Northwood Investors

Templar House

Surface Water Drainage Statement

Report Ref

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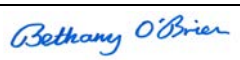
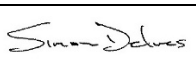
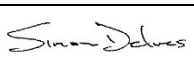
		Signature			
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Contents

Appendices

1 Introduction

Arup has been commissioned by Northwood Investors (hereafter, 'the Applicant') to prepare a Surface Water Drainage Statement in support of a planning application submitted for the redevelopment of Templar House, 81 - 87 High Holborn (hereafter, 'the Site'). The Site is located within the administrative boundary of the London Borough of Camden (LBC).

This report covers:

- an overview of flood risk to the development;
- the existing site drainage;
- the proposed surface water drainage strategy including discharge rates and storage volumes; and
- the feasibility of employing Sustainable Drainage Systems (SuDS) on the proposed development.

2 Summary of Relevant Policy and Guidance

This section summarises policy and guidance relevant to surface water drainage.

2.1 National Policy and Guidance

2.1.1 National Planning Policy Framework (March 2012) and National Planning Practice Guidance (November 2016)

The National Planning Policy Framework (NPPF) includes relevant policies under *10. Meeting the challenge of climate change, flooding and coastal change (Paragraphs 100 – 104).* The NPPF requires that development is safe, does not increase flood risk elsewhere, and that priority is given to SuDS.

The National Planning Practice Guidance (NPPG), comprising a web-based resource, has been published to ensure the effective implementation of the NPPF. The NPPG gives contingency allowances for sensitivity ranges for peak rainfall intensities to account for the expected impact of climate change. Advice regarding allowances for climate change was last updated in February 2017.

2.1.2 Department for Environment, Food and Rural Affairs Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)

The following clauses from the Standards are considered pertinent to the proposed development:

Peak flow control

Clause S3 states that:

> *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*

Volume control

Clause S5 states that:

> *Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

Clause S6 states that:

> *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*

Flood risk within the development

Clauses S7 to S9 state that:

- *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event;*
- *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development; and*
- *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

Designing for maintenance considerations

Clause S12 states that:

> *Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.*

2.2 Regional Policy and Guidance

2.2.1 The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011 (March 2016)

The document in its current state is *The London Plan* (2011) consolidated with *Revised Early Minor Alteration to The London Plan* (2013), *Further Alterations to The London Plan* (2015), *Housing Standards Minor Alterations to The London Plan* (March 2016) and *Parking Standards Minor Alterations to The London Plan* (March 2016).

The London Plan is the overall strategic plan for London setting out an integrated economic, environmental, transport and social framework for the development of London; it recognises the need to address the increasing effects of climate change.

Relevant policies from the Plan are outlined below:

Policy 5.13: Sustainable drainage

The policy states:

- *Development should utilise Sustainable Urban Drainage Systems (SuDS) unless there are practical reasons for not doing so, and should aim to achieve Greenfield runoff rates and ensure that surface water runoff 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.

- *Drainage should be designed and implemented in ways that deliver other policy objectives of this plan, including water use efficiency and quality, biodiversity, amenity and recreation.*

2.2.2 The London Plan: Supplementary Planning Guidance - Sustainable Design and Construction (April 2014)

The Supplementary Planning Guidance (SPG) sets out the Mayor's priorities with regard to flooding as follows:

- *Developers should maximise all opportunities to achieve greenfield runoff rates in their developments.*

- *When designing their schemes developers should follow the drainage hierarchy set out in London Plan policy 5.13.*

- *Developers should design Sustainable Drainage Systems (SuDS) into their schemes that incorporate attenuation for surface water runoff as well as habitat, water quality and amenity benefits.*

- *Developments are designed to be flexible and capable of being adapted to and mitigating the potential increase in flood risk as a result of climate change.*

2.3 London Borough of Camden Local Policy and Guidance

2.3.1 Camden Local Plan (2017)

The Local Plan sets out LB Camden's planning policies, superseding the Core Strategy and Development Policies (adopted 2010).

Policy CC2 Adapting to climate change

Policy CC2 requires that developments:

- do not increase, and where possible reduce, surface water runoff by increasing the permeable site area and employing SuDS.

Policy CC3 Water and flooding

Policy CC3 requires that developments:

- do not increase flood risk, and where possible, reduce the risk of flooding;
- utilise SuDS in line with the drainage hierarchy to achieve greenfield runoff rates where feasible; and
- incorporate water efficiency measures.

The Local Plan also identifies areas in LB Camden

2.3.2 Camden Planning Guidance CPG3: Sustainability

CPG3 provides guidance relevant to the design of surface water drainage in relation to water efficiency, green/ brown roofs, flooding and adapting to climate change.

3 Existing Site

3.1 Site location

The Site is located at 81-87 High Holborn in the London Borough of Camden, WC1V 6NU. The Ordnance Survey National Grid reference for the site is TQ 30711 81611. The location of the Site is shown in Figure 3.1.

Figure 3.1: Site location

The site is bounded by:

- Eagle Street to the north;
- High Holborn to the south;
- 28-34 Eagle Street, 72-75 Red Lion Street and 79-80 High Holborn to the east; and
- 90 High Holborn to the west.

The Site covers an area of 0.236 ha, the vast majority of which is the footprint of the existing Templar House office building. The existing building has seven storeys above ground and a single level basement that extends beneath the entire footprint of the Site. In its existing condition, the Site is covered entirely by impermeable surfaces.

The Site is accessible by pedestrians from both the north and the south, with the main entrance being from High Holborn to the south. The street level along High

Holborn on the south side of the Site is between +24.3 and +24.4mAOD, with a building threshold at the south entrance of +24.6mAOD.

Vehicle access is from Eagle Street to the north, via a ramp into the basement, which is mainly used as car parking. The threshold of the basement ramp entrance is at +24.96mAOD, which is 200mm above the adjacent road level. The north building entrance has a FFL of +24.94mAOD, with the adjacent footway at +24.84mAOD and the adjacent road level at +24.72mAOD.

4 Proposed Development

The Templar House Project involves the demolition of the existing commercial office building and the construction of two new buildings on the Site, as shown in Figure 4.1. One building, with 12 above-ground storeys, will primarily be a commercial office with retail accommodation at ground level; the other, with 13 above-ground storeys, will primarily be residential with ancillary accommodation at ground level. The buildings will be connected by a single storey basement.

