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Flood Risk and Sustainable Drainage Report, Issue 2

St Clare Business Park - Hampton Hill

12153

For Notting Hill Home Ownership

Engineering at its Best

Report For

Notting Hill Home Ownership

Scheme No: 12153

Flood Risk and Sustainable Drainage Report, Issue 2

St Clare Business Park - Hampton Hill

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Contents

1 Introduction

Tully De'Ath have been commissioned by Notting Hill Home Ownership Ltd to provide a Flood Risk and Sustainable Drainage Report for the redevelopment of the site at St Clare Business Park. The proposals involve the demolition of existing buildings to provide 1no. mixed use building between three and five storeys plus basement in height, comprising 98no. residential flats (Class C3) and 1,172sq.m of commercial floorspace (Class E); 1no. three storey building comprising 893sq.m of commercial floorspace (Class E); 14no. residential houses (Class C3); and associated access, external landscaping and car parking.

The purpose of the report is to demonstrate to the Planners that the site can be drained both safely and sustainably for the lifetime of the development. It also demonstrates that the proposed land use will not increase the flood risk on or off site and is resilient to climate change.

The report has been prepared in accordance with guidance set out within the following documents which have been referred to, whilst preparing this report:

- SuDS Manual v6 (CIRIA C753, 2015);
- London Borough of Richmond's Strategic Flood Risk Assessment (March 2016 and 2021);
- London Borough of Richmond's Surface Water Management Plan (December 2021);
- London Borough of Richmond's Local Flood Risk Management Strategy (August 2015);
- The London Plan (2021);
- London-wide SuDS Guide (November 2016);

Whilst the site is situated in a Flood Zone 1 (lowest flood risk) and is 0.86ha in size (the threshold for a Flood Risk Assessment is 1ha site area), the Borough have requested a Flood Risk Assessment is prepared due to the potential for flooding at the site. The Council Officers consider that there is potential for surface water, ground and sewer flooding; therefore, flooding has been assessed as part of this report. Refer to the London Borough of Richmond's Flood Risk Assessment Checklist within Appendix H.

2 Site Location

The site is located in Hampton Hill, to the west of Bushy Park, in the London Borough of Richmond. It is approximately 100m from the High Street and 0.8 miles to Fulwell station to the north-east. Refer to Appendix A for a Location Plan.

The site contains no designated heritage assets and is not within a conservation area, although part of the eastern boundary abuts the Hampton Hill Conservation Area.

It has a central OS national grid reference of TQ141708/9 and a post code address of TW12 1QF. The surrounding land use is made up of a combination of commercial and residential properties to the north and east, with residential properties to the south.

The western boundary of the St Clare Business Park is formed by the top of the railway cutting in which the Shepperton branch line runs. The northern boundary is formed by the rear of residential properties on Windmill Road. To the east, a mix of uses abut the boundary, with commercial along the northern section changing to two-three storey residential along the majority of the length. The rear gardens to a terrace of two-storey housing on Holly Road forms the southern boundary.

The bulk of the site is accessed directly off Holly Road, with only the north eastern corner of accessed from Windmill Road.

3 Existing Conditions

3.1 Land Use

The site has an area of approximately 0.86ha and comprises circa 2,500sqm. of mixed business/light industrial uses, in several buildings, many of which abut the site boundaries.

Much of the site comprises a series of workshops and office buildings with associated parking areas. It is accessed by a tarmac road connecting onto Holly Road beyond the southern boundary. The vast majority of the site is made up of concrete hard standing and buildings, although there are some trees and shrubs, which are sporadically located throughout the site.

3.2 Topography

A topographical survey (Appendix B) indicates that the site has a gradual fall from east to west, towards the rail line. The low points of the site are located just inside the western boundary with a typical level of 14.70m AOD. Levels adjacent to the eastern boundary range between 16.30m and 16.60m AOD.

3.3 Impermeable Area

With reference to the topographical survey, the site is 95% impermeable (8100m²) made up of tarmac, concrete and various buildings, although as per Section 3.1 above, there are a few trees and small pockets of permeable areas such as gravel scattered across the site.

3.4 Local Sewer Network and Existing Connections

The Thames Water sewer records indicates 225mm diameter surface water and foul sewers running eastwards past the site along Holly Road. In addition, 225mm diameter surface water and foul sewers also run westwards along Windmill Road to the north of the development.

A 150mm diameter adopted foul sewer connects St Clare Business Park to the adopted foul sewer in Windmill Road.

Refer to Appendix C for the Thames Water Sewer Records.

A drainage survey established that Soakaways (8 No.) are currently used on the site as the main form of surface water disposal, however there are areas (230m²) in the northern part of the site which was proven to discharge to the foul system. There is also an area fronting onto Windmill Road (estimated to be 240m²) which connects into the adjacent adopted surface water system.

The onsite foul drainage connects to the adopted system in both Holly Road and Windmill Road. However, the existing block in the north western corner of the site connects to a foul pump station which in turn connects to the foul gravity system discharging to Windmill Road.

3.5 Geology

Figure 3 in the Borough's Local Flood Risk Management Strategy report shows the geology (superficial deposits) on site to be of Taplow Gravel Formation.

An intrusive site investigation in May 2018 by RSK Environment Limited established that the geological strata onsite was:

- Made Ground (up to 1.5 to 3.5m thick, at ground level);

on

- Dense sands and gravels - Taplow Gravel Formation (Up to max. thickness 1.6m, extending to depths of 1.5m and 3.5m BGL);

on

- London Clay Formation (Thickness > 15m, extending to depths of 4 – 4.4m BGL and proven to a depth of 20m BGL in one borehole)

Ground water was observed at depths ranging between 1.3m to 3.5m below existing ground level, with a number of the trial holes noted as being dry.

With the adjacent railway line substantially lower than the ground level of the site, and the varied ground conditions found, it is considered likely that the water table on the site is perched.

3.6 Soakage Tests

Soakage tests were undertaken in April 2018 by RSK using the 'falling head' method. They established that soakage rates range between $6.20x10^{-5}$ to $7.06x10^{-5}$ m/s within the gravels. However, the presence of a significant thickness of made ground and a relatively shallow water table, makes the use of soakaways unlikely.

4 Development Proposals

The development proposals comprise the demolition of the existing buildings and erection of 1no. mixed use building between three and five storeys plus basement in height, comprising 98no. residential flats (Class C3) and 1,172sq.m of commercial floorspace (Class E); 1no. three storey building comprising 893sq.m of commercial floorspace (Class E); 14no. residential houses (Class C3); and, associated access, external landscaping and car parking.

Refer to Appendix E for details of the proposed layout.

5 Flooding Assessment

With reference to the GOV.UK fluvial flood maps (see Appendix D), the site is located within a Flood Zone 1 (very low risk) area which is classed as having less than a 1 in 1000 chance of river or sea flooding in any one year.

The site is not within a Critical Drainage Area (an area that is at greatest risk of flooding) as shown in SFRA 2020 Fluvial & Tidal Flood Risk Interactive Map (see Appendix D).

6 Other Sources of Flooding

6.1 Surface Water Flooding

Surface water flooding is the term used to describe flooding which occurs when intense, often short duration rainfall is unable to soak into the ground or to enter drainage systems and therefore runs over the land surface causing flooding. It is most likely to occur when soils are saturated so that they cannot infiltrate any additional water or in urban areas where buildings, tarmac and concrete prevent water soaking into the ground. The excess water can pond in low points and result in the development of flow pathways often along roads but also through built up areas and open spaces. This type of flooding is usually short lived and associated with heavy downpours of rain.

The GOV.UK Surface Water Flood Map shows the majority of the site is at a very low surface water flood risk, with small pockets of low, medium and high flood risk on site. In reviewing the topographical survey, the medium to high-risk areas on site relate to localised low points adjacent to the existing buildings.

The Richmond Surface Water Flood Risk Interactive map shows similar flood extents.

Figure 3.8.6a shows patches of surface water flood depth of between 0.1 – 0.25m on site for a 1 in 100 chance of rainfall event (1% AEP) and a flood depth of between 0.25 – 0.5m on the railway line adjacent to the west of the site for the same scenario.

Figure 3.8.6b of Richmond's SWMP (see Appendix D) shows areas that have been classified as a flood hazard. The adjacent railway line (which is at a lower level to the site) is shown as both a 'moderate' and 'significant' flood zone/hazard area. This is described as a "flood zone with deep fast flowing water. Dangerous for most people". The railway line is also shown to be at a high risk of surface water flooding, according to the GOV.UK surface water flood map. Correspondence from Network Rail advised that they do have surface water flooding issues at track level in this location.

