running towards Hampstead Lane. A CCTV survey is to be undertaken to confirm the line, level and condition of the existing pipework..

3.0 Proposed Development

The proposal comprises of restoration of the disused Athlone House to extend it and provide basement facilities along with the re-establishment of the gardens and landscaping.

4.0 Flood Risk

4.1 General

The developable site area is 28800sqm, 2.88ha) and as a consequence requires a flood risk assessment of the site in terms of the potential for it to be subject to and also causing flooding.

4.2 Flood Map

The flood map for the development site shown below in figure 4.3 indicates that the site is entirely contained within Flood Zone 1, which is defined in NPPF as comprising land at low risk of flooding.

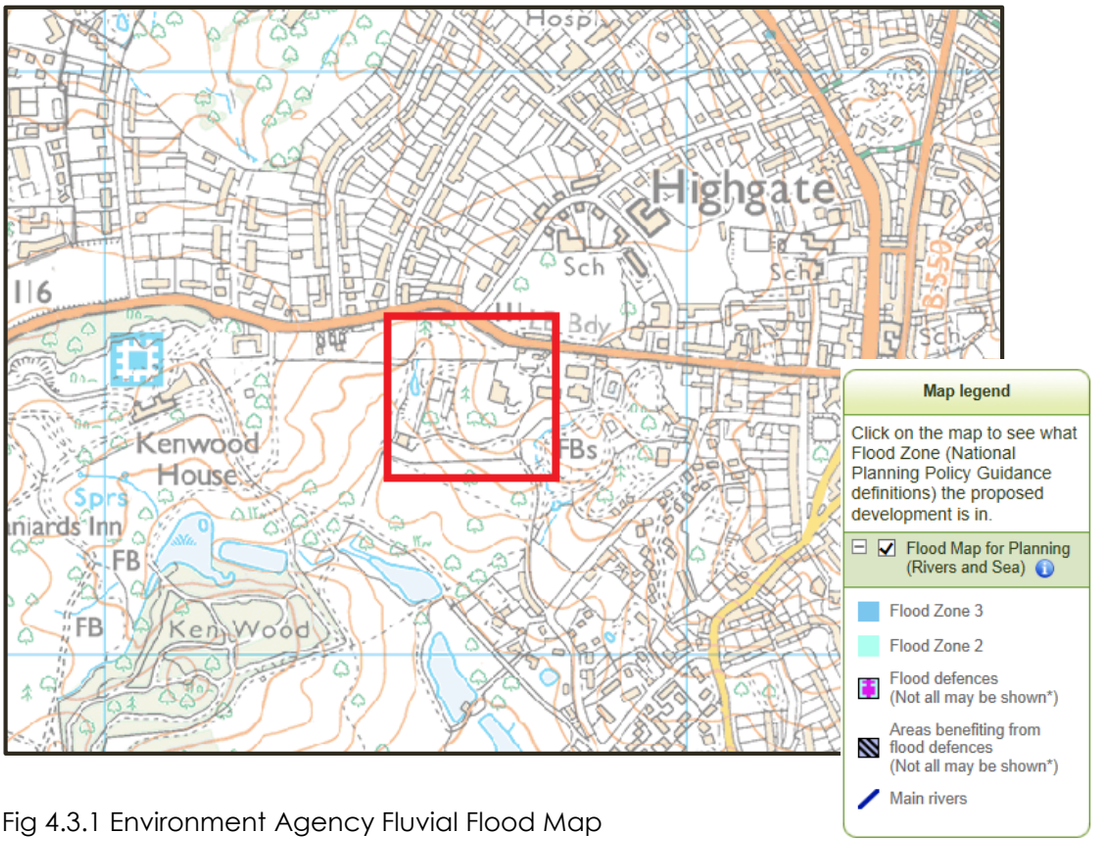


Fig 4.3.1 Environment Agency Fluvial Flood Map

5.0 The National Planning Policy Framework (NPPF)

5.1 Flood zone definition

The National Planning Policy Framework and the accompanying Planning Practice Guidance gives advice for development with respect to flooding. NPPF promotes a sequential approach in order to encourage development away from areas that may or are susceptible to flooding. In doing so it categorises flood zones in the context of their probability of flooding.

NPPF Definition of Flood Zones

Flood zone	Fluvial	Tidal	Probability of flooding
1	< 1 in 1000 year (<0.1 %)	<1 in 1000 year (<0.1 %)	Low probability
2	Between < 1 in 1000 year (<0.1 %) and 1 in 100 year 1%	Between <1 in 1000 year (<0.1 %) and 1 in 200 year 0.5%	Medium Probability
3a	> 1 in 100 year 1% (>1.0%)	> 1 in 200 year (>0.5%)	High probability
3b	Either > 1 in 20 (5%) or as agreed between the EA and the LPA	Either > 1 in 20 (5%) or as agreed between the EA and the LPA	Functional flood plain

5.2 NPPF Flood Risk Vulnerability (Extract from NPPF)

(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 1 - Low Probability
Definition
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Appropriate uses
All uses of land are appropriate in this zone.
FRA requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques
Zone 2 - Medium Probability
Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses
Essential infrastructure and water compatible, less vulnerable and more vulnerable uses as set out in Table 5.3 are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
FRA requirements
All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.
Zone 3a - High Probability
Definition
This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Appropriate uses
The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
FRA requirements
All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.
Policy aims
In this zone, developers and local authorities should seek opportunities to: reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and relocate existing development to land with a lower probability of flooding.

5.3 NPPF Flood Risk Compatibility Classification

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes)which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police stations, Ambulance stations and Fire stations and Command Centre's and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

More Vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, **subject to a specific warning and evacuation plan**.

Less Vulnerable

- Police, ambulance and fire stations which are ***not*** required to be operational during flooding.
- Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do **not** need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- MOD defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, **subject to a specific warning and evacuation plan.**

5.4 Flood Risk Vulnerability And Flood Zone Compatibility Table

Vulnerability classification flood zone	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
1	√	√	√	√	√
2	√	√	Exception test required	√	√
3a	Exception test required	√	x	Exception test required	√
3b	Exception test required	√	x	x	x

√ Development is appropriate x development is not appropriate

An exception test provides a method of managing flood risk while still allowing necessary development to occur.

6.0 Flood Mechanisms

6.1 Other Flooding Mechanisms

In addition to the potential for assessing flooding from fluvial and tidal sources NPPF also requires that consideration is given to other mechanisms for flooding -

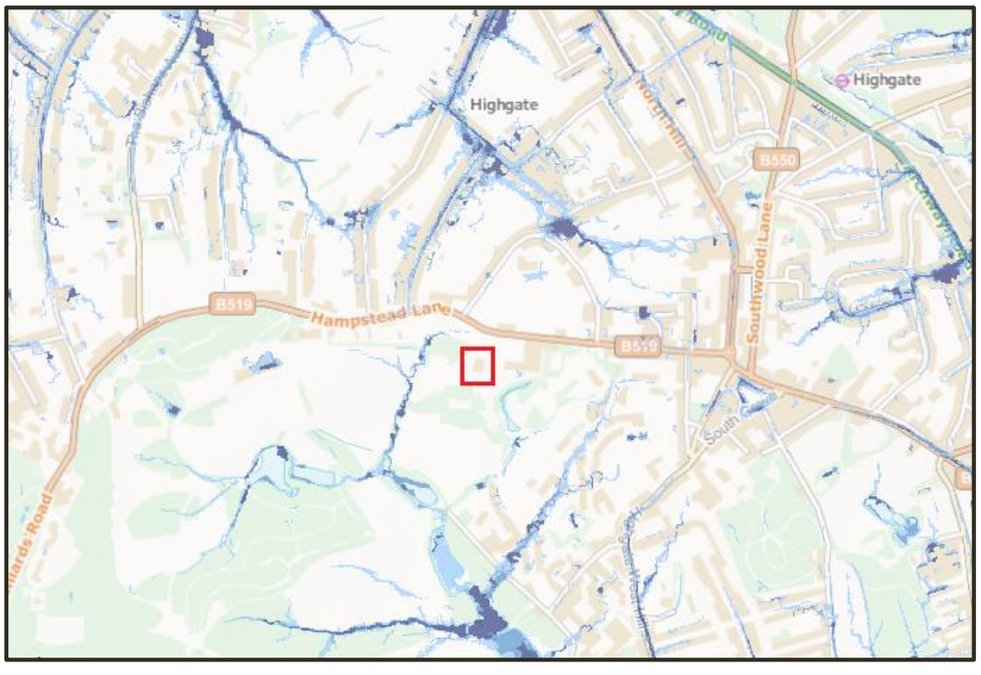
- Flooding from land – intense rainfall, often in short duration, that is unable to soak into the ground or enter drainage systems, can run rapidly off land and result in local flooding.
- Flooding from groundwater – occurs when water levels in the ground rise above the surface elevations.
- Flooding from sewers – In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and waste water sewers known as combined sewers. Flooding can result causing surcharging when the sewer is overwhelmed by heavy rainfall
- Flooding from reservoirs, canals and other artificial sources – Non-natural or artificial sources of flooding can result from sources such as reservoirs, canals lakes etc, where water is held above natural ground levels.