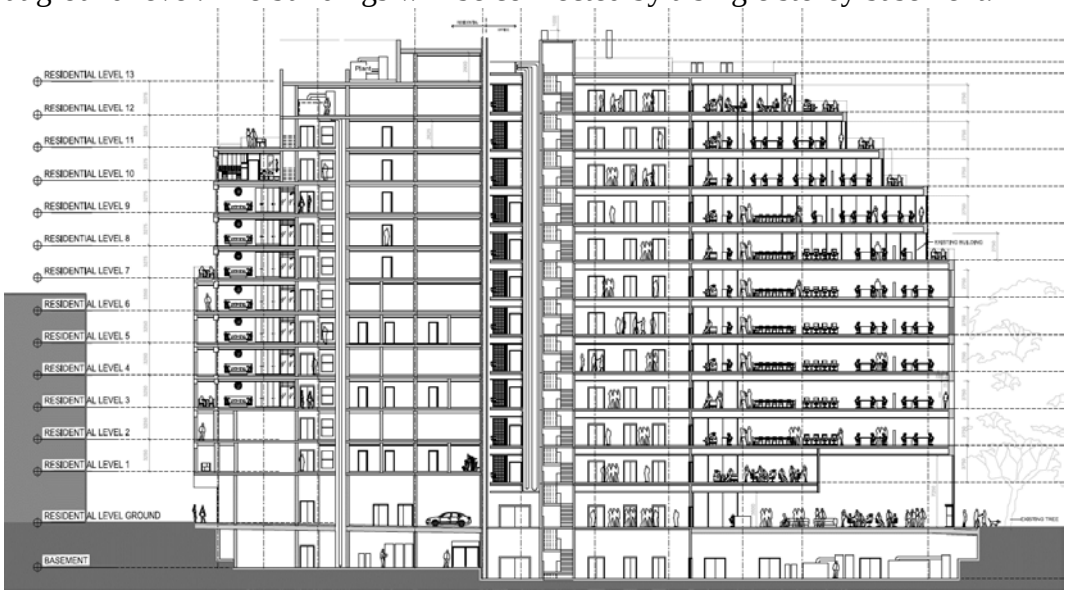


Figure 4.1: Proposed development

There is no change in the impermeable area as a result of the proposed development.

5 Flood Risk Summary

5.1 Fluvial/tidal flood risk

The Site is located in Flood Zone 1 on the Flood Map for Planning as shown on Figure 5.1. Therefore, the Site has a low risk of fluvial and tidal flooding.

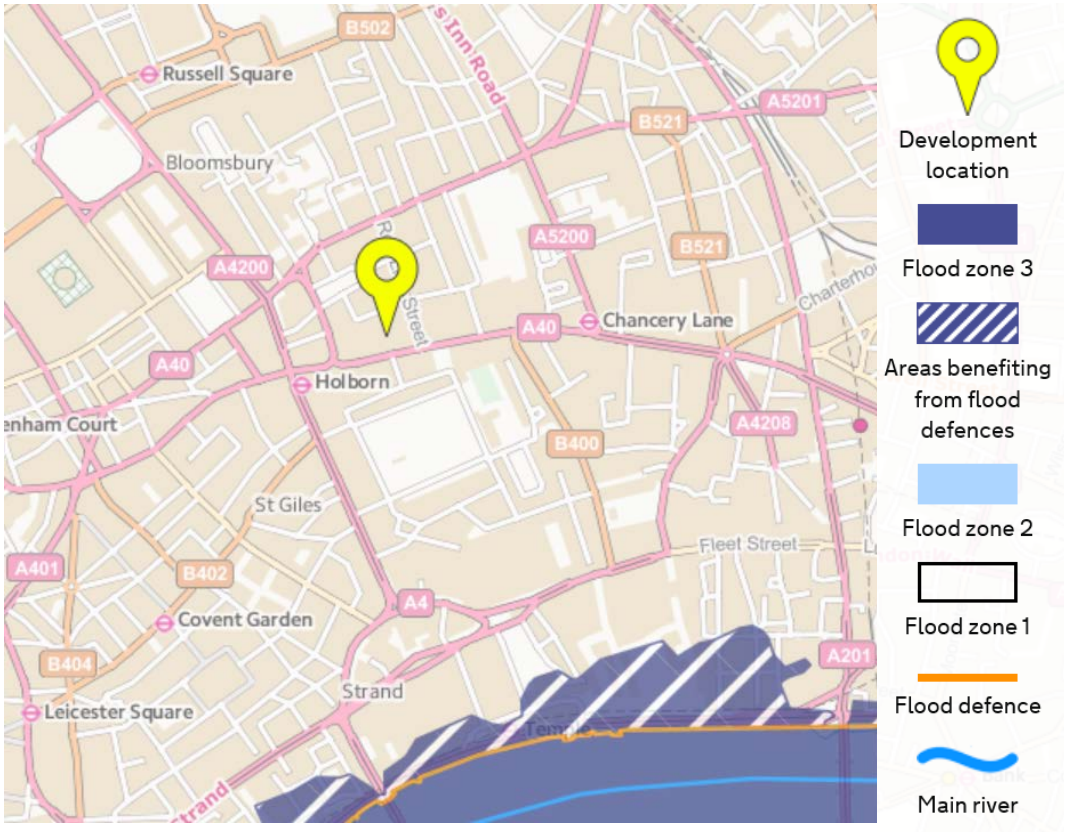


Figure 5.1: Flood Map for Planning (Gov.UK, 2018)

5.2 Surface Water and Sewer Flood Risk

The Site, as shown in Figure 5.2, has not been subject to a significant historic flood event, nor is it located in a Local Flood Risk Zone (LFRZ). LFRZs are areas considered to be vulnerable to flooding and are identified in the Camden Local Plan. It can be seen from the surface water flood map available on Gov.UK (see Figure 5.3) that the Site is identified as being at low risk of surface water flooding. Although this flood map does not show the susceptibility of individual properties to surface water flooding, it is based on aerial LiDAR data, and as such, identifies topographic low points in the local area surrounding the Site.