To reduce the risk of surface water flooding, the following mitigation measures are proposed:

- Reduce the impermeable area of the site (by 650m²);
- On-site below ground attenuation will be provided for all rainfall events with a return period of up to and including 1 in 100 years plus an additional 40% allowance for climate change;
- The layout of the site has been designed so that excess surface water will no longer be trapped by the buildings when falling to the west;
- During an exceedance or blockage event, ground levels within the site will be designed such that overland surface water flows will be directed away from buildings. The existing topography of the site currently directs overland flows towards the western boundary, into the railway cutting, and the proposed development would continue with this approach;
- A duty and standby pump set will be provided to the surface water system, which will include an audio and visual warning system in the event of a pump failure;
- Any sensitive equipment in basements will be protected with flood boards, which will be permanently in place, and only removed to allow for inspection or maintenance of the plant. Flood doors will also be provided to the access cores.

With the implementation of the above mitigation measures, the surface water flood risk is considered to be low.

6.2 Sewer Flooding

The TW12 1 postcode area, where the site lies has had between 11-15 sewer flooding incidents (based on DG5 data), as shown on Figure I from the Borough's SFRA (see Appendix D). This suggests surcharging of the local Thames Water network. However, no incidents are known to have occurred on site, specifically.

The Richmond Interactive mapping indicates that the site is within an area of between 10 to 20 incidents reported.

With reference to Chapter 8, although there may be a nominal increase in surface water flows during low intensity rainfall events, for the more onerous storms there will be a reduction in flows offsite as they will be restricted to 5l/s for all events up to the 1 in 100-year return period (with an additional 40% allowance for climate change). This should reduce the risk of surface water sewer flooding downstream of the site.

With reference to Chapter 9, although the new development will result in an increase in foul flows from the site, the removal of the surface water which currently discharges into the foul system will more than offset the increase in foul flows. Consequently, the new development should result in a reduced risk of foul sewer flooding both within and beyond the site.

6.3 Groundwater

The site is within an area that has 'potential for groundwater flooding of property situated below ground level', as shown on Figure E of Richmond's SFRA report. The railway line to the west of the site is classified as 'potential for groundwater flooding to occur at surface', however, given the railway line is significantly lower than the application site, there is very little risk of this flood water spreading to the site.

The Richmond Areas Susceptible to Groundwater Flood interactive map locates the site within an area of more than 75%.

Figure 3.5.1 in the Borough's SWMP report also shows that although there have been no groundwater flood incidents on or near to the site, there is an increased potential for elevated groundwater on permeable superficial deposits along the railway line to the west of the site.

Groundwater on site was observed at depths ranging between 1.3m to 3.5m below existing ground level, with a number of the trial holes noted as being dry. This combined with the varied ground conditions suggests that there may be areas of perched groundwater on the site. The adjacent railway cutting is significantly lower than the site levels and as a result is likely to have an impact on the groundwater levels on the site. It is therefore considered that groundwater flooding is unlikely to pose risk.

However, as an additional form of protection to Block B1, the basement carpark will be constructed using water resistant measures (such waterproof concrete) to form a watertight structure which will prevent ground water entering the basement.

Refer to Appendix D for the flood maps.

6.4 Reservoirs

In 2009, the Environment Agency commissioned inundation mapping of all reservoirs listed under the Reservoirs Act 1975. The inundation maps show the effects of a dam breach on the downstream catchment and were produced to assist Local Authorities in their responsibilities in coordinating emergency plans.

Reservoirs in the UK have an extremely good safety record. The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. Consequently, it is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. Therefore, reservoirs in the UK present a managed risk.

The nearest reservoirs to the site are Red House Reservoir (2km away to the west) and reservoirs at Thames Water Hampton Water Treatment Works to the south-west (2.2km away). These are not in the immediate vicinity of the site indicating the site would not be at risk of flooding in the highly unlikely event of a reservoir failure. The GOV.UK flood map (Appendix D) shows the site is not within an area which is subject to reservoir flooding.

6.5 Flood Risk Assessment Checklist

To accord with the London Borough of Richmond's validation requirements a completed Flood Risk Assessment Checklist is included within Appendix H, as well as The London Sustainable Drainage Proforma.

7 Suitable Drainage Options

CIRIA C753 SuDS Manual explains that the primary function of SuDS measures is to protect watercourses from any impact due to the new development. However, SuDS can also improve the quality of life in a new development and urban spaces by making them more vibrant, visually attractive, sustainable and more resilient to change. This document explains the wider social context of SuDS and how SuDS can deliver high quality drainage while supporting urban areas to cope better with severe rainfall both in present and future.

There are four main categories of benefits that can be achieved by SuDS:

- Water Quantity (mitigate flood risk & protect natural water cycle)
- Water Quality (manage the quality of the runoff to prevent pollution)
- Amenity (create and sustain better places for people)

- Biodiversity (create and sustain better places for nature)

There are many site-specific factors which will influence the choice of any SuDS devices used within a development. The primary factors are:

- How the land is to be used- whether domestic, commercial or industrial.
- Soil contamination.
- Existing soil conditions i.e. ground permeability, groundwater levels.
- Site topography e.g. steeply sloping.
- Space availability – urban or non-urban.

Most advice on the use of sustainable drainage techniques recommends the utilisation of ground infiltration, which may take the form of permeable paving, swales, infiltration basins or soakaways. However, these systems are dependent on the sub-soil suitability, unsaturated soil zone to an adequate depth and the absence of leachable contaminants in the sub-soils.

It is essential to design and install a sustainable drainage system that is appropriate for the specific development and location in question.

SuDS measures, as stated in CIRIA C753 SuDS Manual, have been considered and the potential SuDS solutions for inclusion in this development are stated in Table 1 – SuDS Feasibility Matrix.

Table 1: SuDS Feasibility Matrix

Technique	Description	Implementation at the Site
Rainwater Harvesting	Collection of rainwater for re-use externally for irrigation or internally within the building for toilets, washing machine etc.	YES - Water butts will be provided to the rear gardens and within communal gardens, for irrigation. Internal re-use not implementable due *to cost.*
Green Roofs	Areas of living vegetation installed on the top of buildings to reduce run-off	YES – Green roofs will be provided on Block 1 covering an area of approximately 584m². The podium within Block 1 will also be heavily planted and incorporate permeable paving.
Infiltration Systems	Specifically, designed systems designed to promote infiltration of surface water runoff into the ground	NO – Due to potential contamination and high-water levels, infiltration is not appropriate.
Proprietary Treatment Systems	Manufactured products that remove specified pollutants from surface water run off	NO – Pollution hazard indices class the site as VERY Low or LOW. No specific products required over current provision of catchpits, trapped gullies etc. before discharge. However, all parking bays will be Type C permeable paving
Filter Strips	Uniformly graded and gently sloping strips of grass or vegetation designed to treat surface water runoff from adjacent impermeable areas.	NO – On a constrained and sloping site other methods are more appropriate.

Filter Drains	Shallow trenches filled with stone/gravel creating temporary storage, conveyance and filtration of surface water run-off.	NO - Not desirable in residential landscaping other measures more appropriate.
Swales	Shallow, flat bottomed, vegetated open channels for conveyance and often attenuation	NO– The constraints of the site mean there is insufficient space is available
Bioretention Systems	Shallow landscaped depressions that can reduce run off	YES – There will be the provision of 1120m² of new soft landscaping of which 180m² could be used for bioretention and Rain Gardens
Trees	Protect and enhance the urban environment. Transpiration, Interception, Increased infiltration, Phytoremediation.	YES – New tree planting is to be provided across the site.
Pervious Pavements	Vehicular/pedestrian pavements allowing water to infiltrate through the surface into underlying structural layers	YES – Permeable paving (Type C) is to be used for all parking bays.
Attenuation Storage Tanks	Below ground void space for the temporary storage of surface water.	YES – Attenuation tanks are proposed below the basement carpark in Block 1
Detention Basins	Landscaped depressions for the temporary storage of surface water.	NO – On a constrained and sloping site other methods are more appropriate.
Ponds and Wetlands	Features with permanent water providing attenuation and treatment of surface water.	NO – On a constrained and sloping site other methods are more appropriate.

