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## **FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY**

**Station Road, Hampton  
London**

**CWA-19-207**

**26.07.19**

|                       |   |
|-----------------------|---|
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## **1.00 INTRODUCTION**

- 1.01 CWA have been commissioned to prepare a Flood Risk Assessment and Outline Surface Water Drainage Strategy for a Proposed Care Home development off Station Road, Hampton.
- 1.02 The Flood Risk Assessment will be part of a Planning Application to be made to London Borough of Richmond Upon Thames Council.
- 1.03 The development proposes a Care Home with parking and amenity space.
- 1.04 All new building and external works lie entirely within Flood Zone 1 where there is a low probability of fluvial flooding occurring.
- 1.05 This Flood Risk Assessment follows government and local guidance on development and flood risk (National Planning Policy Framework NPPF<sup>1</sup>) and is undertaken in consultation with the relevant bodies.
- 1.06 It is a requirement for development applications to consider the potential risk of flooding to the proposed development over its expected lifetime and any possible impacts on flood risk elsewhere in terms of its effects on flood flows and run off.
- 1.07 The following aspects of flood risk should be addressed in all planning applications in flood risk areas:
  - The area liable to flooding.
  - The probability of flooding occurring now and over time.
  - The extent and standard of existing flood defences and their effectiveness over time.
  - The rates of flow likely to be involved.
  - The likelihood of impacts to other areas, properties and habitats.
  - The effects of climate change which currently requires designs to include 1 in 100-year rainfall events + climate change allowance.
  - The nature and current expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

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<sup>1</sup> Communities and Local Government, March 2012, National Planning Policy Framework



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## **2.00 SITE LOCATION AND DESCRIPTION**

- 2.01 The development site is situated at Station Road, Hampton at post code TW12 2AX. The Ordnance Survey National Grid reference to the centre of the site is E513712, N169726.
- 2.02 A Site Location Plan, Aerial View Plan and Red Line Location Plan can be found in Appendix 1.
- 2.03 The site is irregularly shaped and occupies an approximate area of approximately 0.286 ha.
- 2.04 The neighbouring land use is as follows:
- North Greenfield Area.
  - East Commercial Units.
  - South Station Road & Office space.
  - West Commercial units & Office Space
- 2.05 The site slopes from 13.29m to 12.56m with a fall of 0.73m. The site is predominantly flat across the parking area with a gradient of 1 in 168.
- 2.06 The existing site is currently a police station which comprises of office space along the Western boundary with warehouse parking to the North. An access road runs through the centre of the site with outdoor parking to the East.
- 2.07 A Topographical Survey can be found in Appendix 3.





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### **3.00 SITE DEVELOPMENT PROPOSALS**

3.01 The development proposes the construction of the following:

3.01.01 67 bed care home and 22 care suites

3.01.02 14 no. Parking Spaces

3.01.03 Amenity Areas located to the rear and centre of the development

3.01.04 Access Road Entering in from Station Road

3.02 A copy of the Site Layout, proposed Floor Plan and Elevation can be found in Appendix 2.



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#### **4.00 EXISTING GROUND CONDITIONS**

##### 4.01 Site Geology and Hydrology

- 4.01.01 LCM Environmental were commissioned to undertake a site investigation survey at 60-68 Station Road, Hampton (TW12 2DA). Dated 08<sup>th</sup> October 2014<sup>2</sup>.

##### 4.02 Ground Conditions

###### 4.02.01 Ground Geology

The site geology is formed of a deep layer of London Clay which overlays Taplow Gravel.

###### 4.02.02 Groundwater

Groundwater was encountered at 3.65m deep as per ground investigation report studies carried out by LCM Environmental

###### 4.02.03 Soakaway Design

Based upon the findings of LCM it would be assumed that soakaways should not be considered at this point due to the overlying clay which has low permeability. CWA would suggest that further tests be carried out to determine the exact infiltration rate.

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<sup>2</sup> 08<sup>th</sup> October 2019, LCM Environmental Site Investigation Reference 1374-14



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## **5.00 CONSULTATION AND POLICY**

### 5.01 Drainage Authority

5.01.01 Thames Water Ltd has been contacted for information regarding existing public storm and foul water sewers.

5.01.02 A copy of the Thames Water Correspondence and public sewer records in Appendix 5.

#### 5.01.03 Foul Water Drainage

- There is an existing 175mm diameter foul water public sewer in Station Road Which is the recommended point of connection. A discharge rate of 4.09 l/s has been accepted by Thames Water.

#### 5.01.04 Surface Water Drainage

- There is an existing 225mm diameter surface water sewer located in Station Road Which is the recommended point of connection. A rate of 2 l/s has been agreed with Thames Water

#### 5.01.05 Additional note from Thames Water Ltd:

Since 1st October 2011 many private sewers have been transferred into the ownership of Thames Water Limited as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.

#### 5.01.06 Hydrology

- The River Thames runs along the West to East approximately 350m South of the site. This is classified as a main river and is therefore the responsibility of the Environment Agency.



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## 5.02 Lead Local Flood Authority

5.02.01 The Lead Local Flood Authority (LLFA) is London Borough of Richmond Upon Thames Council

5.02.02 London Borough of Richmond Upon Thames Council have a Strategic Flood Risk Assessment<sup>3</sup> and Local Plan<sup>4</sup> which define flooding and drainage requirements.

5.02.03 Key items within the Flood Risk Assessments: climate change allowances and SFRA are;

- 40% – Climate Change
- Identification of risk levels within the within the county
- Identification of key historical area of flood risk

5.02.04 The key section of the London Borough of Richmond Upon Thames Council Local Plan is Policy Planning which defines:

- All new developments to incorporate Sustainable Drainage Systems (SuDS) unless impractical.
- All new development over 1ha are to be limited to Greenfield runoff rates.
- Building levels to be over 600mm above 1 in 100 year plus climate change flood level, although commercial properties can vary subject to agreement.

5.02.05 An Email and telephone correspondence was held with London Borough of Richmond Upon Thames Council Drainage department, to discuss the main principles of the scheme. The following items were raised:

- New development using new drainage will need to be based on Greenfield runoff derived from IH124 methodology<sup>5</sup>.
  - Water Quality
  - Climate Change
  - Method of Discharge
  - Rainfall Data
  - Historical Flooding

<sup>3</sup> March 2016, London Borough of Richmond upon Thames Strategic Flood Risk Assessment.

<sup>4</sup> September 2011, London Borough of Richmond upon Thames Local Plan

<sup>5</sup> Institute of Hydrology, 1975, Flood Studies Report



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- Return Period for Drainage Design

### 5.03 Environment Agency

5.03.01 The Environment Agency (EA) flood mapping data for the site, shows the developable area to be within Flood Risk Zone 1 – with less than 1 in 1000 (0.1%) chance of flooding from rivers in any one year. EA flood mapping can be found in Appendix 4.

5.03.02 A email conversation was held with the Environment Agency to discuss; Awaiting Response

### 5.04 Applicable Policy

#### 5.04.01 Applicable Planning Policy

- Planning Practice Guidance to the National Planning Policy Framework (NPPF) was introduced in March 2014; it deals specifically with development planning zones. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed residential development, based on an assessment of current and future conditions.

#### 5.04.02 Planning Zones

- The overall aim should be to steer new developments to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, local planning and authorities allowing land in local plans or determining planning applications for development at any particular location should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the exception test if required.



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**Table 1 – Flood Zones**

| <b>Zone 1: Low Probability</b>   |  |
|--|--|
| <b>Definition</b><br>This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).  | <b>Appropriate Uses</b><br>All uses of land are appropriate in this zone.<br><b>FRA requirements</b><br>For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention.<br><b>Policy Aims</b><br>In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development and the appropriate application of sustainable drainage systems. |
| <b>Zone 2: Medium Probability</b>  |  |
| <b>Definition</b><br>This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year. | <b>Appropriate Uses</b><br>Essential infrastructure and the water compatible, less vulnerable and more vulnerable uses as set out in table 2 are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.<br><b>FRA Requirements</b><br>All development proposals in this zone should be accompanied by a flood risk assessment.<br><b>Policy Aims</b><br>In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems.  |



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| <b>Zone 3a: High Probability</b>  |   |
|---|---|
| <p><b>Definition</b><br/>This zone comprises land assessed as having between a 1 in 100 or greater annual probability of river flooding (&gt;1%) or a 1 in 200 or greater annual probability of flooding from the sea (&gt;0.5%) in any year.</p> | <p><b>Appropriate Uses</b><br/>The water compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.</p> <p><b>FRA requirements</b><br/>All development proposals in this zone should be accompanied by a flood risk assessment.</p> <p><b>Policy Aims</b><br/>In this zone, developers and local authorities should seek opportunities to:</p> <ul style="list-style-type: none"><li>• Reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems.</li><li>• Relocate existing development to land in zones with a lower probability of flooding and</li><li>• Create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.</li></ul> |



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| <b>Zone 3b: Functional Floodplain</b>   |  |
|---|--|
| <p><b>Definition</b><br/>This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.</p> | <p><b>Appropriate Uses</b><br/>Only the water-compatible uses and the essential infrastructure listed in table 2 that has to be there should be permitted in this zone. It should be designed and constructed to:</p> <ul style="list-style-type: none"><li>• Remain operational and safe for users in times of flood</li><li>• Result in no net loss of floodplain storage</li><li>• Not impede water flows</li><li>• Not increase flood risk elsewhere</li></ul> <p><b>FRA Requirements</b><br/>All development proposals in this zone should be accompanied by a flood risk assessment.</p> <p><b>Policy Aims</b><br/>In this zone, developers and local authorities should seek opportunities to:</p> <ul style="list-style-type: none"><li>• Reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems.</li><li>• Relocate existing development to land with a lower probability of flooding.</li></ul> |





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**Table 2 – Flood Risk Vulnerability Classification**

|                                 |  |
|---------------------------------|--|
| <b>Essential Infrastructure</b> | <ul style="list-style-type: none"><li>• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.</li><li>• Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations and water treatment works that need to remain operational in times of flood.</li><li>• Wind turbines.</li></ul>   |
| <b>Highly Vulnerable</b>        | <ul style="list-style-type: none"><li>• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.</li><li>• Emergency dispersal points.</li><li>• Basement dwellings.</li><li>• Caravans, mobile homes and park homes intended for permanent residential use.</li><li>• Installations requiring hazardous substances consent (where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).</li></ul> |
| <b>More Vulnerable</b>          | <ul style="list-style-type: none"><li>• Hospitals.</li><li>• Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels.</li><li>• Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.</li><li>• Non-residential uses for health services, nurseries and educational establishments.</li><li>• Landfill and sites used for waste management facilities and hazardous waste.</li></ul>   |



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|                        |   |
|------------------------|---|
|                        | <ul style="list-style-type: none"><li>• Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.</li></ul>  |
| <b>Less Vulnerable</b> | <ul style="list-style-type: none"><li>• Police, ambulance and fire stations which are not required to be operational during flooding.</li><li>• Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable” and assembly and leisure.</li><li>• Land and buildings used for agriculture and forestry.</li><li>• Waste treatment (except landfill and hazardous waste facilities).</li><li>• Minerals working and processing (except for sand and gravel working).</li><li>• Navigations facilities.</li><li>• Ministry of Defence installations.</li><li>• Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.</li><li>• Water-based recreation (excluding sleeping accommodation).</li><li>• Lifeguard and coastguard stations.</li><li>• Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</li><li>• Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.</li></ul> |



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**Water Compatible Development**

- Water treatment works which do not need to remain operational during times of flood.
- Sewerage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewerage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.



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**Table 3 - Flood Risk Vulnerability and Flood Zone Compatibility**

| Flood risk vulnerability classification<br>(see table 2) |                               | Essential infrastructure | Water compatible | Highly vulnerable       | More vulnerable         | Less vulnerable |
|--|-------------------------------|--------------------------|------------------|-------------------------|-------------------------|-----------------|
| Flood zone (see table 1)                                 | Zone1                         | ✓                        | ✓                | ✓                       | ✓                       | ✓               |
|  | Zone 2                        | ✓                        | ✓                | Exception Test required | ✓                       | ✓               |
|  | Zone 3a                       | Exception Test required  | ✓                | X                       | Exception Test required | ✓               |
|  | Zone 3b functional floodplain | Exception Test required  | ✓                | X                       | X                       | X               |

Key:        ✓ Development is appropriate  
               X Development should not be permitted

Notes to table:

This table does not show:

- a) The application of the Sequential Test which guides development to Flood Zone 1 first, Zone 2 and then Zone 3.
- b) Flood Risk Assessment requirements, or
- c) The Policy aims for each flood zone.



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## 6.00 FLOOD RISK

6.01 An appraisal was made of the site and surrounding areas to assess the potential risk of flooding at the site from the various sources:

6.01.01 Sea (Tidal) – The site is not located in the vicinity of the coast and is therefore not at risk of flooding due to tidal flows.

6.01.02 River (Fluvial) – The site is located approximately 286m north of the River Thames. There is therefore no risk of flooding from fluvial flow.

6.01.03 Surface (Pluvial) - The levels for the site have been set to fall towards the Station road, and therefore any overland flow will fall away from the development, and not pose a risk to it. Exceedance flows will fall towards Station Road to the South of the site.

6.01.04 Sewers (Pluvial) – There are public sewers location in Station Road. In the event of exceedance, flows are directed away from the building as described above. There is therefore negligible risk of flooding from sewers.

6.01.05 Groundwater – Groundwater was detected at a depth of 3.65m on site. These levels are below the intended design levels. There is therefore no risk of flooding from groundwater, although consideration for localised dewatering may be needed during the construction of deeper foundations.

6.01.06 Artificial Sources – There are no major artificial water sources such as canal, reservoirs or water tanks within the vicinity of the site, and therefore there is no flood risk due to artificial sources.

**Table 4 - Flood Risk Assessment Summary**

| Aspects of Flood Risk               | Assessment/Comment   |
|-------------------------------------|--|
| Area liable to flooding             | The development site lies within Flood Zone 1 of the Environment Agency Flood Zone Map.          |
| Probability of flooding occurring   | Flooding from surface water at the site will be considered during the level and drainage design. |
| Standard of existing flood defences | N/A  |



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|   |   |
|---|---|
| and their effectiveness                                       |   |
| Likely depth of flooding                                      | N/A   |
| Rates of flow likely to be involved                           | N/A   |
| Likelihood of impacts to other areas, properties and habitats | Any increase in the surface area, SUDS will be used for surface water management.   |
| Effects of climate  | The effects of climate change on flooding at the site are likely to be limited, due to the use of infiltration technique and the system will be designed for 1 in 100-year storm event plus climate change. |

#### 6.02 Sequential Test

6.02.01 The Sequential Test is intended to direct new development to area of lowest probability of flood risk, and ensure development is in the most appropriate flood zone.