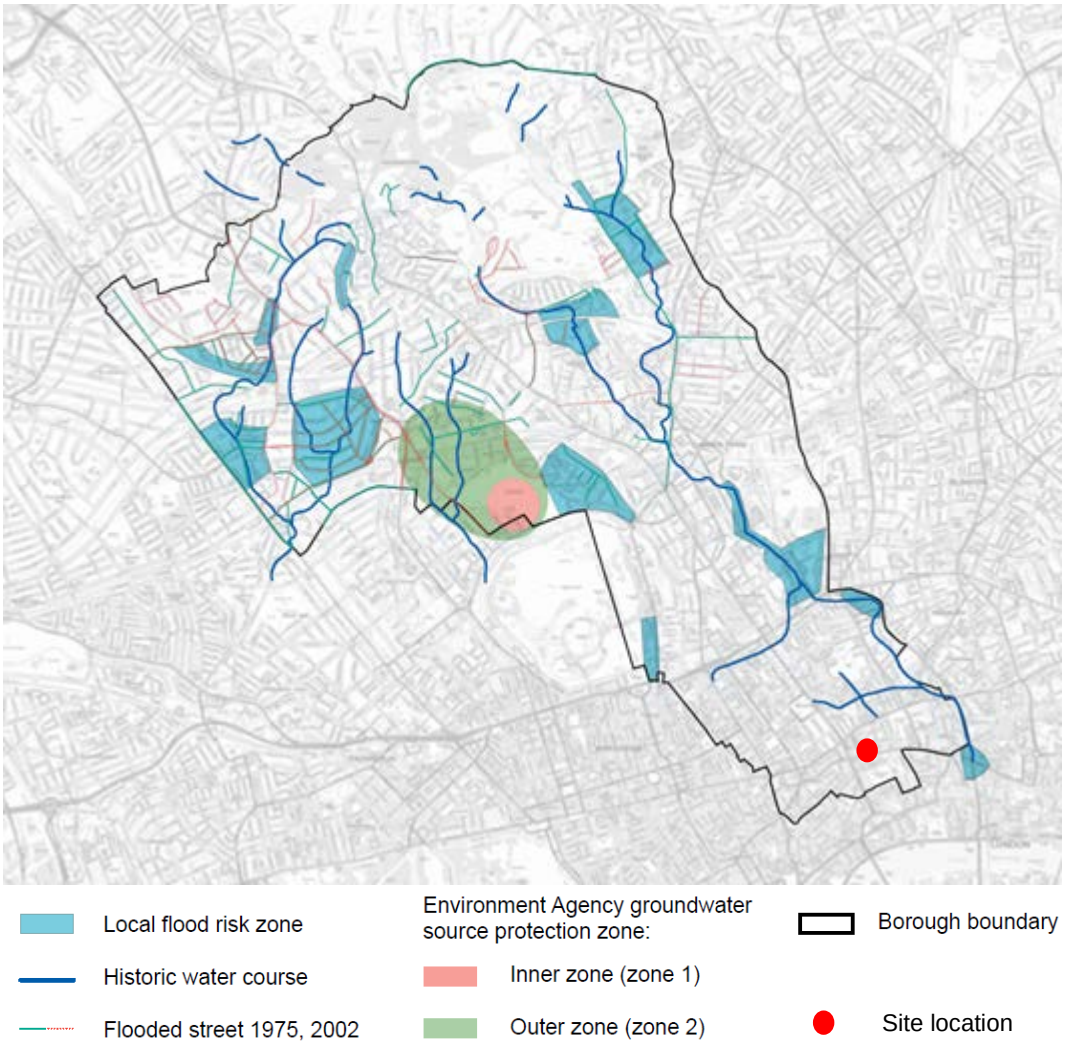


Figure 5.2: Map of historic flooding and LFRZs in LB Camden (LB Camden, 2017)

Proposed building threshold levels are such that the development will have a low risk of surface water flooding from adjacent streets (i.e. Eagle Street and High Holborn).

According to the LB Camden Strategic Flood Risk Assessment (SFRA) published in 2014, historic records provided by TWUL indicate that sewer flooding incidents have been concentrated in the west part of LB Camden, rather than the south where the Site is located.

The proposed drainage strategy for the development will minimise risk of surface water / sewer flooding to the Site and elsewhere by providing attenuation for storm events up to and including the 1 in 100 year storm event plus an allowance for climate change. Refer to Section 6 of this report for more information.

Figure 5.3: Surface water flood map (Gov.UK, 2018)

5.3 Groundwater Flood Risk

A geotechnical desk study of the Site was undertaken by Arup in December 2014.

One of the former Lost Rivers of London (underground tributaries of the River Thames) called the River Fleet had a tributary 250m to the north of the Site; however, the distance is such that this is not considered relevant with regard to groundwater flood risk to the Site.

Based on the stratigraphic profiles obtained from previous ground investigations near the Site it can be concluded that the Site is typical of those encountered in central London. The groundwater regime at the Site is likely to comprise:

- a shallow aquifer within the strata above the aquiclude that is formed by London Clay; and
- a deep aquifer within the strata lying below the London Clay;
- with the relatively impermeable strata of London Clay and Lambeth Group clays acting as an aquitard (non-aquifer) which separates and impedes the groundwater flow between the shallow and deep aquifers.

Based on available information from nearby sites, a groundwater level of approximately +20.5mOD for the shallow aquifer can be anticipated. The deep aquifer groundwater level is anticipated to be approximately -38mOD. The shallow aquifer groundwater level is likely to be just below the proposed basement slab. However, in the event that the proposed basement structure

extends below groundwater level, appropriate structural design and adequate waterproofing will prevent water ingress such that the residual risk of groundwater flooding is low.

5.4 Reservoir Flood Risk

The site is not located within the extents of flooding caused by a reservoir breach, as shown in the flood map in Figure 5.4.

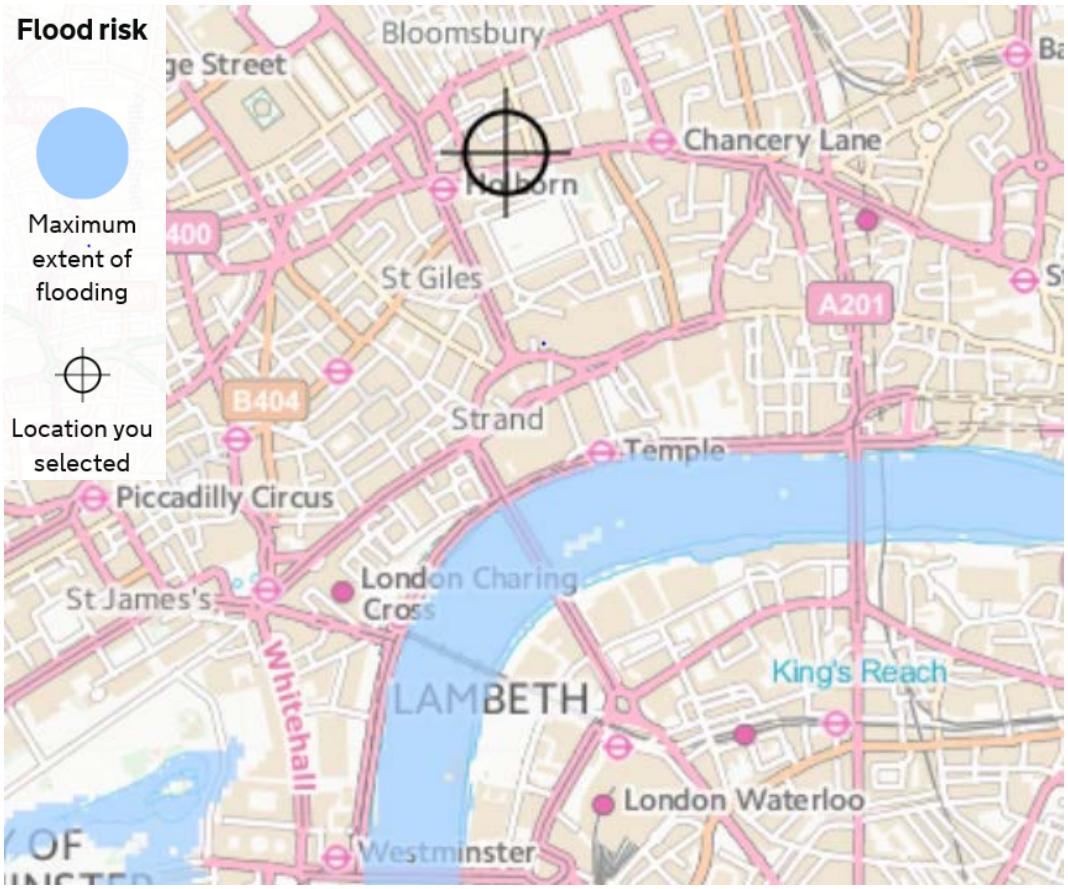


Figure 5.4: Map of flooding resulting from reservoir breach (Gov.UK, 2018)