8 Surface Water Drainage Proposals

The London Plan requests that new developments should utilise sustainable drainage systems (SuDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

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

In terms of rainwater re-use, water butts are to be used for irrigation within the rear gardens to all the houses and within the communal gardens.

With reference to Section 3.5 above, the Taplow Gravel stratum that underlies the site has the potential for ground infiltration. However, due to the thickness of the made ground, significant excavations would be required to get to the natural strata, which would as a result locate the base of the soakaway within or close to the ground water levels. In addition, there is a concern that the existing soakaways on site might be contributing to the flooding issues within the railway cutting. As a consequence, infiltration is not considered to be appropriate for this site.

As there are no available water courses in the vicinity, it is proposed to discharge surface water into the adjacent adopted surface water system in Windmill Road. Due to site levels relative to the adopted sewers, it will be necessary to provide a pumped surface water drainage system.

An indicative drainage layout is provided within Appendix F.

8.1 Discharge Rates

8.1.1 Impermeable Areas

With a total site area of 8565m² the existing and proposed impermeable areas have been calculated as follows:

- Existing Impermeable Area = 8100m²
- Proposed Impermeable Area = 7450m²

These figures show that there will be 650m² decrease in impermeable area for the proposed development.

8.1.2 Control of Surface Water Flows from the Development

The greenfield rates noted in Table 1 have been calculated using Micro Drainage Software's Source Control programme 'ICP SUDS' for QBAR. The calculations are provided in Appendix F.

Table 1 Greenfield Run-Off Rates

Storm Return Period	Greenfield Rate
Qbar	1.3 l/s
1 in 1 Year	1.1 l/s
1 in 30 year	3.0 l/s
1 in 100 year	4.2 l/s

The drainage survey has established that approximately 240m² of impermeable area currently discharges unrestricted to the adopted surface water sewer in Windmill Road. This equates to an existing run-off rate of:

1-year Return Period = 3.3 l/s;

30-year Return Period = 7.5 l/s;

100-year Return Period = 9.6 l/s.

It is proposed to restrict the flows offsite to 5 l/s (via a pump set) for all events up to the 1 in 100-year return period with an additional 40% allowance for climate change. This is to ensure that there is no detrimental impact in surface water flows to the sewer in Windmill Road.

It is recognised that there may be a nominal increase in flows during the low intensity rainfall events, however for the more onerous storms there will be a betterment, which should reduce the risk of sewer flooding downstream of the site.

8.2 Design Storm Events and Attenuation Storage

The control of surface water discharge flows from the development will involve temporary storage within the site. In accordance with current design standards, the storage volume provided will need to cater for all rainfall events with a return period of up to and including 1 in 100 years plus an additional 40% allowance for climate change.

Based upon a pump rate of 5 l/s, storage calculations have been carried out using the Source Control program within the Micro Drainage software suite. It has been calculated that the required storage volume will be 634m³ which will be provided within two below ground attenuation tanks. A hydrobrake flow control device will be used upstream of the pump chamber to regulate the flow to the pumps. Refer to Appendix F for copies of the attenuation calculations.

With reference to the indicative drainage drawing, there is limited external space to form the tanks, and as a result the attenuation tanks have been located beneath the lower car parking area in Block 1.

8.3 Surface Water Treatment

All surface water will receive some element of treatment before discharging into the adopted surface water sewers via a series of trapped gullies and catch-pits, which are efficient at removing silt and urban pollutants. The parking bays are the most likely areas to generate pollutants, consequently these areas will be provided with permeable paving (tanked), which are very efficient at removing hydrocarbons. The parking areas under Block 1 will be covered and as a result will generate little surface water runoff, however trapped gullies will be provided which will connect to the foul system.

8.4 Exceedance

The drainage system will be designed to accommodate a 1 in 100 +40% climate change event. However, to provide protection during an exceedance or blockage event, ground levels within the site will be designed such that overland surface water flows will be directed away from buildings. The existing topography of the site currently directs overland flows towards the western boundary and into the railway cutting. The new development has a similar levels strategy to the existing, and as a result the overland flood routes would match the current situation.

A duty and standby pump set will be provided to the surface water system, which will include an audio and visual warning system in the event of a pump failure. At telemetry system will also be provided to alert the maintenance team that there is a problem.

In the event of a sustained pump failure whereby there is no discharge, the surface water attenuation tank capacity may become exceeded, surface water would flood the basement carpark, which effectively provides additional storage. As a guide, a 1 in 30-year rainfall event with no discharge would create less than 50mm ponding within the floodable basement area of 1400m², a 100-year event would create 132mm ponding.

Any sensitive equipment in basements will be protected with flood boards, which will be permanently in place, and only removed to allow for inspection or maintenance of the plant. Flood doors will be provided to the access cores.

9 Foul Drainage Proposals

Based on the peak daily flow of 4000 litres per dwelling specified in Sewers for Adoption 7th Edition, the 112 residential units within the proposed development, will generate a peak foul design flow of 5.2 l/s.

It is also expected that the 2047m² of commercial units (class B1) within the proposed development will generate a peak foul design flow of 0.34 l/s, which will generate a total foul flow rate of 5.54 l/s.

The new development will result in an increase in foul flows from the site. However, the removal of the surface water which currently discharges into the foul system will more than offset the increase in foul flows. Consequently, the new development should result in a reduced risk of foul sewer flooding.

With regard to the drainage layout, the ground floor levels to the most south westerly units have been raised slightly to ensure that a gravity system can be provided.

The Indicative Drainage drawing in Appendix F shows how the foul system serving the new development discharges into the adopted sewer in Windmill Road.

The connection described above will be subject to Thames Water approval via a Section 106 Agreement under the terms of the Water Industry Act 1991.

10 Maintenance

Maintenance of any drainage scheme is essential to ensure that it continues to perform as designed. Within the site's Health & Safety File a Maintenance Strategy will be developed which will give details of routine maintenance inspections for each element of the drainage system, together with details of how they should be undertaken and at what intervals or events. It should also include all the installed manufacturer's details and maintenance recommendations, as well as holding the records of any inspections or remedial measures undertaken. The drainage maintenance plan should be made available for inspection by the council if requested.

Generally, the surface water drainage system requires regular inspection/clearing to prevent blockages due to the accumulation of silt and debris. It is recommended that the system is initially inspected and cleared by a suitably trained person every six months for at least the first two years of operation to establish the long-term inspection/clearing interval appropriate for this site. Inspection/clearing should also be carried out every major storm event.

The following items should be inspected:

- Rainwater roof outlets;
- Rainwater downpipe outlets at ground level;
- Trapped gullies;
- Drainage channels;
- Permeable block paving;
- Below ground tanks;
- Pump sets;
- Green roof system.

The attenuation tank should be provided with inspection/cleaning access points.

Trapped gullies, flow control devices and catch-pits within the drainage network should be inspected and cleared of silt.

If regular excessive accumulation of silts and debris are found in surface water system a CCTV inspection of the attenuation tank(s) should be undertaken. Notwithstanding the above, a CCTV inspection of the tanks should be undertaken at least every five years.

Any debris obstructing or in danger of obstructing the surface water flow should be removed within a period not exceeding two weeks from inspection. Any blockage or partial blockages reported to the managing organisation should be removed within a period not exceeding two weeks.

The installation and future maintenance of the permeable block paving must be carried out in accordance with the appropriate supplier's/manufacturer's recommendations in order to remove silt from the open joints between the blocks. This may involve periodic sweeping/cleaning, jetting or clearing by suction by a specialist permeable paving contractor to maintain acceptable permeability through the road construction.

The site will be managed by Notting Hill Home Ownership Ltd for the lifetime of the development and, as a consequence, the drainage system will form part of their maintenance obligations.

A detailed maintenance schedule is included within Appendix G.

11 Conclusions

The site is located within a Flood Zone 1 area which is assessed as having less that a 1 in 1000 chance of river flooding in any one year.

The surface water flood maps indicate that there are limited areas on the existing site which have a medium and high risk of surface water flooding. However, when reviewing the topographical survey, these areas relate to a localised low spot which is trapped by a building.

The adjacent railway line, which is at a lower level than the site, is shown to be at a high risk of surface water flooding. However, due to the level difference, the site is considered not to be at risk from this type of flooding.

Other forms of flooding have been reviewed and are considered to be low.

Soakaways are currently used on the site, However, due to the thickness of the made ground, significant excavations would be required in order to get to the natural strata, which would as a result locate the base of the soakaway within or close to the ground water levels. In addition, there is a concern that the existing soakaways on site might be contributing to the flooding issues within the adjacent railway cutting. In light of this, soakaways are not considered appropriate for this site.

