# Flood Risk Assessment & Surface Water Drainage Strategy

## 13A North Common Road, Uxbridge

HDB Investments Ltd

Sweco UK Limited
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# Status / Revisions

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# 1 Introduction

Sweco UK has been appointed by HBD Investments Limited, hereafter known as the Client, to undertake an update to our previous Flood Risk Assessment (FRA) and Drainage Strategy to inform the design of their proposed residential development at 13A North Common Road, Uxbridge.

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

The site is shown on the Environment Agency (EA) Flood map for planning (see Figure 1) to lie in Flood Zone 1 (low risk). Flood Zone 1 is the area described as having a less than 0.1% annual probability of river or sea flooding. All land uses are appropriate in this flood zone.

It is proposed to develop the site for residential use.

Table 1 shows the relationship between flood uses and vulnerability classification. The site lies in Flood Zone 1 and is more vulnerable and is therefore shown to be an appropriate use.

*Table 1 – Flood Zone and Vulnerability Classification*

| Flood Zone | Flood Risk Vulnerability Classification | | | | |
|---|---|---|---|---|---|
| | Essential Infrastructure | Highly Vulnerable | More Vulnerable | Less Vulnerable | Water Compatible |
| Zone 1 | Yes | Yes | Yes | Yes | Yes |
| Zone 2 | Yes | Exception Test Req'd | Yes | Yes | Yes |
| Zone 3a | Exception Test Req'd | No | Exception Test Req'd | Yes | Yes |
| Zone 3b* | Exception Test Req'd* | No | No | No | Yes* |

** uses should be designed and constructed to 1) remain operation and safe during flood, 2) not result in net loss of floodplain, and 3) not impeded flow of water or increase flood risk elsewhere*

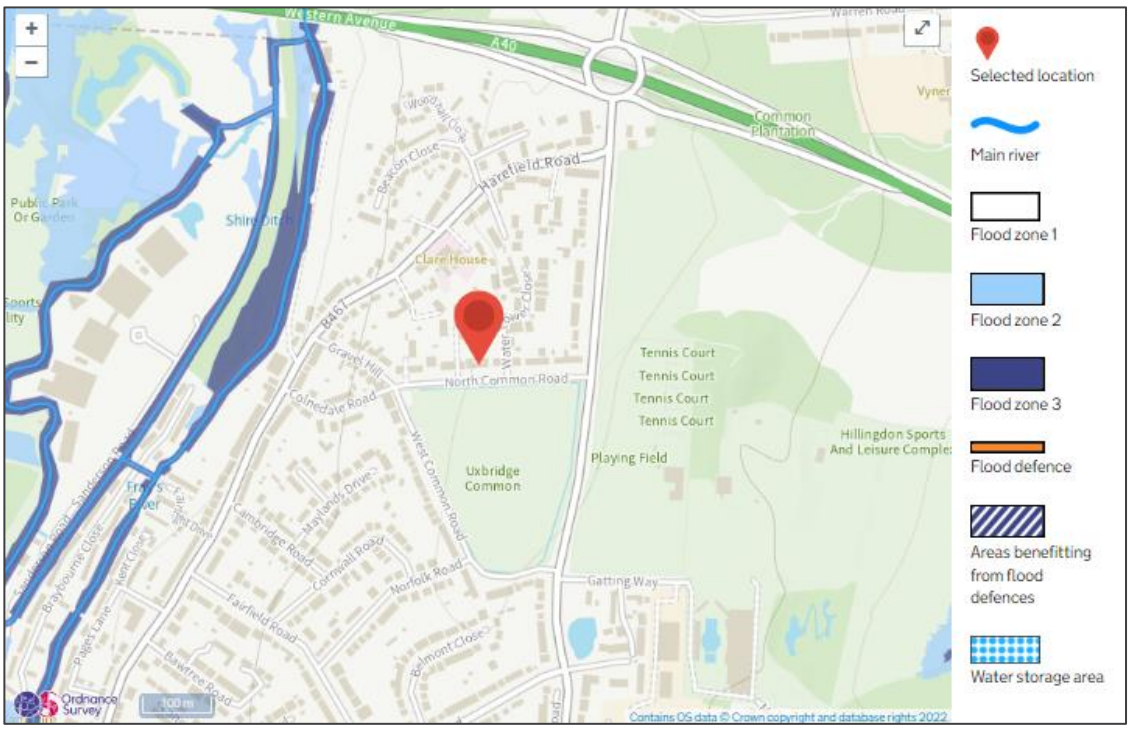



*Figure 1 - EA Flood map for planning*

This report includes commentary on the surface water drainage strategy for the site which sets out how the proposals will attenuate surface water run-off, provide treatment and discharge at a controlled rate from the site. The report discusses the use of Sustainable Drainage Systems (SuDS) at the site for the attenuation and removal of pollutants prior to discharge from the site.

# 2 Policy Context

## 2.1 Flood and Water Management Act (2010)

The Flood and Water Management Act 2010 defines clearer roles and responsibilities for the implementation of SuDS in developments, by requiring drainage systems to be approved against a set of draft National standards.

In December 2014 the government set out changes to planning that apply to major development from 6 April 2015. This change confirmed that in considering planning applications, local planning authorities (LPA) should consult the relevant Lead Local Flood Authority (LLFA) on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

On 15 April 2015 the LLFA became a statutory consultee on surface water and SuDS proposals.

## 2.2 West London Strategic Flood Risk Assessment (2018)

The West London Strategic Flood Risk Assessment 2018 (SFRA) is a joint Level 1 Strategic Flood Risk Assessment for London Boroughs of Barnet, Brent, Ealing, Harrow, Hillingdon and Hounslow. The document provides the evidence base for ensuring development is steered away from areas identified most at risk from all sources of flood risk, reducing the risk of flooding to residents and buildings.

It provides an overview of the relevant national, regional, and sub-regional policies relating to flood risk and associated requirements, and an overview of Hillingdon's key local policies.

The SFRA provides an overview of the flood risk from all sources across the study area, including climate change implications where this information is available. Interactive online mapping is provided which depicts the various flood risks across the study area.

In addition, the SFRA provides guidance for developers undertaking Flood Risk Assessments (FRA) for proposed development sites within any of the six boroughs. Borough-specific guidance is included where any key differences exist.

## 2.3 The London Borough of Hillingdon Surface Water Management Plan (2011)

The London Borough of Hillingdon Surface Water Management Plan 2011 (SWMP) provides an evidence base of local knowledge on flood risks from sewers, drains, groundwater and runoff from land, small watercourses and ditches that could occur as a result of heavy rainfall.

The SWMP uses direct rainfall modelling and knowledge of flooding history to delineate Critical Drainage Areas (CDAs) in the Borough which are identified to be at more significant risk.

# 3 Site Description

## 3.1 Site context

The site is centred on Ordnance Survey (OS) grid reference 505968, 185192 covering an area of approximately 0.260 hectares (ha). It is located to the north of North Common Road, Uxbridge UB8 1PD in the London Borough of Hillingdon. The site is occupied by a residential property in the west, and a number of small outbuildings including sheds and greenhouses. A pond is located towards the east of the site which is irregular in shape. The southern end of the pond is wider than the northern end.

The site is in an area of largely residential use and is bound by residential properties to the east and west, with a property of commercial appearance to the north. The site is accessed from the south via a private road extending from North Common Road.

## 3.2 Topography

A review of the topographical survey (see Appendix A) shows that the site slopes from the south to north. Ground levels to the north are approximately 59.01 mAOD and increase along the access road to the highest elevation of 59.51 mAOD moving north along the access road. Ground levels then gradually decline along the access road to 57.32 mAOD on the southern side of the existing residential building. Ground levels north of the building are 56.67 mAOD and continue to fall to the northern corner of the site where there are levels of 55.27 mAOD.

## 3.3 Geology

British Geological Survey mapping shows the site as being underlain by London Clay Formation - Clay, silt and sand with Black Park Gravel Member superficial deposits - Sand and gravel.

## 3.4 Hydrology

There are no significant water bodies (lakes, large ponds, reservoirs etc.) within the immediate vicinity of the site that appear likely to pose a risk to the site.

## 3.5 Proposed site

The proposal (refer to Appendix A) involve retention of the existing residential property and development of the remainder of the site for a further tworesidential plots.

It is proposed to infill the existing pond and create a new landscaped pond towards the east of the site.

Residential development, including care homes, is classed as ‘more vulnerable’ in accordance with Table 2 of the PPG. As the application is located in flood zone 1 the proposed development is shown to be appropriate in accordance with Table 3 of the PPG.

# 4 Flood Risk

The NPPF requires flood risk from the following sources to be assessed:

- Tidal and fluvial sources (sea and river flooding);
- Pluvial sources (flooding resulting from overland flows);
- Groundwater sources;
- Artificial sources, canals, reservoirs etc., and;
- Increases in surface water discharge.

Each of the sources are addressed separately below.

## 4.1 Tidal and fluvial flooding

Tidal flooding is typically the result of extreme tidal conditions caused by severe weather which may cause a storm surge where water is pushed onshore through elements such as high winds and other storms.

Fluvial flooding occurs when excessive rainfall over an extended period of time or heavy snow melt causes a river to exceed its capacity.

The EA Flood Map for Planning (see Figure 1 above) shows that the site lies entirely within a Flood Zone 1 (low risk). Flood Zone 1 is the areas described as having less than 0.1% annual probability of river or sea flooding.

A Product 4 request was made to the EA who responded on 8th March 2019 (refer to Appendix B) stating they hold no detailed flood modelling data on the site because it does not fall within an area at risk of flooding from rivers or the sea.

The site has been assessed as at very low risk of fluvial and tidal flooding.

## 4.2 Pluvial flooding

There is always a potential risk of surface water flooding from very high intensity rainfall events exceeding the capacity of drainage systems and causing flooding, especially in urban areas. Surface water run-off can be channelled either by natural features such as valley lines or by artificial features such as highways, to low points in the topography. If surface water is not able to flow away from the low points then pluvial flooding can occur.

The mapping shows that the site is generally at very low risk of flooding from surface water. The northern corner, north of the pond, is at low to medium risk of flooding. The area at high risk of surface water flooding is the location of the existing pond and as such, being a localised depression, is shown at a higher risk of flooding. The areas shown to be at risk of surface water flooding correspond with the low points shown on the topographical survey and as such surface water would be more likely to ‘pond’ in these locations.

The GOV.UK Flood risk from surface water – Extent of flooding mapping (see Figure 2) shows the majority of the site to be at very low risk of surface water flooding.

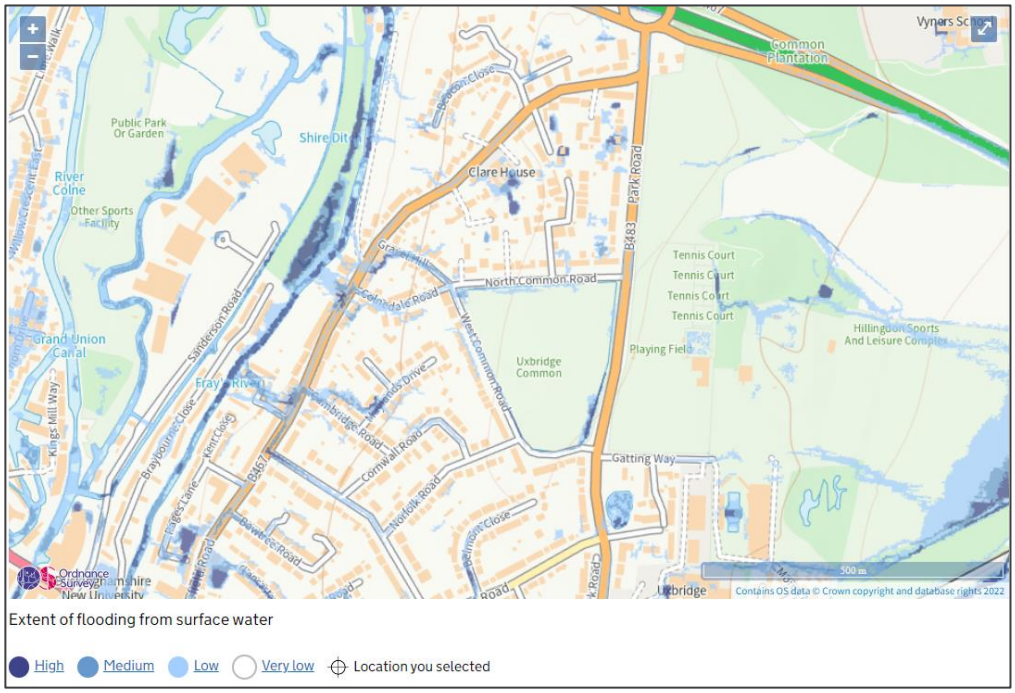



*Figure 2 - GOV.UK Flood risk from surface water – Extent of flooding map*

The risk of surface water flooding at the site is very low which meaning that the probability of flooding is less than 0.1%.


*Figure 3 - GOV.UK Flood risk from surface water – Low Risk of flooding map*


*Figure 4 - GOV.UK Flood risk from surface water – Medium Risk of flooding map*


*Figure 5 - GOV.UK Flood risk from surface water – High Risk of flooding map*

The risk of flooding from this source is considered to be low.

## 4.3 Groundwater

British Geological Survey mapping shows the site as being underlain by London Clay Formation - Clay, silt and sand with Black Park Gravel Member superficial deposits - Sand and gravel.

The presence of the pond on the site suggest a shallow layer of the more permeable Black Park Gravel Member in this area. During the site visit some open trial pits were witnessed which confirmed the geology as given on the BGS mapping.

The BGS maps have been checked for borehole records, however none are shown in the vicinity of the site.

The site is not considered to be at significant risk of flooding from groundwater.

## 4.4 Water bodies

There are no lakes, large ponds, or reservoirs etc shown within the immediate vicinity of the site which are at an elevation equal to or higher than the site or otherwise likely to pose a flood risk to the site.

The GOV.UK Flood risk from reservoirs – Extent of flooding online mapping shows that the site is not at risk of flooding from this source.

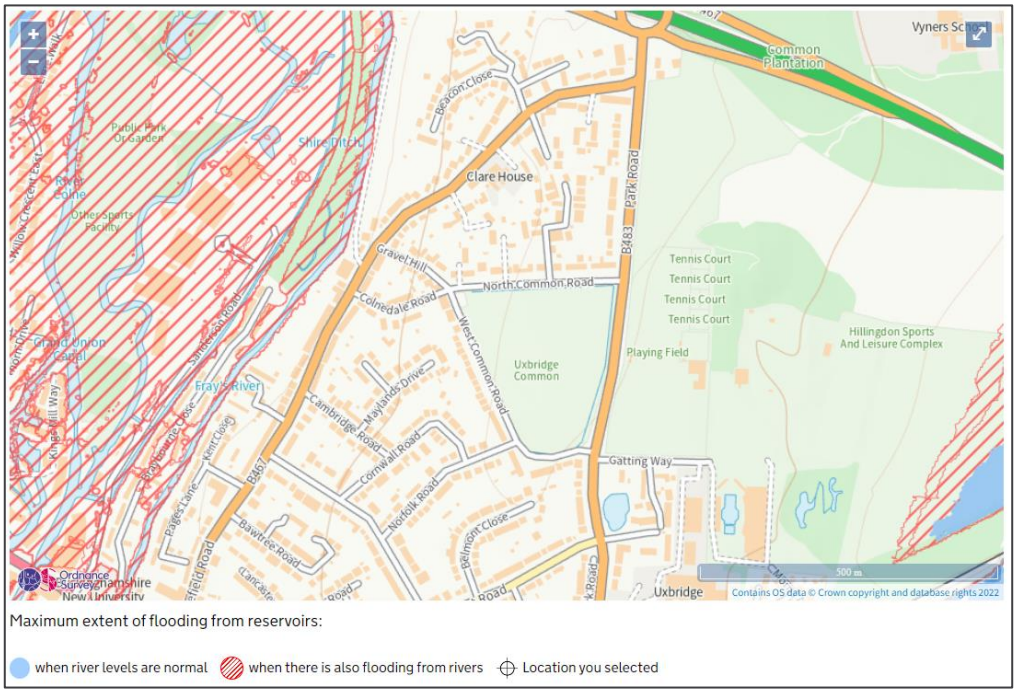



*Figure 6 - GOV.UK Flood risk from reservoirs*

## 4.5 Infrastructure flooding

Sewer flooding can occur due to sewer infrastructure failure or due to an increased flow and volume of water entering a sewer system which exceeds its hydraulic capacity, causing the system to surcharge. If sewer outfall points are either blocked or submerged due to high water levels, water can back up in a sewer system and cause flooding. These issues can result in water overflowing from gullies and manholes, causing flooding in the local area. Blockages caused by sediment or debris can further exacerbate the probability of sewer flooding.