In conclusion, it is considered that the Site is at low risk of flooding from all sources assessed in line with the NPPF, providing an adequate drainage strategy is implemented, as outlined in Section 6.

6 Drainage Strategy

6.1 Existing Drainage Infrastructure

A review of the Thames Water Utilities Ltd (TWUL) Asset Location Search (see Figure 6.1 and Appendix A) show:

- a 1067mm x 610mm combined sewer in Eagle Street. to the north of the Site; and
- a 1372mm x 914mm combined sewer in High Holborn to the south of the Site.

Both sewers appear to flow north-eastwards.

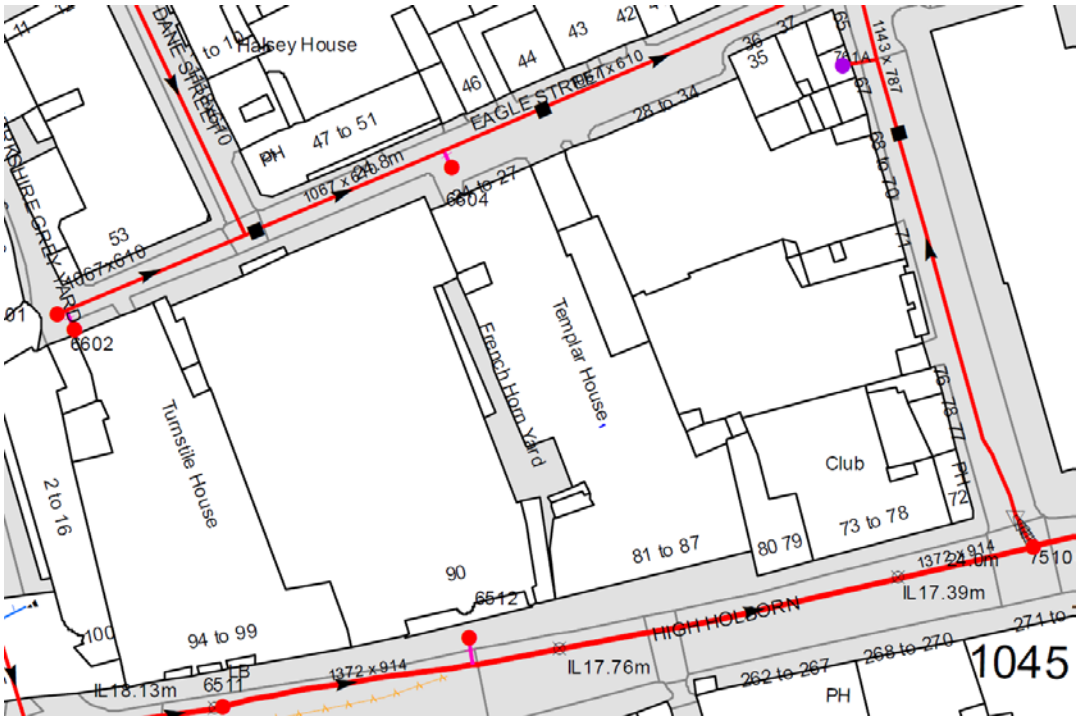


Figure 6.1: Extract from existing sewer records (TWUL, 2014)

Although the connection from the existing building to the public sewer is not shown on the TWUL records, it is likely that the existing point of discharge is via manhole 6604 to the north of the building, on Eagle Street. The invert level of this manhole is not given in the sewer records. Therefore, it will be necessary for a CCTV drainage survey to be undertaken to ascertain this information, as well as to confirm the existing sewer connections from the Site to determine whether they can be reused by the proposed development.

6.2 Proposed Connections to the Public Sewer

Due to site constraints, discharging surface water runoff via infiltration methods, direct discharge to a surface water course or discharge to a surface water sewer in line with the drainage hierarchy is not possible. Therefore, it is intended that both

foul discharges and surface water discharges will be conveyed to the public combined sewer.

The current intention is to discharge to the public combined sewer via two outfalls, one from each of the proposed buildings. It is envisaged that the residential building on the north part of the development will connect to the public sewer in Eagle Street and that the commercial building on the south part of the development will connect to the public sewer in High Holborn. The number and location of connections will be agreed with TWUL at the next design phase.

6.3 Proposed Discharge Rates and Storage Volumes

Although it is proposed that the development discharges to the public sewer via two outfalls, the calculated proposed discharge rates and storage volumes are given as a total for the whole development. During the next design stage, and after consultation with TWUL, it will be possible to determine the proportion of the discharge rate and storage volume that will be used and provided by each building.

The LB Camden surface water drainage pro-forma is appended to this Statement (see Appendix B).

6.3.1 Foul

Foul water from the development will be minimised by using water efficient fittings in the buildings. Greywater reuse is also proposed to reduce foul flows to the public sewer.

6.3.2 Surface water

The impermeable area of the existing site and the proposed development are the same; therefore the development will not result in an increase in the surface water runoff rate or volume compared with the existing condition. An allowance of 40% on peak rainfall intensity has been made in the calculation of the 1 in 100 year storm event, in line with current NPPG guidance.

There are a number of constraints on the development that limit the potential for stormwater attenuation:

- The extent of the basement structure means that surface water cannot be discharged via infiltration;
- The coverage of the entire Site area by the building footprints means attenuation cannot be provided in landscaping features such as ponds or pervious hard surfaces; and
- Due to the whole site area being covered by the building footprint, subsurface storage will need to be provided to attenuate the 1 in 100 year (plus climate change) event in order to retain runoff from this event within the Site boundary. This is more onerous than the typical design

aspiration to store the 1 in 30 year storm event below ground and the 1 in 100 year (plus climate change event) above ground.

Considering the constraints on storage, it is not reasonably practicable to achieve the greenfield runoff rates calculated for the Site (see Figure 6.2 and Appendix C). In addition, the Greenfield rates (Qbar being 0.37l/s) are too low to ensure self-cleansing velocities are achieved in the onsite drainage network.