As there is no watercourse in the immediate vicinity of the site, it is proposed to discharge the surface water to the adjacent adopted surface water system. Due to site levels relative to the adopted sewer in Windmill Road, it will be necessary to provide a new pumped surface water system. Flows will be restricted to 5 l/s to avoid having a detrimental impact on the offsite sewers.

Surface water attenuation will be provided onsite to accommodate a 100-year event with a 40% allowance for climate change. This will be provided in below ground attenuation tanks located below Block 1.

A variety of SuDS features have been incorporated into the design which include a reduction in impermeable area, permeable paving to all external parking bays, green roofs to Block 1, rain gardens and water butts. These proposals will mitigate the risk of surface water ponding in the lower lying areas on site.

All surface water run-off will be attenuated and treated prior to discharging to the adopted sewer.

The development will result in an increase in foul water flows, however surface water which currently discharges into the foul system will be removed, which will more than offset the increase in foul flows.

The drainage system will be maintained for the lifetime of the development by Notting Hill Home Ownership Ltd.

With the implementation of the measures mentioned above the new development will provide a sustainable drainage system for the lifetime of the development and will not increase the likelihood of flooding both within and beyond the site boundary.

Appendix A - Location Plan

Site Location Plan

St Clare Business Park,
Holly Road,
Hampton Hill,
London Borough of
Richmond, TW12 1QF

Appendix B - Topographical Survey

Notes:
Electromagnetic and/or Ground Penetrating Radar techniques have been used to locate/map underground utilities and features on this drawing. Cadmap Ltd has made every endeavour to make sure that the information contained within this drawing is accurate and of the highest quality. Cadmap Ltd has used any record drawings provided by the client or by the Statutory Utility Providers, at the client's request, at the time of the survey. Any information taken from these drawings (e.g. pipe sizes and position) is not guaranteed. Historic record information is often incomplete and inaccurate and cannot be relied upon. Cadmap Ltd is not liable for any topographical survey that has not been undertaken by us. Any inaccuracies relating to topographical plans/development plans/Ordnance Survey data that we have no control over is the liability of the customer. Where quoted, depth information of underground services/features is stated. Depths are generally within +/10% accurate, but cannot be guaranteed. Any depths shown on drains are usually to invert (base of drainage channel) unless otherwise stated. At Cadmap Ltd we use skilled staff and modern, calibrated equipment to perform our surveys. However, the completeness of any underground survey cannot be 100% guaranteed and the results from these types of surveys are not infallible. If the location or depth of services/features is of particular importance to a project then it is strongly recommended that discussions are held with Cadmap Ltd regarding any possible limitations or anomalies. It is also strongly advised that trial excavations should be undertaken to confirm survey results. We cannot be held responsible for any inaccuracies beyond those that could be reasonably expected by a competent company.

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FLOODED, GAS, WATER, ELECTRIC & BT IN CHAMBER 1.7d. WATER LEAK IN CHAMBER AT TIME OF SURVEY

4" WATER PE - UTT ASSUMED FIRE MAIN

GAS 63Ø PE UTT

WATER 63Ø PE UTT

UTS AREA OVERGROWN & DEBRIS/EQUIPMENT IN AREA

CABLES ABOVE GROUND

UTR UNDER OBSTRUCTION

UTS OBSTRUCTIONS IN AREA

BLOCKED

SWIC 3 STAGE INTERCEPTOR IL14.27 PD1.30

SWIC SOAKAWAY CL14.97 IL12.87

SWIC SOAKAWAY CL14.88 IL13.23

SWIC SOAKAWAY CL15.12 IL13.62

SWIC SOAKAWAY CL15.37 IL14.35

SWIC 3 STAGE INTERCEPTOR IL13.88 PD2.19 NO INCOMING PIPES VISIBLE

SWIC SOAKAWAY CL15.30 IL13.83

SWIC SOAKAWAY CL15.14 IL13.12

SWIC SOAKAWAY CL14.68 IL12.93

SWIC 3 STAGE INTERCEPTOR IL13.78 PD7.05 OVERFLOW PIPE 0.80

SWIC SOAKAWAY CL14.70 IL12.85

SWIC - UTS SURCHARGED @ 0.68d

FWIC UTS SURCHARGED

FW UTS SURCHARGED WET WELL

FWIC CL15.80 IL13.02

FWIC CL16.02 IL13.79

FWIC CL15.71 IL14.76

FWIC CL16.48 IL14.83

FWIC CL16.49 IL12.19 SLAB 2.30d

FWIC CL16.40 IL14.90

FWIC CL16.31 IL15.61

FWIC CL16.37 IL14.62

FWIC CL16.42 IL15.50

FWIC CL16.46 IL15.35

FWIC CL16.44 IL15.27

FWIC 3.20d SLAB 0.80d

SWIC CL16.55 IL15.40

SWIC CL16.73 IL14.73

SWIC 1.03d SILTED

BTIC PD0.60

BTIC PD0.40

BTIC PD0.65

BTIC PD0.5

GAS OIL TANK 0.53d CAPACITY UNKNOWN REDUNDANT

DIESEL TANK 0.85d CAPACITY UNKNOWN, REDUNDANT

VENTS

BOILER ROOM REDUNDANT

ELECTRIC SUB-STATION

APPROX POSITION OF MH 0.29d

LOCKED CABINET (PUMP CONTROLS)

CUT OFF ELECTRIC - UTT

SOUND TESTED

UTL - ASSUMED FUEL TANK

WATER METER ABOVE GROUND POSSIBLY FED FROM GARAGE

BURIED FUEL TANK 0.45d. DISUSED

POSSIBLE FUEL PIPE

UNIDENTIFIED SERVICE CHAMBER CL16.15 IL15.00

LAMP HOLE CL16.13 IL14.63 HEAD OF RUN

ASSUMED LAMP HOLE - HEAD OF RUN TFR

RM - TFR NOT VISIBLE ON SITE

SOUNDTESTED CONNECTION

1. AREA SCANNED WITH EML & GPR, NO SERVICES LOCATED.
2. MULTIPLE PARKED VEHICLES. LIMITED ACCESS TO SCAN

WINDMILL ROAD

HOLLY ROAD

NOTES:
1. PLASTIC WATER & GAS UTT
2. FOUL DRAINAGE FROM UNITS SURCHARGED. PUMP IN PUMPING STATION WET WELL NOT WORKING.
3. ALL SURCHARGED DRAINS ASSUMED ROUTE.

ABBREVIATIONS (Land & Utilities)