6.02.02 As the development extents of the site are within Flood Zone 1 and is in the least vulnerable category, the development can be considered appropriate for the proposed use, and therefore passes the Sequential Test.

#### 6.03 Exception Test

6.03.01 The Exception Test is not required as the site is located within Flood Zone 1.



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## **7.00 SUSTAINABLE DRAINAGE PROPOSALS**

### **7.01 Storm Water Management and SuDS**

7.01.01 Sustainable Drainage Systems (SuDS) involve the management of storm water from developments effectively in order to reduce the impact of run-off both to the site in question and properties downstream, and not to exacerbate existing problems. This is achieved by not increasing peak flows that will otherwise result from the development. The philosophy of SuDS is to mimic as closely as possible, the natural drainage from a site before development, and to ensure that storm water runoff is treated so there is no detriment to water quality of the receiving watercourse.

Using SuDS may provide water quantity and quality control, as well as increased amenity value. Appropriately designed and maintained schemes may improve the sustainable water management at the site by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream.
- Reducing the volume, rate of discharge, and the frequency of water flowing directly to watercourses or sewers from the developed sites.
- Improving water quality compared with conventional surface water sewers by removing pollutants.

7.01.02 The following section represents the considered views on suitable SuDS options appropriate to this site. CIRIA C753<sup>6</sup> The SuDS Manual was consulted to examine the use of SuDS on this site. Conclusions are based on the assessment of the site and the evaluation of the relevant design requirements and regulatory consultation.

### **7.02 Potential SuDS Techniques Considered for this Site**

#### **7.02.01 Green Roofs**

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover, over a drainage layer. They are designed to intercept and

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<sup>6</sup> CIRIA, 2016. The SuDS Manual C753



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retain precipitation, reducing the volume of run-off and attenuating peak flows.

Cost to the structure can be considerable and poor maintenance will leave it looking unsightly. Space is also limited due to the need to provide for plant and photovoltaic cells on the building roof.

**Not Recommended**

7.02.02 Soakaways

Soakaways are square or circular excavations either filled with rubble or lined with brickwork, precast concrete or polyethylene rings/perforated storage structures surrounded by granular backfill. They can be grouped and linked together to drain large areas including highways. The supporting structure and backfill can be substituted by modular geocellular units. Soakaways provide storm water attenuation, storm water treatment and groundwater recharge.

Accurate infiltration rates for the site have yet to be determined. Based on the understanding of the ground water level, the site is currently considered as unsuitable for soakaways.

**Not Recommended**

7.02.03 Swales

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, thus providing effective pollutant removal. Roadside swales can replace conventional gullies and drainage pipes.

Swales should be considered during detailed design subject to a ground investigation report. Due to the limited space on site, the development is unsuitable for swales

**Not Recommended**

7.02.04 Tanked Pervious Pavements





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Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored between infiltration to the ground, reuse or discharge to a watercourse or other drainage system. Pavements with aggregate sub-bases can provide good water quality treatment.

The use of permeable paving for external car parking bays can be used as a stone sub-base not only stores and slows down the rate of discharge, but also raises the water quality.

**Recommended**

7.02.05 Geo-cellular/Modular Systems

Modular plastic geo-cellular systems with a high void ratio that can be used to create a below ground storage structure.

Modular tanks can be used for run off attenuation but requires silt trap protection and a suitable means of access for cleaning and inspection.

**Recommended**

7.02.06 Ponds/Infiltration Basin

Ponds can provide both storm water attenuation and treatment. They are designed to support emergent and submerged aquatic vegetation along their shoreline. Run off from each rain event is detained and treated in the pool. The retention time promotes removal through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations.

**Not Recommended**

7.03 Sustainable Drainage Maintenance

7.03.01 The various SuDS features will remain privately owned and be maintained by the landowner once handed over post construction. The exact details of this arrangement will be defined with the future tenants are confirmed.



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7.03.02 The SuDS operation and maintenance strategy will be in accordance with CIRIA C753 best practice, as tabled below:

**Table 5 – SuDS Operation and Maintenance Requirements**

|                     |   |   |
|---------------------|---|---|
| Routine maintenance | Inspect flow control chamber for evidence of poor operation   | Monthly for 3 months then annually.         |
|                     | Remove debris from catchment surface.   | Monthly                                     |
|                     | Remove sediment from catch-pits.  | Annually, or as required by inspection      |
| Remedial actions    | Replace malfunctioning flow control parts.  | As required                                 |
| Monitoring          | Inspect all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed. | Annually                                    |
|                     | Inspect permeable paving joints and reapply grit filler as required to ensure block support.                          | Annually                                    |
|                     | Survey inside of attenuation tank for sediment build up and remove if necessary.                                      | Every 5 years or as required by inspection. |



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## **8.00 DRAINAGE STRATEGY – SURFACE WATER**

### 8.01 Drainage Strategy

8.01.01 The Station Road, Hampton site consists of...

- Underground Attenuation storage facility 110m<sup>3</sup>
- Silt Trap Manhole
- Package Pumping Station discharging at 2 l/s (Subject to LLFA approval)
- Shallow sub-base permeable block paving
- Surface Water manholes
- Surface Water Sewers

### 8.02 Proposed Surface Water Runoff Rate

8.02.01 The site consists of a Proposed Care Home development which has an impermeable area 2280m<sup>2</sup>.

8.02.02 Based on the Environment Agency Guidance for climate change published in February 2016<sup>7</sup>, a climate change allowance of 40% should be considered.

8.02.03 In accordance with the LLFA requirements, this development should be restricted to Greenfield run-off rates.

8.02.04 The Greenfield run-off calculations using IH124 have been undertaken. A copy of the “Greenfield” calculations can be found in Appendices 6. The Greenfield Runoff formula is:

$$Q_{\text{bar rural}} = 0.00108 \times (0.01 \times .228)^{0.89} \times 598^{1.17} \times 0.3^{2.17}$$

This is based on the following characteristics:

- Soil type: 2
- SPR: 0.3
- SAAR: 598mm
- M5-60 Rainfall depth: 20mm
- ‘r’ Ratio M5-60/MS-2 day: 0.4
- Hydrological region:6

<sup>7</sup> Gov.uk, 19 February 2016, Guidance Flood Risk Assessments: Climate Change Allowances



**CWA**

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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy

**Table 5 – Greenfield Runoff Rates**

| Return Period                | 1:1 Year | 1:30 Year | 1:100 Year | Qbar |
|------------------------------|----------|-----------|------------|------|
| Greenfield Runoff Rate (l/s) | 0.37     | 1         | 1.38       | 0.43 |

8.02.05 A runoff value for the Greenfield section of the site has therefore been set at  $Q_{bar} = 0.43$  l/s. As recommended by Thames Water we propose to restrict the surface water discharge flow to 2 litres/second for all storm events up to and including 1 in 100 year + 40% CC. The flow will be restricted to 2 l/s and as a result the outlet vortex orifice will be less than 75mm. This will need to be agreed with LLFA.

#### 8.03 Attenuation Volume

8.03.01 Using hydraulic modelling software, the total required attenuation for the detailed planning area is approximately 138m<sup>3</sup> in a 1 in 100 year + 40% climate change events.

8.03.02 The attenuation is provided via Modular Attenuation Storage Tanks (95% Void).

8.03.03 In accordance with best practice, a SuDS treatment train will be included into the proposed drainage strategy. This will consist of:

- Shallow Sub-base Permeable Block paving
- Silt Trap Manhole
- Silt Trap Gullies
- Landscape Areas

#### 8.04 Drainage Strategy

CWA have prepared a surface water strategy drawing which can be found in Appendix 7.



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Flood Risk Assessment and Drainage Strategy

## **9.00 DRAINAGE STRATEGY – FOUL SEWERAGE**

- 9.01 The proposed foul drainage will provide infrastructure to support for 89 no. units
- 9.02 It is proposed to pumping rate of 4.09 l/s (4000l/day/unit) the future development to the public foul water sewer in Station Road.
- 9.03 A formal S106 application will be required.
- 9.04 Thames water have confirmed that the existing foul sewer network has sufficient capacity to accommodate the proposed foul water discharge from the proposed development.
- 9.05 CWA have prepared a foul water strategy drawing, which can be found in Appendix 7.



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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy

## **10.0 CONCLUSIONS**

- 10.01 The development proposes a Care home consisting of 89 units and 14 parking bays with access road running through to the to the north of the site.
- 10.02 Foul water with a pumping rate of 4.09l/s and will discharge into Station Road 175mm foul public sewers, subject to a formal S106 connection application.
- 10.03 Surface water will be designed to cater for storm events up to 1 in 100 plus 40% climate change. The site will drain at runoff rate of 2 l/s via a cellular attenuation tank and pumps.
- 10.04 The use of sustainable drainage systems (SuDS) has been considered and can be incorporated within the design. Surface water discharge will be attenuated on site via a cellular attenuation storage tank system with an attenuation volume of approximately 138m<sup>3</sup>.
- 10.05 Infiltration values are to be confirmed further to testing. CWA therefore assume the site is not suitable for infiltration and the use of soakaways as the ground is classed as London Clay.
- 10.06 The development is classified as Less Vulnerable usage and the proposed development part of the site is in Flood Zone 1 and meets the Sequential Test. The Exception Test is not therefore required.
- 10.07 The site does not pose any increased flood risk to the site itself or adjacent developments and is not susceptible to flooding by other techniques.
- 10.08 This report has been prepared to meet the requirements of National Planning Policy Framework (NPPF) for a site not at risk from flooding.



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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy

## **APPENDICES**



**CWA**

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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy

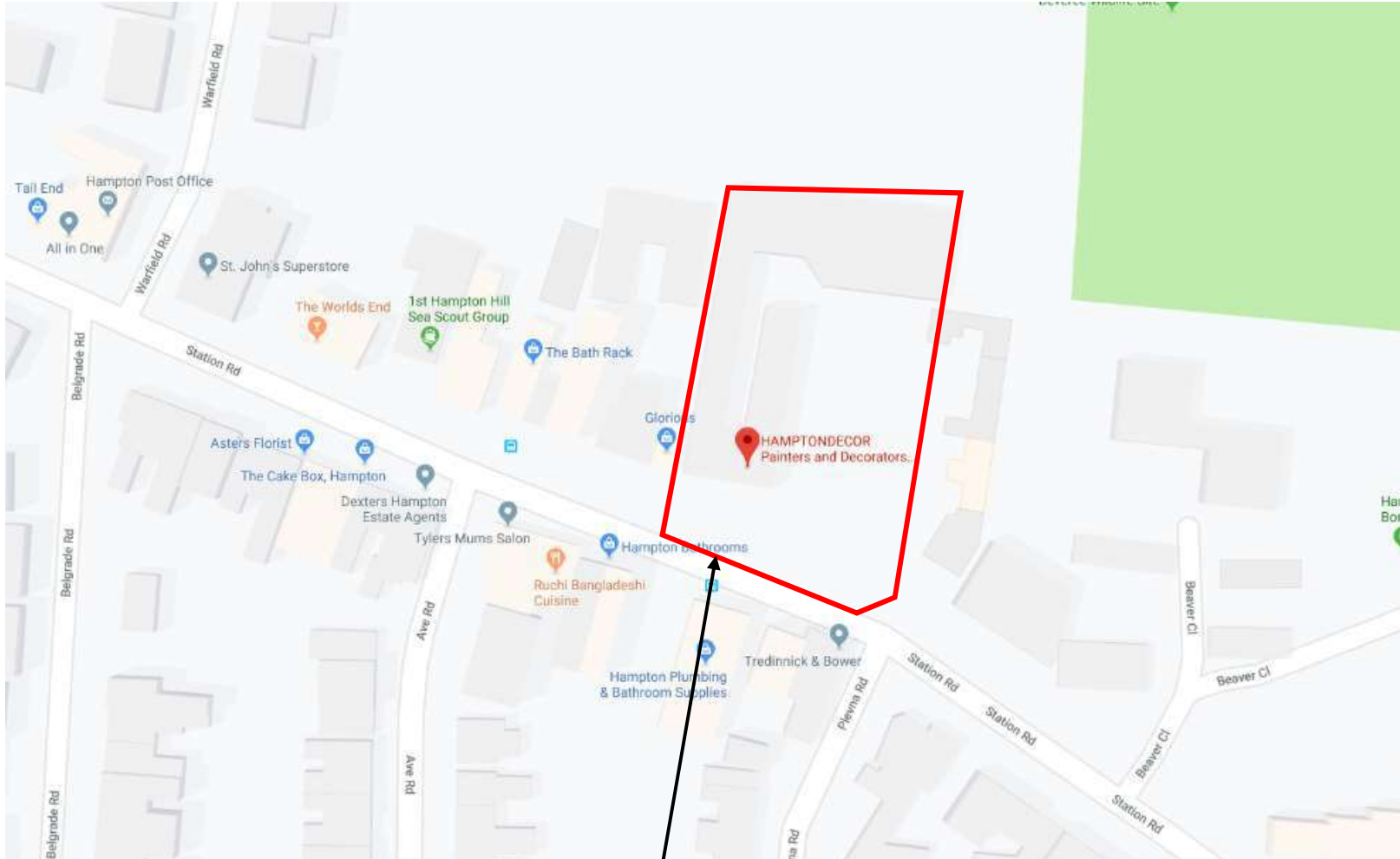
## **APPENDIX 1**

### **LOCATION PLAN AND AERIAL VIEW**



Appendix 1A – Site Location Plan

Station Road, Hampton (TW12 2AX)



Site Location

Appendix 1B – Aerial View Plan

Station Road, Hampton (TW12 2AX)



Site Location

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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy



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## **APPENDIX 2**

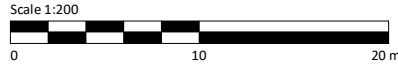
### **DEVELOPMENT PROPOSAL**



Figured dimensions only are to be used. All dimensions to be checked onsite. Difference between drawings and between drawings and specifications or bills of quantities to be reported to the PRC Group.