Qbar (l/s)	0.37	0.37
1 in 1 year (l/s)	0.31	0.31
1 in 30 years (l/s)	0.84	0.84
1 in 100 years (l/s)	1.17	1.17

Figure 6.2: UK SuDS tool output of Greenfield runoff rates for the Site (HR Wallingford, 2018)

Instead, it is proposed that the maximum allowable surface water discharge rate for the Site be based on a "50% of existing" rate, as referenced in the Supplementary Planning Guidance to the London Plan.

It is assumed that, in line with Sewers for Adoption, the existing site drainage is designed to carry up to a 1 in 5 year storm event without surcharging. The estimate of the existing surface water discharge rate for the Site, based on a 1 in 5 year event and an impermeable area of 0.236 ha, is 36.3l/s. Therefore, the maximum allowable discharge rate, based on a "50% of existing" betterment scenario, is 18.2l/s.

Policy requires that runoff from developments be attenuated to at least 50% of the existing surface water runoff rate for a given event. For storm events with a return period greater than 1 in 5 years a reduction of more than 50% is achieved with a limiting discharge of 18.2l/s (e.g. a 66% reduction of the 1 in 30 year runoff rate and a 74% reduction of the 1 in 100 year runoff rate).

However, for storm events with a shorter return period (i.e. the 1 in 1 year storm) the limiting discharge rate must be reduced to achieve a 50% reduction. To achieve a 50% reduction of the existing 1 in 1 year surface water discharge rate of 21.9l/s, it is necessary to limit discharges to 10.9l/s.

It is proposed that this is achieved by utilising the flow profile of a Hydrobrake to:

- achieve the maximum discharge rate of 18.2l/s for events equivalent to a 1 in 5 year return period storm or greater;
- whilst limiting the discharge rate for events equivalent to a 1 in 1 year return period storm to 10.9l/s.

The Quick Storage Estimate function in MicroDrainage, using FSR rainfall data, has been used to estimate the amount of storage required to attenuate a 1 in 100 year event (plus climate change) to a limiting discharge rate of 18.2l/s. The estimated range has a lower value of 60 m^3 and an upper value of 100$m^{3.}$ Therefore, it is proposed that a storage volume of approximately 80m^3 is required on the development.

7 Sustainable Drainage Systems (SuDS)

7.1 Feasibility Assessment

Policy and guidance (see Section 2) emphasise the importance of utilising SuDS, where feasible, to reduce the rate and volume of surface water runoff from developments.

A preliminary assessment of SuDS options has been carried out to determine which would be suitable for inclusion in the proposed scheme. The recommendations of this assessment are shown below in Table 7.1.

Table 7.1: SuDS assessment for Templar House

SuDS Technique	Feasible?	Description/Comments
Rainwater harvesting	✓	Rainwater from roofs can be stored and re-used in the building, reducing both the runoff rate and volume. There is an option to combine the functions of rainwater harvesting and attenuation in a single tank, using a system that is managed remotely by discharging stored rainwater in anticipation of a forecast storm event. It is recommended that rainwater harvesting be considered at the next stage of design. The system is likely to require pumping.
Pervious paving	×	Suitable for pedestrian/vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. Water is temporarily stored before discharge to a drainage system. Aggregate sub-bases can provide good water quality treatment. The vast majority of the site is covered by the building footprints; therefore, pervious paving is not considered appropriate.
Blue-green roofs	✓	Green or brown roofs comprise a multi-layered system that covers the roof of a building with vegetation, providing a reduction in a runoff and treatment of pollutants. A blue-green roof has, in addition, a layers of geocellular crates in the buildup to attenuate rainwater above the waterproofing membrane. It is recommended that a shallow blue roof system be explored at the next stage of design to provide storage.
Filter strips	×	Filter strips are vegetated strips of land designed to accept runoff as overland sheet flow from hard surfaces, such as roads. The vast majority of the site is covered by the building footprints. Therefore, there is not scope to provide attenuation as part of the landscaping strategy.
Swales	×	Swales are vegetated drainage features in which surface water can be stored or conveyed, aiming to reduce velocity of run off to allow suspended particulates to settle. The vast majority of the site is covered by the building footprints. Therefore, there is not scope to provide attenuation as part of the landscaping strategy.

SuDS Technique	Feasible?	Description/Comments
Ponds	×	Ponds can provide stormwater attenuation and treatment (through sedimentation and aquatic vegetation). The vast majority of the site is covered by the building footprints. Therefore, there is not scope to provide attenuation as part of the landscaping strategy.
Soakaways	×	Sub-surface structures that store and dispose of water via infiltration. Not proposed due to the presence of a basement level beneath the entire building footprint.
Sand filters	×	Sand filters are single or multi-chambered structures designed to treat surface water runoff through filtration using a sand bed as the primary filter medium. Attenuation is achieved through ponding above the filter layer. They are used where particularly high pollutant removal is required. Not proposed as high pollutant removal is not considered necessary. The surface water runoff is from the roofs and is considered to be relatively uncontaminated.
Subsurface storage	✓	Oversized pipes and accessories, such as tanks and geocellular modules, can provide conveyance and storage. Treatment can occur through sedimentation and/or filter media. An attenuation tank at basement level is currently proposed.

It is currently proposed that the required storage volume of 80m^3 be provided in the form of storage tanks at basement level due to the site constraints eliminating many of the SuDS options available.

It is recommended that incorporating a blue-roof system, comprising shallow storage modules above the roof waterproofing membrane, be explored as the building design progresses to determine whether it would be an effective means of providing some storage on this development.

If the level of the existing sewer does not allow for gravity discharge, surface water will need to be pumped at the limiting discharge rate. If it is possible to achieve a gravity discharge, flows will be limited using a flow control device such as a Hydrobrake.

7.2 Management and Maintenance of SuDS

The use of SuDS on the Site will mean that ongoing monitoring and maintenance will be required.

The site's SuDS will not be adopted by a public body, but will be owned and managed by the Applicant. As such, the appointed facilities management team will be provided with an Operation and Maintenance Manual detailing:

- the location of all SUDS and drainage systems;
- a summary of component parts, their purpose and potential performance risks;
- details of maintenance trigger indicators;

- the Maintenance Plan and maintenance record pro forma;
- details of contacts for system failure incidents;
- areas where certain activities could compromise drainage; and
- advice on actions to be taken if alterations are to be made to the development.

The SuDS Maintenance Plan should be reviewed annually. Guidance on SuDS maintenance can be found in *CIRIA C753: The SuDS Manual*. Maintenance of proprietary products (e.g. flow controls) should be in line with the manufacturer's specification.