AR	ASSUMED ROUTE	KO	KERB OUTLET	SIL	SIGNAL LOST
AV	AIR VALVE	Lby	LIFEBOUY	SP	SIGN POST
BB	BELISHA BEACON	Lok	LOCK GATE	SPil	SHEET PILING
BD	BACKDROP	Ldr	LADDER	Spr	SPRING
Bdl	BED LEVEL	LH	LAMP HOLE	SPt	SAMPLING POINT
BH	BOREHOLE	LP	LAMP POST	ST	STOP TAP
BHch	BASEMENT HATCH COVER	LV	LOW VOLTAGE	Sti	STILE
Bin	LITTER / GRIT SALT BIN	MgP	MOORING POST	Stl	STRUCTURE TOP LEVEL
BL	BASEMENT LIGHT	mH	METERS HIGH	Stp	STUMP (TREE)
Bol	BOLLARD	Mhcy	MACHINERY	StP	STAND PIPE
BP	BOUNDARY POST	MH	MANHOLE	StPo	STAY POST
BS	BUS STOP	Mkr	MARKER POST	StW	STAY WIRE
BTIC	BRITISH TELECOM CHAMBER	MkE	MARKER POST (ELECTRIC)	SV	STOP VALVE
Catl.	CATENARY LEVEL	MkG	MARKER POST (GAS)	SVP	SOIL VENT PIPE
CATV	CABLE TV COVER	MkR	MARKER POST (RAILWAY)	TBM	TEMPORARY BENCH MARK
CB	CONTROL BOX	MkT	MARKER POST (TELECOM)	TCB	TELEPHONE CALL BOX
CBH	CONVEYOR BELT	MkW	MARKER POST (WATER)	TEL	TELECOM CHAMBER COVER
CC	COAL CHUTE	MP	MILE POST	TFR	TAKEN FROM RECORDS
CGrd	CATTLE GRID	MS	MILE STONE	Th	THRESHOLD LEVEL
CNL	CHANNEL LEVEL	NL	NOT LOCATED	TL	TRAFFIC LIGHT
Chy	CHIMNEY	NP	NAME PLATE	TP	TELEGRAPH POLE
CI	CAST IRON	OSA	OUTSIDE SURVEY AREA	Tpt	TRIAL PIT
CL	COVER LEVEL	OSBM	O.S BENCH MARK	Tr	TROUGH
CO	CONCRETE	OGP	OVERGROUND PIPE	UTF	UNABLE TO FIND
CP	CABLE PIT	OHCu	O/H CABLE (UNIDENTIFIED)	UTGA	UNABLE TO GAIN ACCESS
CpL	COPING LEVEL	OHE	OVERHEAD CABLE (ELECTRIC)	UTL	UNABLE TO LIFT
Cpsn	CAPSTAN	OHG	OVERHEAD GANTRY	UTR	UNABLE TO ROD
Cpst	CAMERA POST	OHP	OVERHEAD PIPE	UTS	UNABLE TO SURVEY
CR	CABLE RISER	OHT	OVERHEAD CABLE (TELECOM)	UTT	UNABLE TO TRACE
CrL	CROWN LEVEL	OP	OUTLET PIPE	VC	VITREOUS CLAY
CulP	CULVERT PIPE	P	POST	VP	VENT PIPE
CWM	CABLE WINDING MACHINERY	Pb	PARK BENCH	VR	VAPOUR RECOVERY
d	DEPTH	PB	POST BOX	VS	VENTILATION SHAFT
Dia.	DIAMETER	PCsg	PEDESTRIAN CROSSING	VW	VALVE / SLUICE WHEEL
DS	DIRECTION SIGN	PE	POLYETHALINE	WB	WEIGHBRIDGE
EIC	ELECTRIC INSPECTION COVER	PF	PITCH FIBER	WL	WATER LEVEL
EoC	EDGE OF CANOPY	Pl	PILE	WM	WATER METER
EOR	END OF RECORDS	Pir	MOVEMENT DETECTOR	WO	WASH OUT VALVE
EOT	END OF TRACE	Pmd	PLANT MOTOR DRIVE	Wr	WEIR
EP	ELECTRICITY POLE	PP	PETROL / DIESEL PUMP	WrL	WEIR LEVEL
ER	EARTH ROD	PR	PIPE RISER	WrPl	WEIR PLATE (TOP)
ESHw	EMERGENCY SHOWER	Pstk	PENSTOCK	WWP	WASTE WATER PIPE
ESP	ELECTRICITY SUPPLY POINT	PU	PUMP		
Esw	ELECTRICAL SWITCH	PV	PIPE (VERTICAL)	FENCE TYPES:	
FB	FOOTBRIDGE	PVC	POLYVINYL CHLORIDE	AMF	ARMCO
FH	FIRE HYDRANT	Pyl	PYLON	BWF	BARBED WIRE
FL	FLOOR LEVEL	Pz	PIEZOMETER	CBF	CLOSE BOARDED
FS	FLAG STAFF / POLE	RE	RODDING EYE	CIF	CORRUGATED IRON
G	GULLY	RG	RAIN GAUGE	CLF	CHAIN LINK
G+	GIRTH	RMP	RESERVOIR MONITORING PNT	CPF	CHESTNUT PALING
GIP	GAS INLET PIPE	RP	REFLECTOR POST	IRF	IRON RAILING
GP	GUIDE POST	RS	ROAD SIGN	IWF	INTERWOVEN
GPR	TRACED BY G.P.R	RSP	RAILWAY SIGNAL POST	PCF	POST & CHAIN
Grl	GRILLE	RWP	RAIN WATER PIPE	PIF	POST & IRON RAIL
GV	GAS VALVE	S	SPREAD	PRF	POST & RAIL
Hgt	HEIGHT	SA	SURVEY ABANDONED	PWF	POST & WIRE
Hrl	HANDRAIL	SB	SIGN BOARD	SPF	STEEL PALLISADE
HV	HIGH VOLTAGE	Shlt	SHELTER (BUS / TRAM)	WMF	WIRE MESH
IC	INSPECTION CHAMBER	SI	SPUN IRON		
IL	INVERT LEVEL	SL	SOFFIT LEVEL		
IP	INLET PIPE	SltL	SILT LEVEL (TOP)		
JN	JUNCTION	SMP	SETTLEMENT MONITORING PNT		

KEY

- TV — CCTV / CABLE TELEVISION
- 450 — COMBINED DRAINAGE
- COM — COMMUNICATIONS CABLE
- A — COMPRESSED AIR
- DUCTING
- E — EARTH CABLE
- ELECTRIC CABLE
- EOT — END OF TRACE
- 150 — FOUL DRAINAGE
- F — FUEL PIPE
- GAS PIPE
- G — GAUGE LINE
- H — HEATING
- O — OFFSET FILL PIPE
- PUMPING MAIN
- R — RADAR AREA ANOMALY
- R — RADAR UTILITY TRACE
- 300 — SURFACE DRAINAGE
- SURVEY BOUNDARY
- TELECOM CABLE
- TL — TRAFFIC LIGHTS
- U — UNIDENTIFIED
- VR — VAPOUR RECOVERY
- V — VENT PIPE
- WATER PIPE
- O.S BENCH MARK
- SURVEY CONTROL STATION

North: Levels are in metres

Grid: By Others

Levelling:

Drawing Title:
Underground Utility Survey
Sheet 1 of 2

Site Address:
St. Clares Business Park
Hampton Hill
TW12 1QF

Client:
Point 2 Surveyors Limited

Surveyor	AJO	Drawn By	AS	Verified By	SC	Date	02.01.18

CM No: CMU/17564 | Rev:

Scale: 1:200m @ A0 | Date: January 2018

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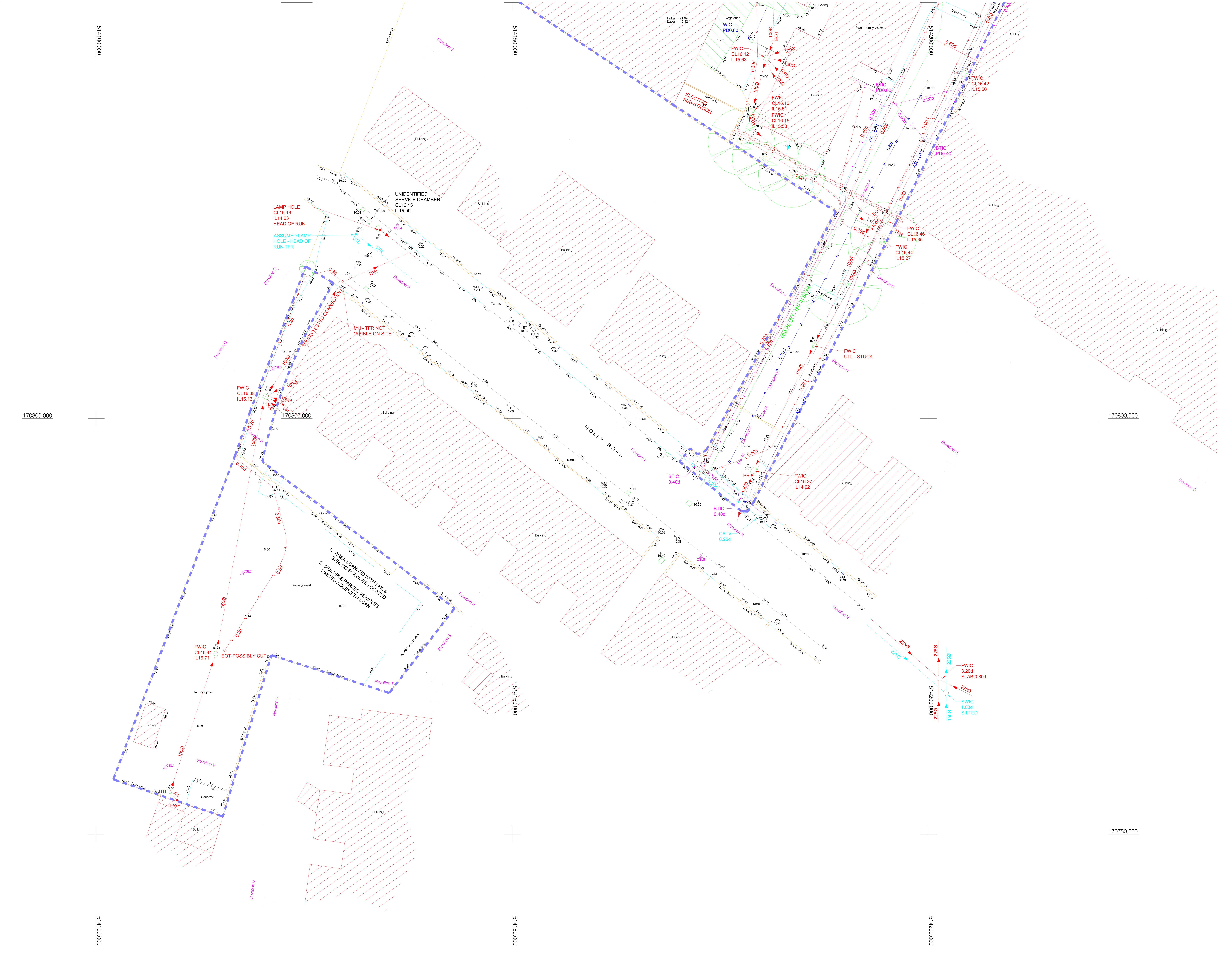