6.2 Flooding From Fluvial Sources

The development site is designated as Flood Zone 1, as defined on the Environment Agency Flood Zone Maps and is defined in The National Planning Policy Framework as land assessed as land at low risk from flooding

It is therefore the consideration of this report that the site has a low risk from fluvial flooding.

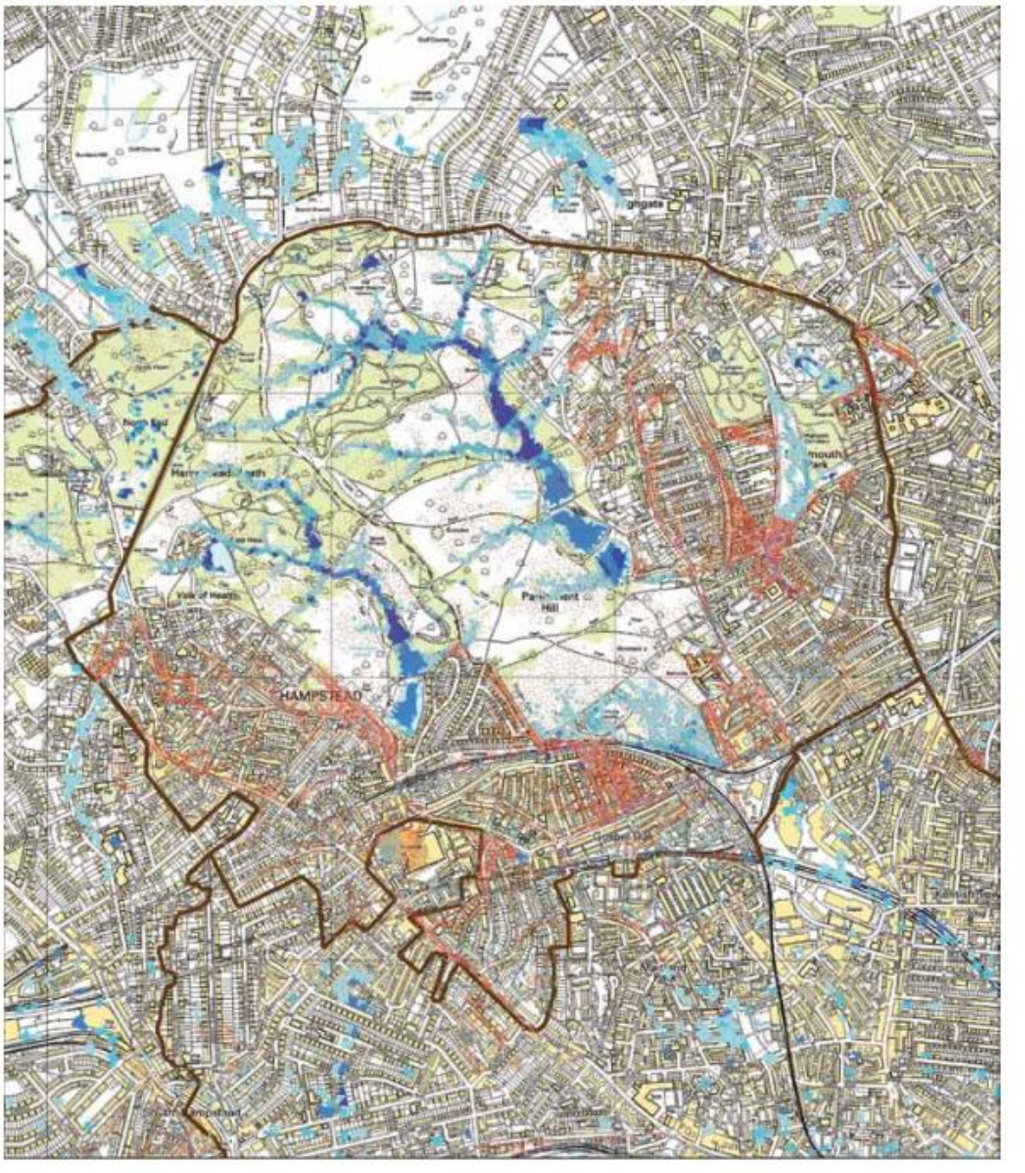
6.3 Flooding From Overland Flows to the Site



The Environment Agency Flood maps do not indicate any instances of surface flooding affecting the site.

Reference has been made to the Camden Strategic Flood Risk Assessment and flood modelling has been undertaken by them and the results are shown in the figure shown below. As can be seen it shows the un-named watercourse at the lower level and to the west of the site as subject to flooding during a 1.33% probability storm, however, these flows would not enter the site due to the topography of the watercourse being lower that the site.

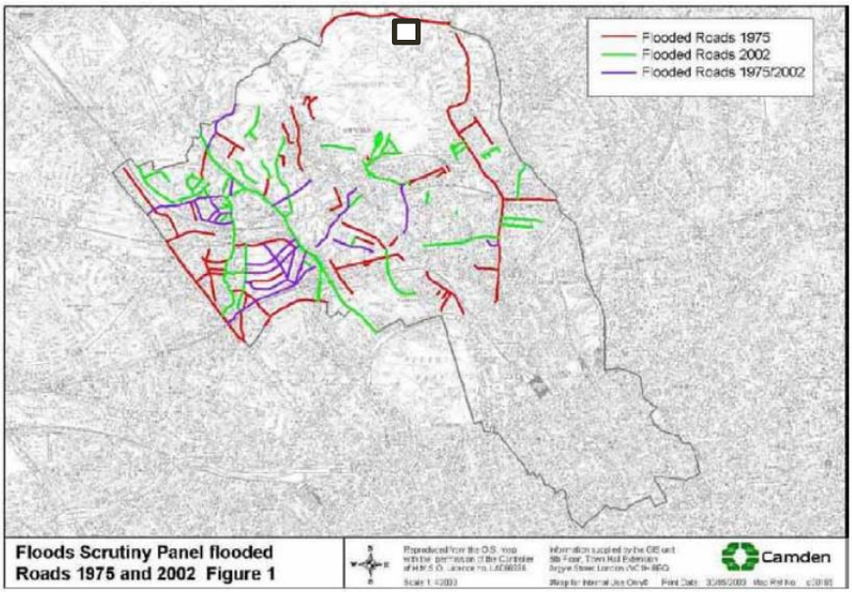
Map of surface water runoff in Camden North



KEY
Flood velocity (how quickly the water is travelling) >= 0.05m/s >= 0.05m/s
>= 0.01m >= 0.02m >= 0.03m >= 0.1m >= 1m

These are initial maps showing potential flows and areas of ponding for a flood event with a 1.33% chance of occurring in any one year (a 1 in 75 year return period). It is an indicative map and may be superseded by more area specific maps. It is not accurate to property level. More accurate modelling on Gospel Oak can be found in the Royal Haskoning report on the area.

The Camden Flood Risk Assessment also indicates that Hampstead Lane suffered flooding during the extreme storm of 1975, however, these flows did not enter the site. See below.



It is therefore the consideration of this FRA that the site has a low risk of flooding from overland flows.

6.4 Flooding From Ground Water

The GEA Ground investigation Ref J16075 Issue 1 dated 23rd May 2016 indicated relatively shallow depths of made ground overlying Claygate member of the London Clay. During the drilling of the boreholes, groundwater was encountered at depths of 12.10m and 12.5m corresponding to levels of between 10.43m AOD and 99.75m AOD.
The bore holes previously installed were monitored from July 2014 ; these indicated groundwater depths of between 9.62m and 10.21m, levels of 101.99m AOD and 103.23mAOD . It is therefore considered that the development is not at risk of rising groundwater levels given the ground strata London Clay does not lend itself to the free movement of water. The basement construction will need to take consideration of the seepage that is present. which may be a result of surface level water seeping into interfaces between the building and the clay strata.

