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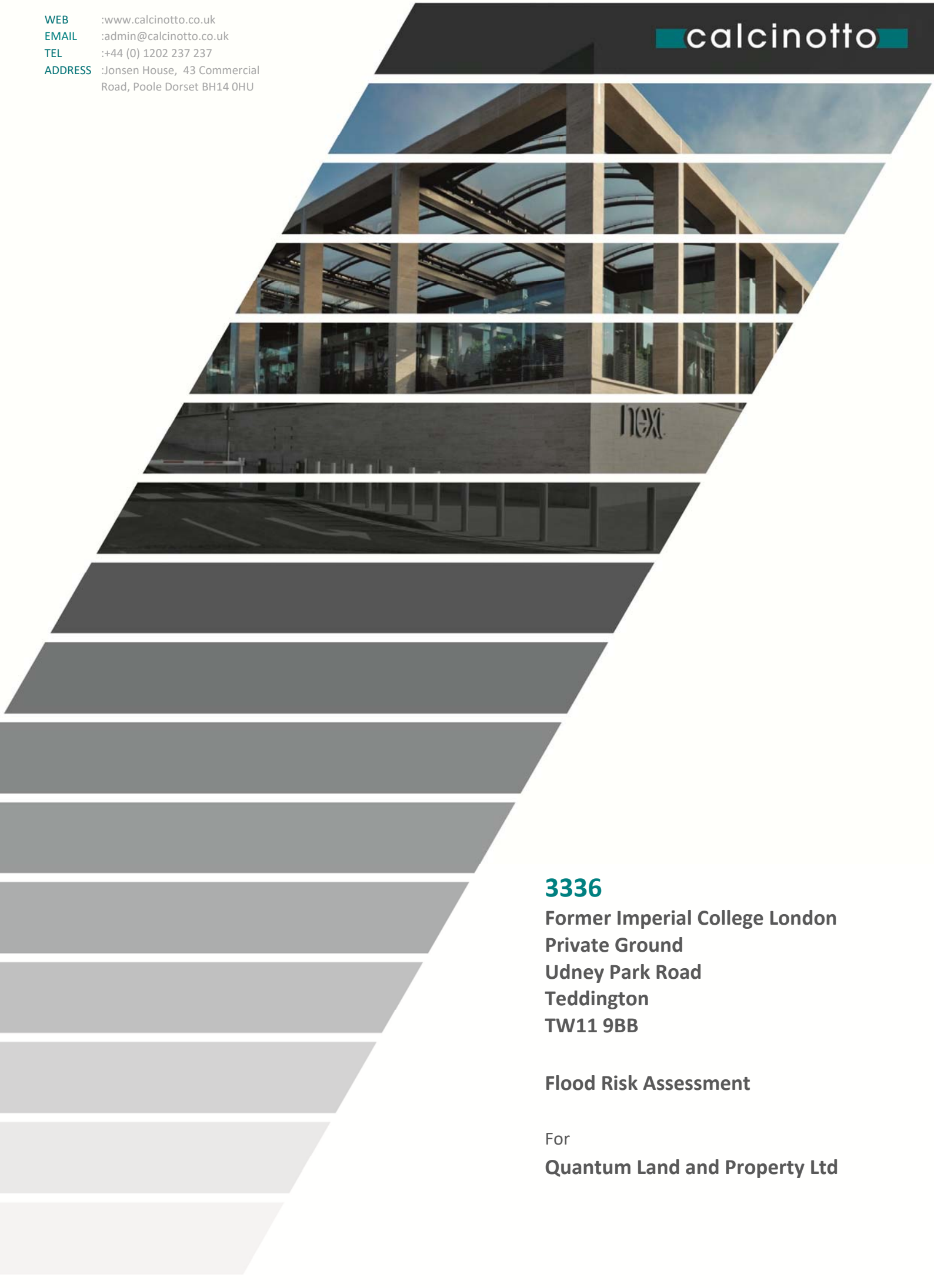