Notes:
Electromagnetic and/or Ground Penetrating Radar techniques have been used to locate/map underground utilities and features on this drawing. Cadmap Ltd has made every endeavour to make sure that the information contained within this drawing is accurate and of the highest quality. Cadmap Ltd has used any record drawings provided by the client or by the Statutory Utility Providers, at the client's request, at the time of the survey. Any information taken from these drawings (e.g. pipe sizes and position) is not guaranteed. Historic record information is often incomplete and inaccurate and cannot be relied upon. Cadmap Ltd is not liable for any topographical survey that has not been undertaken by us. Any inaccuracies relating to topographical plans/development plans/Ordnance Survey data that we have no control over is the liability of the customer. Where quoted, depth information of underground services/features is stated. Depths are generally within +/10% accurate, but cannot be guaranteed. Any depths shown on drains are usually to invert (base of drainage channel) unless otherwise stated. At Cadmap Ltd we use skilled staff and modern, calibrated equipment to perform our surveys. However, the completeness of any underground survey cannot be 100% guaranteed and the results from these types of surveys are not infallible. If the location or depth of services/features is of particular importance to a project then it is strongly recommended that discussions are held with Cadmap Ltd regarding any possible limitations or anomalies. It is also strongly advised that trial excavations should be undertaken to confirm survey results. We cannot be held responsible for any inaccuracies beyond those that could be reasonably expected by a competent company.

ABBREVIATIONS (Land & Utilities)

AR	ASSUMED ROUTE	KO	KERB OUTLET	SiL	SIGNAL LOST
AV	AIR VALVE	Lby	LIFEBOUY	SP	SIGN POST
BB	BELISHA BEACON	Lck	LOCK GATE	SPil	SHEET PILING
BD	BACKDROP	Ldr	LADDER	Spr	SPRING
Bdl	BED LEVEL	LH	LAMP HOLE	SPt	SAMPLING POINT
BH	BOREHOLE	LP	LAMP POST	ST	STOP TAP
BHch	BASEMENT HATCH COVER	LV	LOW VOLTAGE	Sti	STILE
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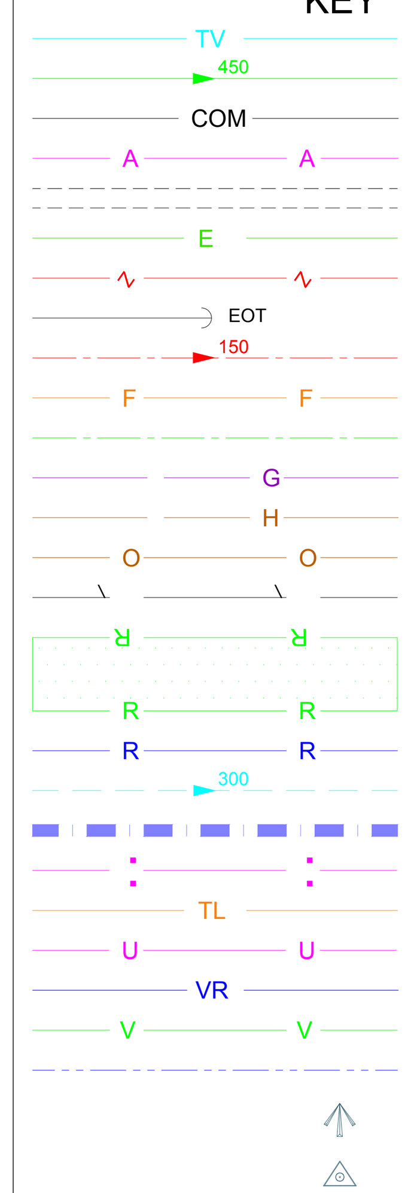
IP	INLET PIPE	SltL	SILT LEVEL (TOP)		
JN	JUNCTION	SMP	SETTLEMENT MONITORING PNT		

KEY



- CCTV / CABLE TELEVISION
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North:

Grid: By Others

Levelling:

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Underground Utility Survey
Sheet 2 of 2

Site Address:
St. Clares Business Park
Hampton Hill
TW12 1QF

Client:
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Surveyor	AJO	Drawn By	AS	Verified By	SC	Date	02.01.18

CM No: CMU/17564
Rev:
Scale: 1:200m @ A1
Date: January 2018

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Appendix C - Thames Water Sewer Records

The width of the displayed area is 500m

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

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
0909	n/a	n/a
0910	n/a	n/a
19ZS	n/a	n/a
19ZR	n/a	n/a
1907	16.4	11.89
29YZ	n/a	n/a
09ZV	n/a	n/a
09XV	n/a	n/a
09YS	n/a	n/a
08ZW	n/a	n/a
09XT	n/a	n/a
09YW	n/a	n/a
08ZX	n/a	n/a
09YX	n/a	n/a
1903	n/a	n/a
1904	15.73	10.49
19ZV	n/a	n/a
19ZW	n/a	n/a
19ZX	n/a	n/a
291I	n/a	n/a
291D	n/a	n/a
291E	n/a	n/a
291J	n/a	n/a
291K	n/a	n/a
29YQ	n/a	n/a
29YX	n/a	n/a
291B	n/a	n/a
291C	n/a	n/a
28ZT	n/a	n/a
29YW	n/a	n/a
291A	n/a	n/a
28ZW	n/a	n/a
28ZX	n/a	n/a
2801	16.67	13.01
17XP	n/a	n/a
17WS	n/a	n/a
17VZ	n/a	n/a
17VX	n/a	n/a
17VY	n/a	n/a
17VW	n/a	n/a
17ZX	n/a	n/a
27YS	n/a	n/a
27YR	n/a	n/a
27YW	n/a	n/a
27ZS	n/a	n/a
27ZT	n/a	n/a
27YV	n/a	n/a
27ZV	n/a	n/a
271A	n/a	n/a
27YY	n/a	n/a
27ZX	n/a	n/a
?7ZY	n/a	n/a
2702	16.6	13.51
2704	16.61	15.7
2703	16.66	15.75
27ZR	n/a	n/a
2701	16.53	13.54
27ZQ	n/a	n/a
28ZR	n/a	n/a
27ZP	n/a	n/a
2803	16.76	15.7
0702	n/a	n/a
171B	n/a	n/a
17VV	n/a	n/a
18ZY	n/a	n/a
17YQ	n/a	n/a
17YR	n/a	n/a
17YS	n/a	n/a
17YT	n/a	n/a
17WP	n/a	n/a
17YV	n/a	n/a
18ZX	n/a	n/a
17WQ	n/a	n/a
17WR	n/a	n/a
17YP	n/a	n/a
17XY	n/a	n/a
18ZV	n/a	n/a
17XW	n/a	n/a
17ZR	n/a	n/a
17XV	n/a	n/a
17XT	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
17WX	n/a	n/a
17WV	n/a	n/a
17XS	n/a	n/a
17ZS	n/a	n/a
17WZ	n/a	n/a
17XR	n/a	n/a
1702	16.38	15.33
09YT	n/a	n/a
0801	15.84	14.14
0803	15.79	15.02
07ZY	n/a	n/a
17VT	n/a	n/a
28ZY	n/a	n/a
2802	16.76	14.58
28ZV	n/a	n/a
291F	n/a	n/a
391A	n/a	n/a
3801	16.67	15.56
39XY	n/a	n/a
39XZ	n/a	n/a
29ZV	n/a	n/a
29YR	n/a	n/a
29ZW	n/a	n/a
291G	n/a	n/a
29ZY	n/a	n/a
291H	n/a	n/a
29ZP	n/a	n/a