The TW asset location search, shown in Figure 12 below (refer to Appendix C for full copy), shows two TW sewers on site: a surface water sewer running in a north-westerly direction from the southern end of the pond to the surface water sewer in Harefield Road. The mapping is incorrect and the pipe does in fact run from the northern end of the pond (shown as a separate pond on the mapping).

A foul sewer is shown to run in a southerly direction from the access road in the south outfalling into the foul sewer in North Common Road.

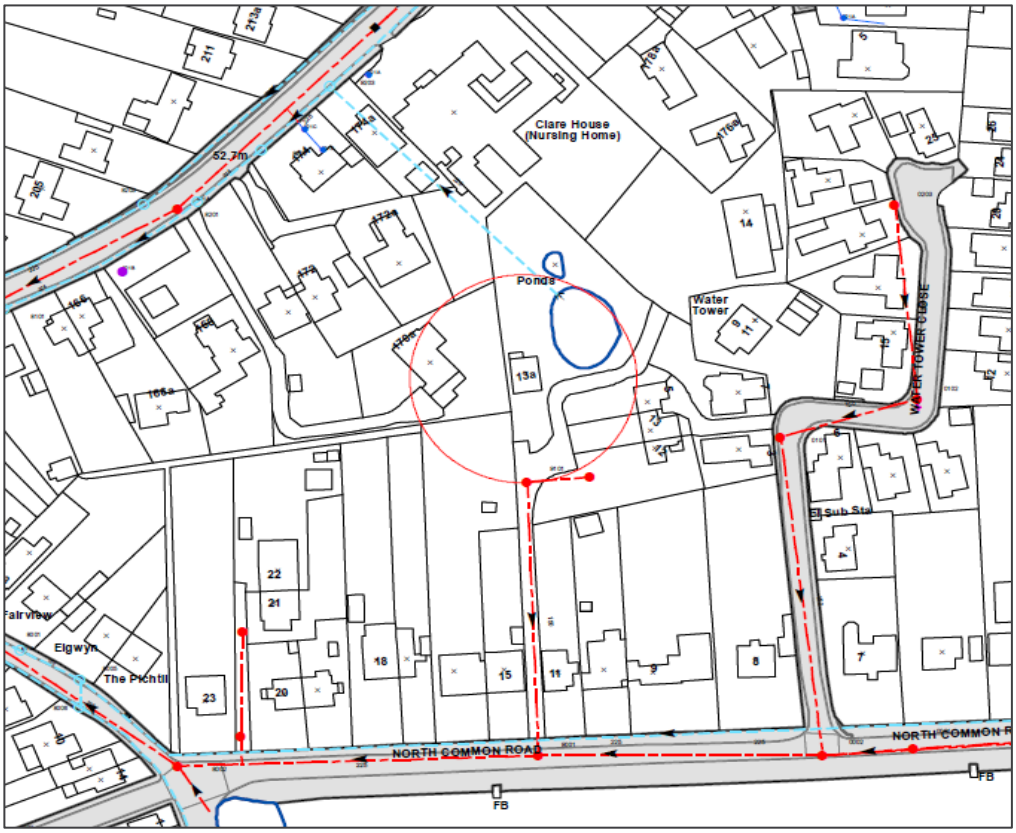


Figure 7 -Thames Water asset location search centred on the site

The TW sewers represent a low residual risk of infrastructure flooding to the site from failure or surcharging of either sewer.

Maintaining the sewers and drains on site regularly, ensuring they are free of blockages and sediment build up, would help further minimise the risk of infrastructure flooding.

Assuming the recommendations above are followed, the proposals are considered to be at low risk of flooding from infrastructure.

# 5 Surface Water Drainage

## 5.1 Existing Surface Water Drainage

The existing site is brownfield land with an impermeable area of approximately 0.066 ha.

The existing run-off rate has been calculated using the Modified Rational Method (see calculations in Appendix E) and are based on the existing impermeable area of the site. In summary the pre-development discharge rates for the site are:

*Table 2 – Greenfield Run-off Rates*

| AEP Event | Greenfield Discharge Rate (l/s) |
|---|---|
| 100% | 0.1 |
| Qbar | 0.1 |
| 3.3% | 0.3 |
| 1% | 0.4 |

*Table 3 – Brownfield Run-off Rates*

| AEP Event | Brownfield Discharge Rate (l/s) |
|---|---|
| 100% | 6.7 |
| 3.3% | 21.3 |
| 1% | 32.2 |

## 5.2 Proposed Surface Water Drainage

It is proposed to collect and attenuate surface water run-off from the site prior to discharge to the surface water sewer.

It is possible that in extreme rainfall events the drainage systems could be overwhelmed and some surface water flooding could occur. External ground and paving levels should be designed to fall away from entrances to stair wells etc. so that if any of the drainage systems were to fail, surface water would not flow towards the buildings.

Surface water will be attenuated on site within the basin and attenuation crates and discharged to the sewer at a rate of 2 l/s.

## 5.3 Proposed Surface Water Treatment

An assessment of the level of treatment required and provided at the site has been undertaken in accordance with the method set out in within Chapter 26 of CIRIA 753 The SuDS Manual.

**TABLE 26.2 Pollution hazard indices for different land use classifications**

| Land use | Pollution hazard level | Total suspended solids (TSS) | Metals | Hydro-carbons |
|---|---|---|---|---|
| Residential roofs | Very low | 0.2 | 0.2 | 0.05 |
| Other roofs (typically commercial/ industrial roofs) | Low | 0.3 | 0.2 (up to 0.8 where there is potential for metals to leach from the roof) | 0.05 |
| Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day | Low | 0.5 | 0.4 | 0.4 |
| Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1] | Medium | 0.7 | 0.6 | 0.7 |
| Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1] | High | 0.8[2] | 0.8[2] | 0.9[2] |

*Figure 8 - CIRIA 753 The SuDS Manual Table 26.2*

Table 26.2 shows that the pollution hazard indices for the proposed roof areas are:

*Table 4 – Pollution Hazard Indices*

| Land Use | TSS | Metals | Hydrocarbons |
|---|---|---|---|
| Residential Roof | 0.2 | 0.2 | 0.05 |
| Driveways and access road | 0.5 | 0.4 | 0.4 |

**TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters**

| | Mitigation indices[1] | | |
|---|---|---|---|
| **Type of SuDS component** | **TSS** | **Metals** | **Hydrocarbons** |
| Filter strip | 0.4 | 0.4 | 0.5 |
| Filter drain | 0.4[2] | 0.4 | 0.4 |
| Swale | 0.5 | 0.6 | 0.6 |
| Bioretention system | 0.8 | 0.8 | 0.8 |
| Permeable pavement | 0.7 | 0.6 | 0.7 |
| Detention basin | 0.5 | 0.5 | 0.6 |
| Pond[4] | 0.7[3] | 0.7 | 0.5 |
| Wetland | 0.8[3] | 0.8 | 0.8 |
| Proprietary treatment systems[5,6] | These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area. | | |

*Figure 9 – CIRIA 753 The SuDS Manual Table 26.4*

Table 26.3 shows that the mitigation indices for the access road are:

*Table 5 – Mitigation Indices*

| SuDS Feature | TSS | Metals | Hydrocarbons |
|---|---|---|---|
| Filter Drain | 0.4 | 0.4 | 0.4 |
| Detention Basin* | 0.25 | 0.25 | 0.3 |
| **Total** | **0.65** | **0.65** | **0.7** |

* mitigation indices halved for secondary treatment stage

The access road is therefore suitably mitigated as the total mitigation indices for the SUDS features is greater than the hazard indices.

The private drive in the north will be permeable paving for which the mitigation indices are higher than the pollution indices.

The roof areas will either drain to the basin or to the permeable paving both of which have higher mitigation indices than the pollution indices for residential roofs.

The mitigation indices for the site therefore exceed the pollution hazard indices for the site and will therefore provide sufficient mitigation in terms of water quality for the proposed development.

# 6 Conclusion

All sources of flood risk at the site, and in the context of the proposals were assessed. The site was assessed at low risk of flooding from all sources of flooding.

A surface water drainage strategy has been proposed which demonstrates how the proposals will ensure surface water generated on site will be collected, attenuated, treated and discharged at a controlled rate in accordance with local and national policies, thereby reducing the risk of surface water flooding on and off-site.

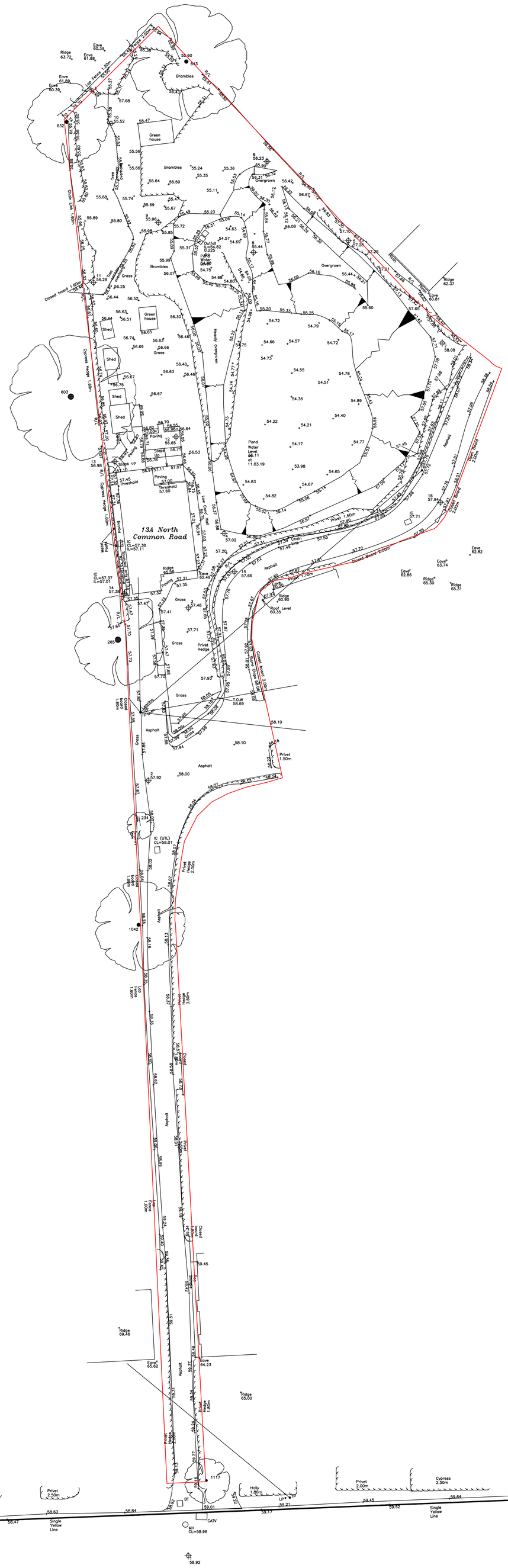
In conclusion, this FRA demonstrates that the proposals are consistent with the aims of the NPPF and its Planning Practice Guidance, along with the aims of the Strategic Flood Risk Assessment. The site will not be at significant risk of flooding, or increase flood risk to others.

## Appendix A – Topographical Survey

The Gillett MacLeod Partnership drawing 22/3511/20 Survey Plan

Scale Bar 1:200 @ A0 Metres

0 10 20 30 40 50




# SURVEY PLAN

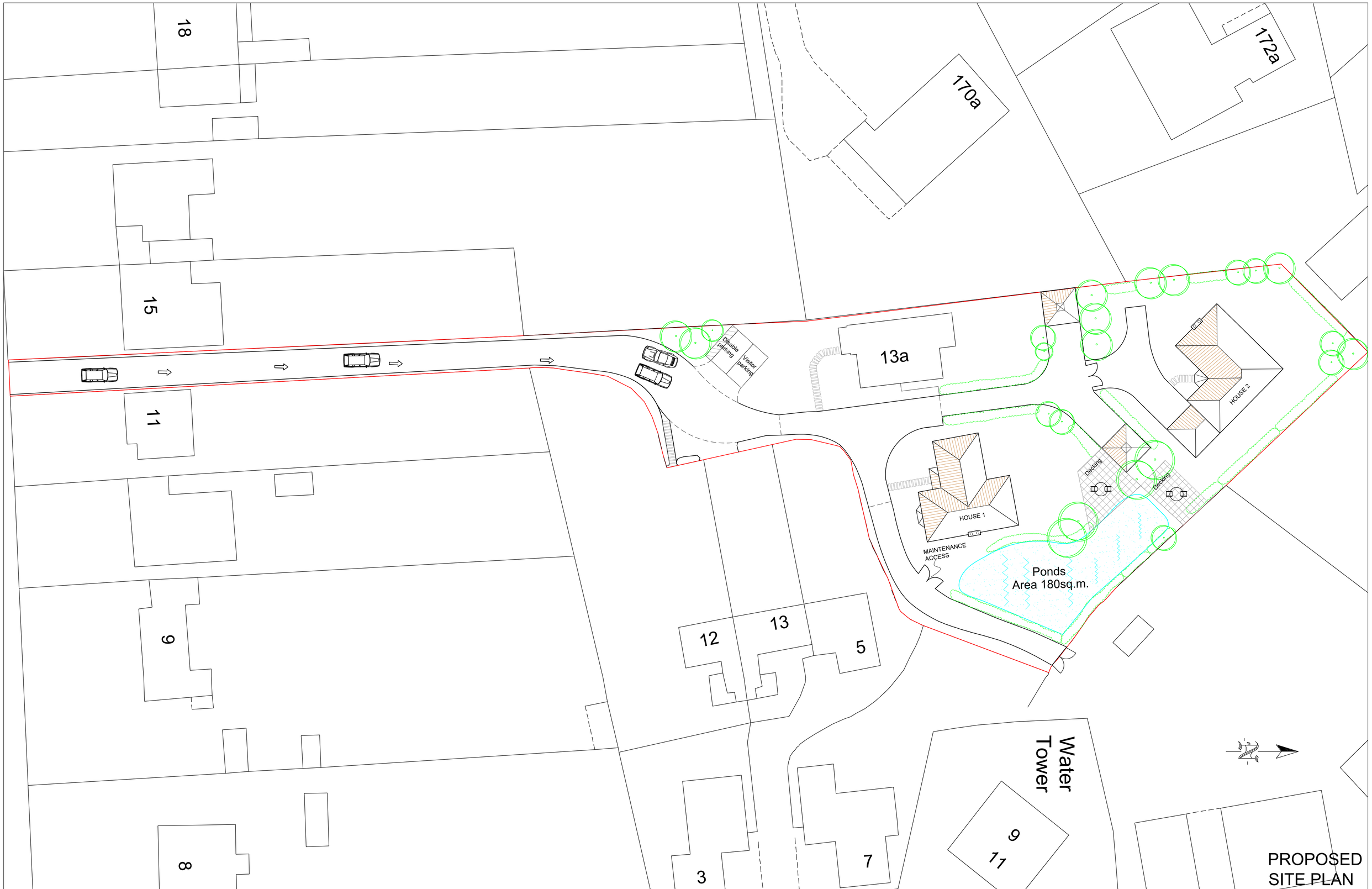
## 13A NORTH COMMON ROAD, UXBRIDGE, LONDON. UB8 1PD


THE GILLETT MACLEOD PARTNERSHIP
Chartered Architects & Town Planning Consultants
1 High Road Old Eastcote Pinner Middlesex HA5 2EW tel. 0208 868 1333


| | |
|---|---|
| Drg. No. | 22/3511/20 |
| Scale | 1:200@A0 |
| Date | 16/06/22 |
| Drawn by | AK |

## Appendix B – Site Layout

The Gillett MacLeod Partnership drawing 22/3511/3 Proposed Site Plan




PROPOSED SITE PLAN

13A NORTH COMMON ROAD, UXBRIDGE, LONDON. UB8 1PD

Scale Bar
0 1 2 3 4 5 6 7 8 9 10 Metres

1:200 @ A1

THE GILLETT MACLEOD PARTNERSHIP
Chartered Architects & Town Planning Consultants
1 High Road Old Eastcote Pinner Middlesex HA5 2EW tel. 0208 868 1333

Drg. No. 22/3511/3
Scale 1:200
Date 18/05/22
Drawn by AK

REVISION
C drawer

## Appendix C – Thames Water

Property Search

Thames Water email dated 24 September 2019

# Residential

The Law Society's CON29DW
Drainage & Water Enquiry

Thames Water Property Searches

Mr Ross Underwood
SwiftQuest Associates Ltd
69
Lynton Avenue
London
W13 0EA

| | |
|---|---|
| Search address supplied | 13 A, North Common Road, Uxbridge, UB8 1PD |
| Your reference | DDC/21417 |
| Our reference | DWS/DWS Standard/2019_3946552 |
| Received date | 2 February 2019 |
| Search date | 5 February 2019 |

**Keeping you up-to-date**

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Residential CON29DW and Commercial Drainage & Water Enquiries in line with RPI at 3.23%.