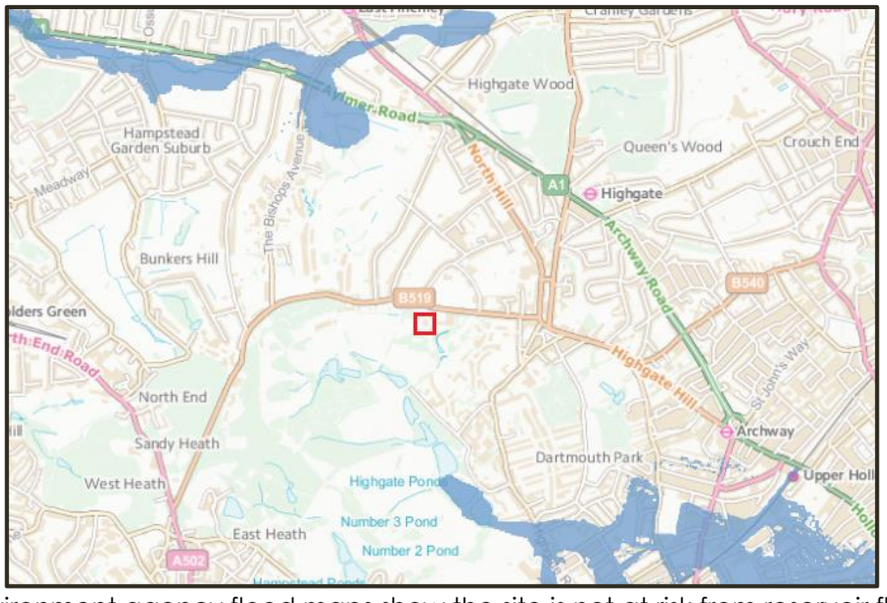
It is therefore the consideration of this report that the site has a low risk of flooding from rising groundwater levels.

6.5 Flooding From the Local Sewerage Network

There is a small diameter public sewer located in Hampstead Lane. Thames water records confirm that there are no recorded incidenets of sewer flooding in the vicinity of the property. Given the proposal is to connect the basement to the existing gravity connection it is the recommendation of this report that an anti back flow valve is installed to provide protection against sewer surcharge events.
It may be necessary, depending on the final basement levels that pumping of the basement drainage takes place. This will provide further protection against surcharge from the main sewer as the rising main from the pump station will have non return valves fitted as standard.
Thames Water sewer records do show any recorded flooding events in the vicinity (Appendix E).

It is therefore the consideration of this report that the site has a low risk of flooding by surcharging of the local sewer network.

6.6 Flooding from reservoirs, canals and other artificial sources.



Environment agency flood maps show the site is not at risk from reservoir flooding.

It is therefore the consideration of this report that the site has a low risk of flooding by reservoirs, canals or other artificial sources.

7.0 Flood Risk As A Result Of The Development

7.1 Effect Of The Development Generally

Development by its nature usually has the potential to increase the impermeable area with a resultant increase risk of causing rapid surface water runoff to watercourses and sewers, thereby causing surcharging and potential flooding. There is also the potential for pollutants to be mobilised and consequently flushed into the receiving surface water system.

Increases in both the peak runoff rate (usually measured in litres per second l/s) and runoff volume (cubic metres m^3) can result.

7.2 Surface Water Drainage And Sustainable Drainage Systems

Sustainable Drainage techniques (SUDS) covers a range of approaches to manage surface water runoff. The NPPF requires that –

'Surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and

elsewhere, taking climate change into account. This should be demonstrated as part of the flood risk assessment.'

7.3 Peak Storm Design Criteria

The proposed sustainable drainage techniques for the development should accommodate the peak rainfall event for a 1 in 100 year storm event with an additional allowance for climate change. Table 5 of NPPF recommends for developments that have a life expectancy beyond 2085 that an additional factor of 30% is applied to the peak volume of runoff.

In line with policy 5.13 of the 2011 London Plan the surface water drainage from the development site should aim to reduce surface water flows off the development site and where possible reduce these down to the associated greenfield run off rate for the development site.

7.4 Existing surface water runoff rates, greenfield and impermeable areas

The existing development site area is approximately 2880sqm 2.88ha and is a combination of impermeable and landscape areas (see appendix). The existing impermeable area equates 3800sqm which leaves a remaining greenfield of 25,000sqm.

The greenfield runoff rates calculated using the ICP method are detailed in the table below.

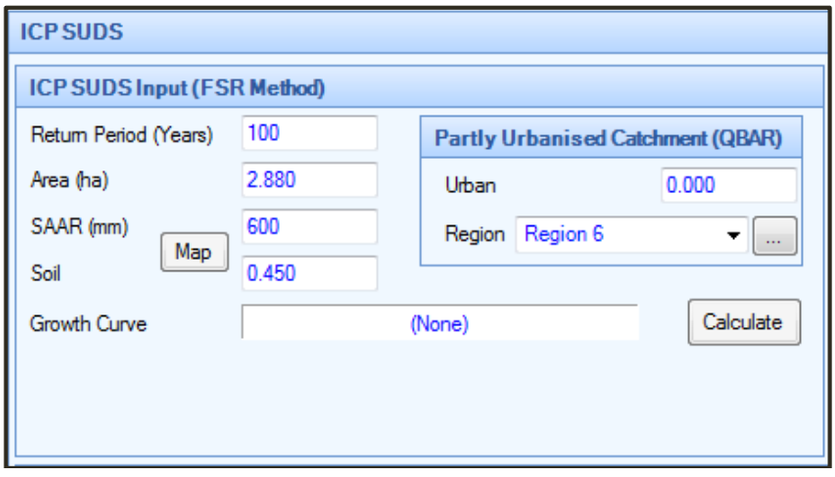
Green field runoff rate estimation

Return period	Runoff rate l/s
I in 1 year	9
1 in 30 year	23.9
1 in 100 year	33.7
QBar	10.6

Table 8.2 Existing Runoff rates

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	10.6	26.2	9.0	20.0	26.2
Region 2	10.6	27.8	9.2	20.0	27.8
Region 3	10.6	22.0	9.1	18.6	22.0
Region 4	10.6	27.2	8.8	20.7	27.2
Region 5	10.6	37.6	9.2	25.4	37.6
Region 6/Region 7	10.6	33.7	9.0	23.9	33.7
Region 8	10.6	25.6	8.2	20.1	25.6
Region 9	10.6	23.0	9.3	18.6	23.0
Region 10	10.6	22.0	9.2	17.9	22.0
Ireland National	10.6	19.4	9.0	16.8	19.4
Ireland East	10.6	20.1	9.0	17.2	20.1
Ireland South	10.6	19.4	9.0	16.8	19.4
Ireland West	10.6	18.8	9.0	16.3	18.8
Ireland Greater Dublin	10.6	27.6	9.0	22.4	27.6



The QBar greenfield runoff rate is 10.6 l/s (this figure ignores any urbanization factor) Using the greenfield runoff rate of 10.6 l/s. results in a storage requirement in the order of 199 cum to accommodate a 1 in 100 year storm with an additional allowance of 30% climate change. Microdrainage calculations are contained in appendix E.

7.5 Drainage Strategy & Design

This FRA is not intended to provide a detailed design for the drainage system to serve the proposed development, but to show that a proposed system is feasible in principle given the storage volume required and land availability. A detailed drainage scheme should be submitted to the Local Planning Authority (LPA) prior to the commencement of development and/or to discharge the appropriate planning condition.

The existing surface water discharge from the existing Athlone House property appears to be via a conventional piped system into the ornamental pond on the western boundary.

In line with Policy 5.13 of the London Plan, development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to reduce run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1 store rainwater for later use
2 use infiltration techniques, such as porous surfaces in non-clay areas
3 attenuate rainwater in ponds or open water features for gradual release
4 attenuate rainwater by storing in tanks or sealed water features for gradual release
5 discharge rainwater direct to a watercourse
6 discharge rainwater to a surface water sewer/drain
7 discharge rainwater to the combined sewer.

The table below lists the SuDS options considered for the Athlone House development.