Appendix A

Thames Water Utilities Ltd sewer map

Asset Location Search

Joe Shawyer
Groundwise Searches Ltd
Suite 8 Chichester House
45Chichester Road
SOUTHEND ON SEA
SS1 2JU

Search address supplied 530694 181592
Eagle Street
London
WC1V 6NU

Your reference URO4716.1JS

Our reference ALS/ALS Standard/2014_2837076

Search date 7 August 2014

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

Asset Location Search

Search address supplied: 530694 181592, Eagle Street, London, WC1V 6NU

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.

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

An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 3189, Slough, SL1 4WW.

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: 0800 316 9800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

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

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

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

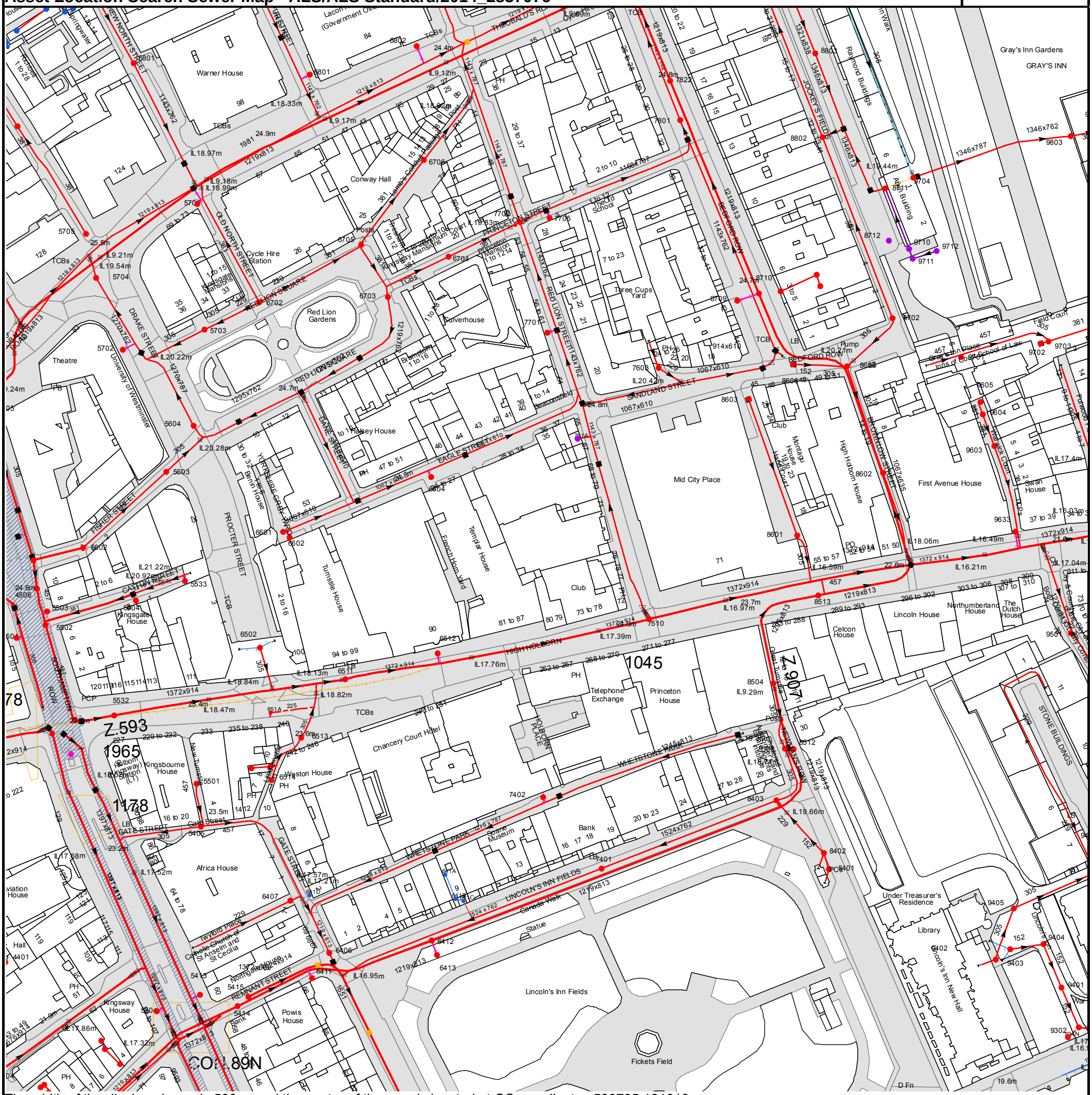
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2014_2837076



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 530735,181613

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
9803	n/a	n/a
9603	22.96	18.33
9604	22.76	18.8
9605	n/a	n/a
9701	22.47	18.41
9702	n/a	n/a
9703	21.03	17.5
6706	24.11	19.81
6704	24.63	20.02
7702	24.67	17.8
7701	n/a	n/a
7705	n/a	n/a
761A	n/a	n/a
7603	24.91	20.92
7822	24.5	n/a
7801	24.75	19.32
8709	n/a	n/a
8603	24.68	21.15
8710	n/a	n/a
87BG	n/a	n/a
8606	24.6	20.63
8803	23.51	19.76
87BF	n/a	n/a
87BE	n/a	n/a
8802	23.59	18.77
8605	23.87	19.98
8602	23.09	19.08
8711	n/a	n/a
8712	n/a	n/a
8702	23.78	20.87
9710	n/a	n/a
9711	n/a	n/a
9704	23.25	18.84
9712	n/a	n/a
9403	20.23	19.44
9404	19.97	19.26
9405	20.16	16.2
9501	21.13	16.15
9633	22.14	n/a
6604	24.71	n/a
6412	n/a	n/a
6413	n/a	n/a
6512	24.12	n/a
641A	n/a	n/a
641B	n/a	n/a
641C	n/a	n/a
7402	n/a	n/a
7401	22.85	17.99
7510	24.18	n/a
8504	23.49	20.05
8403	22.63	18.28
8502	23.39	n/a
8512	n/a	n/a
8601	23.79	19.34
8513	23.03	9.26
8402	22.14	19.95
8401	22.02	20.89
9402	20.33	16.61
934N	n/a	n/a
9302	19.56	18.75
9401	19.79	19.03
43BD	n/a	n/a
53EE	n/a	n/a
53DG	n/a	n/a
53DF	n/a	n/a
53DE	n/a	n/a
5304	n/a	n/a
5414	n/a	n/a
5415	n/a	17.56
5413	n/a	n/a
6411	n/a	n/a
6406	22.58	17.06
6407	23.03	18.16
641D	n/a	n/a
5405	23.48	19.04
5501	23.29	19.58
6514	23.7	21.1
5594	n/a	n/a
6515	n/a	n/a
5506	n/a	n/a
6513	23.45	20.17
5505	n/a	n/a
5531	n/a	n/a
5532	23.55	18.77
651A	n/a	n/a
6511	23.71	n/a
6502	23.93	19.35
4504	n/a	n/a
5502	n/a	n/a
5503	n/a	n/a
4503	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5504	n/a	n/a
4506	n/a	n/a
5533	25.19	n/a
4604	n/a	n/a
5602	25.05	n/a
6602	n/a	n/a
6601	25.09	20.83
48BG	n/a	n/a
48BH	n/a	n/a
48BE	n/a	n/a
4801	24.78	20.24
58BF	n/a	n/a
58BB	n/a	n/a
58BC	n/a	n/a
5705	25.25	20.5
5704	25.56	19.62
5702	n/a	n/a
5801	24.86	19.32
5603	24.89	20.42
5604	24.89	20.1
5701	n/a	n/a
5703	24.77	20.5
6702	24.83	21.52
6801	n/a	n/a
6705	24.57	20.23
6703	24.67	20.7
6802	n/a	n/a

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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.