For further details on the price increase, please visit our website: www.thameswater-propertysearches.co.uk Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

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

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

0845 070 9148

CON29DW DRAINAGE AND WATER ENQUIRY

searchcode

# Residential

The Law Society's CON29DW
Drainage & Water Enquiry

Thames Water Property Searches

| Question | | Summary Answer |
|---|---|---|
| **Maps** | | |
| **1.1** | Where relevant, please include a copy of an extract from the public sewer map. | Map Provided |
| **1.2** | Where relevant, please include a copy of an extract from the map of waterworks. | Map Provided |
| **Drainage** | | |
| **2.1** | Does foul water from the property drain to a public sewer? | Connected |
| **2.2** | Does surface water from the property drain to a public sewer? | Connected |
| **2.3** | Is a surface water drainage charge payable? | Charge Payable |
| **2.4** | Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the property? | Yes |
| **2.4.1** | Does the public sewer map indicate any public pumping station or any other ancillary apparatus within the boundaries of the property? | No |
| **2.5** | Does the public sewer map indicate any public sewer within 30.48 metres(100 feet) of any buildings within the property? | Yes |
| **2.5.1** | Does the public sewer map indicate any public pumping station or any other ancillary apparatus within the 50metres of any buildings within the property? | No |
| **2.6** | Are any sewers or lateral drains serving, or which are proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement? | No |
| **2.7** | Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain? | No |
| **2.8** | Is the building which is or forms part of the property, at risk of internal flooding due to overloaded public sewers? | Not At Risk |
| **2.9** | Please state the distance from the property to the nearest boundary of the nearest sewage treatment works. | 4.77 Kilometres |
| **Water** | | |
| **3.1** | Is the property connected to mains water supply? | Connected |
| **3.2** | Are there any water mains, resource mains or discharge pipes within the boundaries of the property? | No |
| **3.3** | Is any water main or service pipe serving or which is proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement? | No |
| **3.4** | Is the property at risk of receiving low water pressure or flow? | No |
| **3.5** | What is the classification of the water supply for the property? | Hard |
| **3.6** | Please include details of the location of any water meter serving the property. | No Meter |
| **Charging** | | |
| **4.1.1** | Who are the sewerage undertakers for the area? | Thames Water |
| **4.1.2** | Who are the water undertakers for the area? | Affinity Water |
| **4.2** | Who bills the property for sewerage services? | Affinity Water |
| **4.3** | Who bills the property for water services? | Affinity Water |
| **4.4** | What is the current basis for charging for sewerage and/or water services at the property? | See Details |
| **4.5** | Will the basis for charging for sewerage and water services at the property change as a consequence of a change of occupation? | No |

# Residential

The Law Society's CON29DW
Drainage & Water Enquiry

Thames Water Property Searches

**Search address supplied:** 13 A, North Common Road, Uxbridge, UB8 1PD

Any new owner or occupier will need to contact Thames Water on 0800 316 9800 or log onto our website www.thameswater.co.uk and complete our online form to change the water and drainage services bills to their name.

The following records were searched in compiling this report: - the Map of Public Sewers, the Map of Waterworks, Water and Sewer billing records, Adoption of Public Sewer records, Building Over Public Sewer records, the Register of Properties subject to Internal Foul Flooding, the Register of Properties subject to Poor Water Pressure and the Drinking Water Register. Thames Water Utilities Ltd (TWUL), Clearwater Court, Vastern Road, Reading RG1 8DB, holds all of these.

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

Please refer to the attached Terms & Conditions.

DRAINAGE + WATER SEARCHES NETWORK DWSN

We are members of DWSN, the industry body for those companies responsible for compiling responses to the Law Society's CON29DW Enquiry. We comply with the DWSN Code of Practice that provides consumer protection and ensures good practice in this critical area of property information.

CoPSO EXECUTIVE MEMBER

Thames Water Property Searches is an Executive member of CoPSO (Council of Property Search Organisations).

The Property Ombudsman Consumer Redress

Thames Water Property Searches fully complies with The Property Ombudsman in any queries or complaints received.

**Interpretation of CON29DW Drainage and Water Search**

Appendix 1 contains definitions of terms and expressions used in this report.

For your guidance:

- Thames Water Property Searches Complaints Procedure:
  - Thames Water Property Searches offers a robust complaints procedure. Complaints can be made by telephone, in writing, by email (searches@thameswater.co.uk) or through our website (www.thameswater-propertysearches.co.uk)

As a minimum standard Thames Water Property Searches will:

- endeavour to resolve any contact or complaint at the time of receipt. If this isn't possible, we will advise of timescales;
- investigate and research the matter in detail to identify the issue raised (in some cases third party consultation will be required);
- provide a response to the customer within 10 working days of receipt of the complaint;
- provide compensation, if no response or acknowledgment that we are investigating the case is given within 10 working days of receipt of the complaint;
- keep you informed of the progress and, depending on the scale of investigation required, update with new timescales as necessary;
- provide an amended search, free of charge, if required;
- provide a refund if we find your complaint to be justified; take the necessary action within our power to put things right.

If you want us to liaise with a third party on your behalf, just let us know.

If you are still not satisfied with the outcome provided we will refer the matter to a Senior Manager for resolution who will respond again within 5 working days.

If you remain dissatisfied with our final response you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). Please refer to the final page of the search for further details.

## Maps

### 1.1 – Where relevant, please include a copy of an extract from the public sewer map.

A copy of an extract of the public sewer map is included, showing the public sewers, disposal mains and lateral drains in the vicinity of the property.

For your guidance:

- The Water Industry Act 1991 defines Public Sewers as those which Thames Water have responsibility for. Other assets and rivers, watercourses, ponds, culverts or highway drains may be shown for information purposes only.
- 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.
- Assets other than public sewers may be shown on the copy extract, for information.

### 1.2 – Where relevant, please include a copy of an extract from the map of waterworks.

A copy of an extract from the map of waterworks is included in which the location of the property is identified.

For your guidance:

- The "water mains" in this context are those, which are vested in and maintainable by the water company under statute.
- Assets other than public water mains may be shown on the plan, for information only.
- Water companies are not responsible for private supply pipes connecting the property to the public water main and do not hold details of these. These may pass through land outside of the control of the seller, or may be shared with adjacent properties. The buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- 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.

## Drainage

### 2.1 – Does foul water from the property drain to a public sewer?

Records indicate that foul water from the property drains to a public sewer.

For your guidance:

- Water companies are not responsible for any private drains that connect the property to the public sewerage system and do not hold details of these. The property owner will normally have sole responsibility for private drains serving the property. These may pass through land outside the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- If foul water does not drain to the public sewerage system, the property may have private facilities in the form of a cesspit, septic tank or other type of treatment plant.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

### 2.2 – Does surface water from the property drain to a public sewer?

Records indicate that surface water from the property drains to a public sewer.

For your guidance:

- Sewerage Undertakers are not responsible for any private drains that connect the property to the public sewerage system, and do not hold details of these.
- The property owner will normally have sole responsibility for private drains serving the property. These private drains may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- In some cases, 'Sewerage Undertakers' records do not distinguish between foul and surface water connections to the public sewerage system.
- At the time of privatisation in 1989, Sewerage Undertakers were sold with poorly-kept records of sewerage infrastructure. The records did not always show which properties were connected for surface water drainage purposes. Accordingly, billing records have been used to provide an answer for this element of the drainage and water search.
- Due to the potential inadequacy of 'Sewerage Undertakers' infrastructure records with respect to surface water drainage, it is the customer's responsibility to inform the Sewerage Undertaker that they do not receive the surface water drainage service. If on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. For further information, please contact Thames Water on Tel: 0800 316 9800, or refer to the website at www.thameswater.co.uk.
- If surface water from the property does not drain to the public sewerage system, the property may have private facilities in the form of a soakaway or private connection to a watercourse.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

**2.3 – Is a surface water drainage charge payable?**

Records confirm that a surface water drainage charge is payable for the property and the charge is £25.15 for the current financial year.

For your guidance:

- If surface water from the property drains to a public sewer, then a surface water drainage charge is payable.
- Where a surface water drainage charge is currently included in the property's water and sewerage bill but, on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. For further information, please contact Thames Water on Tel: 0800 316 9800 or refer to the website www.thameswater.co.uk.

**2.4 – Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the property?**

The public sewer map included indicates that there is a public sewer, disposal main or lateral drain within the boundaries of the property. However, from the 1st October 2011 there may be additional public sewers, disposal mains or lateral drains which are not recorded on the public sewer map but which may further prevent or restrict development of the property.

For your guidance:

- Thames Water has a statutory right of access to carry out work on its assets. Employees of Thames Water or its contractors may, therefore, need to enter the property to carry out work.
- Please note if the property was constructed after 1st July 2011 any sewers and/or lateral drain within the boundary of the property are the responsibility of the householder.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public sewer running within the boundary of the property may restrict further development. The company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the company, or its contractors, needing to enter the property to carry out work.
- 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.

**2.4.1 – Does the public sewer map indicate any public pumping station or any other ancillary apparatus within the boundaries of the property?**

The public sewer map included indicates that there is no public pumping station within the boundaries of the property.

For your guidance:

- Private pumping stations installed before 1 July 2011 will be transferred into the ownership of the sewerage undertaker.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public Pumping station running within the boundary of the property may restrict further development. The company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the company, or its contractors, needing to enter the property to carry out work.
- 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.

**2.5 – Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?**

The public sewer map included indicates that there is a public sewer within 30.48 metres (100 feet) of a building within the property.

For your guidance:

- From the 1st October 2011 there may be additional lateral drains and/or public sewers which are not recorded on the public sewer map but are also within 30.48 metres (100 feet) of a building within the property.
- The presence of a public sewer within 30.48 metres (100 feet) of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- 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.

**2.5.1 – Does the public sewer map indicate any public pumping station or any other ancillary apparatus within 50 metres of any buildings within the property?**

The public sewer map included indicates that there is no public pumping station within 50 metres of any buildings within the property.

For your guidance:

- Private pumping stations installed before 1 July 2011 will be transferred into the ownership of the sewerage undertaker.
- The presence of a public pumping station within 50 metres of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- 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.

**2.6 – Are any sewers or lateral drains serving or which are proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?**

Records confirm that Foul sewers serving the development, of which the property forms part are not the subject of an existing adoption agreement or an application for such an agreement.

The Surface Water sewer(s) and/or Surface Water lateral drain(s) are not the subject of an adoption agreement.

For your guidance:

- Any sewers and/or lateral drains within the boundary of the property are not the subject of an adoption agreement and remain the responsibility of the householder. Adoptable sewers are normally those situated in the public highway.
- This enquiry is of interest to purchasers of new homes who will want to know whether or not the property will be linked to a public sewer.
- Where the property is part of a very recent or ongoing development and the sewers are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains and sewers for which they will hold maintenance and renewal liabilities.
- Final adoption is subject to the developer complying with the terms of the adoption agreement under Section 104 of the Water Industry Act 1991 and meeting the requirements of 'Sewers for Adoption' 6th Edition.

**2.7 – Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?**

There are no records in relation to any approval or consultation about plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain. However, the sewerage undertaker might not be aware of a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain.

For your guidance:

- From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership and the sewerage undertaker may not have been approved or consulted about any plans to erect a building or extension on the property over or in the vicinity of these.
- Buildings or extensions erected over a sewer in contravention of building controls may have to be removed or altered.

**2.8 – Is the building which is or forms part of the property at risk of internal flooding due to overloaded public sewers?**

The property is not recorded as being at risk of internal flooding due to overloaded public sewers.

From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership It is therefore possible that a property may be at risk of internal flooding due to an overloaded public sewer which the sewerage undertaker is not aware of. For further information it is recommended that enquiries are made of the vendor.

For your guidance:

- For reporting purposes buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- 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

**2.9 – Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.**

The nearest sewage treatment works is Iver (North) STW which is 4.77 kilometres to the south of the property.

For your guidance:

- The nearest sewage treatment works will not always be the sewage treatment works serving the catchment within which the property is situated.
- The sewerage undertaker's records were inspected to determine the nearest sewage treatment works.
- It should be noted that there may be a private sewage treatment works closer than the one detailed above that has not been identified.
- As a responsible utility operator, Thames Water Utilities seeks to manage the impact of odour from operational sewage works on the surrounding area. This is done in accordance with the Code of Practice on Odour Nuisance from Sewage Treatment Works issued via the Department of Environment, Food and Rural Affairs (DEFRA). This Code recognises that odour from sewage treatment works can have a detrimental impact on the quality of the local environment for those living close to works. However DEFRA also recognises that sewage treatment works provide important services to communities and are essential for maintaining standards in water quality and protecting aquatic based environments. For more information visit www.thameswater.co.uk

## Water

### 3.1 – Is the property connected to mains water supply?

Records indicate that the property is connected to mains water supply.

For your guidance:

- The Company does not keep details of private supplies. The situation should be checked with the current owner of the property.

### 3.2 – Are there any water mains, resource mains or discharge pipes within the boundaries of the property?

The map of waterworks does not indicate any water mains, resource mains or discharge pipes within the boundaries of the property.

For your guidance:

- The boundary of the property has been determined by reference to the plan supplied. Where a plan was not supplied the Ordnance Survey Record was used. If the Water company mentioned in 4.1.2 is not Thames Water Utilities Ltd the boundary of the property has been determined by the Ordnance Survey.
- The presence of a public water main within the boundary of the property may restrict further development within it. Water companies have a statutory right of access to carry out work on their assets, subject to notice. This may result in employees of the company, or its contractors, needing to enter the property to carry out work.

### 3.3 – Is any water main or service pipe serving or which is proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that water mains or service pipes serving the property are not the subject of an existing adoption agreement or an application for such an agreement.

For your guidance:

- This enquiry is of interest to purchasers of new homes who will want to know whether or not the property will be linked to the mains water supply.

### 3.4 – Is the property at risk of receiving low water pressure or flow?

Records confirm that the property is not recorded on a register kept by the water undertaker as being at risk of receiving low water pressure or flow.

For your guidance:

- The boundary of the property has been determined by reference to the plan supplied. Where a plan was not supplied the Ordnance Survey Record was used.
- "Low water pressure" means water pressure below the regulatory reference level, which is the minimum pressure when demand on the system is not abnormal.
- Water Companies are required to include in the Regulatory Register that is presented annually to the Director General of Water Services, properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level)
- The reference level of service is a flow of 9 litres/minute at a pressure of 10metres / head on the customer's side of the outside stop valve (osv). The reference level of service must be applied on the customer's side of a meter or any other company fittings that are on the customer's side of the main stop tap. The reference level applies to a single property. Where more than one property is served by a common service pipe, the flow assumed in the reference level must be appropriately increased to take account of the total number of properties served. For two properties, a flow of 18 litres/minute at a pressure of 10metres/head on the customers' side of the osv is appropriate. For three or more properties the appropriate flow should be calculated from the standard loadings provided in BS806-3 or the Institute of Plumbing handbook.
- **Allowable exclusions** The Company is required to include in the Regulatory Register properties receiving pressure below the reference level, provided that allowable exclusions listed below do not apply.
- **Abnormal demand:** This exclusion is intended to cover abnormal peaks in demand and not the daily, weekly or monthly peaks in demand, which are normally expected. Companies should exclude from the reported figures properties which are affected by low pressure only on those days with the highest peak demands. During the report year companies may exclude, for each property, up to five days of low pressure caused by peak demand.
- **Planned maintenance:** Companies should not report low pressures caused by planned maintenance. It is not intended that companies identify the number of properties affected in each instance. However, companies must maintain sufficiently accurate records to verify that low-pressure incidents that are excluded because of planned maintenance are actually caused by maintenance.
- **One-off incidents:** This exclusion covers a number of causes of low pressure; mains bursts; failures of company equipment (such as pressure reducing valves or booster pumps); firefighting; and action by a third party. However, if problems of this type affect a property frequently, they cannot be classed as one-off events and further investigation will be required before they can be excluded
- **Low-pressure incidents of short duration:** Properties affected by low pressures, which only occur for a short period, and for which there is evidence that incidents of a longer duration would not occur during the course of the year, may be excluded from the reported figures.
- Please contact your water company mentioned in Question 4.1.2 if you require further information on water pressure.

### 3.5 – What is the classification of the water supply for the property?

The water supplied to the property has an average water hardness of 108mg/l calcium which is defined as Hard by Affinity Water.