3336

Former Imperial College London
Private Ground
Udney Park Road
Teddington
TW11 9BB

Flood Risk Assessment

For

Quantum Land and Property Ltd

REPORT REFERENCE

3336/CIV/1707/02

PROJECT NUMBER

3336

PROJECT TITLE

Former ICL Private Ground, Udney Park Road, Teddington

CLIENT

Quantum Land and Property Ltd

Issue No:	1		
Prepared By:	Gerry Bird/Paul Westcott *Senior Civils Engineer*		
Date:	June/ July 2017		
Checked By:	Paul Westcott *Senior Civils Engineer*		
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Issue Status	Draft		

CONTENTS

Appendices

1 Executive Summary

Calcinotto have been appointed to prepare a Drainage Strategy Statement for drainage proposals in connection with the development of the former ICL Private ground site off Udney Park Road, Teddington, in the London Borough Upon Thames, the nearest postcode is TW11 9BB.

The proposed scheme will see the former Imperial College London Private Ground on Udney Park Road, Teddington, London, TW11 9BB, regenerated for a mixed-use development that will deliver high-quality sports and community facilities, alongside new public open space and affordable, care led accommodation for Older People and a new GP Surgery. This triple approach secures a sustainable, inclusive future for the site, the benefits of which underpin national and local planning policy.

With the creation of the Teddington Community Sports Ground Community Interest Company, three areas will be established:

1. Assisted living, extra care community with new GP Surgery;
2. Open parkland with community Orchard and outdoor gym;
3. Community sports facilities.

The proposed community sports facilities will comprise of the following: -

- A full-size Third Generation artificial grass pitch (3G AGP)
- Natural grass playing pitch provision
- Tennis Courts / MUGA
- Community pavilion containing changing rooms, kitchen, bar and server, flexible-use community rooms and crèche

An application for a pre-development enquiry has been made to Thames Water regarding the capacity of the public sewers outside of the site in the surrounding roads of Kingston Lane, Cromwell Road and Udney Park Road. Thames Water have responded confirming there is a capacity to accept foul flows from the development in the public system.

Any surface water flows from the site into the public system can only be equivalent to the greenfield run-off rate based on 5 l/s/ha.

The initial surface water proposals include specifying various sustainable drainage techniques to help manage surface water run-off on site prior to a controlled discharge into the public surface water sewers off-site in 3 principle locations of Kingston Lane, Cromwell Road and Udney Park Road to suit the various elements of the development.

The principles around the surface water strategy will be to specify various sustainable drainage techniques to help manage as far as possible the surface water run off on the site combined with controlled discharges at various points in to the off-site public system to minimise the risk to on site and off site flooding.

In accordance with the National Planning Policy Framework March 2012 document (NPPF), climate change is to be included in the design of the surface water drainage systems for the site. The drainage strategy will include a review of a climate change allowance of 20 – 40% in peak rainfall intensity as recommended in current guidelines.

The proposed development is classified in the NPPF from Table 2 Flood Risk Vulnerability Classification as 'more vulnerable' and from Table 3 Flood Risk Vulnerability and Flood Zone Compatibility as appropriate at this location in Zone 1.

The assessment shows that the proposals for the development can be accommodated with minimal risk of flooding to the development site and with no increase in risk of flooding to adjacent properties. The development is also not at any increased risk of flooding from other sources of flooding referenced in the report.

A fairly detailed preliminary surface water drainage strategy is proposed within the report which will be enhanced in greater detail post planning consent. Planning should therefore not be withheld on Flood Risk or drainage strategy ground.

2 Introduction

2.1 Brief

Calcinotto has been appointed by Quantum Land and Property to prepare a Flood Risk Assessment in support of a Planning Application for the proposed redevelopment of the Imperial College London Private Ground site off Udney Park Road, Teddington.

2.1.1

The site is private land classified as Other Land of Townscape Importance with only 1 building on it which was used as the Club House facility.