Sewer Key - Commercial Drainage and Water Enquiry

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

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

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

Weir

End Items

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

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

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

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

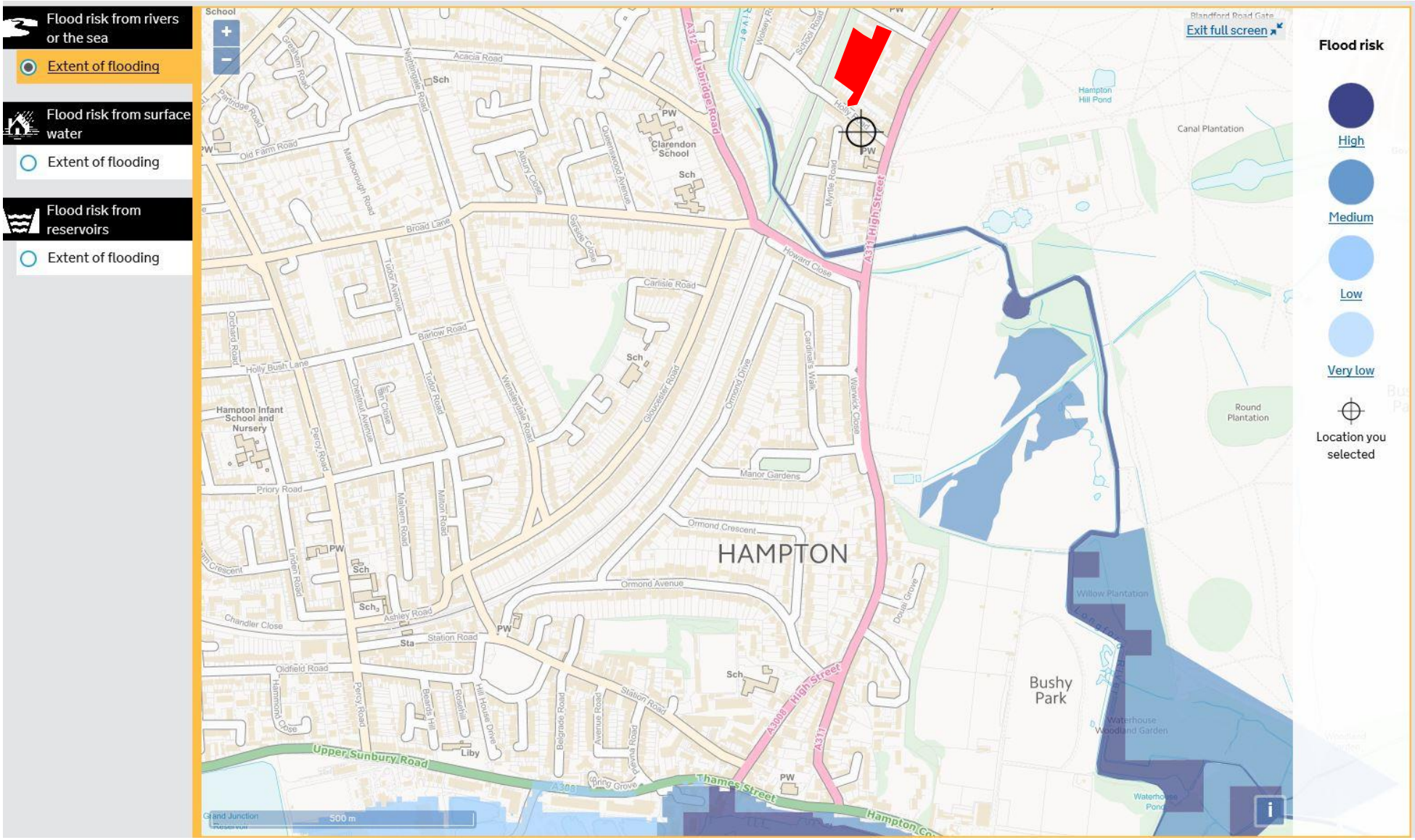
Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0118 925 1504.