For your guidance:

- Water hardness can be expressed in various indices for example the hardness settings for dishwashers are commonly expressed in Clark's degrees, but check with the manufacturer as there are also other units. The following table shows the normal ranges of hardness.
- Sample table for information only:

| Hardness Category | Calcium (mg/l) | Calcium Carbonate (mg/l) | English Clarke degrees | French degrees | General/ German degrees |
|---|---|---|---|---|---|
| Soft | 0 to 20 | 0 to 50 | 0 to 3.5 | 0 to 5 | 0 to 2.8 |
| Moderately Soft | 21 to 40 | 51 to 100 | 3.6 to 7 | 6 to 10 | 2.9 to 5.6 |
| Slightly hard | 41 to 60 | 101 to 150 | 8 to 10.5 | 11 to 15 | 5.7 to 8.4 |
| Moderately hard | 61 to 80 | 151 to 200 | 10.6 to 14 | 16 to 20 | 8.5 to 11.2 |
| Hard | 81 to 120 | 201 to 300 | 15 to 21 | 21 to 30 | 11.3 to 16.8 |
| Very hard | Over 120 | Over 300 | Over 21 | Over 30 | Over 16.8 |

### 3.6 – Please include details of the location of any water meter serving the property.

Records indicate that the property is not served by a water meter.

For your guidance:

- Where a meter does not serve the property and the customer wishes to consider this method of charging, they should contact the water undertakers mentioned in Question 4.1.2.

## Charging

### 4.1.1 – Who is responsible for providing the sewerage services for the property?

Thames Water Utilities Limited, Clearwater Court, Reading, RG1 8DB is the sewerage undertaker for the area.

### 4.1.2 – Who is responsible for providing the water services for the property?

Affinity Water Ltd, Tamblin Way, Hatfield, AL10 9EZ, is the water undertaker for the area.

### 4.2 – Who bills the property for sewerage services?

The property is billed for sewerage services on behalf of Thames Water by:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0845 7823333

### 4.3 – Who bills the property for water services?

The property is billed for water services by:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0845 7823333

**4.4 – What is the current basis for charging for sewerage and/or water services at the property?**

The charges are based on the rateable value of the property which has a rateable value of £388.00, and the charge for the current financial year of £239.42.

For your guidance:

- Water and sewerage companies' full charges are set out in their charges schemes which are available from the company free of charge upon request.
- The Water Industry Act 1991 Section 150, The Water Resale Order 2001 provides protection for people who buy their water or sewerage services from a person or company instead of directly from a water or sewerage company. Details are available from the Office of Water Services (OFWAT) website is www.ofwat.gov.uk.
- Where charges are given these are based on the data available at the time of the report.
- The Company may install a meter at the premises where a buyer makes a change of use of the property or where the buyer uses water for:
    - Watering the garden other than by hand (this includes the use of sprinklers).
    - Automatically replenishing a pond or swimming pool with a capacity greater than 10,000 litres.
    - A bath with a capacity in excess of 230 litres.
    - A reverse osmosis unit.

**4.5 – Will the basis for charging for sewerage and water services at the property change as a consequence of a change of occupation?**

There will be no change in the current charging arrangements as a consequence of a change of occupation.

For your guidance:

- Water and sewerage companies' full charges are set out in their charges schemes which are available from the company free of charge upon request.
- The Water Industry Act 1991 Section 150, The Water Resale Order 2001 provides protection for people who buy their water or sewerage services from a person or company instead of directly from a water or sewerage company. Details are available from the Office of Water Services (OFWAT) website is www.ofwat.gov.uk.
- It is policy to meter all new water connections. This would result in charges being levied according to the measured tariff.
- The Company may install a meter at the premises where a buyer makes a change of use of the property or where the buyer uses water for:
    - Watering the garden other than by hand (this includes the use of sprinklers).
    - Automatically replenishing a pond or swimming pool with a capacity greater than 10,000 litres.
    - A bath with a capacity in excess of 230 litres.
    - A reverse osmosis unit.

**Payment for this Search**

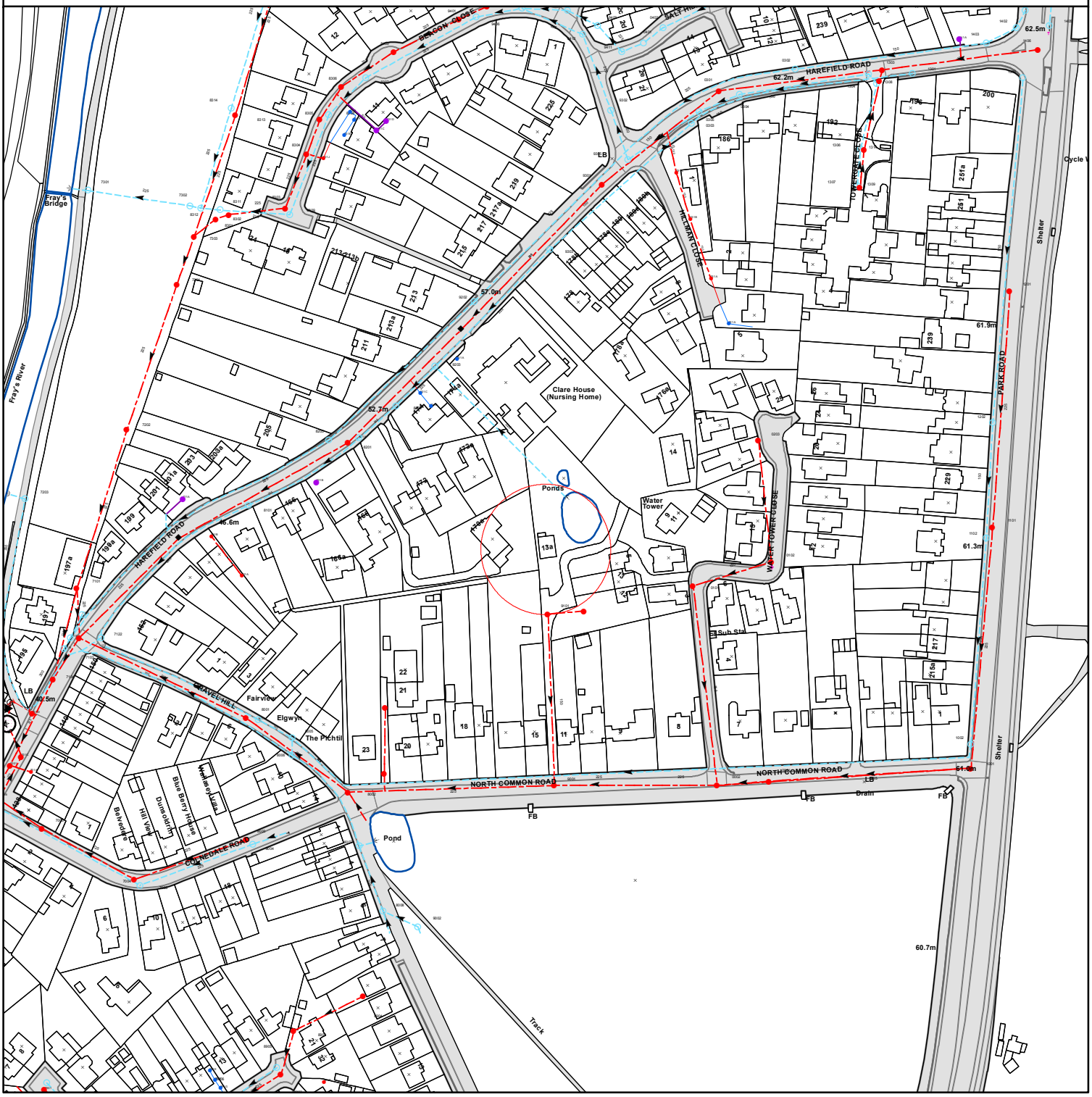
An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 3189, Slough, SL1 4WW.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information.

All prices are in accordance with the standard terms of Property Searches; discounts are available, please contact us on 0845 070 9148 to obtain further details.

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

# DWS/DWS Standard/2019_3946552




0 15 30 60 90 120 Meters

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 before any works are undertaken. Crown copyright Reserved

| | |
|---|---|
| **Scale:** | 1:2525 |
| **Width:** | 500m |
| **Printed By:** | SAsirvat |
| **Print Date:** | 05/02/2019 |
| **Map Centre:** | 505961,185177 |
| **Grid Reference:** | TQ0585SE |

**Comments:**

# Residential Drainage & Water Search Sewer Key

## Public Sewer Pipes (Operated & Maintained by Thames Water)

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

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

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

**Trunk Sewer:** A strategic sewer which collects either foul or surface water flow from a number of subsidiary catchments and transfers this flow to a pumping station, river outfall or treatment works.

**Storm Overflow Sewer:** A sewer designed to convey excess rainfall to rivers or watercourses so that the flow does not exceed the capacity of normal sewers (which could cause flooding).

**Biosolids:** A sewer designed to convey sludge from one treatment works to another.


**Vent Pipe:** A section of sewer pipe connected between the top of a sewer and vent column, used to prevent the accumulation of gas in a sewer and thus allowing the system to operate properly.

**Rising Main:** A pipe carrying pumped flow under pressure from a low point to a high point on the sewerage network. Line style / colour and direction of fleck indicate sewer purpose and direction of flow within the pipe.

**Vacuum:** A foul sewer designed to remove foul sewerage under pressure (vacuum sewers cannot accept direct new connections).

**Proposed Foul Sewer**

**Proposed Surface Water Sewer**

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

**Foul Sewer:** Any foul sewer that is not owned by Thames Water.

**Surface Water Sewer:** Any surface water sewer that is not owned by Thames Water.

**Combined Sewer:** Any combined sewer that is not owned by Thames Water.

**Gulley:** A sewer designed to convey surface water from large roads, motorways, etc. watercourses or to public surface water sewers. These sewers are generally maintained by th relevant highway authority.


**Culverted Watercourse:** A watercourse running through a culvert or pipe which is the respons bility of the property owner or the Environment Agency.

**Abandoned Sewer:** A disused sewer. Usually filled with cement mixture or removed from th ground.

## Other Symbols

**Undefined Ends:** These symbols represent the point at which a pipe continues but no recor of its position are currently held by Thames Water. These symbols are rare but may be found o any of the public sewer types.

**Public/Private Pumping Station:** Foul or Surface water pumping station.

**Notes:**

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

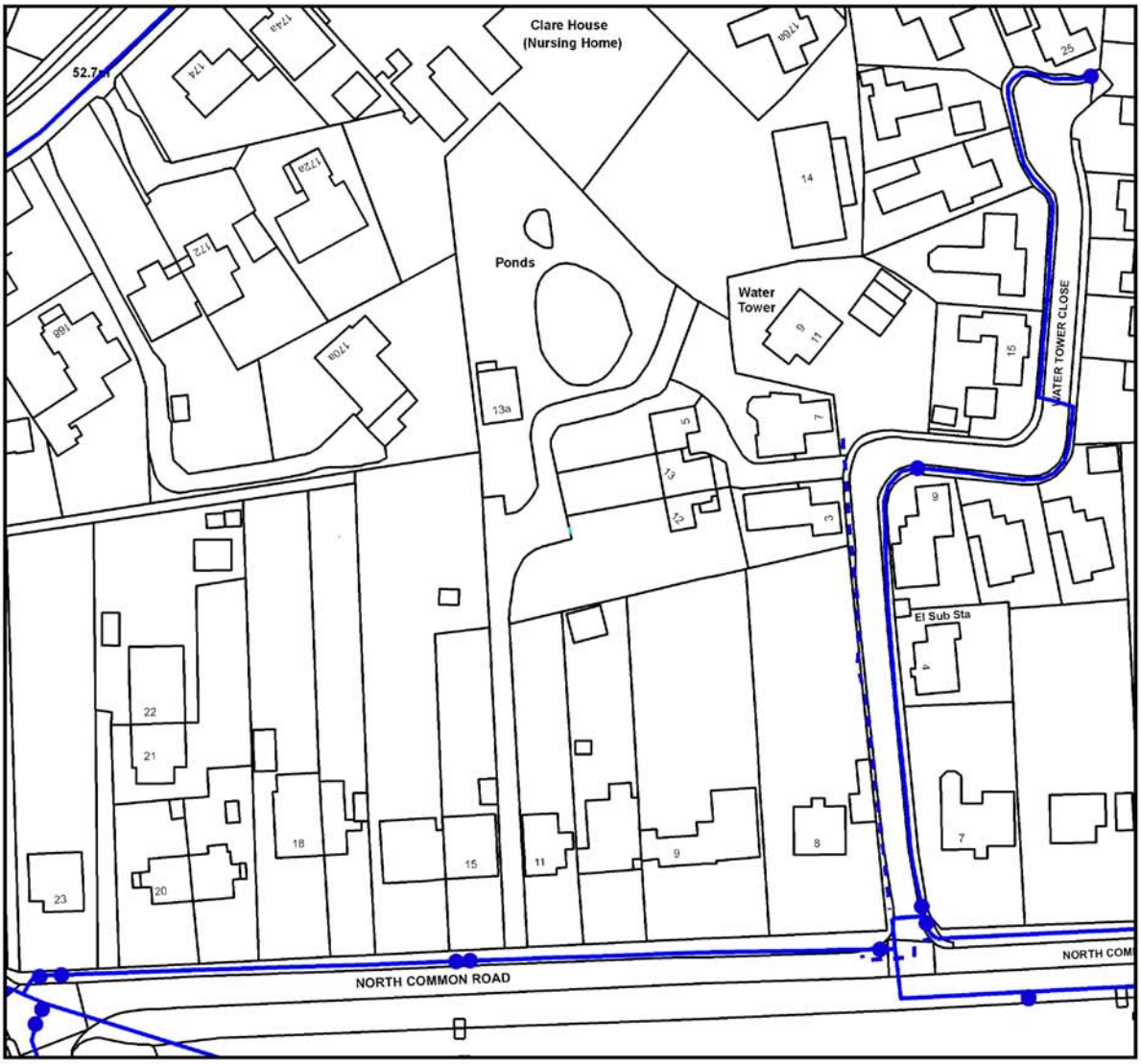
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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 a manhole indicates the manhole reference number and should not be taken as a measurement. If you ar unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0845 070 9148.

Reference No: 2019_3946552




This map is centred upon Ordnance Survey grid reference 505975,185152

Water Main
Abandoned Water Main
Hydrants, Valves, etc
Borehole, Pumping Facility, etc

1:1159
05/02/2019



It shows water mains and associated apparatus but should not be relied upon as evidence of ownership or evidence of responsibility for maintenance. Privately owned service pipes (which may serve one or more properties) are unlikely to be shown.

The position of Company apparatus shown on this plan is provided for guidance only and the Company accepts no responsibility in the event of inaccuracy

For further information about the contents of this plan, please contact Affinity Water on 0845 7823333 or at the address below.

Affinity Water, Tamblin Way, Hatfield, Hertfordshire, AL10 9EZ. www.affinitywater.co.uk/central

## Appendix 1 - terms and expressions in this report

"the 1991 Act" means the Water Industry Act 1991**(1)**;

"the 2000 Regulations" means the Water Supply (Water Quality) Regulations 2000**(2)**;

"the 2001 Regulations" means the Water Supply (Water Quality) Regulations 2001**(3)**;

"adoption agreement" means an agreement made or to be made under section 51A(1) or 104(1) of the 1991 Act**(4)**;

"bond" means a surety granted by a developer who is a party to an adoption agreement;

"bond waiver" means an agreement with a developer for the provision of a form of financial security as a substitute for a bond;

"calendar year" means the twelve months ending with 31st December;

"discharge pipe" means a pipe from which discharges are made or are to be made under section 165(1) of the 1991 Act;

"disposal main" means (subject to section 219(2) of the 1991 Act) any outfall pipe or other pipe which—

(a) is a pipe for the conveyance of effluent to or from any sewage disposal works, whether of a sewerage undertaker or of any other person; and

(b) is not a public sewer;

"drain" means (subject to section 219(2) of the 1991 Act) a drain used for the drainage of one building or of any buildings or yards appurtenant to buildings within the same curtilage;

"effluent" means any liquid, including particles of matter and other substances in suspension in the liquid;

"financial year" means the twelve months ending with 31st March;

"lateral drain" means—

(a) that part of a drain which runs from the curtilage of a building (or buildings or yards within the same curtilage) to the sewer with which the drain communicates or is to communicate; or

(b) (if different and the context so requires) the part of a drain identified in a declaration of vesting made under section 102 of the 1991 Act or in an agreement made under section 104 of that Act**(5)**;

"licensed water supplier" means a company which is the holder for the time being of a water supply licence under section 17A(1) of the 1991 Act**(6)**;

"maintenance period" means the period so specified in an adoption agreement as a period of time—

(a) from the date of issue of a certificate by a sewerage undertaker to the effect that a developer has built (or substantially built) a private sewer or lateral drain to that undertaker's satisfaction; and

(b) until the date that private sewer or lateral drain is vested in the sewerage undertaker;

"map of waterworks" means the map made available under section 198(3) of the 1991 Act**(7)** in relation to the information specified in subsection (1A);

"private sewer" means a pipe or pipes which drain foul or surface water, or both, from premises, and are not vested in a sewerage undertaker;

"public sewer" means, subject to section 106(1A) of the 1991 Act**(8)**, a sewer for the time being vested in a sewerage undertaker in its capacity as such, whether vested in that undertaker—

(a) by virtue of a scheme under Schedule 2 to the Water Act 1989**(9)**;

(b) by virtue of a scheme under Schedule 2 to the 1991 Act**(10)**;

(c) under section 179 of the 1991 Act**(11)**; or

(d) otherwise;

"public sewer map" means the map made available under section 199(5) of the 1991 Act**(12)**;

"resource main" means (subject to section 219(2) of the 1991 Act) any pipe, not being a trunk main, which is or is to be used for the purpose of—

(a) conveying water from one source of supply to another, from a source of supply to a regulating reservoir or from a regulating reservoir to a source of supply; or

(b) giving or taking a supply of water in bulk;

"sewerage services" includes the collection and disposal of foul and surface water and any other services which are required to be provided by a sewerage undertaker for the purpose of carrying out its functions;

"sewerage undertaker" means the company appointed to be the sewerage undertaker under section 6(1) of the 1991 Act for the area in which the property is or will be situated;

"surface water" includes water from roofs and other impermeable surfaces within the curtilage of the property;

"water main" means (subject to section 219(2) of the 1991 Act) any pipe, not being a pipe for the time being vested in a person other than the water undertaker, which is used or to be used by a water undertaker or licensed water supplier for the purpose of making a general supply of water available to customers or potential customers of the undertaker or supplier, as distinct from for the purpose of providing a supply to particular customers;

"water meter" means any apparatus for measuring or showing the volume of water supplied to, or of effluent discharged from any premises;

"water supplier" means the company supplying water in the water supply zone, whether a water undertaker or licensed water supplier;

"water supply zones" in relation to a calendar year means the names and areas designated by a water undertaker within its area of supply that are to be its water supply zones for that year; and

"water undertaker" means the company appointed to be the water undertaker under section 6(1) of the 1991 Act for the area in which the property is or will be situated.