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| Revisions:           | Drawn / Chkd: | Date:      |
|----------------------|---------------|------------|
| P1 Preliminary Issue | MAS           | 22.05.2019 |
| P2 General updates   | AM            | 02.07.2019 |
| P3 Building update   | AM            | 10.07.2019 |
| P4 General updates   | AM            | 24.07.2019 |



**Preliminary Issue**

Client:  
**Cinnamon Care Collection** 

Project:  
 Proposed Care Development  
 Station Road, Hampton

24 Church St. West,  
 Woking, Surrey,  
 GU21 6HT  
 01483 494 350  
 info@prc-group.com  
 www.prc-group.com

Drawing Title:  
**Site Layout**

Architecture  
 Planning  
 Master Planning  
 Urban Design  
 Interiors  
 Landscape

Scale @ A1: 1:200  
 Checked by: AM  
 Date: 16.05.2019

Job No: 11045  
 Stage\_Drawing No: FE\_010  
 Rev: P4

Issue Status:  
 Construction  Preliminary   
 Information  Approval   
 Tender

Offices  
 Woking  
 London  
 Milton Keynes  
 Warsaw







| Revisions:            | Drawn / Chkd: | Date:      |
|-----------------------|---------------|------------|
| P1 Preliminary Issue  | MAS           | 22.05.2019 |
| P2 Minor Amendments   | MAS           | 04.06.2019 |
| P3 Floor Plan updates | AM            | 01.07.2019 |
| P4 Floor Plan updates | AM            | 10.07.2019 |
| P5 General updates    | AM            | 24.07.2019 |



## Preliminary Issue

Client:  
Cinnamon Care Collection



Project:  
Proposed Care Development  
Station Road, Hampton

24 Church St. West,  
Woking, Surrey,  
GU21 6HT  
01483 494 350

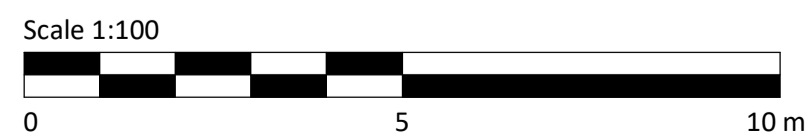
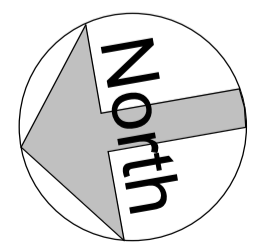
info@prc-group.com  
www.prc-group.com

Drawing Title:  
Basement Floor Layout

| Scale @ A1: | Checked by: | Date:      |
|-------------|-------------|------------|
| 1:100       | AM          | 16.05.2019 |

| Job No: | Stage_Drawing No: | Rev: |
|---------|-------------------|------|
| 11045   | FE_011            | P5   |

| Issue Status:   | Offices       |
|---|---------------|
| Construction <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> | Woking        |
| Information <input type="checkbox"/> Approval <input type="checkbox"/>                | London        |
| Tender <input type="checkbox"/>   | Milton Keynes |
|   | Warsaw        |





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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy



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## **APPENDIX 3**

### **TOPOGRAPHICAL SURVEY**







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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy



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## **APPENDIX 4**

### **EA FLOOD ZONE MAPS**

# Flood map for planning

Your reference  
**Appendix 4A**

Location (easting/northing)  
**513754/169693**

Created  
**17 Jul 2019 7:43**

**Your selected location is in flood zone 1, an area with a low probability of flooding.**

## **This means:**

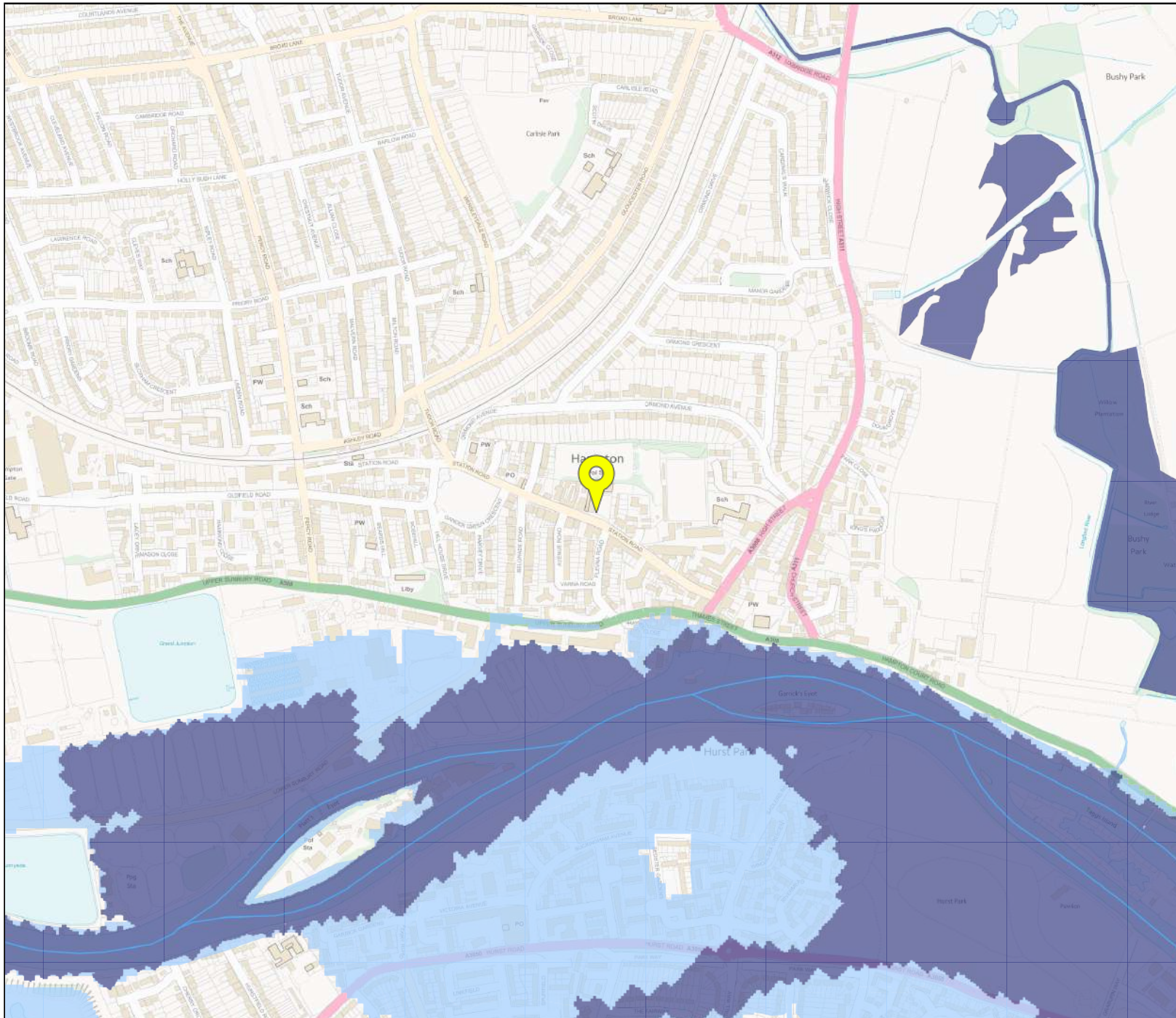
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

## **Notes**

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>











### Flood map for planning

Your reference  
**Appendix 4A**

Location (easting/northing)  
**513754/169693**

Scale  
**1:10000**

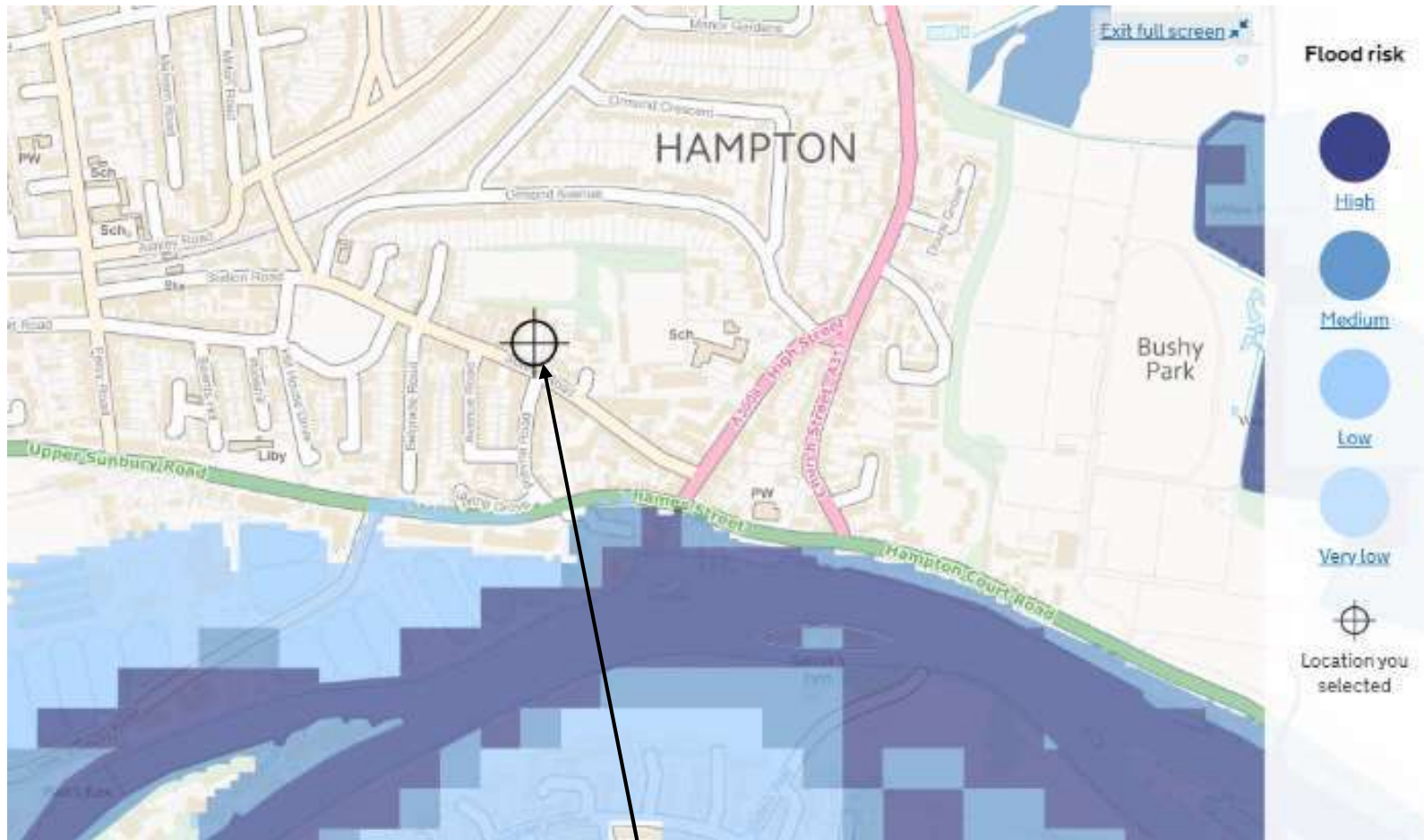
Created  
**17 Jul 2019 7:43**

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefiting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area



Appendix 4B – Flood Risk from rivers or the Sea

Station Road, Hampton (TW12 2AX)



Site Location



Appendix 4C – Flood Risk from Surface Water

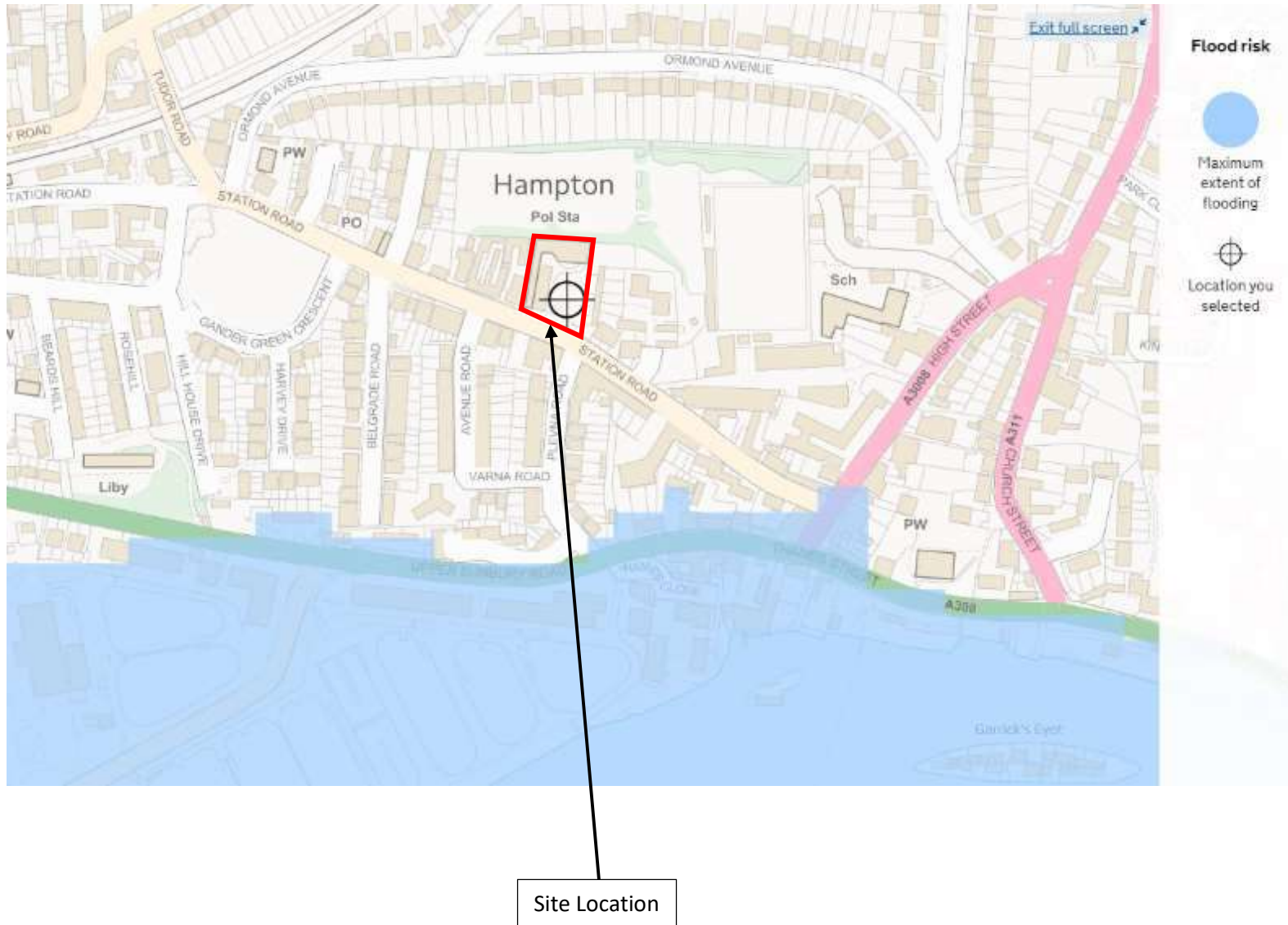
Station Road, Hampton (TW12 2AX)