2.1.2

The site lies within Flood Zone 1 Low Risk as classified by the Environment Agency on their website.

2.1.3

Further details on flood related issues and an outline to the proposed drainage strategy are described in more detail within this report.

2.2 Report Structure

2.2.1

This report has been produced to support a Planning Application for redevelopment of the new mixed development incorporating Extra Care Community, GP Surgery and Leisure facilities. The report is to follow and comply with the planning policy described in Section 3.0. The existing site is described in terms of existing infrastructure, topography, geology, hydrology and hydrogeology in Section 4.0. The scope of this Flood Risk Assessment is defined in Section 5.0. Sources of existing and proposed Flood Risk is discussed in Section 6.0. A detailed description of the development proposals and drainage strategy is provided in Section 7.0. Flood Risk Management measures and Residual Risk is discussed in Sections 8.0 and 9.0.

2.3 Limitations

2.3.1

This report has been prepared for exclusive use by Quantum Land and Property for the purpose of assisting them in evaluating the potential risk of flooding and drainage strategy options for the site. Calcinotto accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Calcinotto. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole.

2.3.2

Calcinotto has endeavoured to assess all information provided to them during this appraisal. The report summarises information from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

2.3.3

The comment on the Flood Risk element of the report addresses the flood risk posed to and from the proposed development. The extent of development is shown by the Architects drawings in Appendix A and outlined in Section 7.2. This report has been undertaken with the assumption that the site will be developed generally in accordance with the above proposals without significant changes. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

2.3.4

A full Ground Investigation has not been carried out at this stage. This exercise will be procured for Post Planning Consent. A Desk Study has been undertaken by Ruddlesdon Geotechnical and recorded in the document Preliminary Geotechnical and Contamination Assessment Report dated October 2016. A linked Soakaway Test Investigation has been undertaken by Ruddlesdon Geotechnical and recorded in the document 'Soakaway Test Report' dated October 2016.

2.3.5

A topographic survey undertaken by LDS Surveys has been used as a basis for identifying existing site topography, proposed levels and where provided an indication of existing drainage infrastructure. This has been partly enhanced by information gained from Thames Water, as part of an assets search for the area.

3 Planning Policy

3.1 National Planning Policy

3.1.1

The National Planning Policy Framework (NPPF) and its associated Technical Guidance, published in March 2012 clearly identifies flood risk as a specific material consideration in the Planning process and in the allocation and release of sites for development or re-development.

3.1.2

The NPPF replaces previous guidance and policy set out in PPS 25: Development and Flood Risk, however the technical criteria for Flood Risk Assessments remain largely unchanged. The Framework seeks to strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. Through the Framework Local Planning Authorities will continue to use their powers to guide, regulate and control development in relation to flooding and flood risk. The NPPF places a presumption in favour of sustainable development whilst meeting the challenge of climate change, flooding and coastal change. In accordance with Tables 1, 2 and 3 of the Technical Guidance, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk through application of the Sequential Test.

3.1.3

The Water Resources Act 1991 (section 105) also requires the Environment Agency to exercise a general supervision over all flood defence matters, including flood plains and wetlands which accommodate waters during periods of flood. In discharging their functions, the Agency from time to time carries out surveys and flood studies, largely of 'main rivers' within its jurisdiction.

3.1.4

A section 105 Study involves the Agency topographically surveying the subject watercourse (or parts of it) and obtaining details if the flow mechanics within the watercourse. This data then enables them to generate a hydraulic computer model for the watercourse. From this hydraulic model the EA are able to define the approximate extent of fluvial floodplain associated with the 1 in 200 year (0.5% annual probability) flooding event.

3.1.5

The extents of the modelled floodplain are then provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood-susceptible areas. If development is proposed in a flood-susceptible area, or in an area where there is a history of flooding, the EA, as a statutory consultee in the planning process, will generally recommend that the risk of flooding be formally assessed, in accordance with the National Planning Policy Framework, and that a Flood Risk Assessment report be produced to support the Planning Application. The broader modelled flood extents are also indicated on the EA's Flood Zone Maps, available through their website.