In this report, references to a pipe, including references to a main, a drain or a sewer, shall include references to a tunnel or conduit which serves or is to serve as the pipe in question and to any accessories for the pipe.

(**1**) 1991 c. 56.

(**2**) S.I. 2000/3184. These Regulations apply in relation to England.

(**3**) S.I. 2001/3911. These Regulations apply in relation to Wales.

(**4**) Section 51A is inserted by section 92(2) of the Water Act 2003 (c. 37). Section 104(1) is amended by section 96(4) of that Act.

(**5**) To which there are various amendments made by sections 102 and 104 by section 96 of the Water Act 2003.

(**6**) Inserted by section 56 of and Schedule 4 to the Water Act 2003.

(**7**) Subsection (1A) is inserted by section 92(5) of the Water Act 2003.

(**8**) Section 106(1A) is inserted by section 99 of the Water Act 2003.

(**9**) 1989 c. 15.

(**10**) To which there are various amendments made by section 101(1) of and Schedule 8 to the Water Act 2003.

(**11**) To which there are various amendments made by section 101(1) of and Schedule 8 to the Water Act 2003.

(**12**) Section 199 is amended by section 97(1) and (8) of the Water Act 2003.

# CON29DW DRAINAGE & WATER ENQUIRY (DOMESTIC)
# TERMS AND CONDITIONS

**The Customer and the Client are asked to note these terms, which govern the basis on which the drainage and water report is supplied.**

**Definitions**

"Apparatus" means the public assets shown on the Company's map keys relevant to the Report.
"Client" means the person, company or body who is the intended recipient of the Report with an actual or potential interest in the Property.
"Company" means the company who produces the Report, being Thames Water Utilities Limited, a company registered in England and Wales with company number 02366661 and whose registered office is at Clearwater Court, Vastern Road, Reading, Berkshire, RG1 8DB.
"Customer" means the person, company, firm or other legal body placing the Order, either on their own behalf as Client, or, as an agent for a Client.
"Order" means any request completed by the Customer requesting the Report from the Company.
"Property" means the address or location supplied by the Customer in the Order.
"Report" means the drainage and/or water report prepared by the Company in respect of the Property, including any maps provided as part of such reports.

**1. Agreement**

1.1 The Company agrees to supply the Report to the Customer and the Client subject to these terms and conditions. The scope and limitations of the Report are described in clause 2 of these terms. Where the Customer is acting as an agent for the Client then the Customer shall be responsible for bringing these terms to the attention of the Client.

1.2 The Customer and the Client agree that the placing of an Order for a Report and the subsequent provision of a copy of the Report to the Client indicates their acceptance of these terms.

**2. The Report**

Whilst the Company will use reasonable care and skill in producing the Report, it is provided to the Customer and the Client on the basis that they acknowledge and agree to the following:-

2.1 The information contained in the Report can change on a regular basis so the Company cannot be responsible to the Customer or the Client for any change in the information contained in the Report after the date on which the Report was produced and sent to the Client.

2.2 The Report does not give details about the actual state or condition of the Property nor should it be used or taken to indicate or exclude actual suitability or unsuitability of the Property for any particular purpose, or relied upon for determining saleability or value, or used as a substitute for any physical investigation or inspection. Further advice and information from appropriate experts and professionals should always be obtained.

2.3 The information contained in the Report is based upon the accuracy of the address supplied by the Customer or Client when placing the Order.

2.4 The Report provides information as to the indicative location and connection of existing services and other information in relation to drainage and water enquiries and should not be relied on for any other purpose.

2.5 The Report is produced only for use in relation to individual domestic property transactions which require the provision of drainage and water information and cannot be used for commercial development of domestic properties, development of land or commercial properties for intended occupation by third parties. Where a Report is required for commercial development of domestic properties, development of land or commercial properties for intended occupation by parties, the Customer can order a different report, and different terms shall apply.

2.6 The customer shall only use the Report for the purpose for which it is supplied in accordance with these terms.

2.7 In providing the Customer with the Report, the Company shall comply with the Drainage & Water Searches Network (DWSN) Standards.

2.8 In providing the Customer with the Report, the Company shall comply with the Search Code.

**3. Disclaimers**

3.1 Without prejudice to any other terms set out herein, the Company accepts responsibility for any inaccuracy in the location of Apparatus, or missing Apparatus contained in the maps within the Report provided that such inaccuracies or errors arise as a direct result of the negligence of the Company and the existence of which the Company should reasonably have been aware.

3.2 For the purposes of the Report, the Company will not seek to rely on any statements and/or disclaimer shown on any maps which seeks to limit its liability in relation to the accuracy and/or location of Apparatus where any inaccuracies or errors arise as a direct result of the negligence of the Company and the existence of which the Company should reasonably have been aware.

**4. Liability**

4.1 The Company shall not be liable to the Customer or Client in contract, tort, negligence, breach of statutory duty, misrepresentation or otherwise for any inaccuracies, mistakes or omissions in the Report unless any such liability arises as a direct consequence of the Company's negligence and the existence of which the Company should reasonably have been aware.

4.2 Notwithstanding clause 4.1 above, the Company shall accept liability for (a) death or personal injury arising from its negligence, (b) fraud or fraudulent misrepresentation, and (c) any other liability which cannot be excluded or limited by law.

4.3 Subject to clause 4.2 above, the Company's total liability to the Customer or Client, whether for breach of contract, tort, negligence, breach of statutory duty, misrepresentation or otherwise, arising under or in connection with these terms and conditions and/or the provision of a Report shall be limited to £10 million in aggregate.

**5. Copyright and Confidentiality**

5.1 The Customer and the Client acknowledge that the Report is confidential and is intended for the personal use of the Client. The copyright and any other intellectual property rights in the Report shall remain the property of the Company and/or its licensors. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided in these terms.

5.2 The Customer or Client is entitled to make copies of the Report for their own internal purposes, but may only copy Ordnance Survey mapping or data contained in or attached to the Report if they have an appropriate licence from the originating source of that mapping or data.

5.3 The Customer and the Client agree (in respect of both the original and any copies made) to respect and not to alter any trademark, copyright notice or other property marking which appears on the Report.

5.4 The maps contained in the Report are protected by Crown Copyright and must not be used for any purpose outside the context of the Report.

5.5 The enquiries in the Report are protected by copyright by the Law Society of 113 Chancery Lane, London WC2A 1PL and must not be used for any purpose outside the context of the Report.

5.6 The Customer and the Client agree to indemnify the Company against any losses, costs, claims and damage suffered by the Company as a result of any breach by either of them of the terms of clauses 5.1 to 5.5 inclusive.

**6. Payment**

6.1 Unless otherwise stated, all prices are inclusive of VAT. The Customer shall pay for the price of the Report specified by the Company, without any set off, deduction or counterclaim. Unless otherwise agreed between the parties, the Company must receive payment for the Report in full before the Report is produced. Where the parties agree that payment is not required in advance, the Customer must pay for the Report in full within 14 days of the date of the invoice, unless otherwise agreed in writing between the parties.

**7. Cancellation Rights**

**As a consumer**

7.1 Where the Customer is an individual consumer (and not acting for purposes wholly or mainly relating to his or her trade, business, craft or profession), the Customer has specific legal rights relating to cancellation of any Order the Customer may place. The Customer may cancel his or her Order at any time within 14 days after the day on which the contract is entered into ("**Cancellation Period**").

7.2 To exercise the right to cancel, the Customer must inform the Company in writing of his or her decision to cancel this contract.

7.3 Where the Customer is ordering a Report as a consumer, due to the Customer's cancellation rights, the Company will not process the Order or provide the Report to the Customer before the end of the Cancellation Period unless the Customer provides his or her express consent and acknowledges that he or she will lose the right to cancel the contract under regulation 29(1) of the Consumer Contracts (Information, Cancellation, and Additional Charges) Regulations 2013

7.4 In addition to these rights, where the Company is able to, it will cancel any Order in accordance with its cancellation policy, which can be found on the Company's website.

**As a business**

7.5 The Cancellation Period does not apply to the Customer's Order if the Customer is placing the Order wholly or mainly for purposes relating to their trade, business, craft or profession.

7.6 If the Customer cancels the Order other than in accordance with this clause the Customer may be liable for fees as detailed in the Company's cancellation policy which can be found on the Company's website.

**8. Complaints**

8.1 The Company's complaints procedure is available on the Company's website.

8.2 If the Customer follows the Company's complaints procedure but is dissatisfied with the response, the Customer may refer the complaint for consideration under The Property Ombudsman Scheme (TPOs). Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

**9. General**

9.1 These terms are the only terms and conditions that shall apply to any Order and the provision of a Report by the Company to the Customer and shall constitute the entire agreement between the Customer and the Company and supersede, replace and extinguish any previous arrangement, understanding or agreement between the parties relating to such Report.

9.2 In the event of any conflict of inconsistency between any information on the Company's website describing the features of the Report and these terms, then these terms shall prevail.

9.3 Where the Customer is acting wholly or mainly in the normal course of his or her trade, business, craft or profession, the Client is entitled to the benefit of these terms. Save as provided in this clause 9.3, it is not intended that any other person who is not a party to these terms has any right to enforce any term of these terms under the Contracts (Rights of Third Parties) Act 1999.

9.4 If any provision of these terms is or becomes invalid or unenforceable, it will be taken to be removed from the rest of these terms to the extent that it is invalid or unenforceable. No other provision of these terms shall be affected.

9.5 These terms shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts.

9.6 Nothing in these terms and conditions shall in any way restrict the Customer or the Client's statutory or any other rights of access to the information contained in the Report.

**These Terms & Conditions are available in larger print for those with impaired vision**

| | |
|---|---|
| **From:** | DEVELOPER.SERVICES@THAMESWATER.CO.U |
| **To:** | Beverley Hunter |
| **Subject:** | RE: RE: Confirmation of the surface water sewer. 6100360 North Common Road |
| **Date:** | 24 September 2019 10:42:28 |

Dear Beverly,

Thank you for your email,

Apologies for the confusion, there is no surface water sewer flowing into the pond, there is however an inlet of the pond into the surface water sewer. you can contact our property searches team on 0845 070 9148 and they will be able to provide a copy of the map which shows this.

Regards,

Connor
Developer Services

Original Text

| | |
|---|---|
| **From:** | Beverley Hunter <bev.hunter@mlmgroup.com> |
| **To:** | DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK> |
| **CC:** | |
| **Sent:** | 19.09.19 15:38:11 |
| **Subject:** | RE: Confirmation of the surface water sewer. 6100360 North Common Road |

Dear Developer Services

Further to the email below, are you able to confirm what the surface water sewer serves? There doesn't appear to be any connection into the pond, only the outfall to the Thames Water surface water sewer. Was there an historic connection into the pond?

Kind regards

Begin forwarded message:

Beverley Hunter
Technical Administrator

D +44 1473 350147
T +44 1473 231100
E bev.hunter@mlmgroup.com
A MLM Group, North Kiln, Felaw Maltings, 46 Felaw Street, Ipswich, Suffolk, IP2 8PN
W www.mlmgroup.com

MLM. Group
Part of Sweco

Buildings • Infrastructure • Compliance • Environment

**From:** "DEVELOPER.SERVICES@THAMESWATER.CO.U" <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
**Date:** 15 February 2019 at 14:00:39 GMT
**To:** <gary@trafalgarproperty.com>
**Subject: Confirmation of the surface water sewer.**

## Confirmation

**Site location:**

13A NORTH COMMON ROAD UB8 1PD

Dear Mr Wynne,

Thank you for your enquiry. I can confirm that after locating your property on our mapping system, the sewer connecting into the pond in the back of your property is a surface water sewer. The status of the sewer is live and in use.

If you'd like to discuss this further, please call us on 0800 009 3921 between 8am and 5pm, Monday to Friday.

Yours sincerely,

Zenab Chechi

Customer Service Advisor
Developer Services

Visit us online www.thameswater.co.uk , follow us on twitter www.twitter.com/thameswater or find us on www.facebook.com/thameswater. We're happy to help you 24/7.

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## Appendix D – Surface Water Drainage

Sweco Calculations 65206825-XX-XX-T-C-0001 – Greenfield Run-off Calculations
Sweco Calculations 65206825-XX-XX-T-C-0002 – Brownfield Run-off Calculations
Sweco Drawing 65206825-SWE-XX-XX-D-C-0101 – Surface Water Drainage Strategy
Microdrainage Calculations
Management & Maintenance Plan

## ICP SUDS Mean Annual Flood

Input

| | | | |
|---|---|---|---|
| Return Period (years) | 1 | Soil | 0.300 |
| Area (ha) | 0.066 | Urban | 0.000 |
| SAAR (mm) | 693 | Region Number | Region 6 |

**Results l/s**

| | |
|---|---|
| QBAR Rural | 0.1 |
| QBAR Urban | 0.1 |
| Q1 year | 0.1 |
| Q1 year | 0.1 |
| Q30 years | 0.3 |
| Q100 years | 0.4 |

| | | | | | |
|---|---|---|---|---|---|
| SWECO | Project | **13a Northcommon Road** | | Made JRC | Ref 65206825 |
| | Section | **Brownfield Run-off** | | Checked | Sheet No. 1 of 2 |
| | Rev P01 | Date | Description | Made | Checked |

| Ref. | Calculation | Output |
|---|---|---|

1. Brownfield Run-off Calculation

Based on the Modified Rational Method the current discharge rate from the site for the 100%, 3.3% and 1% annual exceedance probability (AEP) events (1, 30 & 100 year) can be calculated as:

Q = 3.61 CiA

| | | |
|---|---|---|
| C = Volumetric run-off co-efficient | 0.9 | |
| i = Rainfall intensity | see below | mm / hr |
| A = Contributing Area | 0.062 | ha |

Rainfall intensity taken from MicroDrainage Rainfall Generator

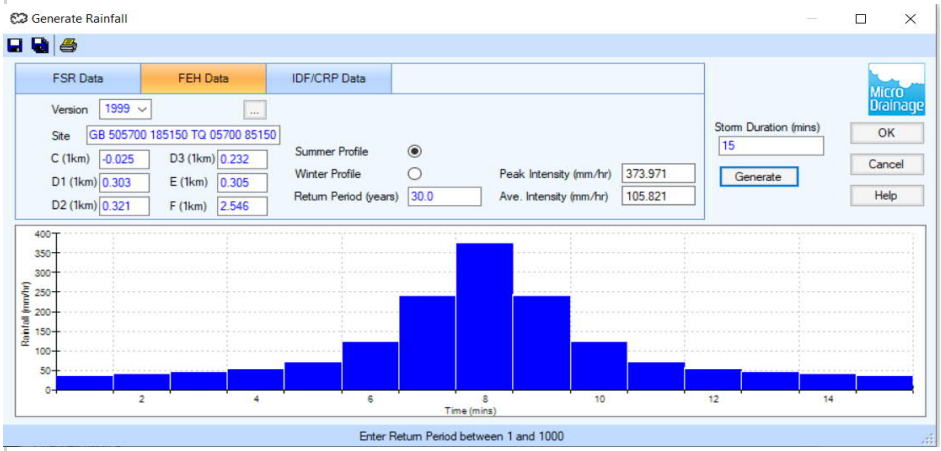
| | | |
|---|---|---|
| 100% | 33.524 | mm / hr |
| 3.3% | 105.821 | mm / hr |
| 1% | 159.928 | mm / hr |