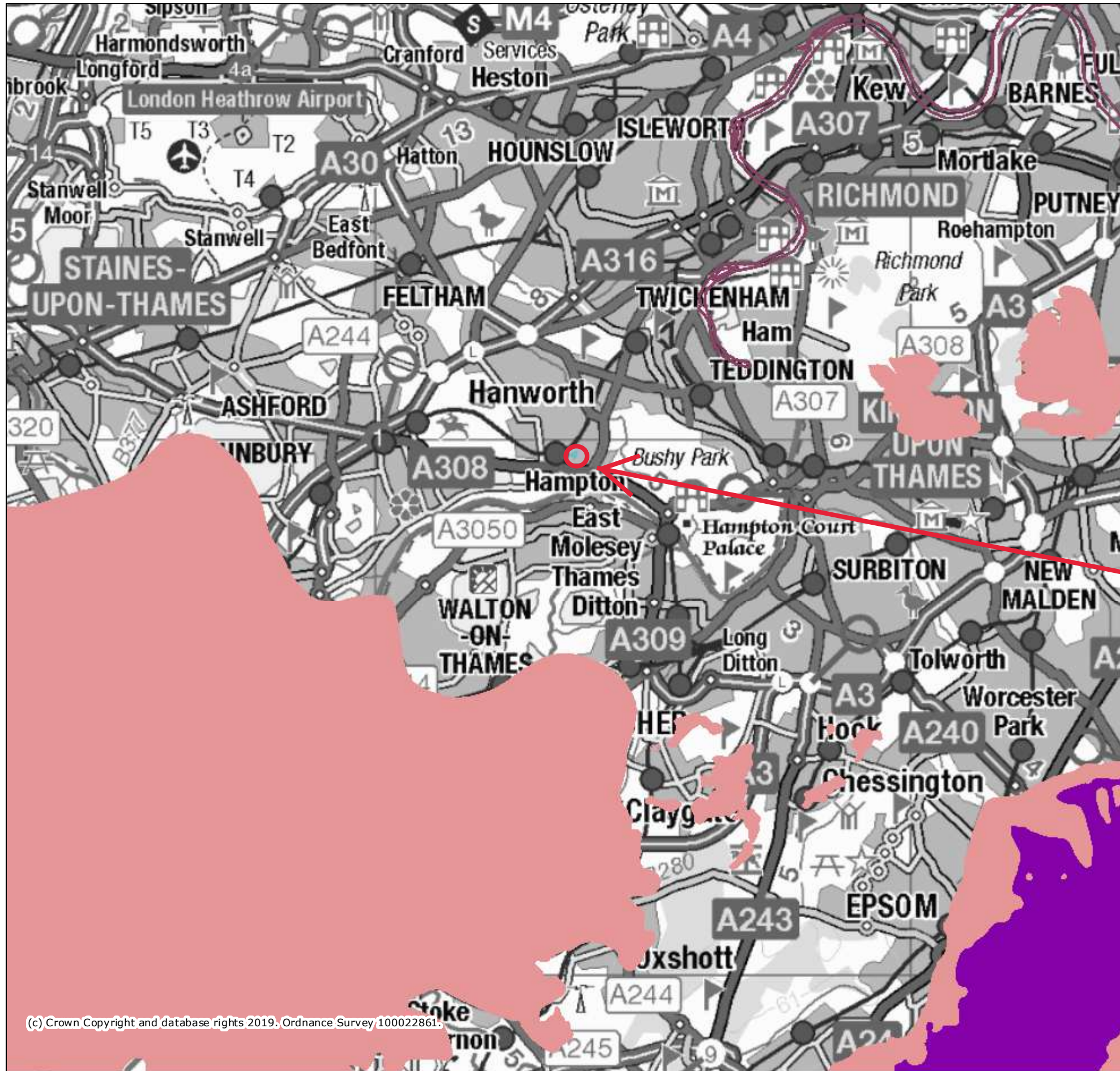
Site Location

Appendix 4D – Flood Risk from Reservoirs

Station Road, Hampton (TW12 2AX)







**Legend**

Aquifer Designation Map (Bedrock)  
(England)

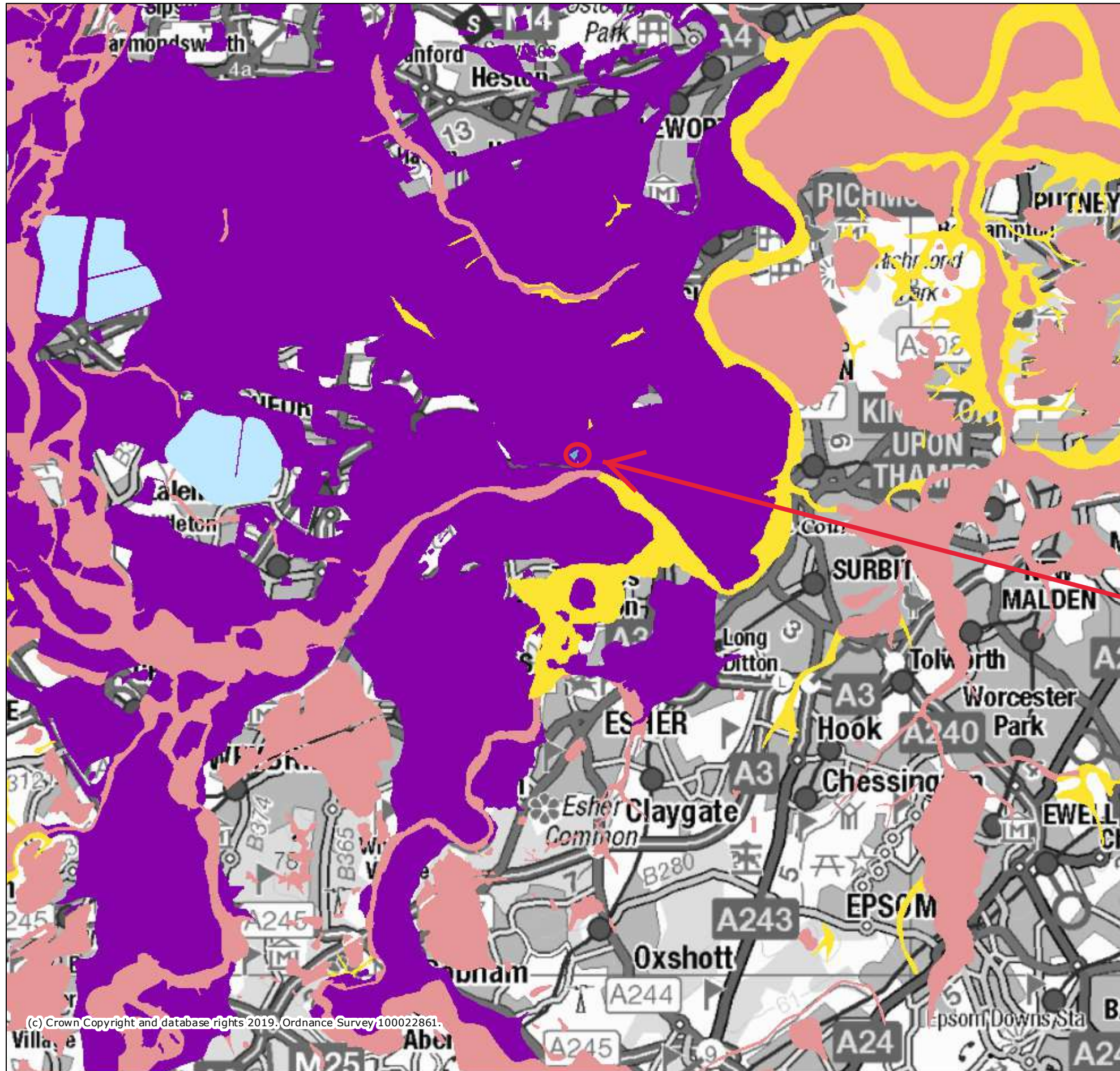
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

Site  
Location

Projection = OSGB36  
 xmin = 493500  
 ymin = 158400  
 xmax = 533700  
 ymax = 177900  
 0 1.5 3  
 km

Map produced by MAGIC on 17 July, 2019.  
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**Legend**

Aquifer Designation Map (Superficial Drift) (England)

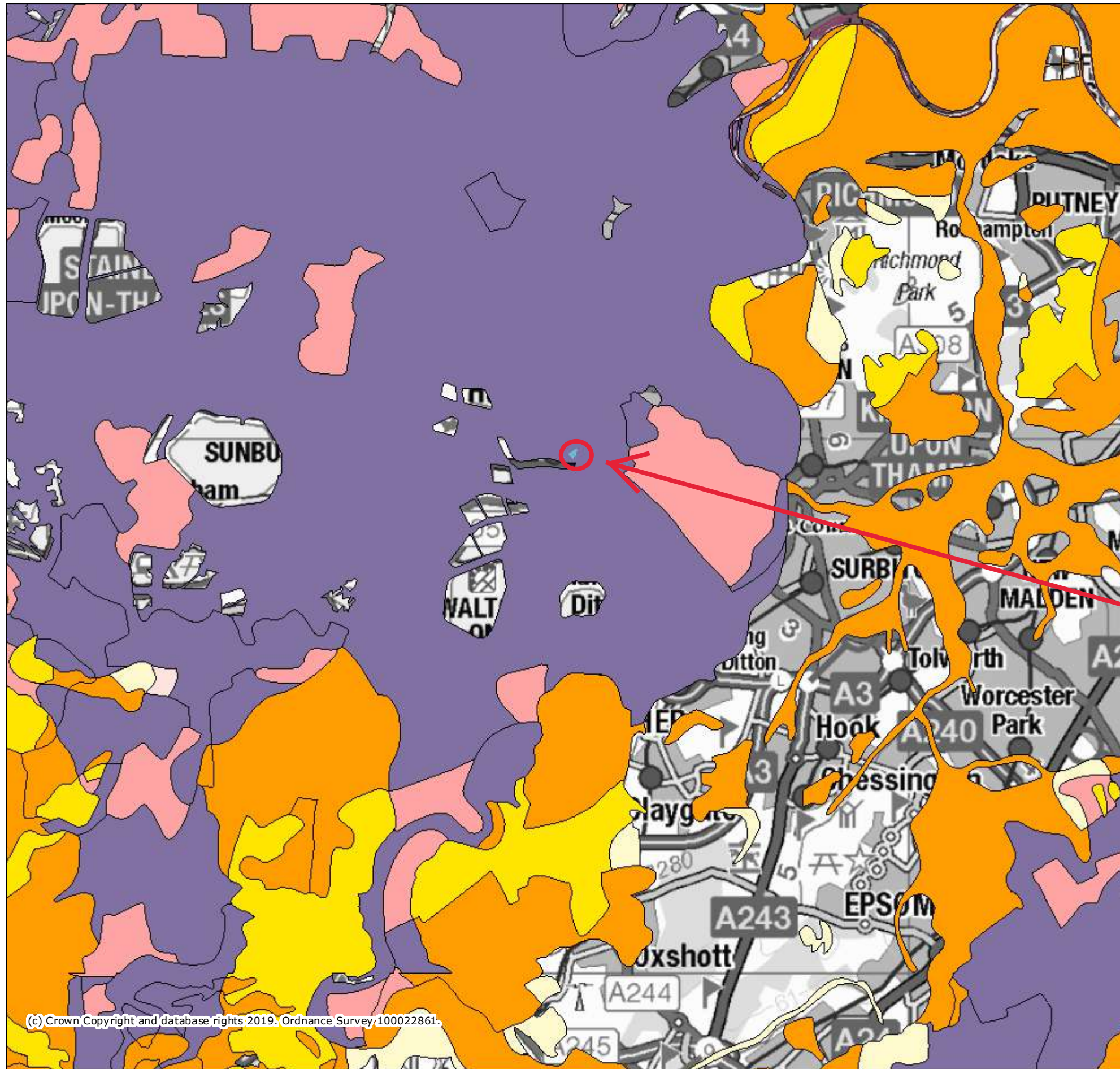
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

Site Location

Projection = OSGB36  
 xmin = 493500  
 ymin = 158400  
 xmax = 533700  
 ymax = 177900

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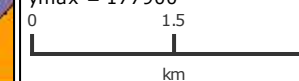
**Legend**

**Groundwater Vulnerability Map (England)**

- Major Aquifer High
- Major Aquifer Intermediate
- Major Aquifer Low
- Minor Aquifer High
- Minor Aquifer Intermediate
- Minor Aquifer Low

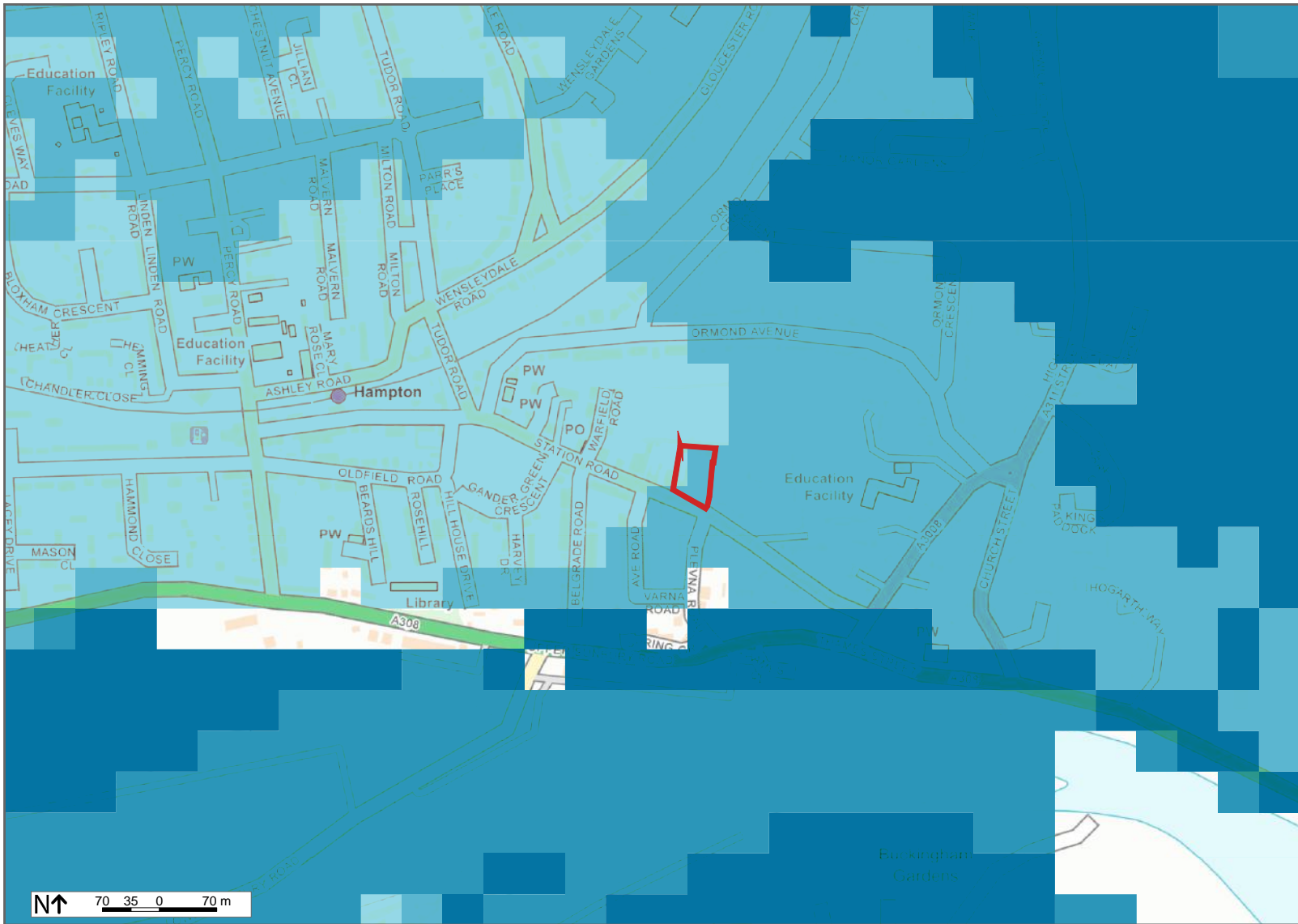
Site Location

Projection = OSGB36  
 xmin = 493500  
 ymin = 158400  
 xmax = 533700  
 ymax = 177900