3.2 Local Planning Policy

3.2.1

The London Borough of Richmond Upon Thames Planning Policy (LBORUT) is confirmed in a hierarchy of policy and guidance documents from the national to the local level, all of which are used to guide and manage development in the Borough of Richmond.

At the time of compiling this report LBORUT were in the process of preparing a new Local Plan to replace the existing policies within the Core Strategy (2009) and Development Management Plan 2011.

3.2.2

The Development Management Plan (DMP) includes the detailed policies which are used when new developments are considered. Within the DMP there are 3 policies which specifically related to Flood Risk and Drainage, these are:-

Policy DM SD 6 – Flood Risk

Policy DM SD 7 – Sustainable Drainage

Policy DM SD 10 – Water and Sewerage Provision

3.2.3

The essential individual wording for each policy is given below as taken from the DMP. There is additional descriptive to accompany the main policy wording but this has not been included.

Policy DM SD 6

Flood Risk

Development will be guided to areas of lower risk by applying the Sequential Test as set out in paragraph 3.1.35. Unacceptable developments and land uses will be restricted in line with PPS25 and as outlined below. Developments and Flood Risk Assessments must consider all sources of flooding and the likely impacts of climate change.

Where a Flood Risk Assessment is required and in addition to the Environment Agency's normal floodplain compensation requirement, attenuation areas to alleviate fluvial and/or surface water flooding must be considered where there is an opportunity. The onus is on the applicant/developer for proposals on sites of 10 dwellings or 1000sqm of non-residential development or more to provide evidence and justification if attenuation areas cannot be used.

In areas at risk of flooding, all proposals on sites of 10 dwellings or 1000sqm of non-residential development or more are required to submit a Flood Warning and Evacuation Plan.

	Land uses (refer to PPS25) and developments – restrictions	**Sequential Test**	**Exception Test**	**Flood Risk Assessment**
Zone 3b	The functional floodplain as identified in the Borough's Strategic Flood Risk Assessment will be protected by not permitting any form of development on undeveloped sites unless it: • is for water-compatible development; • is for essential utility infrastructure which has to be located in a flood risk area and no alternative locations are available and it can be demonstrated that the development would be safe, without increasing flood risk elsewhere and where possible would reduce flood risk overall. Redevelopment of existing developed sites will only be supported if there is no land use intensification and a net flood risk reduction; the restoration of the functional floodplain to its original function will be supported. Proposals for the change of use or conversion to a use with a higher vulnerability classification will not be permitted. Basements, basement extensions, conversions of basements to a higher vulnerability classification or self-contained units will not be permitted.	Required for essential utility infrastructure	Required for essential utility infrastructure	Required for all development proposals

Zone 3a	Land uses are restricted to water compatible, less and more vulnerable development. Highly vulnerable developments will not be permitted. Self-contained residential basements and bedrooms at basement level will not be permitted. All basements, basement extensions and basement conversions must have internal access to a higher floor and flood resistant and resilient design techniques must be adopted.	Required for all developments unless exceptions outlined in the justification apply	Required for more vulnerable development	Required for all development proposals
Zone 2	No land use restrictions Self-contained residential basements and bedrooms at basement level will not be permitted. All basements, basement extensions and basement conversions must have internal access to a higher floor and flood resistant and resilient design techniques must be adopted.	Required for all developments unless exceptions outlined in the justification apply	Required for highly vulnerable development	Required for all development proposals unless for change of use from water compatible to less vulnerable
Zone 1	No land use restrictions	Not applicable	Not applicable	Required for sites greater than 1 ha Required for all other development proposals where there is evidence of a risk from other sources of flooding, including surface water, ground water and sewer flooding.