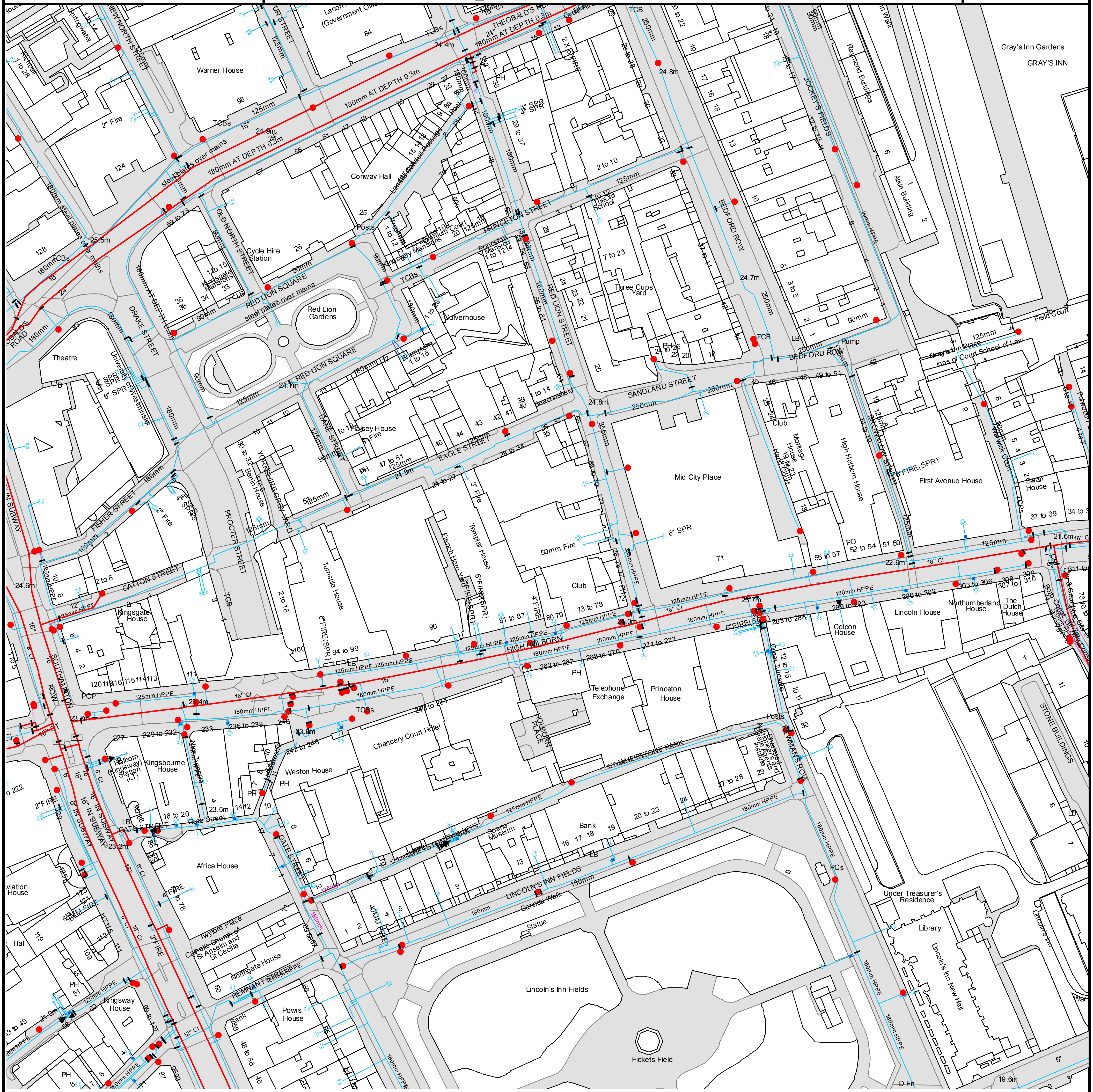
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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/2014_2837076



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 530735, 181613.

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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

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

3" SUPPLY

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

3" FIRE

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

3" METERED

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

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

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

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

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

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

Terms and Conditions

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

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

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

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

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to 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.

Invoice

Joe Shawyer

Groundwise Searches Ltd
45 Chichester House
Chichester Road
Southend on Sea
SS1 2JU

Thames Water Utilities Ltd.
PO Box 3189
Slough
SL1 4WW

Customer Reference: URO4716.1JS
Customer Number: ADS104834
Purchase Order No:

Invoice No: ADS14370199
Our Ref: ALS/ALS Standard/2014_2837076
Posting Date: 07-08-2014
Due Date: 21-08-2014

Search Address Supplied: 530694 181592, Eagle Street, London, WC1V 6NU

Description of Charges	Qty	Unit Price	VAT (20%)	Amount (Inc VAT)
Asset Location Search	1	£47.40	£9.48	£56.88

OUTSTANDING AMOUNT (Inc. VAT) £56.88

Please send any outstanding amount to Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.

Your payment terms are within 14 days. Please see previous page for ways to pay.

For queries please contact the Property Searches Customer Support Team on Tel: 0845 070 9148.

VAT Reg. No GB 537456915

Girobank Trans cash

Girobank plc Bootle Merseyside GIR 0AA

Payment slip

bank giro credit

138 208 70

Reference (customer account number): ADS104834 / ADS14370199

Credit account number: 257 1706

Amount due (40p fee payable at PO counter): £ 56.88

Cheque NOT acceptable at Post Office

By transfer from Alliance and Leicester Giro account number

Cashiers stamp and initials

Signature

Date

Groundwise Searches Ltd
45 Chichester House
Chichester Road
Southend on Sea
SS1 2JU

NatWest
Collection Account
Thames Water
Utilities Ltd

57-17-06

Cash

Cheques

£

Items Fee

Please do not write or mark below this line and do not fold this counterfoil

Paragon 6530 01/2004

01001000370199X V7702571706 000056880 74 X

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 B

LB Camden surface water drainage pro-forma

Surface Water Drainage Pro-forma for new developments

This pro-forma accompanies our advice note on surface water drainage. Developers should complete this form and submit it to the Local Planning Authority, referencing from where in their submission documents this information is taken. The pro-forma is supported by the Defra/EA guidance on Rainfall Runoff Management and uses the storage calculator on www.UKsuds.com. This pro-forma is based on current industry best practice and focuses on ensuring surface water drainage proposals meet national and local policy requirements. The pro-forma should be considered alongside other supporting SuDS Guidance.