Map produced by MAGIC on 17 July, 2019.  
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### Appendix 4H - Risk of Flooding from Groundwater

#### Legend:

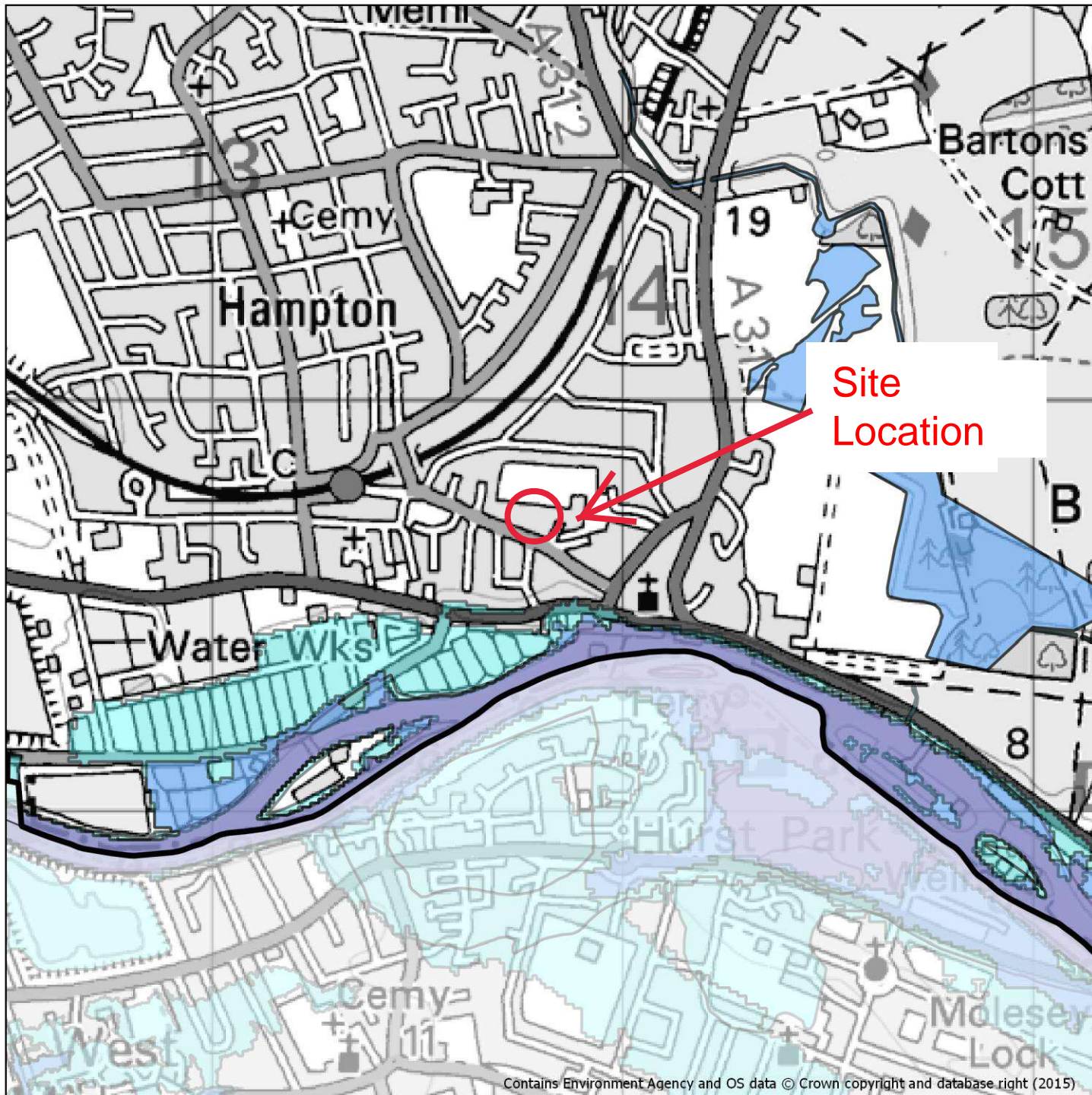
Susceptibility to flooding from groundwater:

- Significant
- Moderate
- Low







#### Map Information

Scale: 1:7500  
 Date: 17/07/19  
 Reference: Station Road Hampton  
 Order No: 2136230





### Legend

-  Borough Boundary
-  Localised Drainage Issues
-  Flood Defences
-  Flood Zone 3b
-  Flood Zone 3a
-  Flood Zone 2

in association with



Metis Consultants Limited



Client



Project Title

London Borough of Richmond Upon Thames Strategic Flood Risk Assessment Level 1

Drawing Title

Risk of fluvial and tidal flooding within character area R8 - Hampton, Taggs Island & Platt's Eyot

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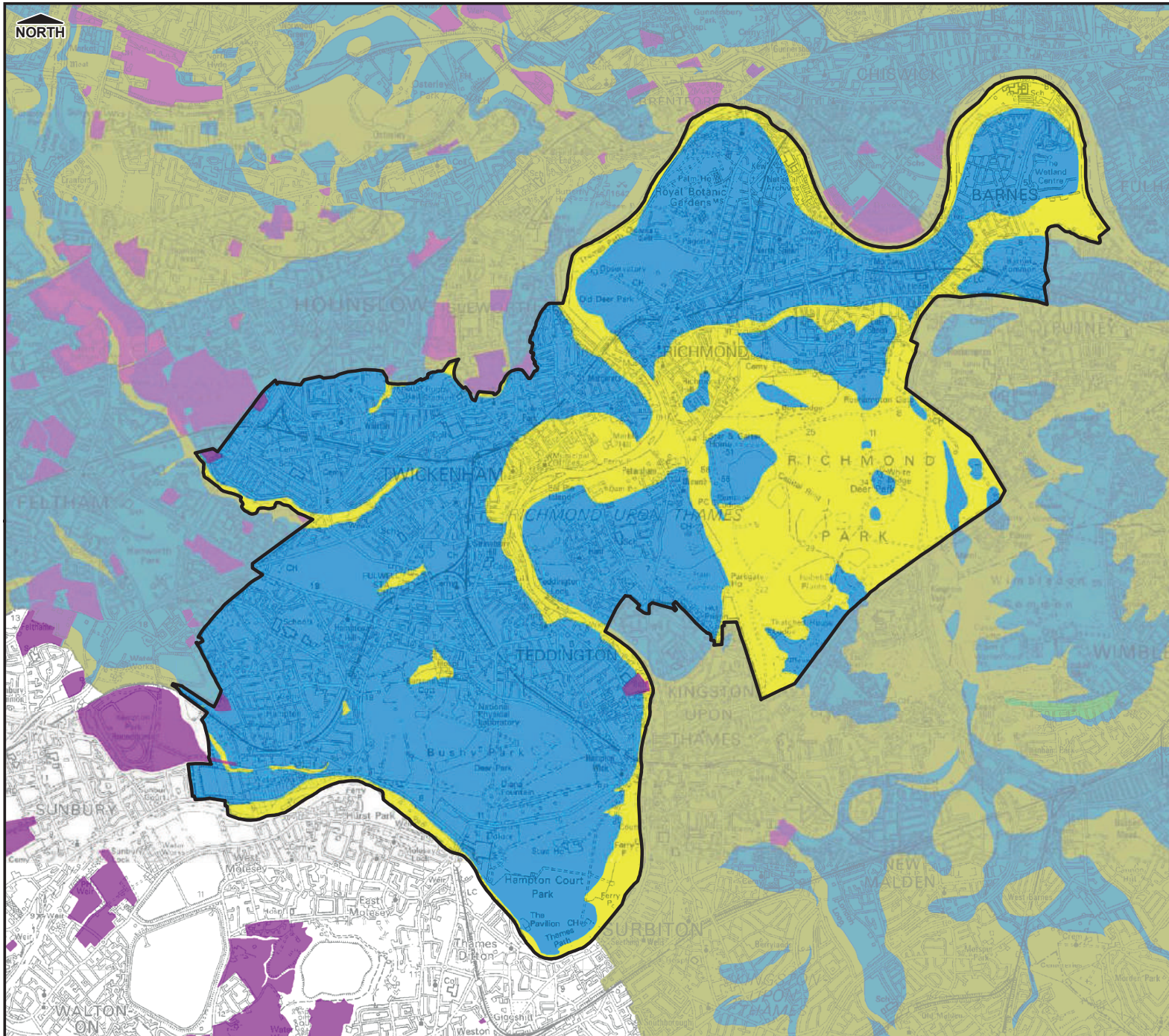
Drawing Number

FIGURE 8








1:14,000







**Legend**

-  Richmond Borough Council
- EA Groundwater Source Protection Zone**
-  Inner Zone
-  Outer Zone
-  Historic Landfill Site
- Infiltration SUDS Suitability**
-  Infiltration SUDS potentially suitable
-  Infiltration SUDS potentially unsuitable
-  Infiltration SUDS Suitability Uncertain - Site investigation required

**Notes**

**London Borough Richmond**



**Surface Water Management Plan**

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|                                |                           |                                |                             |
|--------------------------------|---------------------------|--------------------------------|-----------------------------|
| <b>Scale at A3</b><br>1:50,000 | <b>Date</b><br>22/03/2011 | <b>Drawn by</b><br>C.Woolhouse | <b>Approved by</b><br>S.Cox |
|--------------------------------|---------------------------|--------------------------------|-----------------------------|

**Infiltration SUDS Suitability Map**

**Consultants**



**CAPITA SYMONDS**  
Flood Risk Management



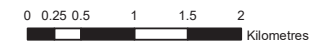
URS / Scott Wilson  
6 - 8 Greencoat Place  
London  
SW1P 1PL

**Drain London Programme Board Members**















**GREATER LONDON AUTHORITY**



**FIGURE D-6**



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

-  Borough Administrative Boundary
  -  Critical Drainage Area
  -  Permanent Water Body
  -  Main River
  -  Ordinary Watercourse
  -  Culverted Watercourse
- Flood Hazard**
-  <0.75 Caution (Very low hazard)
  -  0.75 - 1.25 Moderate (Danger for some)
  -  1.25 - 2.0 Significant (Danger for most)
  -  >2.0 Extreme (Danger for all)

**Notes**

1. Flood Hazard has been defined based upon the joint EA and Deira R&D Technical Report FD2320 (January 2006).
2. Degree of flood hazard can be interpreted as follows:
  - Caution: Flood zone with shallow flowing water or deep standing water
  - Moderate: Flood zone with deep or fast flowing water. Dangerous for children, the elderly and the infirm
  - Significant: Flood zone with deep fast flowing water. Dangerous for most people
  - Extreme: Flood zone with deep fast flowing water. Dangerous for all (including emergency services)

**London Borough of Richmond upon Thames**



**Surface Water Management Plan**

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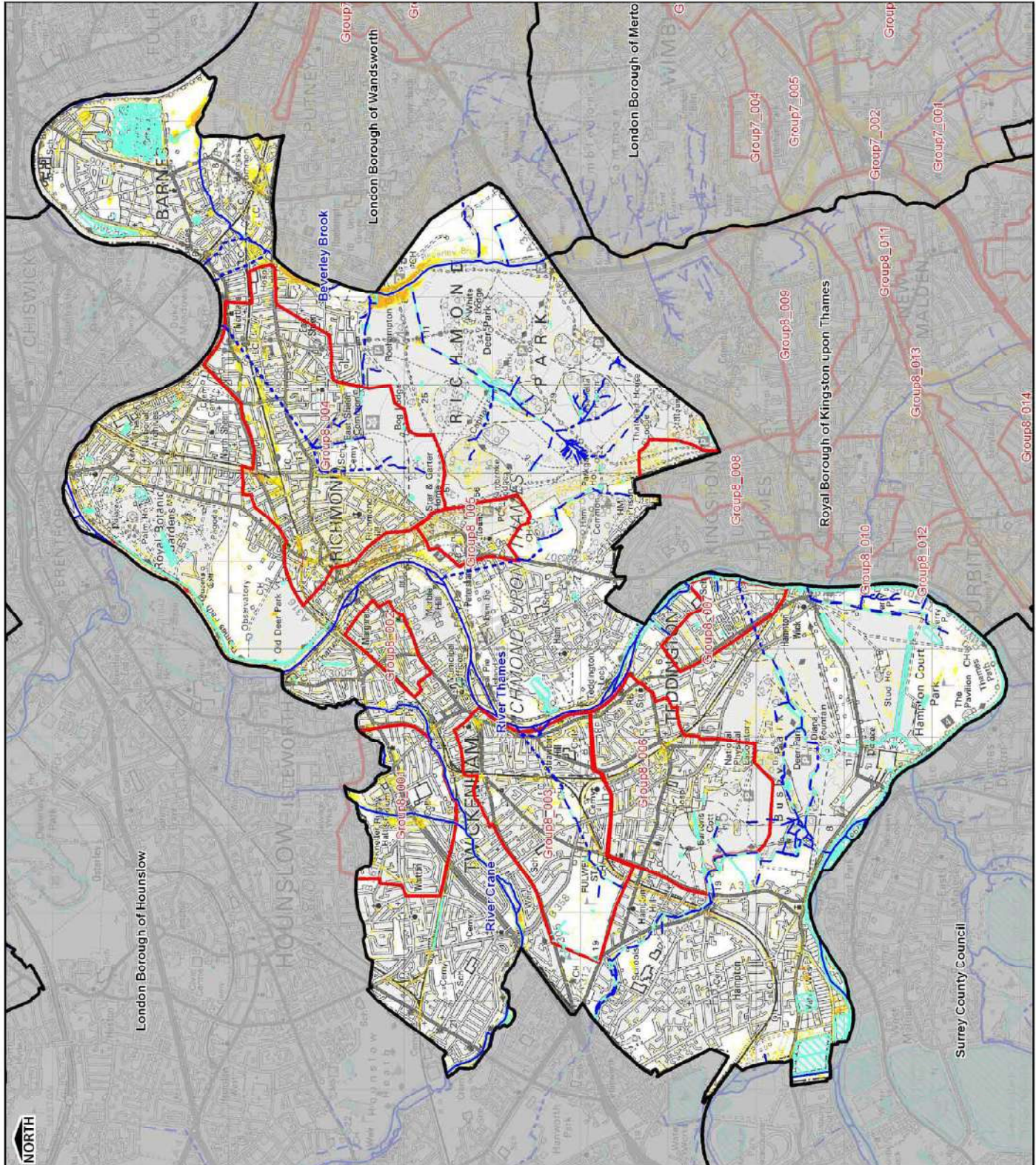
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|-------------|----------|----------|-------------|
| Scale at A3 | Date     | Drawn by | Approved by |
| 1:45,000    | 20/07/11 | A.HARRIS | J.ROBINSON  |