SUDS OPTIONS	Comments	Potential for flow rate control	Volume reduction	Maintenance requirement	Space requirement	Cost	Included in final detailed design
Rainwater harvesting	Rainwater from roof runoff collected for re-use. Cost benefit considerations	L	M	H	L	H	Pos
Water butts	Rainwater collection from roof runoff. Included in final design	L	L	L	L	L	Y
Living roofs	Vegetated roofs that reduce runoff volume and rate	M	L	M	L	H	Pos
Bio-retention	Shallow vegetated areas to retain and treat runoff.	L	L	M	M	L	Pos
Constructed wetlands	Waterlogged areas that can support aquatic vegetation. Replicates existing conditions and provides ecological benefit.	M	L	H	H/M	M	N
Swales	Shallow grassed drainage channels. Replicates existing conditions	H	M	L	M/H	L	Pos
Soakaways	Sub surface structures that dispose of water via infiltration.	H	H	L	L	M	N
Permeable pavements	Surface that infiltrate through surface. Retains pollutants.	H	H	M	L	M	Y*
Tanked storage systems	Oversized pipes or cellular storage.	H	L	L	M	M/H	Y
Infiltration basins	Depressions in the ground to store and release water through infiltration	H	H	H/M	H	M/L	N

Detention basins	Temporary retention of runoff with controlled discharge	H	L	M	H	M/L	Pos

*Tanked permeable paving due to no infiltration.

It might however be feasible, to utilise tanked permeable paving to reduce the proposed surface flows exiting the development site and to provide an additional level water treatment.

The SuDS features proposed for the surface water management of Athlone House are as detailed below -

Tanked cellular storage

Provide tanked cellular storage with a limited greenfield flow rate of 3.8 l/s, and on-site storage in the form of tanked cellular storage of 247 cum to accommodate the flows associated with a 1 in 100 year storm event with an additional allowance of 30% for climate change.

Tanked Infiltration permeable paving

Tanked permeable paved access road to the proposed entrance lodges. thereby providing 3 levels of water quality management 1) retention of suspended solids 2) breakdown of pollutants 3) bio retention.

Rain water gardens

Rain water gardens are usually above ground vegetated drainage features in which roof runoff can be drained into and infiltrated through a filter material contained within a retaining structure such as timber or concrete landscaped container. They are designed to allow infiltration. They promote the capture of suspended particulate load in roof runoff to settle out, thus providing effective pollutant removal.

Rain water butts

To be installed in the rear gardens of all the entrance dwellings. These will address clean water demand and to a lesser extent volume of runoff.

7.6 Water quality

To protect groundwater and receiving watercourses it is essential to capture, control and treat pollution. Using SuDS treatments help to replicate natural drainage regimes and minimize impact.

The proposed use of raingardens and tanked permeable paving have predominantly high ratings to remove suspended solids, heavy metals, nutrients, bacteria and dissolved pollutants.

The permeable paving of the external areas has high ratings to remove suspended solids, heavy metals, nutrients, bacteria and dissolved pollutants.

7.7 SuDs maintenance

The owner of the property will be responsible for maintaining the private SuDs features, This may be undertaken by a maintenance contractor and will be provided with instruction manual that details the frequency and type of maintenance required for all the SuDs features employed.

8.0 Proposed Foul Drainage

8.1 Proposed foul discharge

The proposed development will utilize the existing foul connection that serves the existing development and which connects to the public foul sewer in Hampstead Lane. This connection is subject to CCTV survey to confirm the line level and condition of the connection.

It is recommended that as the basement development will be served by the gravity connection it will be preferable to install an anti backflow valve to protect against sewer surcharge events.

It is anticipated the existing foul connection which serves the current site will be utilised to serve the new development, subject to a Section 106 connection consent from the local water authority, Anglian Water.

The proposed BBQ pavilion is remote and at a lower level from the main building so will require a package pumping station to pump effluent to the higher level gravity drainage system serving the main building.

References & Bibliography

- The National Planning Policy Framework.
- The Planning Practice Guidance.
- Environment Agency indicative flood maps http;//maps.environment- agency gov.uk
- Environment Agency indicative ground water source protection zone maps http;//maps.environment- agency gov.uk
- Environment Agency indicative Aquifer designation maps http;//maps.environment-agency gov.uk
- CIRIA, The Sustainable drainage Systems (SUDS) Manual C753
- Sewers for adoption 6th Edition and interim guidance prior to the introduction of sewers for adoption 7th edition WRC
- London Borough of Camden Managing Flood Risk

Appendix A – Drainage Strategy Plan

Drainage Strategy

Foul Drainage

Private gravity system discharging inlet Thames Water foul sewer.

Surface Water Drainage

Gravity system discharging into tanked cellular storage sized to accommodate 1 in 100 year storm with 30% allowance for climate change. Attenuated green field runoff rate discharge into existing pond controlled by Hydrobrake or similar device.

NOTE:

1. DO NOT SCALE, IF IN DOUBT ASK.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL ENGINEER'S DRAWINGS AND DETAILS, THE SPECIFICATION FOR THE WORKS, THE RELEVANT ARCHITECT'S DRAWINGS AND ANY OTHER SPECIALIST'S DRAWINGS.

Drainage Key

Sewers

	Foul water drain (private/non adoptable)
	Surface water drain (private/non adoptable)
	Foul water sewer (Adoptable)
	Surface water sewer (Adoptable)
	Highway drain (Adoptable)
	Foul rising main
	Existing highway drain
	Existing foul water drain (private/non adopted)
	Existing surface water drain (private/non adopted)
	Existing foul water sewer (Adopted)
	Existing surface water sewer (Adopted)
	Existing combined water sewer (Adopted)
	Redundant sewer

Chamber Key

FW	SW	
MH	MH	Mini access chamber (mac) - 300mmØ *
		PPIC - 475mmØ *
		P.C.C. units/brick *
DM	DM	Adoptable demarcation manhole within 1m of boundary *
		Manhole Depth 1.25 to 1.5m * Depth 1.55 to 3.0m *

* General note
(Refer to standard details & long sections for chamber sizes. Size may need to increase dependant on number of incoming pipes/size of incoming pipes)

RE	Surface water rodding eye
F1	Manhole reference number
	Rain water down pipe (roddable access)
	Soil vent pipe/soil stack
YG	Yard gully (150m - 200mmØ trapped)
RG	Road gully (trapped) C250
FG	Floor gully (trapped)
	Linear drainage channel
	Cellular storage (refer to drawing for sizes)
	Headwall
	Retaining wall
FFL XX.XX	Finished Floor Level (FFL)
	Tanked Permeable paving
	Shallow Swale
	Tree root protection zone (RPZ)
	Tree root membrane
	Impermeable barrier to stop lateral movement of water
	Baffle to prevent rapid through flow of water through permeable paving

HAMPSTEAD HEATH
HAMPSTEAD LANE
HIGHGATE SCHOOL
CAENWOOD COURT
ATHLONE GARDENS
ATHLONE HOUSE
CAENWOOD COTTAGE (SINGLE STOREY GARAGE EXTENSION PROPOSED)
Existing 229mmØ public Foul sewer
PROPOSED NEW ENTRANCE
TW REF 7502
THE GATE HOUSE (NO EXTERNAL CHANGES PROPOSED)
REFUSE STORE TO BE BUILT WITHIN SITE.
Existing adopted drainage
New surface water drainage
Existing private drainage subject to CCTV inspection
Extent of adopted foul drainage subject to CCTV inspection
Existing manhole
Existing foul drainage reused subject to CCTV survey
Shallow Swale to drain access road runoff
ENTRANCE FOUNTAIN
Package pumping station to pump effluent from BBQ pavilion to main house gravity drainage system.
Existing surface water out fall to be utilised subject to CCTV survey.
Existing surface water manhole.
Existing surface water holding tank.
Rising main discharge point
Existing pond overflow into Hampstead Heath Watercourse
Hydrobrake flow control chamber with discharge limited to 4.4 l/s
Offline Tanked Cellular Storage located beneath tennis court 17mL x 10mW x 1.2m Deep To contain a 1in100 year storm with an allowance of 30% for climate change. Storage tank to have inspection tunnel to allow for future maintenance and CCTV inspection
Existing surface water reused subject to CCTV survey
Existing Watercourse
187600N
187550N
187500N
187450N
187400N
187350N
527500E
527550E
527600E
527650E
527700E
527750E
527800E