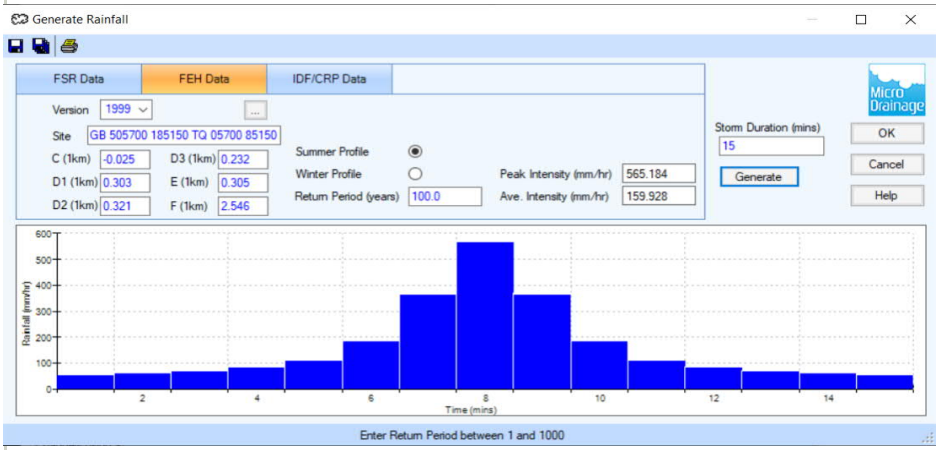
Discharge rate

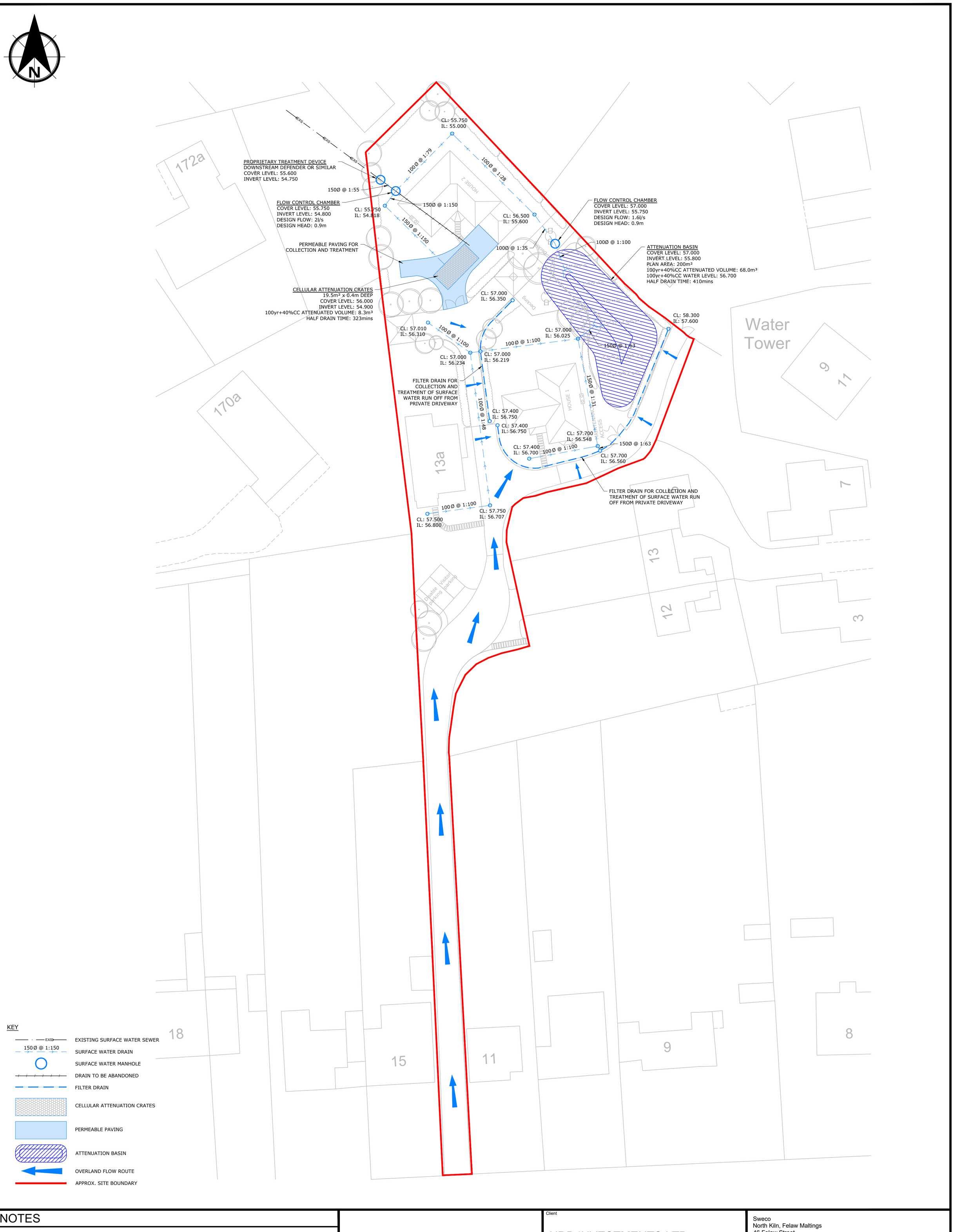
| | | |
|---|---|---|
| 100% | 6.753 | l / s |
| 3.3% | 21.316 | l / s |
| 1% | 32.216 | l / s |

| | | | | |
|---|---|---|---|---|
| SWECO | Project: 13a Northcommon Road | | Made: JRC | Ref: 65206825 |
| | Section: Brownfield Run-off | | Checked: | Sheet No.: 2 of 2 |
| | Rev: P01 | Date: | Description: | Made: / Checked: |

| Ref. | Calculation | Output |
|---|---|---|




## NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S, ARCHITECT'S AND SPECIALIST'S DRAWINGS AND THE SPECIFICATION.
2. DO NOT SCALE FROM THIS DRAWING MANUALLY OR ELECTRONICALLY. WRITTEN PERMISSION MUST BE OBTAINED FROM SWECO PRIOR TO SCALING ELECTRONICALLY OR USING THIS ELECTRONIC FILE.
3. THIS DRAINAGE STRATEGY DRAWING SHOWS HOW SURFACE WATER RUN-OFF COULD BE MANAGED ON SITE WITH A RESTRICTED OFF-SITE DISCHARGE, FOR ALL RAINFALL EVENTS UP TO AND INCLUDING THE 100 YEAR RETURN PERIOD EVENT PLUS 40% CLIMATE CHANGE TO ENSURE NO INCREASED FLOOD RISK TO OTHERS AS A RESULT OF THE PROPOSED DEVELOPMENT.

   THIS IS NOT INTENDED TO BE A DETAILED DESIGN AT THIS STAGE. PLEASE NOTE THAT THE FINAL LAYOUT MAY BE SUBJECT TO REFINEMENT TO MEET CERTAIN TECHNICAL CRITERIA.

| Rev | Date | Amendment Details | Dr'n | Chk' | App' |
|---|---|---|---|---|---|
| P01 | 02.09.2022 | FIRST ISSUE | BP | JRC | JRC |



Client: HDB INVESTMENTS LTD

Project Title: 13A NORTH COMMON ROAD

Drawing Title: SURFACE WATER DRAINAGE STRATEGY

Sweco
North Kiln, Felaw Maltings
46 Felaw Street
Ipswich
IP2 8PN
Tel: +44 (0)1473 231 100
Web: www.sweco.co.uk

| Purpose Of Issue | | | |
|---|---|---|---|
| PRELIMINARY | | | |
| Status | Status Description | | |
| Designed | Drawn | Checked | Approved |
| BP | BP | JRC | JRC |
| Sheet Size | Scale | SWECO Ref | Revision |
| A1 | 1:250 | 65206825 | P01 |

Drawing Number: 65206825-SWE-XX-XX-D-C-0101

P:\6524\65206825_13A_North_Common_Road_Hillingdon_-_FRA\000\04 Deliverables Management\Drawings\Working\ 65206825-SWE-XX-XX-D-C-0101-P01-SWDS.dwg

## STORM SEWER DESIGN by the Modified Rational Method

### Network Design Table for Storm

# - Indicates pipe length does not match coordinates

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 9.293 | 0.093 | 99.9 | 0.010 | 3.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S1.001 | 22.629 | 0.473 | 47.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S2.000 | 7.634 | 0.076 | 100.4 | 0.002 | 3.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S1.002 | 15.976 | 0.159 | 100.5 | 0.012 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S3.000 | 0.760 | 0.012 | 63.3 | 0.060 | 3.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.000 | 10.243 | 0.102 | 100.4 | 0.005 | 3.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S3.001 | 16.046 | 0.523 | 30.7 | 0.006 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.003 | 4.119# | 0.225 | 18.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.004 | 4.832 | 0.050 | 96.6 | 0.020 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S1.005 | 5.251 | 0.150 | 35.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S1.006 | 16.981 | 0.600 | 28.3 | 0.004 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S1.007 | 11.843 | 0.150 | 79.0 | 0.003 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 0.00 | 3.20 | 56.800 | 0.010 | 0.0 | 0.0 | 0.0 | 0.77 | 6.0 | 0.0 |
| S1.001 | 0.00 | 3.54 | 56.707 | 0.010 | 0.0 | 0.0 | 0.0 | 1.12 | 8.8 | 0.0 |
| S2.000 | 0.00 | 3.17 | 56.310 | 0.002 | 0.0 | 0.0 | 0.0 | 0.77 | 6.0 | 0.0 |
| S1.002 | 0.00 | 3.89 | 56.234 | 0.024 | 0.0 | 0.0 | 0.0 | 0.77 | 6.0 | 0.0 |
| S3.000 | 0.00 | 3.01 | 56.560 | 0.060 | 0.0 | 0.0 | 0.0 | 1.27 | 22.4 | 0.0 |
| S4.000 | 0.00 | 3.22 | 56.700 | 0.005 | 0.0 | 0.0 | 0.0 | 0.77 | 6.0 | 0.0 |
| S3.001 | 0.00 | 3.37 | 56.548 | 0.071 | 0.0 | 0.0 | 0.0 | 1.82 | 32.2 | 0.0 |
| S1.003 | 0.00 | 3.92 | 56.025 | 0.095 | 0.0 | 0.0 | 0.0 | 2.37 | 41.8 | 0.0 |
| S1.004 | 0.00 | 4.02 | 55.800 | 0.115 | 0.0 | 0.0 | 0.0 | 0.78 | 6.1 | 0.0 |
| S1.005 | 0.00 | 4.09 | 55.750 | 0.115 | 0.0 | 0.0 | 0.0 | 1.31 | 10.3 | 0.0 |
| S1.006 | 0.00 | 4.28 | 55.600 | 0.119 | 0.0 | 0.0 | 0.0 | 1.46 | 11.4 | 0.0 |
| S1.007 | 0.00 | 4.51 | 55.000 | 0.122 | 0.0 | 0.0 | 0.0 | 0.87 | 6.8 | 0.0 |

## STORM SEWER DESIGN by the Modified Rational Method

### Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S5.000 | 12.275 | 0.082 | 149.7 | 0.014 | 3.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S5.001 | 2.684 | 0.018 | 149.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S1.008 | 2.781 | 0.050 | 55.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S5.000 | 0.00 | 3.25 | 54.900 | 0.014 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 0.0 |
| S5.001 | 0.00 | 3.30 | 54.818 | 0.014 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 0.0 |
| S1.008 | 0.00 | 4.54 | 54.800 | 0.136 | 0.0 | 0.0 | 0.0 | 1.35 | 23.9 | 0.0 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| 1.000 | - | - | 100 | 0.010 | 0.010 | 0.010 |
| 1.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.000 | - | - | 100 | 0.002 | 0.002 | 0.002 |
| 1.002 | - | - | 100 | 0.012 | 0.012 | 0.012 |
| 3.000 | - | - | 100 | 0.060 | 0.060 | 0.060 |
| 4.000 | - | - | 100 | 0.005 | 0.005 | 0.005 |
| 3.001 | - | - | 100 | 0.006 | 0.006 | 0.006 |
| 1.003 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.004 | - | - | 100 | 0.020 | 0.020 | 0.020 |
| 1.005 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.006 | - | - | 100 | 0.004 | 0.004 | 0.004 |
| 1.007 | - | - | 100 | 0.003 | 0.003 | 0.003 |
| 5.000 | - | - | 100 | 0.014 | 0.014 | 0.014 |
| 5.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.008 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| | | | | Total | Total | Total |
| | | | | 0.136 | 0.136 | 0.136 |

## Free Flowing Outfall Details for Storm

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---|---|---|---|---|---|---|
| S1.008 | S | 55.600 | 54.750 | 0.000 | 0 | 0 |

## Simulation Criteria for Storm

| | | | |
|---|---|---|---|
| Volumetric Runoff Coeff | 0.750 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start (mins) | 0 | Inlet Coeffiecient | 0.800 |
| Hot Start Level (mm) | 0 | Flow per Person per Day (l/per/day) | 0.000 |
| Manhole Headloss Coeff (Global) | 0.500 | Run Time (mins) | 60 |
| Foul Sewage per hectare (l/s) | 0.000 | Output Interval (mins) | 1 |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

## Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| Return Period (years) | 100 |
| FEH Rainfall Version | 1999 |
| Site Location | GB 505700 185150 TQ 05700 85150 |
| C (1km) | -0.025 |
| D1 (1km) | 0.303 |
| D2 (1km) | 0.321 |

## Synthetic Rainfall Details

| | |
|---|---|
| D3 (1km) | 0.232 |
| E (1km) | 0.305 |
| F (1km) | 2.546 |
| Summer Storms | Yes |
| Winter Storms | Yes |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |
| Storm Duration (mins) | 30 |

## Online Controls for Storm

### Hydro-Brake® Optimum Manhole: SBASIN, DS/PN: S1.004, Volume (m³): 1.4

| | |
|---|---|
| Unit Reference | MD-SHE-0061-1600-0900-1600 |
| Design Head (m) | 0.900 |
| Design Flow (l/s) | 1.6 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 61 |
| Invert Level (m) | 55.800 |
| Minimum Outlet Pipe Diameter (mm) | 75 |
| Suggested Manhole Diameter (mm) | 1200 |

| Control Points | Head (m) | Flow (l/s) |
|---|---|---|
| Design Point (Calculated) | 0.900 | 1.6 |
| Flush-Flo™ | 0.270 | 1.6 |
| Kick-Flo® | 0.546 | 1.3 |
| Mean Flow over Head Range | - | 1.4 |

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 | 1.3 | 1.200 | 1.8 | 3.000 | 2.8 | 7.000 | 4.1 |
| 0.200 | 1.5 | 1.400 | 1.9 | 3.500 | 3.0 | 7.500 | 4.2 |
| 0.300 | 1.6 | 1.600 | 2.1 | 4.000 | 3.2 | 8.000 | 4.4 |
| 0.400 | 1.5 | 1.800 | 2.2 | 4.500 | 3.3 | 8.500 | 4.5 |
| 0.500 | 1.4 | 2.000 | 2.3 | 5.000 | 3.5 | 9.000 | 4.6 |
| 0.600 | 1.3 | 2.200 | 2.4 | 5.500 | 3.7 | 9.500 | 4.7 |
| 0.800 | 1.5 | 2.400 | 2.5 | 6.000 | 3.8 | | |
| 1.000 | 1.7 | 2.600 | 2.6 | 6.500 | 4.0 | | |

### Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.008, Volume (m³): 1.2

| | |
|---|---|
| Unit Reference | MD-SHE-0069-2000-0900-2000 |
| Design Head (m) | 0.900 |
| Design Flow (l/s) | 2.0 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 69 |
| Invert Level (m) | 54.800 |
| Minimum Outlet Pipe Diameter (mm) | 100 |
| Suggested Manhole Diameter (mm) | 1200 |

## Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.008, Volume (m³): 1.2

| Control Points | Head (m) | Flow (l/s) |
|---|---|---|
| Design Point (Calculated) | 0.900 | 2.0 |
| Flush-Flo™ | 0.278 | 2.0 |
| Kick-Flo® | 0.568 | 1.6 |
| Mean Flow over Head Range | - | 1.8 |

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 | 1.7 | 1.200 | 2.3 | 3.000 | 3.5 | 7.000 | 5.2 |
| 0.200 | 2.0 | 1.400 | 2.4 | 3.500 | 3.7 | 7.500 | 5.3 |
| 0.300 | 2.0 | 1.600 | 2.6 | 4.000 | 4.0 | 8.000 | 5.5 |
| 0.400 | 1.9 | 1.800 | 2.7 | 4.500 | 4.2 | 8.500 | 5.7 |
| 0.500 | 1.8 | 2.000 | 2.9 | 5.000 | 4.4 | 9.000 | 5.8 |
| 0.600 | 1.7 | 2.200 | 3.0 | 5.500 | 4.6 | 9.500 | 6.0 |
| 0.800 | 1.9 | 2.400 | 3.1 | 6.000 | 4.8 | | |
| 1.000 | 2.1 | 2.600 | 3.2 | 6.500 | 5.0 | | |