**Surface Water Flood Hazard Rating 1 in 100  
 Chance of rainfall event occurring in any given year (1% AEP) plus Climate Change**

Consultants  
**CAPITA SYMONDS**  
 Flood Risk Management  
 Drain London Programme Board Members



**FIGURE D-14**

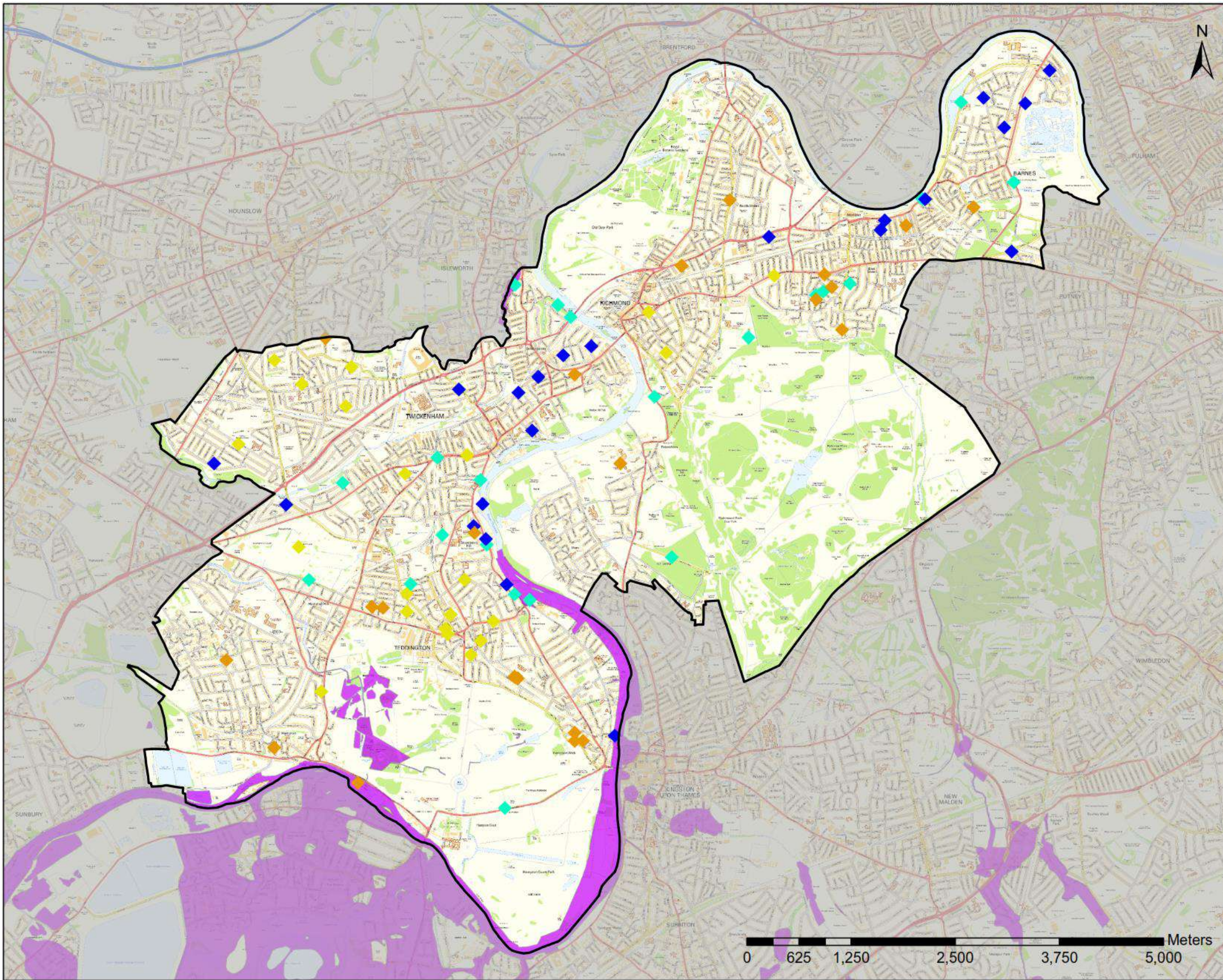


2km

1

0





THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

**Legend**

- Administrative Boundary
- Environment Agency Historic Flood Map

**Reported Flooding Incidents**

- River
- Multiple
- Surface Water
- Groundwater

**Notes**  
 Flooding incidents have been mapped based on Council records available at the time of the production of the Local Flood Risk Management Strategy. In many cases incidents of flooding may not have been reported to the Council and will therefore not be shown on this map.

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 Contains Ordnance Survey data © Crown copyright and database right 2014

|          |            |           |           |
|----------|------------|-----------|-----------|
| DRAWN BY | CHECKED BY | PASSED BY | DATE      |
| GA       | LT         | PH        | June 2014 |

SCALE @ A3  
 1:42,000

ISSUING OFFICE  
 Gresham Street

**Purpose of Issue**  
 DRAFT REPORT FOR CONSULTATION

**Client**

**Project Title**  
 LONDON BOROUGH OF RICHMOND LOCAL FLOOD RISK MANAGEMENT STRATEGY

**Drawing Title**  
 HISTORIC FLOODING

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**Consultant**

Capita  
 Level 4,  
 65 Gresham Street  
 London  
 EC2V 7NG



|                |     |
|----------------|-----|
| DRAWING NUMBER | REV |
| FIGURE 1       | A   |





**CWA**

Intelligent Engineering

26.07.19 Page 32  
Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy

## **APPENDIX 5**

### **EXISTING SEWER RECORDS**





Mr Nathan Robinson  
CWA  
3<sup>rd</sup> Floor, Lancaster House  
67 Newhall Street  
Birmingham  
B3 1NQ



30 July 2019

## Pre-planning enquiry: Confirmation of sufficient capacity

**Site Address: 74A Station Road, Hampton, Greater London - TW12 2AX**

Dear Mr Robinson,

Thank you for providing information on your development for the proposed 88no. bed care home on previously Brownfield land.

**Foul water discharge via gravity into 175mm foul water sewer on Station Road.  
Surface water discharge via gravity into 225mm surface water sewer on Station road. Flows restricted to 5.0l/s discharging a total impermeable area of 1,890m<sup>2</sup>.**

### Foul Water

From the information you have provided, we can confirm that the existing **foul sewer** network does have sufficient capacity to accommodate the proposed foul water discharge from the proposed development.

This confirmation for capacity is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

**You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.**

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

### Surface Water

When redeveloping an existing site, policy 5.13 of the London Plan and Policy 3.4 of the Supplementary Planning Guidance (Sustainable Design And Construction) states that every attempt should be made to use flow attenuation and SUDS/storage to reduce the surface water discharge from the site as much as possible.

Thames Water Planning team would expect the surface water drainage hierarchy to be applied to demonstrate that discharge to the public sewer is the most appropriate discharge route. If this is confirmed, then surface water runoff will need to be attenuated to a peak discharge rate of **2.0litres/second** for all storm events up to and including 1in100year+40%CC. Should the policy above be followed, we would envisage no capacity concerns with regards to surface water for this site.

If you've any further questions, please contact me on 0203 5778 102.

Yours sincerely

Rahim Khan

Development Engineer  
Developer Services – Sewer Adoptions Team

# Asset location search



## Property Searches

CWA Intelligent Engineering  
67 Newhall Street 67 Newhall Street

BIRMINGHAM  
B3 1NQ

**Search address supplied** Station Road, Hampton  
NA  
NA  
74A  
Station Road  
NA  
NA  
Hampton  
Greater London  
TW12 2AX

**Your reference** CWA-19-207

**Our reference** ALS/ALS Standard/2019\_4043919

**Search date** 19 July 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 Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: [www.thameswater-propertysearches.co.uk](http://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](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148



**Search address supplied:** Station Road, Hampton, NA, NA, 74A, Station Road, NA, NA, Hampton, Greater London, TW12 2AX

Dear Sir / Madam

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

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

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

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

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

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

## Contact Us

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

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

Email: [searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)

Web: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

## Waste Water Services

**Please provide a copy extract from the public sewer map.**

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

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

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

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

For your guidance:

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

## Clean Water Services

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

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

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



pressure test to be carried out for a fee.

For your guidance:

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

## **Payment for this Search**

A charge will be added to your suppliers account.

## Further contacts:

### Waste Water queries

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

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

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

Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)

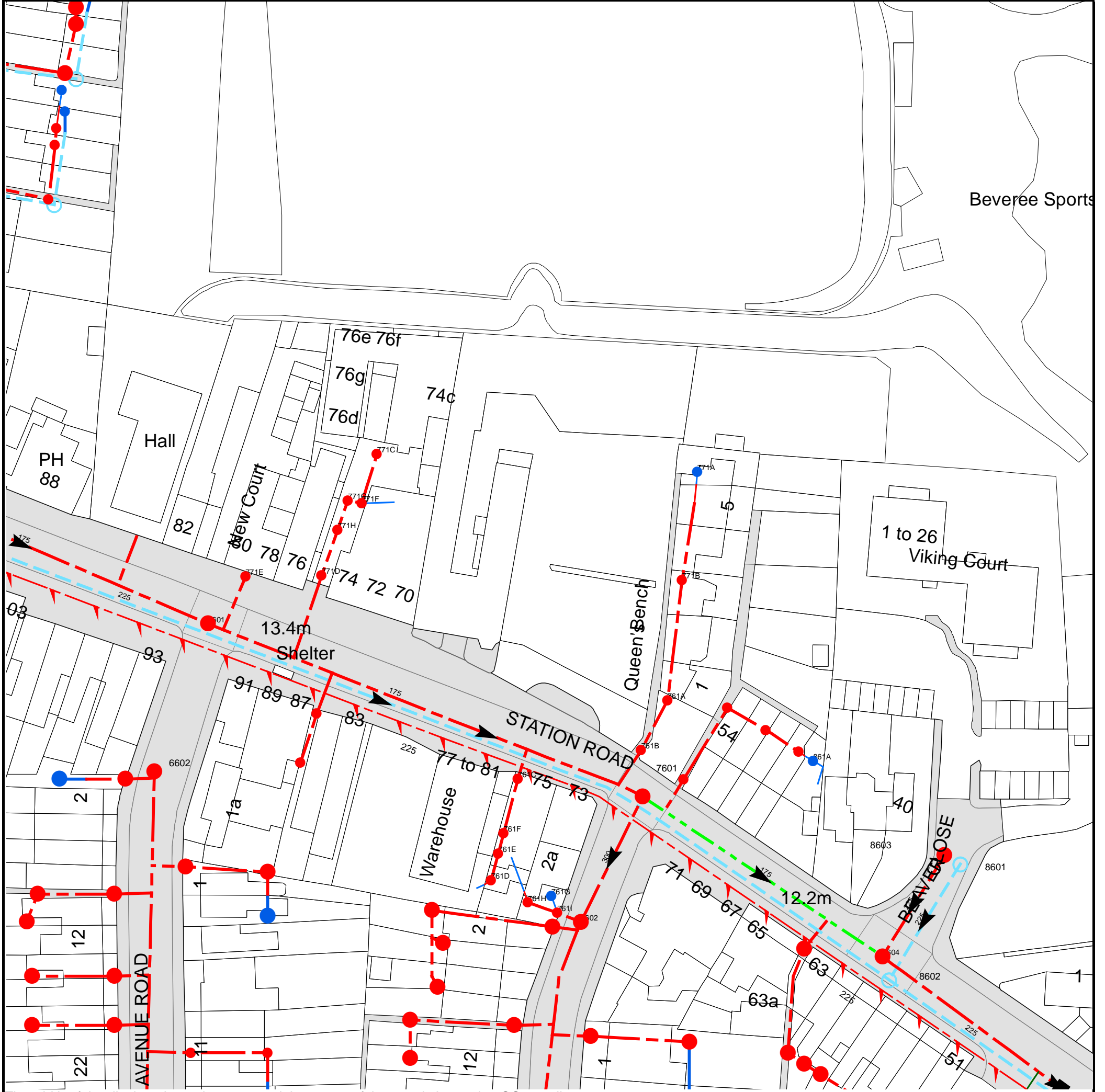
### Clean Water queries

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

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

Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)