Rev.	Date	Amendments	By	Chk'd
P04	15/06/16	BBQ pavilion drainage route and entrance permeable paving amended	ATD	DJ
P03	10/06/16	Updated to new layout, pavilion drainage added	ATD	DJ
P02	31/05/16	Surface water outfall amended	ATD	DJ
P01	15/06/16	Initial issue	ATD	DJ

engineersHRW
London 0207 407 9575 Oxford 01865 251 206 www.ehrw.co.uk

Project:
Athlone House
Hampstead Lane
London

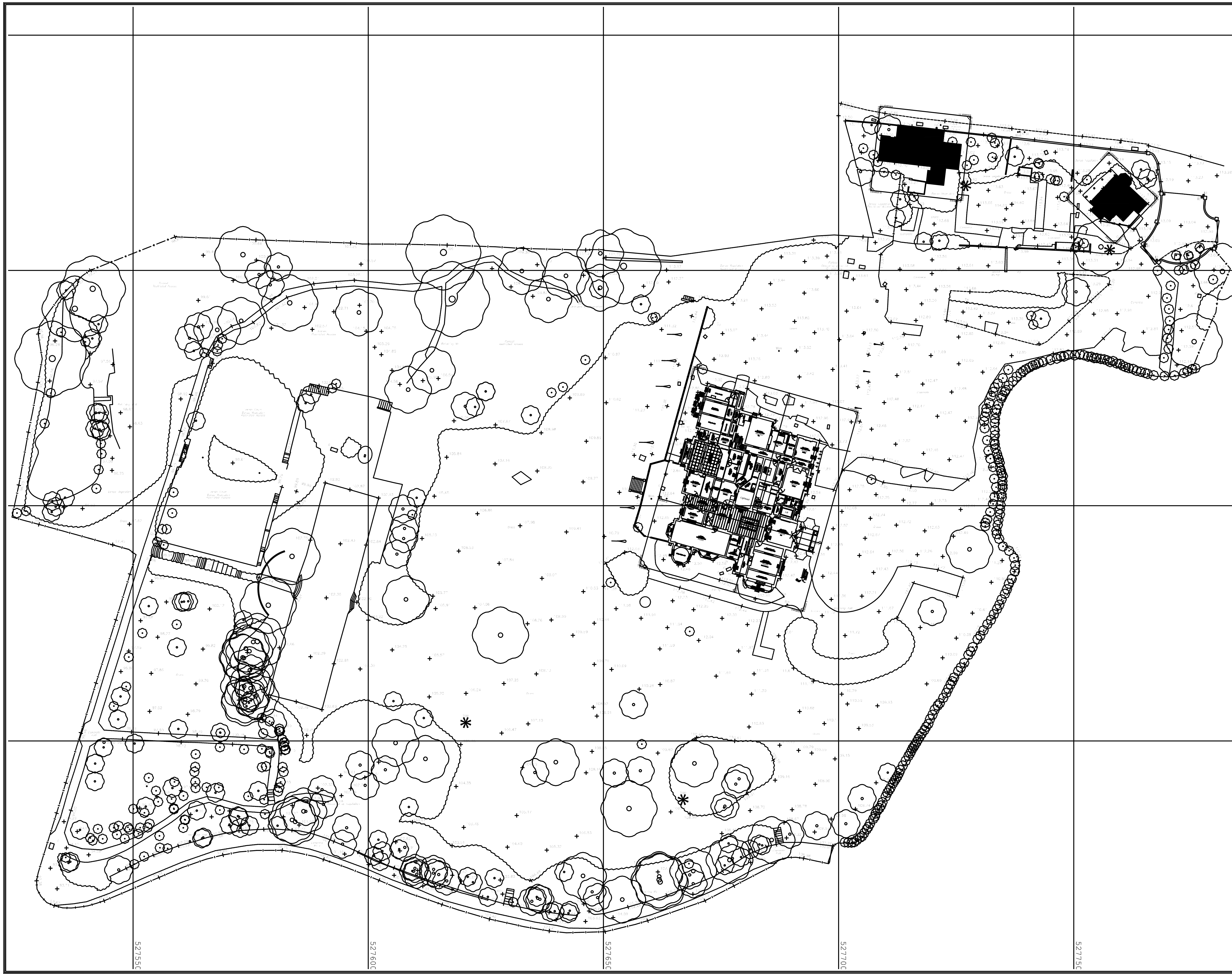
Drawing title:
Drainage Strategy Plan

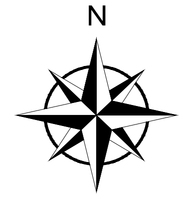
Scale at A1:	Drawn by:	Date:	Chk'd by:
1:500	ATD	15/06/2016	DJ

Preliminary

Project Number:	Drawing Type:	Drawing No:	Revision:
1480	DR	50	P04

Appendix B – Topographic Survey





Survey Control Details.

Stn.	Eastings.	Northings.	Level.
S1	527712.917	187465.387	112.508
S2	527694.885	187449.796	112.504
S3	527759.941	187497.520	113.061
S4	527736.770	187504.657	113.606
S5	527700.025	187425.801	111.873
S6	527660.027	187438.631	112.438
S7	527671.179	187485.034	112.909

Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid (OSGB36) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN02 & OSGM02 transformation models.
The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Topographical Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line
Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge
Station and Name
Station Level
Tree / Bush / Sapling
Area of Undergrowth
Woodland
R: Ridge Level
E: Eaves Level
F: Flat Roof Level
Gate

Fence types:
I\W Interwoven
I\R Iron Railings
W\M Wire Mesh
P\R Post & Rail
P\W Post & Wire
C\L Chain Link
W\P Wooden Panels
C\P Concrete Panels
S\P Steel Palisade

IC	Inspection chamber	Boll	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Grl	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trialhole
Tl	Traffic light	BH	Borehole
Bus	Bus stop	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	C'box	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slabs
Av	Air valve	CVR	Cover
ICU	Undentified inspection	IC	Inspection chamber
Wo	Wash out	R/wall	Retaining wall
Re	Rodding eye	UTL	Unable to lift
BB	Belisha beacon	TCL	Tree canopy level
CTV	Cable tv	G:	Girth
Mkr	Marker post	MG	Multi girth
Gmkr	Gas marker post	Stmp	Tree Stump
So	Soffit	CL:	Cover level
		IL:	Invert level

Rev	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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Newcastle
24 Riverside Studios
Amethyst Road
Newcastle Bus. Park
Newcastle-U-Tyne
NE4 7YL
t. (01912) 736391

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Poland
t. 0048 32 202 2292
www.greenhatch.pl

CLIENT
SHH Architects

PROJECT
Athlone House
Hampstead lane
N6 4SA

TITLE
Topographical Plan

SCALE	*DATE*
A0@ 1: 250	**25.01.2016**
DRAWN	*QUALITY REF*
GP	

Level datum	*OS GPS*
Grid orientation	*OS GPS*
Job number	*22929*

Drawing No.	*Rev.*
22929_01_P	*0*

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Appendix C – Thames Water Sewer Asset Records

Asset Location Search

Infrastruct CS Ltd
High Cogges Farm High Cogges Farm

WITNEY
OX29 6UN

Search address supplied 26
Hampstead Lane
London
N6 4NX

Your reference 2129 - DJ

Our reference ALS/ALS Standard/2016_3308878

Search date 20 April 2016

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

Asset Location Search

Search address supplied: 26, Hampstead Lane, London, N6 4NX

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

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

Asset Location Search

Waste Water Services

Please provide a copy extract from the public sewer map.

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

TQ2787SE
TQ2787NE

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.

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

TQ2787SE
TQ2787NE

Asset Location Search

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.

Asset Location Search

Further contacts:

Waste Water queries

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

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

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

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

Clean Water queries

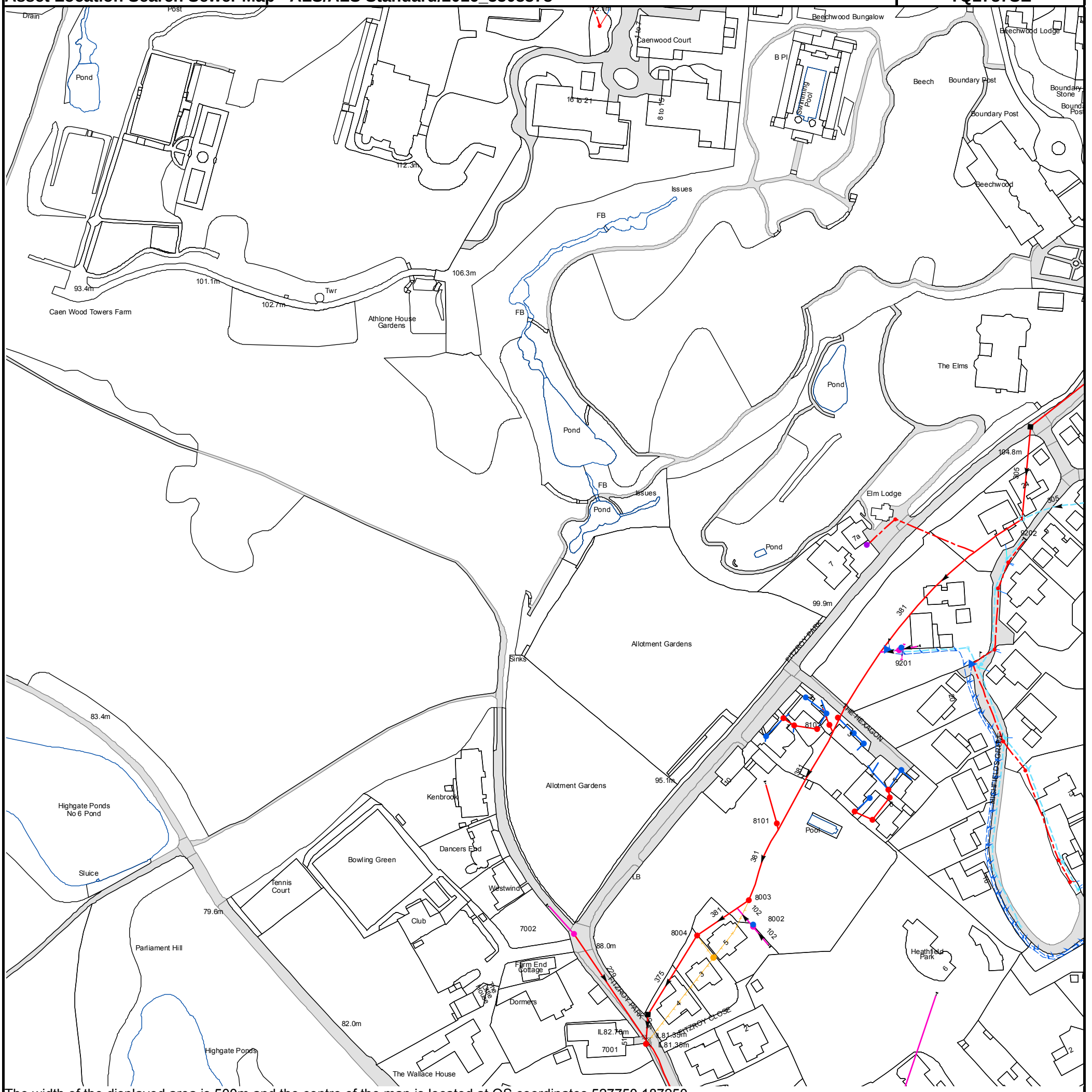
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2016_3308878

TQ2787SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,187250

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.

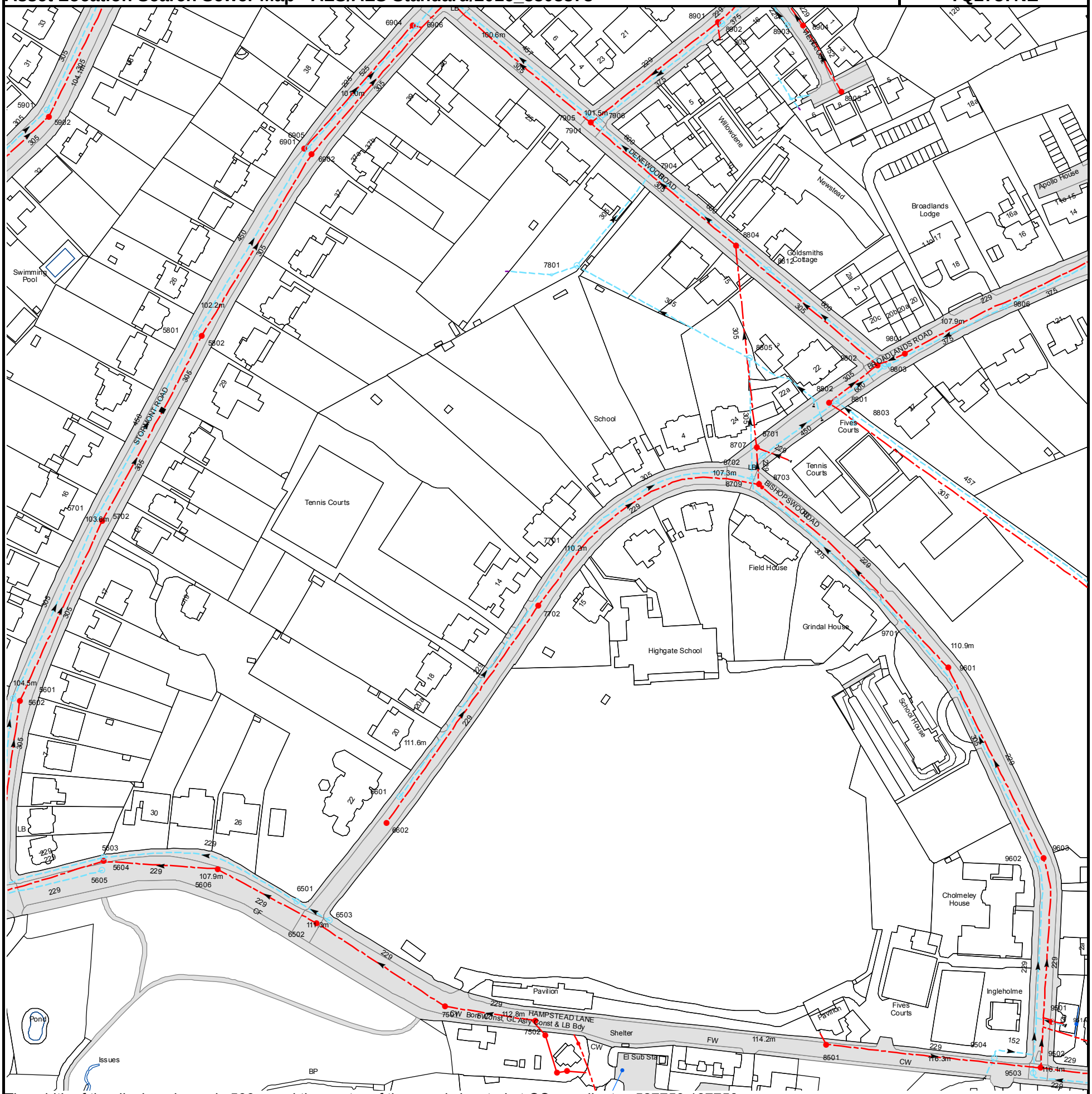
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
741A	n/a	n/a
901B	109.25	107.78
901C	108.997	107.107
911A	104.08	101.99
911G	108.024	106.994
911E	108	105.26
911B	102.736	100.336
911H	102.351	100.401
911F	102.354	100.194
911I	100.2	97.45
911C	100.216	98.016
911D	101.095	97.255
921C	101.929	100.089
921H	101.984	99.714
921A	100.237	97.057
921D	103.366	100.666
921G	103.406	100.426
921F	103.876	100.806
921E	103.893	101.403
9202	103.63	100.18
7001	85.16	n/a
8004	101.84	96.83
7002	88.39	85.89
8002	101.92	100.87
80AC	n/a	n/a
8003	n/a	99.5
8101	n/a	n/a
91AH	n/a	n/a
81CF	n/a	n/a
81CG	n/a	n/a
91AG	n/a	n/a
91AF	n/a	n/a
91AE	n/a	n/a
81CB	n/a	n/a
81BA	n/a	n/a
81CD	n/a	n/a
81BD	n/a	n/a
81BC	n/a	n/a
8102	n/a	n/a
81BB	n/a	n/a
81CC	n/a	n/a
81BH	n/a	n/a
81BG	n/a	n/a
921B	97.163	95.813
9201	n/a	n/a
92AB	n/a	n/a
821A	n/a	n/a
921I	n/a	n/a
901A	106.698	105.258