1. Site Details

Site	Templar House
Address & post code or LPA reference	81-87 High Holborn, London WC1V 6NU
Grid reference	TQ 30711 81611
Is the existing site developed or Greenfield?	Developed
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding? If yes, please demonstrate how this is managed, in line with DP23?	The development is not in a LFRZ. An assessment of surface water and groundwater flood risk is included in the Surface Water Drainage Statement; the development is considered to be at low risk of surface water and groundwater flooding.
Total Site Area served by drainage system (excluding open space) (Ha)*	0.236

***** The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers
Impermeable area (ha)	0.236	0.236	No change in impermeable area	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed impermeability is equal or less than existing, then section 6 can be skipped and section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)	public sewer	public sewer	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via **Proposed drainage method same as existing. Section 3 not required.**

	Yes	No	Evidence that this is possible	Notes for developers
Existing and proposed MicroDrainage calculations				Please provide MicroDrainage calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration				e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse				e.g. Is there a watercourse nearby?
To surface water sewer				Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above				e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?				Evidence must be provided to demonstrate that the proposed Sustainable Drainage strategy has had regard to the SuDS hierarchy as outlined in Section 2.5 above.
Layout plan showing where the sustainable drainage infrastructure will be located on site.				Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	% Difference (difference /existing x 100)	Notes for developers
Greenfield QBAR	0.37	N/A	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	21.88	10.94	10.94	50%	Proposed discharge rates (with mitigation) should aim to be equivalent to greenfield rates for all corresponding storm events. As a minimum, peak discharge rates must be reduced by 50% from the existing sites for all corresponding rainfall events.
1 in 30	53.74	18.16*	35.58	66%	
1in 100	69.93	18.16*	51.76	74%	
1 in 100 plus climate change	N/A	18.16*	n.a.	74% of 1 in 100	The proposed 1 in 100 +CC peak discharge rate (with mitigation) should aim to be equivalent to greenfield rates. As a minimum, proposed 1 in 100 +CC peak discharge rate must be reduced by 50% from the existing 1 in 100 runoff rate sites.

***Proposed rate of "50% of existing" based on an estimated existing sewer capacity sufficient to carry a 1 in 5 yr storm event without surcharging as per Sewers for Adoption.**

5. Calculate additional volumes for storage –The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of stormwater that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

	Greenfield runoff volume (m^3)	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
1 in 1	0.3 (15 min event)	19.7 (15 min event)	19.7 (15 min event)	0	Proposed discharge volumes (with mitigation) should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable and as a minimum should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30	0.8 (15 min event)	25.4 (15 min event)	25.4 (15 min event)	0	
1in 100 6 hour	25.3	148	148	0	
1 in 100 6 hour plus climate change	35.4	148 (1 in 100 6 hour existing)	208	60 (resulting from increased rainfall intensity due to climate change)	The proposed 1 in 100 +CC discharge volume should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable. As a minimum, to mitigate for climate change the proposed 1 in 100 +CC volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

Proposed impermeable area equal to existing. Section 6 not required.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m^3)		Volume of water to attenuate on site if discharging at a greenfield run off rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m^3)		Volume of water to attenuate on site if discharging at a 50% reduction from existing rates. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible] (m^3)		Volume of water to attenuate on site if discharging at a rate different from the above – please state in 1st column what rate this volume corresponds to. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m^3)		Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Percentage of attenuation volume stored above ground,		Percentage of attenuation volume which will be held above ground in swales/ponds/basins/green roofs etc. If 0, please demonstrate why.

7. How is Storm Water stored on site? Site area covered by building footprint; therefore, infiltration not feasible.

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	**State the Site's Geology and known Source Protection Zones (SPZ)**	n.a.	Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	n.a.	Infiltration rates should be no lower than $1x10^{-6}$ m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	n.a.	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.

	Were infiltration rates obtained by desk study or infiltration test?	n.a.	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided..
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	n.a.	Advice on contaminated Land in Camden can be found on our supporting documents webpage Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	**Yes/No? If the answer is No, please identify how the storm water will be stored prior to release**	Infiltration not feasible due to total site area being covered by the building footprint.	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfield run off rate. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	80m3	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
Which Drainage Systems measures have been used, including green roofs?	Basement attenuation tank and blue roof	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	Yes - attenuation designed for 1 in 100+cc	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Will the drainage system contain the 1 in 100 +CC storm event? If no please demonstrate how buildings and utility plants will be protected.	Yes - attenuation designed for 1 in 100+cc	National standards require that the drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	Yes - attenuation designed for 1 in 100+cc	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	Overflow directed to public sewer.	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased. Exceedance events are defined as those larger than the 1 in 100 +CC event.
How are rates being restricted (vortex control, orifice etc)	Hydrobrake for gravity (otherwise, pumped)	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	Northwood Investors	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How is the entire drainage system to be maintained?	Refer to Surface Water Drainage Statement Section 7.	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided. Details must demonstrate that maintenance and operation requirements are economically proportionate. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your proforma, in particular exceedance routes and ownership and location of SuDS (maintenance access strips etc

Pro-forma Section	Document reference where details quoted above are taken from	Page Number
Section 2	Surface Water Drainage Statement, Section 3, 4 and 6	
Section 3	Proposed drainage method same as existing. Section 3 not required.	
Section 4	Surface Water Drainage Statement, Section 6	
Section 5		
Section 6	Proposed impermeable area equal to existing. Section 6 not required.	
Section 7	Surface Water Drainage Statement, Section 6	
Section 8	Surface Water Drainage Statement, Section 6 and 7	

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form Completed By Simon Delves
Qualification of person responsible for signing off this pro-forma CEng MICE
Company Ove Arup and Partners
On behalf of (Client's details) Northwood Investors
Date: 24/01/2018

Appendix C

HR Wallingford UK SuDS Tool
Greenfield Runoff Rates

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Bethany O'Brien
Site name:	Templar House
Site location:	London, WC1V 6NU (London Borough of Camde

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	51.51830° N
Longitude:	0.11759° W

Reference:	6226314
Date:	2018-01-21T15:17:43

Methodology	IH124

Site characteristics

Total site area (ha)	0.236

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	611	611
Hydrological region	6	6
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.37	0.37
1 in 1 year (l/s)	0.31	0.31
1 in 30 years (l/s)	0.84	0.84
1 in 100 years (l/s)	1.17	1.17