The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 513758,169711

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

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



















| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 76ZQ              | n/a                 | n/a                  |
| 761D              | n/a                 | n/a                  |
| 761E              | n/a                 | n/a                  |
| 761F              | n/a                 | n/a                  |
| 76WX              | n/a                 | n/a                  |
| 761C              | n/a                 | n/a                  |
| 761H              | n/a                 | n/a                  |
| 761G              | n/a                 | n/a                  |
| 76ZS              | n/a                 | n/a                  |
| 761I              | n/a                 | n/a                  |
| 7602              | 12.52               | 10.76                |
| 76YY              | n/a                 | n/a                  |
| 761B              | n/a                 | n/a                  |
| 7601              | 12.28               | 10.13                |
| 761A              | n/a                 | n/a                  |
| 771B              | n/a                 | n/a                  |
| 76XX              | n/a                 | n/a                  |
| 76YZ              | n/a                 | n/a                  |
| 76XY              | n/a                 | n/a                  |
| 76XZ              | n/a                 | n/a                  |
| 86ZT              | n/a                 | n/a                  |
| 86ZP              | n/a                 | n/a                  |
| 86ZV              | n/a                 | n/a                  |
| 86ZR              | n/a                 | n/a                  |
| 861A              | n/a                 | n/a                  |
| 86ZW              | n/a                 | n/a                  |
| 8604              | 12.35               | 10.31                |
| 8602              | 10.42               | 9.55                 |
| 8603              | 12.58               | 11.02                |
| 8601              | 12.6                | 10.7                 |
| 67ZS              | n/a                 | n/a                  |
| 67YY              | n/a                 | n/a                  |
| 67ZT              | n/a                 | n/a                  |
| 67ZV              | n/a                 | n/a                  |
| 67ZX              | n/a                 | n/a                  |
| 67YQ              | n/a                 | n/a                  |
| 67ZP              | n/a                 | n/a                  |
| 68ZQ              | n/a                 | n/a                  |
| 67XZ              | n/a                 | n/a                  |
| 68ZR              | n/a                 | n/a                  |
| 771D              | n/a                 | n/a                  |
| 771H              | n/a                 | n/a                  |
| 771G              | n/a                 | n/a                  |
| 771F              | n/a                 | n/a                  |
| 771C              | n/a                 | n/a                  |
| 771A              | n/a                 | n/a                  |
| 66YY              | n/a                 | n/a                  |
| 66YT              | n/a                 | n/a                  |
| 66ZP              | n/a                 | n/a                  |
| 66YQ              | n/a                 | n/a                  |
| 66XV              | n/a                 | n/a                  |
| 6602              | 13.39               | 11.82                |
| 66XR              | n/a                 | n/a                  |
| 66YX              | n/a                 | n/a                  |
| 6601              | 13.56               | 10.99                |
| 771E              | n/a                 | n/a                  |
| 76WS              | n/a                 | n/a                  |
| 76WV              | n/a                 | n/a                  |
| 76YR              | n/a                 | n/a                  |
| 76XT              | n/a                 | n/a                  |
| 76XS              | n/a                 | n/a                  |
| 76WZ              | n/a                 | n/a                  |
| 76WY              | n/a                 | n/a                  |
| 76ZT              | n/a                 | n/a                  |
| 76ZX              | n/a                 | n/a                  |
| 66ZR              | n/a                 | n/a                  |
| 66YR              | n/a                 | n/a                  |
| 66YV              | n/a                 | n/a                  |
| 66ZQ              | n/a                 | n/a                  |

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








# ALS Sewer Map Key

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

-  **Foul:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  **Trunk Surface Water**
-  **Trunk Foul**
-  **Storm Relief**
-  **Trunk Combined**
-  **Vent Pipe**
-  **Bio-solids (Sludge)**
-  **Proposed Thames Surface Water Sewer**
-  **Proposed Thames Water Foul Sewer**
-  **Gallery**
-  **Foul Rising Main**
-  **Surface Water Rising Main**
-  **Combined Rising Main**
-  **Sludge Rising Main**
-  **Proposed Thames Water Rising Main**
-  **Vacuum**





## Sewer Fittings

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

-  Air Valve
-  Dam Chase
-  Fitting
-  Meter
-  Vent Column




## Operational Controls

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

-  Control Valve
-  Drop Pipe
-  Ancillary
-  Weir






## End Items

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

-  Outfall
-  Undefined End
-  Inlet






## Other Symbols

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








-  /  Public/Private Pumping Station
-  Change of characteristic indicator (C.O.C.I.)
-  Invert Level
-  Summit

## Areas

Lines denoting areas of underground surveys, etc.

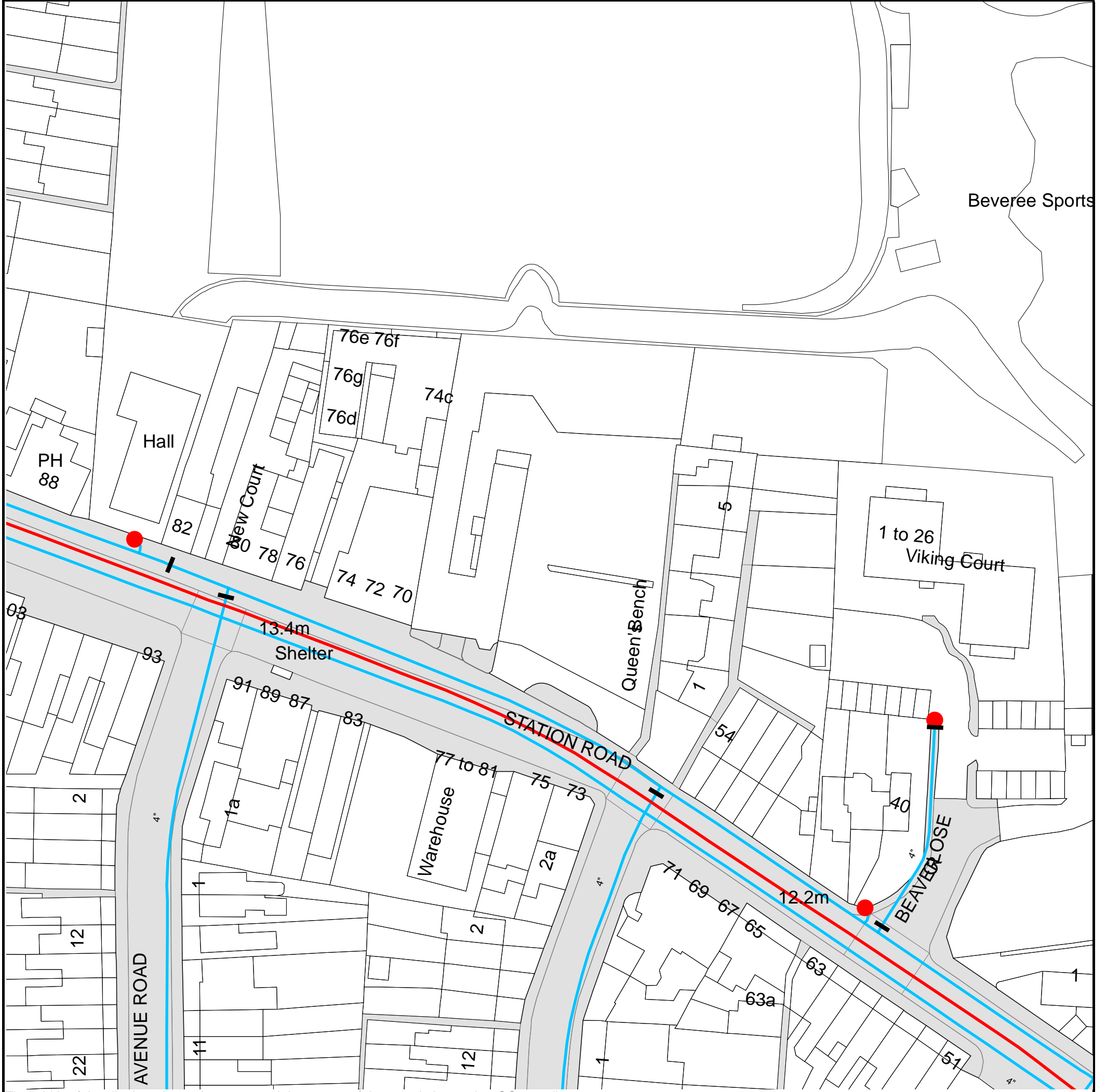
-  Agreement
-  Operational Site
-  Chamber
-  Tunnel
-  Conduit Bridge

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

-  Foul Sewer
-  Surface Water Sewer
-  Combined Sewer
-  Gully
-  Culverted Watercourse
-  Proposed
-  Abandoned Sewer

### Notes:

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



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 513758, 169711.








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

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# ALS Water Map Key

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


- 
**Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- 
**Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- 
**Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- 
**Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- 
**Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
- 
**Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- 
**Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

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

## Valves

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

## Hydrants








-  Single Hydrant

## Meters










-  Meter

## End Items

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

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



## Operational Sites

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

## Other Symbols

-  Data Logger

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

-  **Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
-  **Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

## Terms and Conditions

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

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

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

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

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

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

### Ways to pay your bill

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

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

## Terms and Conditions

### Search Code



#### IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

#### The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

#### The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

#### Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

**Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.**

#### TPOs Contact Details

The Property Ombudsman scheme  
Milford House  
43-55 Milford Street  
Salisbury  
Wiltshire SP1 2BP  
Tel: 01722 333306  
Fax: 01722 332296  
Web site: [www.tpos.co.uk](http://www.tpos.co.uk)  
Email: [admin@tpos.co.uk](mailto:admin@tpos.co.uk)

You can get more information about the PCCB from [www.propertycodes.org.uk](http://www.propertycodes.org.uk)

**PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE**

26.07.19 Page 33  
Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy



**CWA**

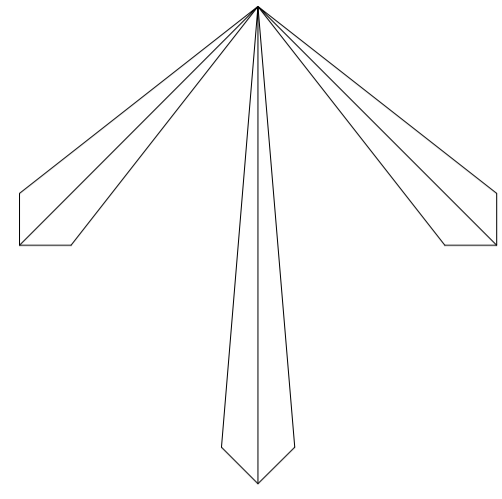
Intelligent Engineering

## **APPENDIX 6**

### **SURFACE WATER CALCULATIONS & IMPERMEABLE AREA PLAN**



INDICATIVE  
NORTH



This drawing is the property of CWA. Copyright is reserved by them and this drawing is issued on the condition that it is not copied either wholly or in part without the consent in writing of CWA. This drawing must be read in conjunction with the project specification. Do not scale from this drawing, use figured dimensions only. This drawing was computer generated using AutoCad.

NOTES

1. This drawing is to be read in conjunction with all relevant Architects, Engineers and other specialist details and specifications.
2. Do not scale from this drawing.
3. Drawing issued for planning discussions only, further to approval from Planning, Local Authority, Sewerage Undertaker, Environment Agency and any other governing parties. Following receipt of further information and comments the scheme may be revised.
4. Drawing based upon PRC Architects layout drawing ref: 11045 - FE\_010 - Proposed Site Plan
5. The location and level of all existing services are to be identified prior to construction and the engineer advised of any clashes.
6. Locations and extent of drainage features, including SuDS facilities indicative only.
7. No hydraulic modeling, geotechnical and structural assessment of the proposal has been carried out at this stage.

Key

- Site Area - 2858m<sup>2</sup>
- Permeable Area - 582m<sup>2</sup>
- Impermeable Area - 2276m<sup>2</sup>

FOR PLANNING  
PURPOSES ONLY

| Rev. | Amendments | Date | By | Chkd. |
|------|------------|------|----|-------|
|      |            |      |    |       |

Drawing Status



Lancaster House, 67 Newhall Street, Birmingham, B3 1NQ  
Tel: 0121 270 6962 Email: enquiries@cwa-eng.com

Station Road  
Hampton  
London

Proposed Impermeable Area Plan

| Drawing Number   | Revision         |
|------------------|------------------|
| CWA-19-207-SK002 | P1               |
| Drawn by NR      | Checked by JSP   |
| Date July 2019   | Scale 1:200 @ A1 |



Calculated by:

Site name:

Site location:

Site coordinates

Latitude:

Longitude:

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

Reference:

Date:

|             |       |
|-------------|-------|
| Methodology | IH124 |
|-------------|-------|

### Site characteristics

|                      |      |
|----------------------|------|
| Total site area (ha) | .286 |
|----------------------|------|

### Methodology

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

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

### Hydrological characteristics

|                               | Default | Edited |
|-------------------------------|---------|--------|
| SAAR (mm)                     | 598     | 598    |
| Hydrological region           | 6       | 6      |
| Growth curve factor: 1 year   | 0.85    | 0.85   |
| Growth curve factor: 30 year  | 2.3     | 2.3    |
| Growth curve factor: 100 year | 3.19    | 3.19   |

### Notes:

- (1) Is  $Q_{BAR} < 2.0$  l/s/ha?  
Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.
- (2) Are flow rates  $< 5.0$  l/s?  
Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements
- (3) Is  $SPR/SPRHOST \leq 0.3$ ?  
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

### Greenfield runoff rates

|                      | Default | Edited |
|----------------------|---------|--------|
| Qbar (l/s)           | 0.43    | 0.43   |
| 1 in 1 year (l/s)    | 0.37    | 0.37   |
| 1 in 30 years (l/s)  | 1       | 1      |
| 1 in 100 years (l/s) | 1.38    | 1.38   |

# Drainage Design Report

## Flow

v6.0

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|                           |   |
|---------------------------|---|
| <b>Network</b>            | Storm Network   |
| <b>Filename</b>           | Y:\Jobs CWA-19\CWA-19-207\06.Calculations\Storm attenuation calcs.pfd |
| <b>Username</b>           | John Panesar (jpanesar@cwa-eng.com)                                   |
| <b>Last analysed</b>      | 31/07/2019 15:00:12   |
| <b>Report produced on</b> | 31/07/2019 15:01:13   |

## Causeway Sales

|               |                        |
|---------------|------------------------|
| <b>Tel:</b>   | +44(0) 1628 552000     |
| <b>Fax:</b>   | +44(0) 1628 552001     |
| <b>Email:</b> | marketing@causeway.com |
| <b>Web:</b>   | www.causeway.com       |