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

Asset Location Search Sewer Map - ALS/ALS Standard/2016_3308878

TQ2787NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,187750

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5901	104.3	98.43
5902	104.33	96.97
5801	102.33	99.27
5802	102.34	99.03
6905	101.23	98.63
6901	101.22	98.15
6902	101.26	97.81
6904	100.4	97.82
6906	100.4	97.46
781A	n/a	n/a
7801	102.55	101.27
7905	101.38	98.38
7901	101.44	98.27
7906	101.46	98.93
7904	102.12	99.57
8901	102.67	99.27
8902	102.7	99.8
8804	104	100.57
8805	104.58	102.73
8702	107.02	104.73
8709	107.01	104.86
8701	106.94	102.06
8703	107.18	102.03
8707	106.91	104.59
8812	104.27	101.55
8903	103.8	102.56
891A	n/a	n/a
891B	n/a	n/a
8904	103.89	102.57
8802	106.81	103.11
8801	106.81	103.64
8905	104.6	103.38
8803	105.55	104.66
9802	107.32	102.8
9803	107.33	103.43
9801	107.56	104.76
9806	109.08	107.62
5601	104.54	101.88
9503	115.94	112.48
75ZT	n/a	n/a
75ZV	n/a	n/a
751A	n/a	n/a
9504	115.8	114.66
8501	115.33	114.56
751B	n/a	n/a
75ZS	n/a	n/a
7502	112.94	108.8
7501	112.34	107.8
6502	111.2	105.51
6503	111.32	110.34
6501	110.67	109.7
5605	106.2	103.73
5606	107.93	104.27
5604	106.35	103.11
5603	106.4	105.06
6602	111.71	105.29
6601	111.6	109.39
5602	104.94	101.27
9601	110.97	107.69
9701	110.19	106.84
7702	110.8	103.52
7701	109.91	106.25
5702	103.51	100.07
5701	103.45	100.22
9602	112.88	109.8
9502	115.99	112.31
9603	112.98	109.96
9501	115.23	112.64
951A	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.

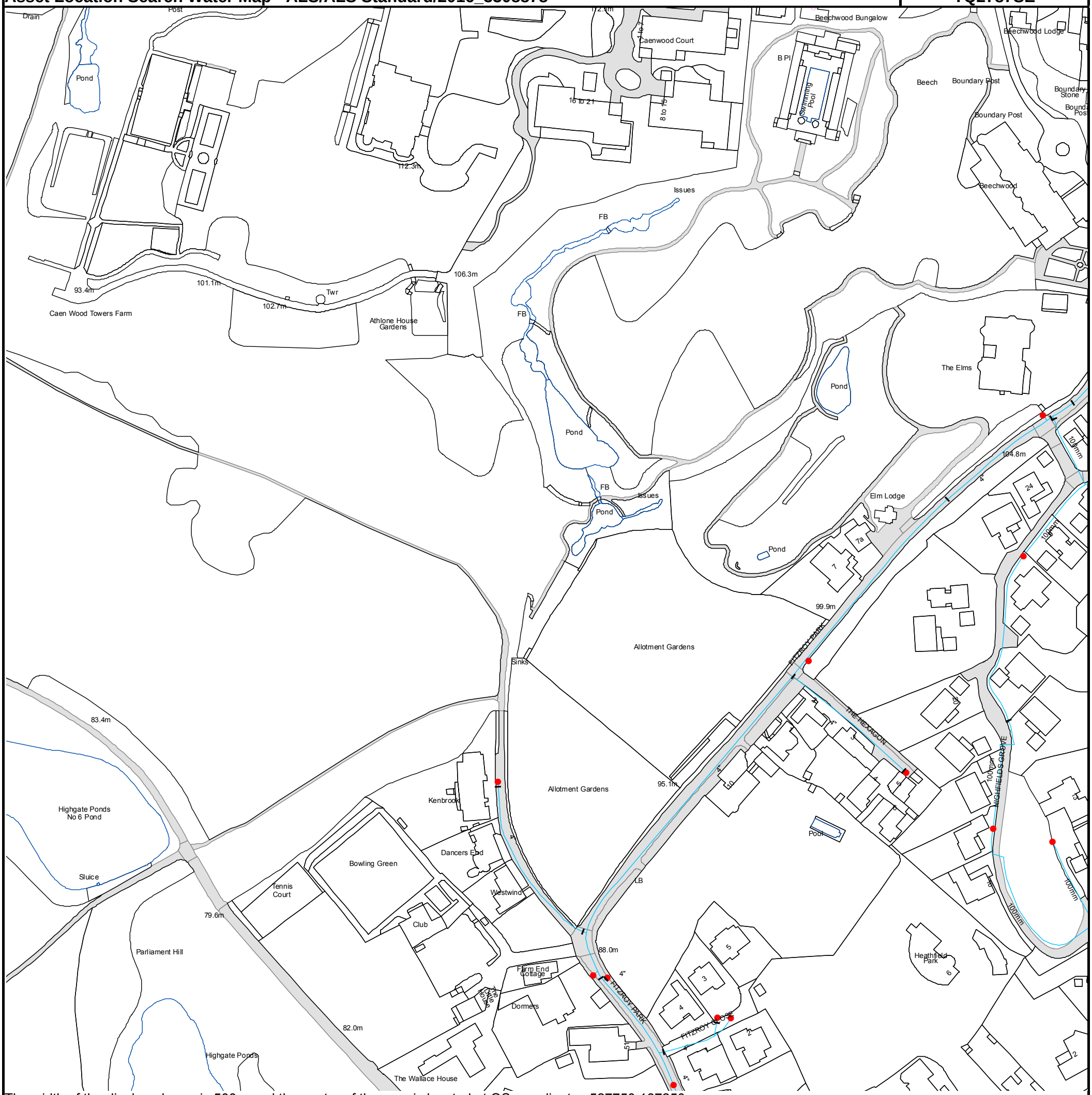
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

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/2016_3308878

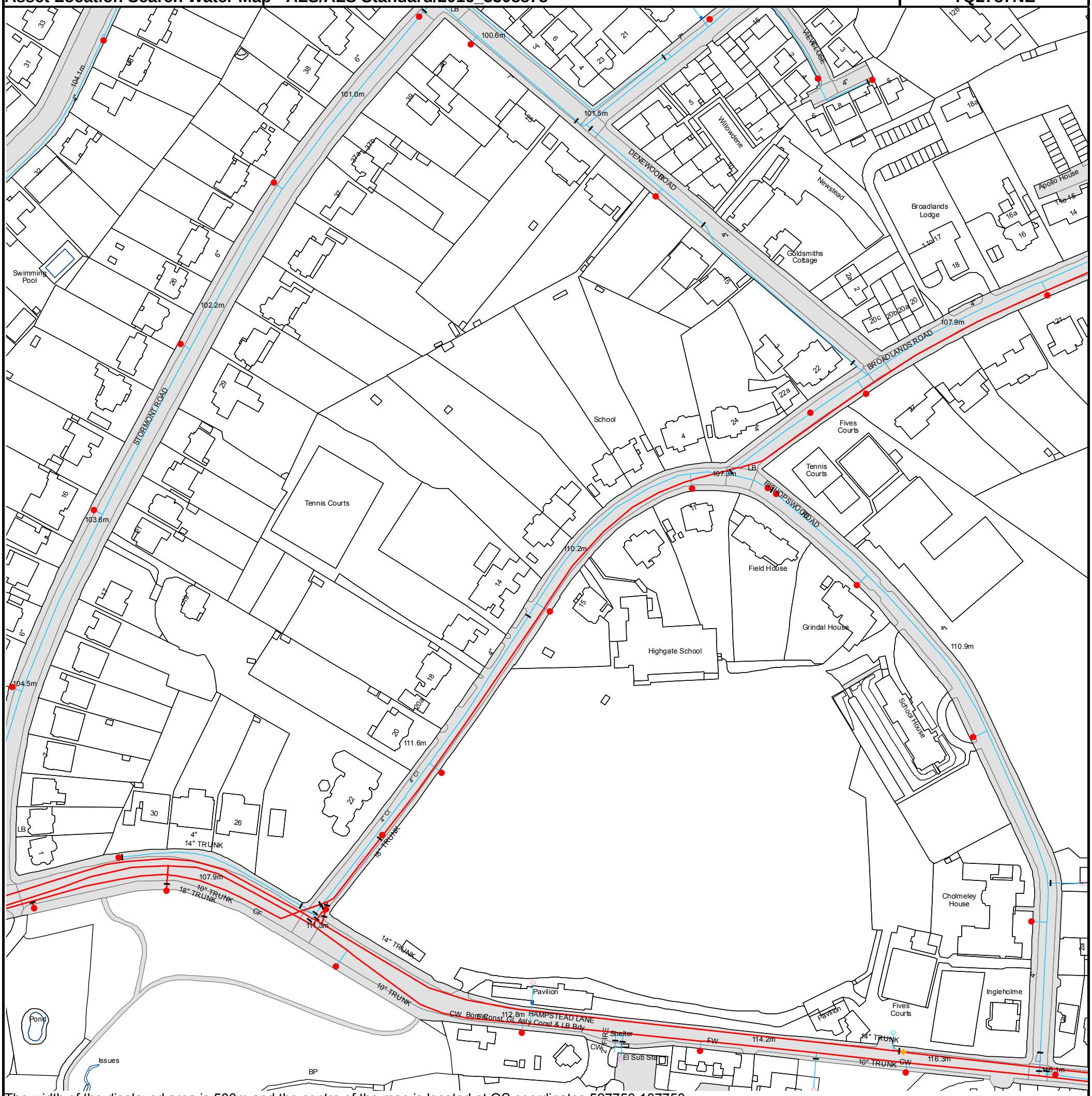
TQ2787SE



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

Asset Location Search Water Map - ALS/ALS Standard/2016_3308878

TQ2787NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,187750

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 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 him at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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