## Storage Structures for Storm

### Infiltration Basin Manhole: SBASIN, DS/PN: S1.004

Invert Level (m) 55.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m²) | Depth (m) | Area (m²) |
|---|---|---|---|
| 0.000 | 24.3 | 1.200 | 200.4 |

### Cellular Storage Manhole: S12, DS/PN: S5.000

Invert Level (m) 54.900 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 | 19.5 | 0.0 | 0.401 | 0.0 | 0.0 |
| 0.400 | 19.5 | 0.0 | | | |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| FEH Rainfall Version | 1999 |
| Site Location | GB 505700 185150 TQ 05700 85150 |
| C (1km) | -0.025 |
| D1 (1km) | 0.303 |
| D2 (1km) | 0.321 |
| D3 (1km) | 0.232 |
| E (1km) | 0.305 |
| F (1km) | 2.546 |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 60 Summer | 1 | +0% | 100/60 Summer | | | | 56.828 |
| S1.001 | S2 | 60 Summer | 1 | +0% | 100/60 Summer | | | | 56.729 |
| S2.000 | S3 | 60 Summer | 1 | +0% | 100/60 Summer | | | | 56.322 |
| S1.002 | S4 | 60 Summer | 1 | +0% | 30/60 Summer | | | | 56.276 |
| S3.000 | S5 | 60 Summer | 1 | +0% | 30/60 Summer | | | | 56.638 |
| S4.000 | S6 | 60 Summer | 1 | +0% | 100/60 Summer | | | | 56.720 |
| S3.001 | S7 | 60 Summer | 1 | +0% | 100/60 Summer | | | | 56.596 |
| S1.003 | S8 | 60 Summer | 1 | +0% | 30/60 Summer | | | | 56.081 |
| S1.004 | SBASIN | 60 Winter | 1 | +0% | 1/60 Summer | | | | 56.037 |
| S1.005 | S9 | 60 Winter | 1 | +0% | | | | | 55.778 |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | -0.072 | 0.000 | 0.17 | | | 1.0 | OK | |
| S1.001 | S2 | -0.078 | 0.000 | 0.11 | | | 0.9 | OK | |
| S2.000 | S3 | -0.088 | 0.000 | 0.03 | | | 0.2 | OK | |
| S1.002 | S4 | -0.058 | 0.000 | 0.37 | | | 2.1 | OK | |
| S3.000 | S5 | -0.072 | 0.000 | 0.53 | | | 5.8 | OK | |
| S4.000 | S6 | -0.080 | 0.000 | 0.08 | | | 0.5 | OK | |
| S3.001 | S7 | -0.102 | 0.000 | 0.22 | | | 6.7 | OK | |
| S1.003 | S8 | -0.094 | 0.000 | 0.30 | | | 8.8 | OK | |
| S1.004 | SBASIN | 0.137 | 0.000 | 0.29 | | 56 | 1.5 | SURCHARGED | |
| S1.005 | S9 | -0.072 | 0.000 | 0.17 | | | 1.5 | OK | |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | 60 Summer | 1 | +0% | 100/120 Winter | | | | 55.627 |
| S1.007 | S11 | 60 Summer | 1 | +0% | 30/60 Winter | | | | 55.039 |
| S5.000 | S12 | 60 Winter | 1 | +0% | 30/60 Summer | | | | 54.951 |
| S5.001 | S13 | 60 Winter | 1 | +0% | 30/60 Summer | | | | 54.950 |
| S1.008 | S14 | 60 Winter | 1 | +0% | 30/60 Summer | | | | 54.950 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | -0.073 | 0.000 | 0.16 | | | 1.8 | OK | |
| S1.007 | S11 | -0.061 | 0.000 | 0.32 | | | 2.0 | OK | |
| S5.000 | S12 | -0.099 | 0.000 | 0.03 | | 45 | 0.5 | OK | |
| S5.001 | S13 | -0.018 | 0.000 | 0.03 | | | 0.3 | OK | |
| S1.008 | S14 | 0.000 | 0.000 | 0.13 | | | 1.9 | OK | |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| FEH Rainfall Version | 1999 |
| Site Location | GB 505700 185150 TQ 05700 85150 |
| C (1km) | -0.025 |
| D1 (1km) | 0.303 |
| D2 (1km) | 0.321 |
| D3 (1km) | 0.232 |
| E (1km) | 0.305 |
| F (1km) | 2.546 |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 60 Summer | 30 | +0% | 100/60 Summer | | | | 56.849 |
| S1.001 | S2 | 60 Summer | 30 | +0% | 100/60 Summer | | | | 56.746 |
| S2.000 | S3 | 60 Summer | 30 | +0% | 100/60 Summer | | | | 56.405 |
| S1.002 | S4 | 60 Summer | 30 | +0% | 30/60 Summer | | | | 56.402 |
| S3.000 | S5 | 60 Summer | 30 | +0% | 30/60 Summer | | | | 56.759 |
| S4.000 | S6 | 60 Summer | 30 | +0% | 100/60 Summer | | | | 56.733 |
| S3.001 | S7 | 60 Summer | 30 | +0% | 100/60 Summer | | | | 56.635 |
| S1.003 | S8 | 120 Winter | 30 | +0% | 30/60 Summer | | | | 56.371 |
| S1.004 | SBASIN | 120 Winter | 30 | +0% | 1/60 Summer | | | | 56.369 |
| S1.005 | S9 | 960 Summer | 30 | +0% | | | | | 55.778 |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | -0.051 | 0.000 | 0.48 | | | 2.7 | OK | |
| S1.001 | S2 | -0.061 | 0.000 | 0.31 | | | 2.7 | OK | |
| S2.000 | S3 | -0.005 | 0.000 | 0.12 | | | 0.6 | OK | |
| S1.002 | S4 | 0.068 | 0.000 | 0.89 | | | 5.1 | SURCHARGED | |
| S3.000 | S5 | 0.049 | 0.000 | 1.50 | | | 16.2 | SURCHARGED | |
| S4.000 | S6 | -0.067 | 0.000 | 0.24 | | | 1.4 | OK | |
| S3.001 | S7 | -0.063 | 0.000 | 0.64 | | | 19.1 | OK | |
| S1.003 | S8 | 0.196 | 0.000 | 0.38 | | | 11.2 | SURCHARGED | |
| S1.004 | SBASIN | 0.469 | 0.000 | 0.29 | | 192 | 1.6 | SURCHARGED | |
| S1.005 | S9 | -0.072 | 0.000 | 0.17 | | | 1.6 | OK | |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | 60 Summer | 30 | +0% | 100/120 Winter | | | | 55.633 |
| S1.007 | S11 | 60 Winter | 30 | +0% | 30/60 Winter | | | | 55.103 |
| S5.000 | S12 | 60 Winter | 30 | +0% | 30/60 Summer | | | | 55.092 |
| S5.001 | S13 | 60 Winter | 30 | +0% | 30/60 Summer | | | | 55.090 |
| S1.008 | S14 | 60 Winter | 30 | +0% | 30/60 Summer | | | | 55.089 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | -0.067 | 0.000 | 0.24 | | | 2.6 | OK | |
| S1.007 | S11 | 0.003 | 0.000 | 0.47 | | | 3.0 | SURCHARGED | |
| S5.000 | S12 | 0.042 | 0.000 | 0.05 | | 62 | 0.6 | SURCHARGED | |
| S5.001 | S13 | 0.122 | 0.000 | 0.06 | | | 0.6 | SURCHARGED | |
| S1.008 | S14 | 0.139 | 0.000 | 0.14 | | | 2.0 | SURCHARGED | |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | |
|---|---|
| Rainfall Model | FEH |
| FEH Rainfall Version | 1999 |
| Site Location | GB 505700 185150 TQ 05700 85150 |
| C (1km) | -0.025 |
| D1 (1km) | 0.303 |
| D2 (1km) | 0.321 |
| D3 (1km) | 0.232 |
| E (1km) | 0.305 |
| F (1km) | 2.546 |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 60 Summer | 100 | +40% | 100/60 Summer | | | | 57.042 |
| S1.001 | S2 | 60 Summer | 100 | +40% | 100/60 Summer | | | | 57.017 |
| S2.000 | S3 | 60 Summer | 100 | +40% | 100/60 Summer | | | | 56.970 |
| S1.002 | S4 | 60 Summer | 100 | +40% | 30/60 Summer | | | | 56.967 |
| S3.000 | S5 | 60 Summer | 100 | +40% | 30/60 Summer | | | | 57.372 |
| S4.000 | S6 | 60 Summer | 100 | +40% | 100/60 Summer | | | | 57.227 |
| S3.001 | S7 | 60 Summer | 100 | +40% | 100/60 Summer | | | | 57.210 |
| S1.003 | S8 | 60 Winter | 100 | +40% | 30/60 Summer | | | | 56.721 |
| S1.004 | SBASIN | 180 Winter | 100 | +40% | 1/60 Summer | | | | 56.700 |
| S1.005 | S9 | 180 Winter | 100 | +40% | | | | | 55.778 |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 0.142 | 0.000 | 0.93 | | | 5.2 | SURCHARGED | |
| S1.001 | S2 | 0.210 | 0.000 | 0.51 | | | 4.4 | SURCHARGED | |
| S2.000 | S3 | 0.560 | 0.000 | 0.18 | | | 1.0 | FLOOD RISK | |
| S1.002 | S4 | 0.633 | 0.000 | 1.24 | | | 7.1 | FLOOD RISK | |
| S3.000 | S5 | 0.662 | 0.000 | 2.55 | | | 27.6 | FLOOD RISK | |
| S4.000 | S6 | 0.427 | 0.000 | 0.52 | | | 2.9 | FLOOD RISK | |
| S3.001 | S7 | 0.512 | 0.000 | 1.00 | | | 29.8 | SURCHARGED | |
| S1.003 | S8 | 0.546 | 0.000 | 1.07 | | | 31.9 | FLOOD RISK | |
| S1.004 | SBASIN | 0.800 | 0.000 | 0.30 | | 410 | 1.6 | FLOOD RISK | |
| S1.005 | S9 | -0.072 | 0.000 | 0.18 | | | 1.6 | OK | |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | 120 Winter | 100 | +40% | 100/120 Winter | | | | 55.743 |
| S1.007 | S11 | 120 Winter | 100 | +40% | 30/60 Winter | | | | 55.726 |
| S5.000 | S12 | 120 Winter | 100 | +40% | 30/60 Summer | | | | 55.712 |
| S5.001 | S13 | 120 Winter | 100 | +40% | 30/60 Summer | | | | 55.711 |
| S1.008 | S14 | 120 Winter | 100 | +40% | 30/60 Summer | | | | 55.711 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.006 | S10 | 0.043 | 0.000 | 0.21 | | | 2.3 | SURCHARGED | |
| S1.007 | S11 | 0.626 | 0.000 | 0.43 | | | 2.7 | FLOOD RISK | |
| S5.000 | S12 | 0.662 | 0.000 | 0.08 | | 323 | 1.1 | FLOOD RISK | |
| S5.001 | S13 | 0.743 | 0.000 | 0.05 | | | 0.6 | FLOOD RISK | |
| S1.008 | S14 | 0.761 | 0.000 | 0.14 | | | 2.0 | FLOOD RISK | |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Ratio R | 0.404 |
| Region | England and Wales | Cv (Summer) | 0.750 |
| M5-60 (mm) | 20.000 | Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 15 Summer | 1 | +0% | 100/15 Summer | | | | 56.838 |
| S1.001 | S2 | 15 Summer | 1 | +0% | 100/15 Summer | | | | 56.737 |
| S2.000 | S3 | 15 Summer | 1 | +0% | 30/15 Summer | | | | 56.326 |
| S1.002 | S4 | 15 Summer | 1 | +0% | 30/15 Summer | | | | 56.289 |
| S3.000 | S5 | 15 Summer | 1 | +0% | 30/15 Summer | | | | 56.677 |
| S4.000 | S6 | 15 Summer | 1 | +0% | 100/15 Summer | | | | 56.726 |
| S3.001 | S7 | 15 Summer | 1 | +0% | 30/15 Summer | | | | 56.614 |
| S1.003 | S8 | 15 Summer | 1 | +0% | 30/15 Summer | | | | 56.100 |
| S1.004 | SBASIN | 60 Winter | 1 | +0% | 1/15 Summer | | | | 56.037 |
| S1.005 | S9 | 60 Winter | 1 | +0% | | | | | 55.778 |
| S1.006 | S10 | 15 Winter | 1 | +0% | | | | | 55.628 |
| S1.007 | S11 | 15 Winter | 1 | +0% | 100/15 Summer | | | | 55.040 |
| S5.000 | S12 | 60 Winter | 1 | +0% | 30/60 Winter | | | | 54.951 |
| S5.001 | S13 | 60 Winter | 1 | +0% | 30/15 Summer | | | | 54.950 |
| S1.008 | S14 | 60 Winter | 1 | +0% | 1/60 Winter | | | | 54.950 |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | -0.062 | 0.000 | 0.29 | | | 1.6 | OK | |
| S1.001 | S2 | -0.070 | 0.000 | 0.20 | | | 1.7 | OK | |
| S2.000 | S3 | -0.084 | 0.000 | 0.06 | | | 0.3 | OK | |
| S1.002 | S4 | -0.045 | 0.000 | 0.56 | | | 3.2 | OK | |
| S3.000 | S5 | -0.033 | 0.000 | 0.90 | | | 9.8 | OK | |
| S4.000 | S6 | -0.074 | 0.000 | 0.14 | | | 0.8 | OK | |
| S3.001 | S7 | -0.084 | 0.000 | 0.39 | | | 11.5 | OK | |
| S1.003 | S8 | -0.075 | 0.000 | 0.49 | | | 14.7 | OK | |
| S1.004 | SBASIN | 0.137 | 0.000 | 0.29 | | 56 | 1.6 | SURCHARGED | |
| S1.005 | S9 | -0.072 | 0.000 | 0.17 | | | 1.6 | OK | |
| S1.006 | S10 | -0.072 | 0.000 | 0.17 | | | 1.9 | OK | |
| S1.007 | S11 | -0.060 | 0.000 | 0.34 | | | 2.2 | OK | |
| S5.000 | S12 | -0.099 | 0.000 | 0.03 | | 46 | 0.5 | OK | |
| S5.001 | S13 | -0.018 | 0.000 | 0.03 | | | 0.3 | OK | |
| S1.008 | S14 | 0.000 | 0.000 | 0.13 | | | 1.9 | SURCHARGED | |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Ratio R | 0.404 |
| Region | England and Wales | Cv (Summer) | 0.750 |
| M5-60 (mm) | 20.000 | Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

WARNING: Half Drain Time has not been calculated as the structure is too full.

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 15 Summer | 30 | +0% | 100/15 Summer | | | | 56.866 |
| S1.001 | S2 | 15 Summer | 30 | +0% | 100/15 Summer | | | | 56.757 |
| S2.000 | S3 | 15 Winter | 30 | +0% | 30/15 Summer | | | | 56.493 |
| S1.002 | S4 | 15 Winter | 30 | +0% | 30/15 Summer | | | | 56.492 |
| S3.000 | S5 | 15 Summer | 30 | +0% | 30/15 Summer | | | | 56.860 |
| S4.000 | S6 | 15 Summer | 30 | +0% | 100/15 Summer | | | | 56.743 |
| S3.001 | S7 | 15 Summer | 30 | +0% | 30/15 Summer | | | | 56.702 |
| S1.003 | S8 | 15 Winter | 30 | +0% | 30/15 Summer | | | | 56.309 |
| S1.004 | SBASIN | 60 Winter | 30 | +0% | 1/15 Summer | | | | 56.297 |
| S1.005 | S9 | 15 Summer | 30 | +0% | | | | | 55.778 |
| S1.006 | S10 | 15 Winter | 30 | +0% | | | | | 55.636 |
| S1.007 | S11 | 60 Winter | 30 | +0% | 100/15 Summer | | | | 55.074 |
| S5.000 | S12 | 60 Winter | 30 | +0% | 30/60 Winter | | | | 55.062 |
| S5.001 | S13 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 55.061 |
| S1.008 | S14 | 60 Winter | 30 | +0% | 1/60 Winter | | | | 55.060 |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | -0.034 | 0.000 | 0.72 | | | 4.0 | OK | |
| S1.001 | S2 | -0.050 | 0.000 | 0.48 | | | 4.1 | OK | |
| S2.000 | S3 | 0.083 | 0.000 | 0.25 | | | 1.4 | SURCHARGED | |
| S1.002 | S4 | 0.158 | 0.000 | 1.18 | | | 6.8 | SURCHARGED | |
| S3.000 | S5 | 0.150 | 0.000 | 2.20 | | | 23.9 | SURCHARGED | |
| S4.000 | S6 | -0.057 | 0.000 | 0.36 | | | 2.0 | OK | |
| S3.001 | S7 | 0.004 | 0.000 | 0.92 | | | 27.6 | SURCHARGED | |
| S1.003 | S8 | 0.134 | 0.000 | 1.03 | | | 30.7 | SURCHARGED | |
| S1.004 | SBASIN | 0.397 | 0.000 | 0.29 | | | 1.6 | SURCHARGED | |
| S1.005 | S9 | -0.072 | 0.000 | 0.17 | | | 1.6 | OK | |
| S1.006 | S10 | -0.064 | 0.000 | 0.27 | | | 3.0 | OK | |
| S1.007 | S11 | -0.026 | 0.000 | 0.44 | | | 2.8 | OK | |
| S5.000 | S12 | 0.012 | 0.000 | 0.04 | | | 0.5 | SURCHARGED | |
| S5.001 | S13 | 0.093 | 0.000 | 0.05 | | | 0.5 | SURCHARGED | |
| S1.008 | S14 | 0.110 | 0.000 | 0.14 | | | 2.0 | SURCHARGED | |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 2 |
| Number of Online Controls | 2 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Ratio R | 0.404 |
| Region | England and Wales | Cv (Summer) | 0.750 |
| M5-60 (mm) | 20.000 | Cv (Winter) | 0.840 |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 450.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | OFF |
| DVD Status | ON |
| Inertia Status | ON |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

WARNING: Half Drain Time has not been calculated as the structure is too full.