## Technical support web portal:

<http://support.causeway.com>

|   |                   |
|---|-------------------|
| <b>Rainfall Methodology</b>                 | FSR               |
| <b>Return Period (years)</b>                | 5                 |
| <b>Additional Flow (%)</b>                  | 0                 |
| <b>FSR Region</b>                           | England and Wales |
| <b>M5-60 (mm)</b>                           | 20.000            |
| <b>Ratio-R</b>                              | 0.400             |
| <b>CV</b>                                   | 0.750             |
| <b>Time of Entry (mins)</b>                 | 4.00              |
| <b>Maximum Time of Concentration (mins)</b> | 30.00             |
| <b>Maximum Rainfall (mm/hr)</b>             | 50.0              |
| <b>Minimum Velocity (m/s)</b>               | 1.00              |
| <b>Connection Type</b>                      | Level Soffits     |
| <b>Minimum Backdrop Height (m)</b>          | 0.200             |
| <b>Preferred Cover Depth (m)</b>            | 1.200             |
| <b>Enforce best practice design rules</b>   |                   |



|  | Name | Area (ha) | T of E (mins) | Add Inflow (l/s) | Cover Level (m) | Node Type | Manhole Type | Diameter (mm) | Width (mm) | Easting (m) | Northing (m) | Depth (m) | Notes |
|--|------|-----------|---------------|------------------|-----------------|-----------|--------------|---------------|------------|-------------|--------------|-----------|-------|
|  | S1   | 0.230     |               |                  | 102.000         | Manhole   |              | 1200          |            |             |              | 2.000     |       |

| Name | US Node | DS Node | Length (m) | ks (mm) / n | Velocity Equation | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | Link Type | T of C (mins) | Rain (mm/hr) | Con Offset (m) | Min DS IL (m) |
|------|---------|---------|------------|-------------|-------------------|-----------|-----------|----------|-------------|----------|-----------|---------------|--------------|----------------|---------------|
|------|---------|---------|------------|-------------|-------------------|-----------|-----------|----------|-------------|----------|-----------|---------------|--------------|----------------|---------------|

| Name | US Node | DS Node | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Minimum Depth (m) | Maximum Depth (m) | Σ Area (ha) | Σ Add Inflow (ha) | Pro Depth (mm) | Pro Velocity (m/s) | Notes |
|------|---------|---------|-----------|-----------|------------|--------------|--------------|-------------------|-------------------|-------------|-------------------|----------------|--------------------|-------|
|------|---------|---------|-----------|-----------|------------|--------------|--------------|-------------------|-------------------|-------------|-------------------|----------------|--------------------|-------|

| Link ID | Length (m) | Slope (1:X) | Dia (mm) | Link Type | US CL (m) | US IL (m) | US Depth (m) | DS CL (m) | DS IL (m) | DS Depth (m) | US Node ID | Dia (mm) | Width (mm) | Node Type | MH Type | DS Node ID | Dia (mm) | Width (mm) | Node Type | MH Type |
|---------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|------------|----------|------------|-----------|---------|------------|----------|------------|-----------|---------|
|---------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|------------|----------|------------|-----------|---------|------------|----------|------------|-----------|---------|



| Node ID | Easting (m) | Northing (m) | CL (m)  | Depth (m) | Dia (mm) | Width (mm) | Node Type | MH Type | Link ID | IL (m) | Dia (mm) | Link Type |
|---------|-------------|--------------|---------|-----------|----------|------------|-----------|---------|---------|--------|----------|-----------|
| S1      |             |              | 102.000 | 2.000     | 1200     |            | Manhole   |         |         |        |          |           |

| Rainfall Methodology              | FSR               |  | Return Period (years) | Climate Change (%) |
|-----------------------------------|-------------------|--|-----------------------|--------------------|
| <b>FSR Region</b>                 | England and Wales |  | 100                   | 40                 |
| <b>M5-60 (mm)</b>                 | 20.000            |  |                       |                    |
| <b>Ratio-R</b>                    | 0.400             |  |                       |                    |
| <b>Summer CV</b>                  | 0.750             |  |                       |                    |
| <b>Winter CV</b>                  | 0.840             |  |                       |                    |
| <b>Analysis Speed</b>             | Normal            |  |                       |                    |
| <b>Drain Down Time (mins)</b>     | 240               |  |                       |                    |
| <b>Additional Storage (m³/ha)</b> | 0.0               |  |                       |                    |
| <b>Storm Durations (mins)</b>     | 15                |  |                       |                    |
|                                   | 30                |  |                       |                    |
|                                   | 60                |  |                       |                    |
|                                   | 120               |  |                       |                    |
|                                   | 180               |  |                       |                    |
|                                   | 240               |  |                       |                    |
|                                   | 360               |  |                       |                    |
|                                   | 480               |  |                       |                    |
|                                   | 600               |  |                       |                    |
|                                   | 720               |  |                       |                    |
|                                   | 960               |  |                       |                    |
|                                   | 1440              |  |                       |                    |
| <b>Check Discharge Rate(s)</b>    | x                 |  |                       |                    |
| <b>1 year (l/s)</b>               |                   |  |                       |                    |
| <b>30 year (l/s)</b>              |                   |  |                       |                    |
| <b>100 year (l/s)</b>             |                   |  |                       |                    |
| <b>Check Discharge Volume</b>     | x                 |  |                       |                    |
| <b>100 year 360 minute (m³)</b>   |                   |  |                       |                    |

| Hydro-Brake® |            |                  |                          |              |                  |                  |                   |                           |                |                |                         |                        |
|--------------|------------|------------------|--------------------------|--------------|------------------|------------------|-------------------|---------------------------|----------------|----------------|-------------------------|------------------------|
| Node         | Flap Valve | Online / Offline | Replaces Downstream Link | Loop to Node | Invert Level (m) | Design Depth (m) | Design Flow (l/s) | Objective                 | Sump Available | Product Number | Min Outlet Diameter (m) | Min Node Diameter (mm) |
| S1           | x          | Online           |                          |              | 100.000          | 1.000            | 2.0(HE)           | Minimise upstream storage |                |                | 0.100                   | 1200                   |

| Depth/Area/Inf Area |                             |                             |               |          |                  |                           |           |                        |                             |
|---------------------|-----------------------------|-----------------------------|---------------|----------|------------------|---------------------------|-----------|------------------------|-----------------------------|
| Node                | Base Inf Coefficient (m/hr) | Side Inf Coefficient (m/hr) | Safety Factor | Porosity | Invert Level (m) | Time to half empty (mins) | Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) |
| S1                  | 0.00000                     | 0.00000                     | 2.0           | 0.95     | 100.000          |                           | 0.000     | 145.0                  | 0.0                         |
|                     |                             |                             |               |          |                  |                           | 0.999     | 145.0                  | 0.0                         |
|                     |                             |                             |               |          |                  |                           | 1.000     | 0.0                    | 0.0                         |



| Default Values        |       | Overrides |            |           |  |      |                |  |
|-----------------------|-------|-----------|------------|-----------|--|------|----------------|--|
|                       |       |           |            |           |  |      |                |  |
|                       |       | Link      | Entry Loss | Exit Loss |  | Node | Flood Risk (m) |  |
| Entry Loss (manhole)  | 0.250 |           |            |           |  |      |                |  |
| Exit Loss (manhole)   | 0.250 |           |            |           |  |      |                |  |
| Entry Loss (junction) | 0.000 |           |            |           |  |      |                |  |
| Exit Loss (junction)  | 0.000 |           |            |           |  |      |                |  |
| Flood Risk (m)        | 0.300 |           |            |           |  |      |                |  |

|  |         |
|--|---------|
| <b>Node Size</b>                           |         |
| <b>Node Losses</b>                         |         |
| <b>Link Size</b>                           |         |
| <b>Minimum Diameter (mm)</b>               | 150     |
| <b>Link Length</b>                         |         |
| <b>Maximum Length (m)</b>                  | 100.000 |
| <b>Coordinates</b>                         |         |
| <b>Accuracy (m)</b>                        | 1.000   |
| <b>Crossings</b>                           |         |
| <b>Cover Depth</b>                         |         |
| <b>Minimum Cover Depth (m)</b>             |         |
| <b>Maximum Cover Depth (m)</b>             | 3.000   |
| <b>Backdrops</b>                           |         |
| <b>Minimum Backdrop Height (m)</b>         |         |
| <b>Maximum Backdrop Height (m)</b>         | 1.500   |
| <b>Full Bore Velocity</b>                  |         |
| <b>Minimum Full Bore Velocity (m/s)</b>    |         |
| <b>Maximum Full Bore Velocity (m/s)</b>    | 3.000   |
| <b>Proportional Velocity</b>               |         |
| <b>Return Period (years)</b>               |         |
| <b>Minimum Proportional Velocity (m/s)</b> | 0.750   |
| <b>Maximum Proportional Velocity (m/s)</b> | 3.000   |
| <b>Surcharged Depth</b>                    |         |
| <b>Return Period (years)</b>               |         |
| <b>Maximum Surcharged Depth (m)</b>        | 0.100   |
| <b>Flooding</b>                            |         |
| <b>Return Period (years)</b>               | 30      |
| <b>Discharge Rates</b>                     |         |
| <b>1 year (l/s)</b>                        |         |
| <b>30 year (l/s)</b>                       |         |
| <b>100 year (l/s)</b>                      |         |
| <b>Discharge Volume</b>                    |         |

|  |  |
|--|--|
| <b>100 year 360 minute (m<sup>3</sup>)</b> |  |
|--|--|

Results for 100 year +40% Critical Storm Duration. Lowest mass balance: 100.00%

| Event             | US Node ID | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status | Link ID | DS Node ID | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-------------------|------------|-------------|-----------|-----------|--------------|---------------|------------|--------|---------|------------|---------------|----------------|----------|---------------|--------------------|
| 360 minute winter | S1         | 352         | 100.974   | 0.973     | 19.8         | 135.1949      | 0.0000     | OK     |         |            | 2.0           |                |          |               | 60.7               |



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Station Road, Hampton  
Flood Risk Assessment and Drainage Strategy



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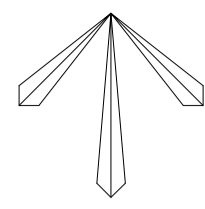
Intelligent Engineering

## **APPENDIX 7**

### **OUTLINE SURFACE & FOUL WATER DRAINAGE STRATEGY**



INDICATIVE NORTH



- Key**
- EX-SWS Existing Adopted Surface Water Sewer
  - Proposed Surface Water Sewer
  - Proposed Surface Water Manhole
  - Attenuation Tank
  - Site Boundary
  - Proposed Storm Pumping Station
  - Potential storm exceedance flow routes for storm events greater than 1 in 100 plus 40% climate change
  - Rising Main

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**NOTES**

1. This drawing is to be read in conjunction with all relevant Architects, Engineers and other specialist details and specifications.
2. Do not scale from this drawing.
3. Drawing issued for preliminary discussions only, further to approval from Planning, Local Authority, Sewerage Undertaker, Environment Agency and any other governing parties. Following receipt of further information and comments the scheme may be revised.
4. Drawing based upon PRC architects layout drawing ref: 11045\_FE-010\_P4 Site Layout
5. The location and level of all existing services are to be identified prior to construction and the engineer advised of any clashes.
6. Locations and extent of drainage features, including SuDS facilities and discharge point indicative only.
7. No hydraulic modelling, geotechnical and structural assessment of the proposal has been carried out at this stage.

**SuDS Design:**

- Site not suitable for infiltration due to made ground and clay substrata
- SuDS options on this site:
- Attenuation tank - modular cellular units (95% void) with suitable access for maintenance. Tank to be below basement / courtyard level to prevent flooding from surcharge.
  - flow vortex control - which will restrict storm discharge to all storm events up to 1 in 100 year plus 40% climate change.
  - Trapped gullies & drainage channel outlets - will effectively remove oils, hydrocarbons and silt from the highway runoff prior to discharge.
  - Tanked Porous paving - will effectively remove oils and improve water quality

**Management and Maintenance of SuDS:**

The drainage system will be designed to minimise maintenance requirements however, a full maintenance scheme will be established for these elements not offered for adoption.

The layout management arrangements will be constructed at the detail stage. A maintenance plan for the SuDS drainage system will be prepared prior to site occupancy to ensure drainage system remains operational and effective for the lifetime of the development.

**Storm Drainage Design Criteria:**

- Total discharge rate: 2 l/s
- Storm design based upon storm events up to and including the 1 in 100 year storm event plus 40% climate change.
- The total proposed Impermeable Area: 0.228Ha
- The total site area = 0.286 Ha
- Total Attenuation volume required: 138m<sup>3</sup> (subject to detailed calculations)

**This Drainage Design Is Subject To:**

- Full ground investigation report
- Porosity test in accordance with BRE 365
- Detail drainage and levels Design
- Further discussion with Thames Water, LA, LLFA, EA
- S106 application approved
- Confirmation of existing storm discharge point required. (CCTV Survey)

Finished Floor Level - 13.45m  
Basement Level - 10.15m

**FOR PLANNING PURPOSES ONLY**

| Rev. | Amendments | Date | By | Chkd. |
|------|------------|------|----|-------|
|      |            |      |    |       |

Drawing Status



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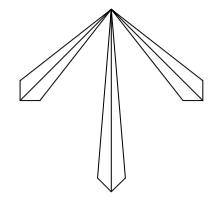
**Outline Surface Water  
Drainage Strategy**

|                         |            |
|-------------------------|------------|
| Drawing Number          | Revision   |
| <b>CWA-19-207-SK001</b> | <b>P4</b>  |
| Drawn by                | Checked by |
| NR                      | JSP        |
| Date                    | Scale      |
| July 2019               | 1:200 @ A1 |





INDICATIVE NORTH



- Key**
- EX-FWS — Existing Adopted Foul Water Sewer
  - Existing Manhole
  - Proposed Foul Water Drain
  - Proposed Foul Water Inspection Chamber
  - Proposed Foul Water Manhole
  - ▲ Proposed Foul Pumping Station
  - Rising Main

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3. Drawing issued for preliminary discussions only, further to approval from Planning, Local Authority, Sewerage Undertaker, Environment Agency and any other governing parties. Following receipt of further information and comments the scheme may be revised.
4. Drawing based upon PRC architects layout drawing ref: 11045\_FE-010\_P4 Site Layout
5. The location and level of all existing services are to be identified prior to construction and the engineer advised of any clashes.
6. Locations and extent of drainage network and discharge point indicative only.
7. No hydraulic modeling, geotechnical and structural assessment of the proposal has been carried out at this stage.
8. Drainage Position subject to detailed design and coordination with foul system and structural foundations
9. Foul design based on 85 units which equates to 4.05 l/s peak flow.

**This Drainage Design Is Subject To:**

- Detail drainage and levels design
- Further discussion with Thames Water, LA, LLFA, EA
- S106 application approved

Finished Floor Level - 13.45m  
Basement Level - 10.15m



**FOR PLANNING PURPOSES ONLY**

| Rev. | Amendments | Date | By | Chkd. |
|------|------------|------|----|-------|
|      |            |      |    |       |

Drawing Status



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**Station Road  
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**Outline Foul Water  
Drainage Strategy**

|                         |            |
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| Drawing Number          | Revision   |
| <b>CWA-19-207-SK003</b> | <b>P4</b>  |
| Drawn by                | Checked by |
| NR                      | JSP        |
| Date                    | Scale      |
| July 2019               | 1:200 @ A1 |