Ways to pay your bill

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

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

Appendix D – Thames Water Sewer Flooding Records

Sewer Flooding
History Enquiry

Infrastruct CS Ltd

Search address supplied

26
Hampstead Lane
London
N6 4NX

Your reference 2129 - DJ

Our reference SFH/SFH Standard/2016_3308879

Received date **20 April 2016**

Search date **20 April 2016**

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Sewer Flooding

History Enquiry

Search address supplied: 26,Hampstead Lane,London,N6 4NX

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

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Reading RG1 8DB

Sewer Flooding

History Enquiry

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

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Appendix E – Microdrainage tanked storage calculations

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

Half Drain Time : 165 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.351	0.691	0.0	10.5	10.5	111.6	O K
30 min Summer	98.538	0.878	0.0	10.5	10.5	141.8	O K
60 min Summer	98.678	1.018	0.0	10.5	10.5	164.4	O K
120 min Summer	98.731	1.071	0.0	10.5	10.5	172.9	O K
180 min Summer	98.705	1.045	0.0	10.5	10.5	168.7	O K
240 min Summer	98.668	1.008	0.0	10.5	10.5	162.8	O K
360 min Summer	98.594	0.934	0.0	10.5	10.5	150.8	O K
480 min Summer	98.521	0.861	0.0	10.5	10.5	139.0	O K
600 min Summer	98.445	0.785	0.0	10.5	10.5	126.8	O K
720 min Summer	98.362	0.702	0.0	10.5	10.5	113.4	O K
960 min Summer	98.225	0.565	0.0	10.5	10.5	91.3	O K
1440 min Summer	98.025	0.365	0.0	10.5	10.5	59.0	O K
2160 min Summer	97.870	0.210	0.0	10.0	10.0	33.9	O K
2880 min Summer	97.814	0.154	0.0	9.0	9.0	24.9	O K
4320 min Summer	97.778	0.118	0.0	6.7	6.7	19.0	O K
5760 min Summer	97.760	0.100	0.0	5.3	5.3	16.2	O K
7200 min Summer	97.750	0.090	0.0	4.4	4.4	14.5	O K
8640 min Summer	97.742	0.082	0.0	3.8	3.8	13.2	O K
10080 min Summer	97.736	0.076	0.0	3.3	3.3	12.2	O K
15 min Winter	98.443	0.783	0.0	10.5	10.5	126.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.329	0.0	121.7	25
30 min Summer	89.302	0.0	157.2	38
60 min Summer	54.817	0.0	193.4	66
120 min Summer	32.499	0.0	229.4	122
180 min Summer	23.630	0.0	250.2	156
240 min Summer	18.745	0.0	264.6	186
360 min Summer	13.505	0.0	286.0	254
480 min Summer	10.699	0.0	302.1	324
600 min Summer	8.924	0.0	315.0	394
720 min Summer	7.692	0.0	325.8	454
960 min Summer	6.081	0.0	343.4	578
1440 min Summer	4.360	0.0	369.2	810
2160 min Summer	3.122	0.0	396.8	1144
2880 min Summer	2.461	0.0	417.1	1476
4320 min Summer	1.758	0.0	446.7	2204
5760 min Summer	1.384	0.0	469.1	2936
7200 min Summer	1.149	0.0	486.8	3672
8640 min Summer	0.986	0.0	501.5	4376
10080 min Summer	0.867	0.0	514.0	5136
15 min Winter	138.329	0.0	136.3	25

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	98.652	0.992	0.0	10.5	10.5	160.2	O K
60 min Winter	98.815	1.155	0.0	10.5	10.5	186.6	O K
120 min Winter	98.895	1.235	0.0	10.7	10.7	198.5	O K
180 min Winter	98.863	1.203	0.0	10.5	10.5	194.3	O K
240 min Winter	98.815	1.155	0.0	10.5	10.5	186.5	O K
360 min Winter	98.717	1.057	0.0	10.5	10.5	170.7	O K
480 min Winter	98.615	0.955	0.0	10.5	10.5	154.2	O K
600 min Winter	98.509	0.849	0.0	10.5	10.5	137.1	O K
720 min Winter	98.384	0.724	0.0	10.5	10.5	116.9	O K
960 min Winter	98.174	0.514	0.0	10.5	10.5	82.9	O K
1440 min Winter	97.917	0.257	0.0	10.3	10.3	41.5	O K
2160 min Winter	97.805	0.145	0.0	8.5	8.5	23.5	O K
2880 min Winter	97.779	0.119	0.0	6.8	6.8	19.2	O K
4320 min Winter	97.755	0.095	0.0	4.9	4.9	15.4	O K
5760 min Winter	97.742	0.082	0.0	3.8	3.8	13.3	O K
7200 min Winter	97.734	0.074	0.0	3.2	3.2	11.9	O K
8640 min Winter	97.728	0.068	0.0	2.7	2.7	10.9	O K
10080 min Winter	97.723	0.063	0.0	2.4	2.4	10.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	89.302	0.0	176.1	38
60 min Winter	54.817	0.0	216.6	66
120 min Winter	32.499	0.0	256.9	120
180 min Winter	23.630	0.0	280.2	172
240 min Winter	18.745	0.0	296.4	196
360 min Winter	13.505	0.0	320.3	274
480 min Winter	10.699	0.0	338.4	350
600 min Winter	8.924	0.0	352.8	426
720 min Winter	7.692	0.0	364.9	494
960 min Winter	6.081	0.0	384.6	610
1440 min Winter	4.360	0.0	413.6	822
2160 min Winter	3.122	0.0	444.5	1124
2880 min Winter	2.461	0.0	467.1	1472
4320 min Winter	1.758	0.0	500.4	2204
5760 min Winter	1.384	0.0	525.4	2936
7200 min Winter	1.149	0.0	545.2	3672
8640 min Winter	0.986	0.0	561.7	4424
10080 min Winter	0.867	0.0	575.8	5056

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.800	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.471

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.157	4	8	0.157	8	12	0.157

Model Details

Storage is Online Cover Level (m) 99.610

Cellular Storage Structure

Invert Level (m) 97.660 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	170.0	170.0	2.600	0.0	237.8
0.200	170.0	180.4	2.800	0.0	237.8
0.400	170.0	190.9	3.000	0.0	237.8
0.600	170.0	201.3	3.200	0.0	237.8
0.800	170.0	211.7	3.400	0.0	237.8
1.000	170.0	222.2	3.600	0.0	237.8
1.200	170.0	232.6	3.800	0.0	237.8
1.400	0.0	237.8	4.000	0.0	237.8
1.600	0.0	237.8	4.200	0.0	237.8
1.800	0.0	237.8	4.400	0.0	237.8
2.000	0.0	237.8	4.600	0.0	237.8
2.200	0.0	237.8	4.800	0.0	237.8
2.400	0.0	237.8	5.000	0.0	237.8

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0146-1060-1200-1060
Design Head (m)	1.200
Design Flow (l/s)	10.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	146
Invert Level (m)	97.660
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	10.5
Flush-Flo™	0.357	10.5
Kick-Flo®	0.780	8.6
Mean Flow over Head Range	-	9.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.300	10.4	0.500	10.3	0.800	8.7
0.200	9.9	0.400	10.5	0.600	10.0	1.000	9.6

Hydro-Brake Optimum® Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	10.5	2.400	14.6	5.000	20.7	8.000	26.0
1.400	11.3	2.600	15.2	5.500	21.7	8.500	26.7
1.600	12.0	3.000	16.2	6.000	22.6	9.000	27.5
1.800	12.7	3.500	17.5	6.500	23.5	9.500	28.2
2.000	13.4	4.000	18.6	7.000	24.3		
2.200	14.0	4.500	19.7	7.500	25.2		