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 15 Winter | 100 | +40% | 100/15 Summer | | | | 56.995 |
| S1.001 | S2 | 15 Winter | 100 | +40% | 100/15 Summer | | | | 56.969 |
| S2.000 | S3 | 15 Winter | 100 | +40% | 30/15 Summer | | | | 56.916 |
| S1.002 | S4 | 15 Winter | 100 | +40% | 30/15 Summer | | | | 56.915 |
| S3.000 | S5 | 15 Summer | 100 | +40% | 30/15 Summer | | | | 57.537 |
| S4.000 | S6 | 15 Winter | 100 | +40% | 100/15 Summer | | | | 57.321 |
| S3.001 | S7 | 15 Winter | 100 | +40% | 30/15 Summer | | | | 57.295 |
| S1.003 | S8 | 15 Winter | 100 | +40% | 30/15 Summer | | | | 56.636 |
| S1.004 | SBASIN | 60 Winter | 100 | +40% | 1/15 Summer | | | | 56.543 |
| S1.005 | S9 | 30 Summer | 100 | +40% | | | | | 55.778 |
| S1.006 | S10 | 15 Winter | 100 | +40% | | | | | 55.643 |
| S1.007 | S11 | 60 Winter | 100 | +40% | 100/15 Summer | | | | 55.260 |
| S5.000 | S12 | 60 Winter | 100 | +40% | 30/60 Winter | | | | 55.246 |
| S5.001 | S13 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 55.245 |
| S1.008 | S14 | 60 Winter | 100 | +40% | 1/60 Winter | | | | 55.245 |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 0.095 | 0.000 | 1.13 | | | 6.3 | SURCHARGED | |
| S1.001 | S2 | 0.162 | 0.000 | 0.63 | | | 5.3 | SURCHARGED | |
| S2.000 | S3 | 0.506 | 0.000 | 0.38 | | | 2.1 | FLOOD RISK | |
| S1.002 | S4 | 0.581 | 0.000 | 1.32 | | | 7.6 | FLOOD RISK | |
| S3.000 | S5 | 0.827 | 0.000 | 3.22 | | | 35.0 | FLOOD RISK | |
| S4.000 | S6 | 0.521 | 0.000 | 0.78 | | | 4.4 | FLOOD RISK | |
| S3.001 | S7 | 0.597 | 0.000 | 1.16 | | | 34.6 | FLOOD RISK | |
| S1.003 | S8 | 0.461 | 0.000 | 1.37 | | | 40.6 | FLOOD RISK | |
| S1.004 | SBASIN | 0.643 | 0.000 | 0.29 | | | 1.6 | SURCHARGED | |
| S1.005 | S9 | -0.072 | 0.000 | 0.17 | | | 1.6 | OK | |
| S1.006 | S10 | -0.057 | 0.000 | 0.39 | | | 4.2 | OK | |
| S1.007 | S11 | 0.160 | 0.000 | 0.54 | | | 3.5 | SURCHARGED | |
| S5.000 | S12 | 0.196 | 0.000 | 0.04 | | | 0.5 | SURCHARGED | |
| S5.001 | S13 | 0.277 | 0.000 | 0.04 | | | 0.5 | SURCHARGED | |
| S1.008 | S14 | 0.295 | 0.000 | 0.14 | | | 2.0 | SURCHARGED | |

# Surface Water Drainage & SuDS - Management & Maintenance Plan

| | |
|---|---|
| Project Name: 13a North Common Road | Author: Kate Holmes |
| Project Reference: JRC/65206825 | Date: 01 September 2022 |
| Project Manager: JRC | Document Reference: 65206825-SWE-ZZ-XX-T-C-1001-DS Revision: P01 |

| Rev. | Date | Reason for issue | Prepared | | Reviewed | | Approved | |
|---|---|---|---|---|---|---|---|---|
| [1] | 01.09.22 | Draft | KH | 01.09.22 | JRC | 01.09.22 | JRC | 01.09.22 |

## 1 Introduction

SuDS features are utilised to manage rainfall and use landscape features to deal with surface water. SuDS control the flow rate and volume of water leaving the development area and reduce pollution by intercepting silt and cleaning run-off from hard surfaces.

Like all aspects of drainage systems, SuDS components should be regularly inspected and maintained. This ensures efficient operation and reduces the likelihood of failure.

SuDS and drainage features for the development are to be maintained by the site owner(s).

The level of inspection and maintenance will vary depending on the type of SuDS component. Further information on maintenance can be found in The SUDS Manual (CIRIA publication C753).

**Managing SuDS**

The SuDS have been designed for easy maintenance to comprise:

- Regular care – litter collection and checking the inlets and outlets where water enters or leaves the SuDS feature.
- Occasional tasks – removing any silt that builds up, cutting back and clearing excessive vegetation growth, inspection on manholes connecting to attenuation crates.
- Remedial work – repairing damage where necessary.

**Contact**

In the event of concern over any matter relating the SuDS, please contact the organisation or person responsible for the management and maintenance of the site.

# 2 SuDS Maintenance

The SuDS scheme includes control structures to manage run-off as it flows to site outfall. The following lists the SuDS components and extra features which may be found on a site.

- **Attenuation crates**. These are below ground structures which hold the water prior to release into the downstream network.
- **SuDS flow control structures** are usually small orifices in control chamber, slots or V-notches in weirs, alternatively they can be specialist flow control devices such as Hydrobrakes. They are usually near the surface, so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection chambers** and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.
- **Detention Basin** is an open basin, usually dry but may have a permanent depth of water, which temporarily stores water following rainfall.
- **Filter Drain** is a stone filled trench, usually with a slotted pipe in the bottom, for the collection of surface water run-off.

Table 1 below provides a breakdown of the general maintenance requirements; maintenance is to be undertaken by the site owner(s), appropriate to the types of SuDS and surface water drainage systems proposed at this site. Site specific SuDS maintenance is provided in Table 2.

***TABLE 1: GENERAL MAINTENANCE REQUIREMENTS***

| **Regular Maintenance** | | **Frequency** |
|---|---|---|
| **1** | **Litter Management**<br>Check for and pick up litter around the entire site. | Monthly |
| **Occasional Maintenance** | | **Frequency** |
| **2** | **Inspection of Control Chambers**<br>Inspection of chambers for silt build up and visually check pipes appear clear and free flowing.<br>Remove silt as required.<br>Jetting as required. | Annually |
| **3** | **Silt management**<br>Inspect attenuation crates for a silt accumulation. | Annually<br>As required |
| **Remedial Work** | | **Frequency** |
| **4** | **Inspect SuDS systems to check for damage or failure**<br>Undertake remedial work as required. | As required |

## *TABLE 2: SPECIFIC SUDS MAINTENANCE*

| SuDS on Site | Frequency | Typical Tasks |
|---|---|---|
| Attenuation storage tanks | Monthly | • Remove debris from the catchment surface (where it may cause risks to performance). |
| | Annually | • Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed. |
| | Remedial work, as required | • Repair/rehabilitate inlets, outlet, overflows and vents.<br>• Survey inside of tank for sediment build-up and remove if necessary |
| Detention Basin | Monthly | • Remove littler/debris.<br>• Inspect inlets, outlets, overflows for blockages and clear if required and Inspect inlets and facility surface for accumulation of silt.<br>• Inspect banksides, structures, pipework etc for evidence of damage.<br>• Cut grass for spillways and access routes – monthly during growing season and cut grass – meadow grass in and around basin every 6 months in spring pre nesting season and autumn.<br>• Manage vegetation and remove nuisance plants monthly/as required. |
| | Annually | • Check any penstocks and other mechanical devices,<br>• Tidy all dead growth at start of growing season.<br>• Remove sediment from inlets, outlet, forebay as required.<br>• Manage wetland plants in outlet pool. |
| | As required | • Reseed poor vegetation growth<br>• Repair erosion or damage by reseeding/re-turfing.<br>• Realignment of rip-rap<br>• Repair of inlets, outlets and overflows.<br>• Relevel uneven surfaces and reinstate design levels.<br>• Prune trees and remove cuttings every 2 years or as required.<br>• Remove sediment from all inlets, outlets borebay and main basin every 5 years or as required. |
| Filter Drain | Monthly | • Inspect surface of filter drain, inlet/outlet pipework and control systems to ensure there are no blockages, clogging, standing water and structural damage.<br>• Remove litter/debris from filter drain. |
| | Biannually | • Inspect pre-treatment systems, inlets and perforates pipework for accumulation of silt, as required establish silt removal frequencies.<br>• Sediment to be removed as required from pre-treatment devices. |
| | As required | • Remove/control tree roots if encroaching on sides of filter drain using recommended methods.<br>• Clear blockages from perforated pipework.<br>• At locations with high pollution loads – remove surface geotextile and replace and wash or replace overlying filter medium. |

| | | |
|---|---|---|
| Proprietary device/ Flow control | Monthly for 6 months, then annually | • Inspect sediment accumulation rates and establish appropriate removal frequencies. |
| | Biannually | • Remove litter and debris and inspect for sediment, oil and grease accumulation.<br>• Inspect for evidence of poor operation.<br>• Inspect filter media and establish appropriate replacement frequencies. |
| | Remedial work, as required | • Replace malfunctioning parts or structures. |
| | As recommended by manufacturer | • Change filter media. |

# Surface Water Drainage & SuDS - Management & Maintenance Plan

| | |
|---|---|
| Project Name: 13a North Common Road | Author: Kate Holmes |
| Project Reference: JRC/65206825 | Date: 01 September 2022 |
| Project Manager: JRC | Document Reference: 65206825-SWE-ZZ-XX-T-C-1001-DS Revision: P01 |

| Rev. | Date | Reason for issue | Prepared | | Reviewed | | Approved | |
|---|---|---|---|---|---|---|---|---|
| [1] | 01.09.22 | Draft | KH | 01.09.22 | JRC | 01.09.22 | JRC | 01.09.22 |

## 1 Introduction

SuDS features are utilised to manage rainfall and use landscape features to deal with surface water. SuDS control the flow rate and volume of water leaving the development area and reduce pollution by intercepting silt and cleaning run-off from hard surfaces.

Like all aspects of drainage systems, SuDS components should be regularly inspected and maintained. This ensures efficient operation and reduces the likelihood of failure.

SuDS and drainage features for the development are to be maintained by the site owner(s).

The level of inspection and maintenance will vary depending on the type of SuDS component. Further information on maintenance can be found in The SUDS Manual (CIRIA publication C753).

**Managing SuDS**

The SuDS have been designed for easy maintenance to comprise:

- Regular care – litter collection and checking the inlets and outlets where water enters or leaves the SuDS feature.
- Occasional tasks – removing any silt that builds up, cutting back and clearing excessive vegetation growth, inspection on manholes connecting to attenuation crates.
- Remedial work – repairing damage where necessary.

**Contact**

In the event of concern over any matter relating the SuDS, please contact the organisation or person responsible for the management and maintenance of the site.

# 2 SuDS Maintenance

The SuDS scheme includes control structures to manage run-off as it flows off site to a receiving watercourse or via infiltration. The following lists the SuDS components and extra features which may be found on a site.

- **Attenuation crates**. These are below ground structures which hold the water prior to release into the downstream network.
- **SuDS flow control structures** are usually small orifices in control chamber, slots or V-notches in weirs, alternatively they can be specialist flow control devices such as Hydrobrakes. They are usually near the surface, so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection chambers** and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.
- **Detention Basin** is an open basin, usually dry but may have a permanent depth of water, which temporarily stores water following rainfall.
- **Filter Drain** is a stone filled trench, usually with a slotted pipe in the bottom, for the collection of surface water run-off.

Table 1 below provides a breakdown of the general maintenance requirements; maintenance is to be undertaken by the site owner(s), appropriate to the types of SuDS and surface water drainage systems proposed at this site. Site specific SuDS maintenance is provided in Table 2.

***TABLE 1: GENERAL MAINTENANCE REQUIREMENTS***

| **Regular Maintenance** | | **Frequency** |
|---|---|---|
| **1** | **Litter Management**<br>Check for and pick up litter around the entire site. | Monthly |
| **Occasional Maintenance** | | **Frequency** |
| **2** | **Inspection of Control Chambers**<br>Inspection of chambers for silt build up and visually check pipes appear clear and free flowing.<br>Remove silt as required.<br>Jetting as required. | Annually |
| **3** | **Silt management**<br>Inspect attenuation crates for a silt accumulation. | Annually<br>As required |
| **Remedial Work** | | **Frequency** |
| **4** | **Inspect SuDS systems to check for damage or failure**<br>Undertake remedial work as required. | As required |

### *TABLE 2: SPECIFIC SUDS MAINTENANCE*

| SuDS on Site | Frequency | Typical Tasks |
|---|---|---|
| Attenuation storage tanks | Monthly | • Remove debris from the catchment surface (where it may cause risks to performance). |
| | Annually | • Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed. |
| | Remedial work, as required | • Repair/rehabilitate inlets, outlet, overflows and vents.<br>• Survey inside of tank for sediment build-up and remove if necessary |
| Detention Basin | Monthly | • Remove littler/debris.<br>• Inspect inlets, outlets, overflows for blockages and clear if required and Inspect inlets and facility surface for accumulation of silt.<br>• Inspect banksides, structures, pipework etc for evidence of damage.<br>• Cut grass for spillways and access routes – monthly during growing season and cut grass – meadow grass in and around basin every 6 months in spring pre nesting season and autumn.<br>• Manage vegetation and remove nuisance plants monthly/as required. |
| | Annually | • Check any penstocks and other mechanical devices,<br>• Tidy all dead growth at start of growing season.<br>• Remove sediment from inlets, outlet, forebay as required.<br>• Manage wetland plants in outlet pool. |
| | As required | • Reseed poor vegetation growth<br>• Repair erosion or damage by reseeding/re-turfing.<br>• Realignment of rip-rap<br>• Repair of inlets, outlets and overflows.<br>• Relevel uneven surfaces and reinstate design levels.<br>• Prune trees and remove cuttings every 2 years or as required.<br>• Remove sediment from all inlets, outlets borebay and main basin every 5 years or as required. |
| Filter Drain | Monthly | • Inspect surface of filter drain, inlet/outlet pipework and control systems to ensure there are no blockages, clogging, standing water and structural damage.<br>• Remove litter/debris from filter drain. |
| | Biannually | • Inspect pre-treatment systems, inlets and perforates pipework for accumulation of silt, as required establish silt removal frequencies.<br>• Sediment to be removed as required from pre-treatment devices. |
| | As required | • Remove/control tree roots if encroaching on sides of filter drain using recommended methods.<br>• Clear blockages from perforated pipework.<br>• At locations with high pollution loads – remove surface geotextile and replace and wash or replace overlying filter medium. |

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| Proprietary device/ Flow control | Monthly for 6 months, then annually | • Inspect sediment accumulation rates and establish appropriate removal frequencies. |
| | Biannually | • Remove litter and debris and inspect for sediment, oil and grease accumulation.<br>• Inspect for evidence of poor operation.<br>• Inspect filter media and establish appropriate replacement frequencies. |
| | Remedial work, as required | • Replace malfunctioning parts or structures. |
| | As recommended by manufacturer | • Change filter media. |