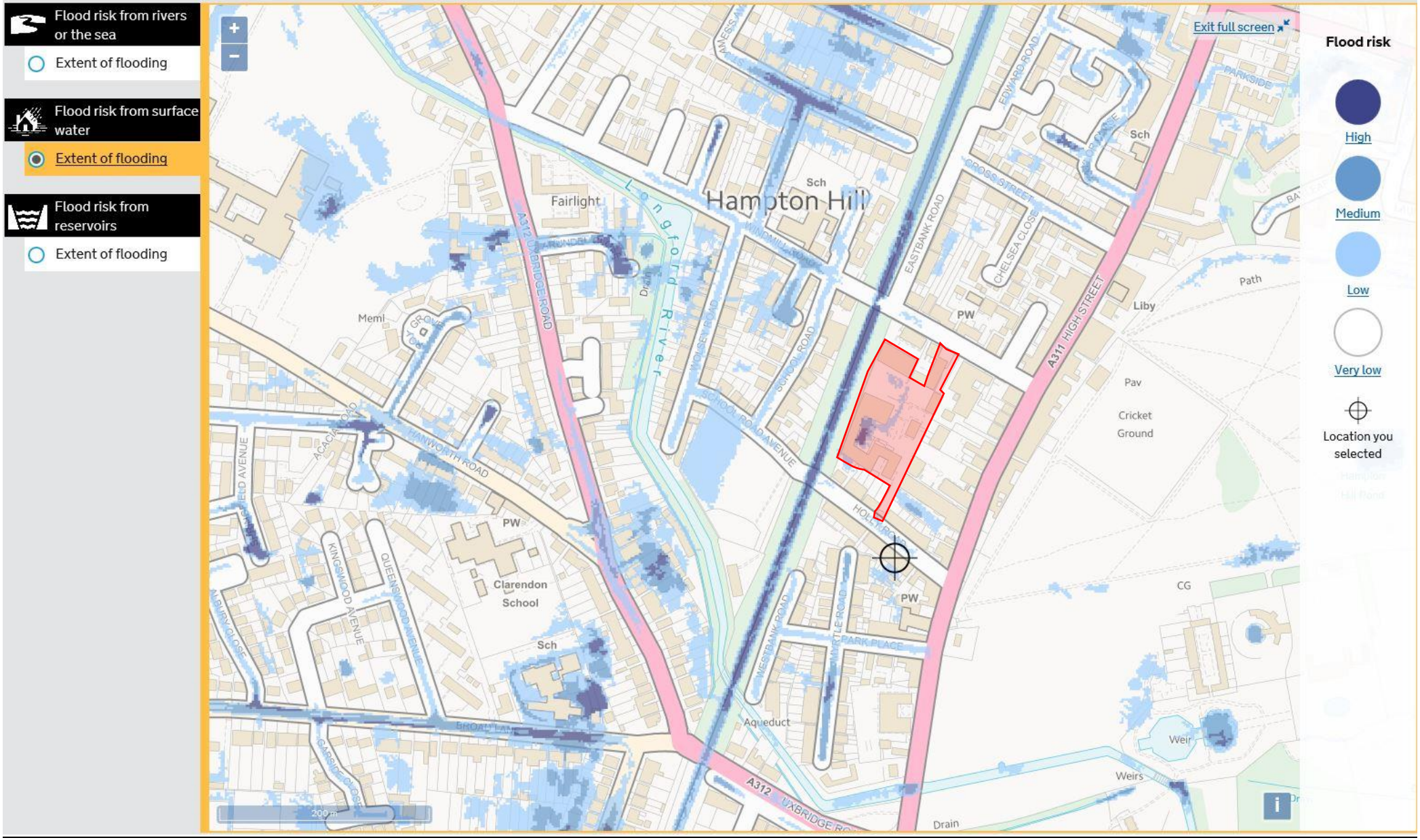
Appendix D - Flood Risk Maps

Flood Risk Map – Rivers and Sea

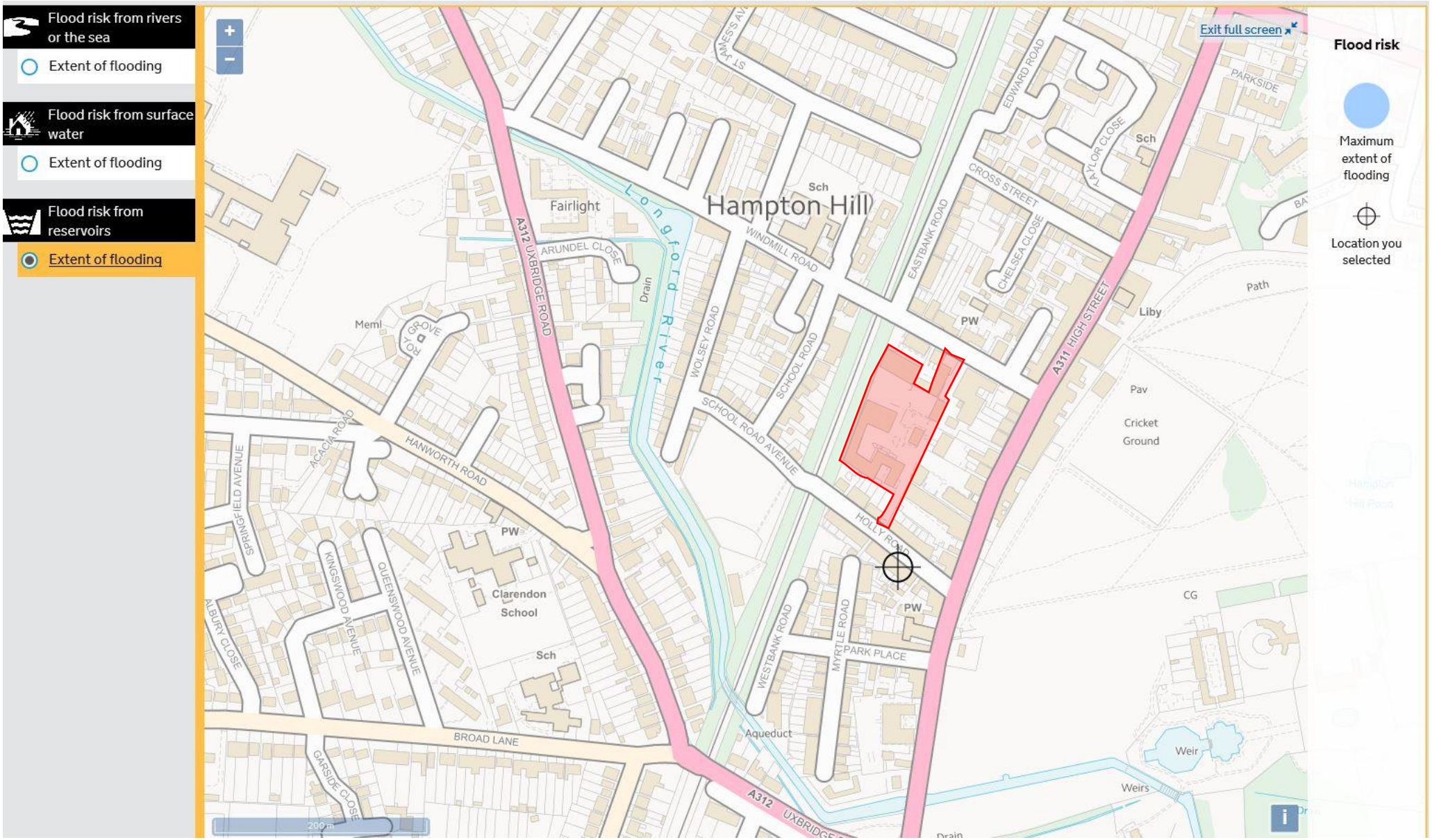
St Clare Business Park,
Holly Road,
Hampton Hill,
London Borough of Richmond, TW12 1QF

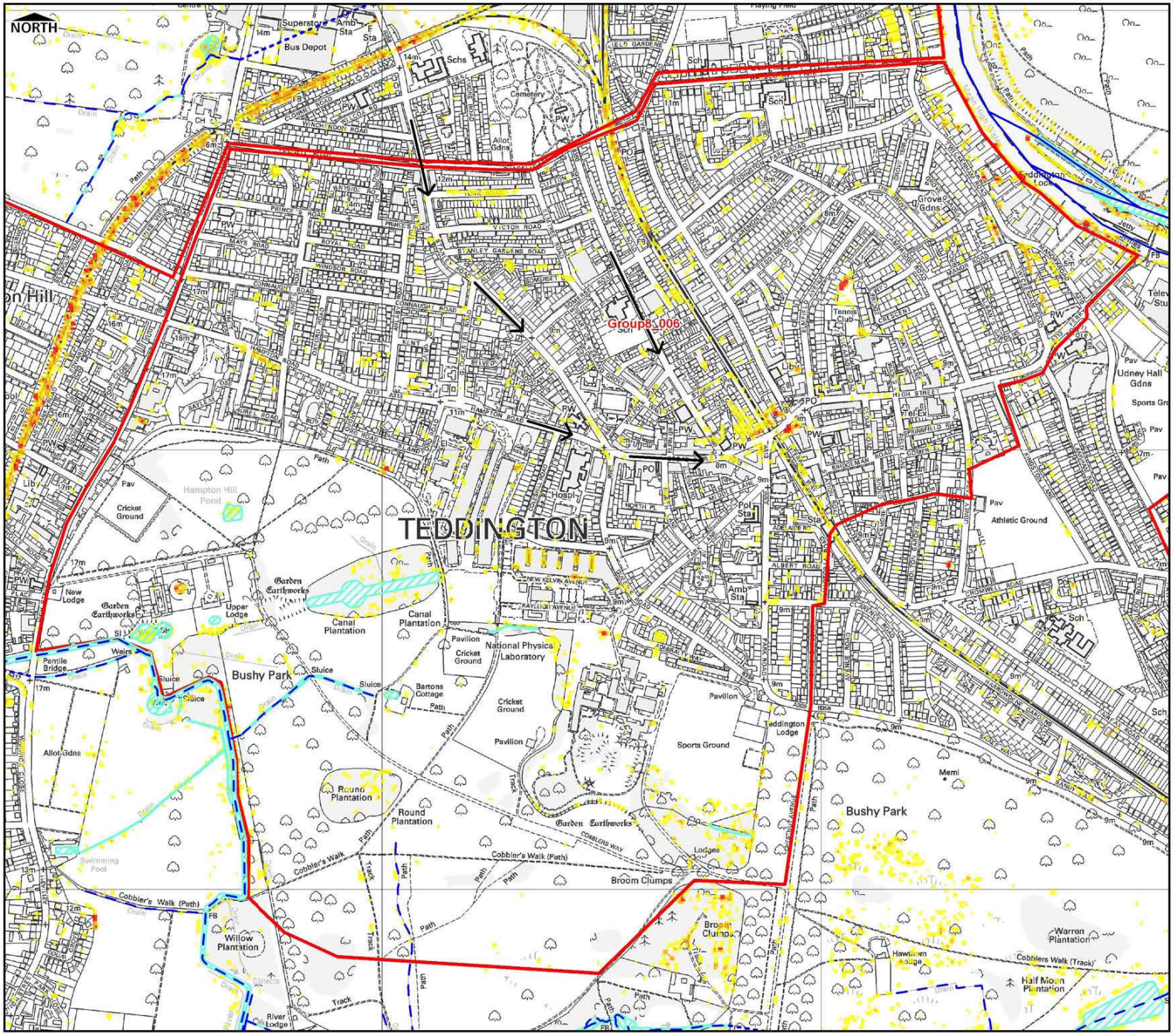


Flood Risk Map – Surface Water



Flood Risk Map – Reservoir





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)

→ Flow Direction Arrows

Notes

1. Flood Hazard has been defined based upon the joint EA and Defra 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)
3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

London Borough of Richmond upon Thames

LONDON BOROUGH OF RICHMOND UPON THAMES

Surface Water Management Plan

Scale at A3	Date	Drawn by	Approved by
1:9,000	20/07/11	A.HARRIS	J.ROBINSON

Group8_006 (Teddington)
Surface Water Flood Hazard Rating
1 in 100 Chance of rainfall event occuring in any given year (1% AEP)

Consultants
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London
SW1P 1PL

Drain London Programme Board Members

Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

FIGURE 3.8.6b

Filepath: N:\Current Projects\D134785 D134786 DRAIN LONDON Tier 2\02 Group 8 (D134786)\05 GIS