Policy DM SD 7

Sustainable Drainage

All development proposals are required to follow the drainage hierarchy (see below) when disposing of surface water and must utilise Sustainable Drainage Systems (SuDS) wherever practical. Any discharge should be reduced to greenfield run-off rates wherever feasible.

When discharging surface water to a public sewer, developers will be required to provide evidence that capacity exists in the public sewerage network to serve their development.

Policy DM SD 10

Water and Sewerage Provision

New development will need to ensure that there is adequate water supply, surface water, foul drainage and sewerage treatment capacity to serve the development.

Planning permission will only be granted for developments which increase the demand for off-site service infrastructure where:

1. sufficient capacity already exists, or
2. extra capacity can be provided in time to serve the development, which will ensure that the environment and the amenities of local residents are not adversely affected.

Developers will be required to provide evidence that capacity exists in the public sewerage and water supply network to serve their development.

Any new water supply, sewerage or waste water treatment infrastructure must be in place prior to occupation of the development. Financial contributions may be required for new developments towards the provision of, or improvements to such infrastructure.

3.3 Strategic Flood Risk Assessment

3.3.1

Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy for the Authority area. The LDD's undergo a Sustainability Appraisal Planning Authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRAs should be used in the review or production of LDDS.

3.3.2

To assist Local Planning Authorities in their strategic land-use planning, SFRAs should present sufficient information to enable Local Authorities to apply the Sequential Test to their proposed development sites: "*LPA's should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate polices for flood risk management for these areas*"

3.3.3

The London Borough of Richmond Upon Thames Strategic Flood Risk Assessment was updated in March 2016. The report was completed by Metis Consultants. This report was the latest update from the last 2010 SFRA. The report was updated to reflect a number of changes legislative documentation nationally and locally which also reflected updated guidance for national and local assessments of Flood Risk, Management and Mapping. SFRA's are produced for the Administrative Boundary of the Local Planning Authority to aid support to the preparation of the Local Development Frameworks in accordance with Government Guidance and the advice of the Environment Agency within the existing flood risk areas or where development could increase run-off affecting existing flood plains and vulnerable land.

3.4 Sequential Test

3.4.1

The Sequential Approach is outlined in the NPPF and aims to ensure preference is given to development of land within Flood Zone 1 prior to Zones 2 and 3. It also ensures that flood vulnerability of the development proposals is taken into consideration when locating development in Flood Zones 2 and 3.

3.4.2

Where the Sequential Approach shows that it is not possible to locate development in zones of lower flood risk due to other wider sustainability issues; it may be possible to justify, using the Exception Test, that development is still feasible by the management of flood risk.

3.4.3

Tables 2 and 3 of the NPPF Technical Guidance defines when the Exception Test is applicable.

3.4.4

This site is shown to be in the Environment Agency Flood Zone 1.

3.4.5

From Table 2 within NPPF this type of development is classified as 'More Vulnerable'.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception test required	✓	✓
	Zone 3a	Exception test required	✓	x	Exception test required	✓
	Zone 3b Functional Floodplain		✓	x	x	x

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

NPPF Table 2: Flood Risk Vulnerability and Flood Zone 'Compatibility'

In accordance with Table 2 above from the NPPF Technical Guidance document the development is appropriate for this flood zone.

3.4.6

Section 13 of Technical Guide to NPPF (March 2012) requires that climate change be taken into consideration when considering flood risk. Table 3 in that document has now been superseded by new guidance in a document Flood Risk Assessments: Climate Change Allowances issued in February 2016 which is detailed in the Table below.

For the South West of England the allowances to be made are as follows:

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2119
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 3: Peak Rainfall Intensity allowance in small and urban Catchments (Use 1961 to 1990 baseline)

These allowances are to be taken into account when designing for SUDS and drainage systems for the new development.

3.4.7

In accordance with Table 2 above 'More Vulnerable' developments are appropriate in Flood Zone 1, hence, the Sequential Test and Exception Test are not required.

4 Site

4.1 Site Location

4.1.1

The site is located in the town of Teddington. The site has boundary features are as follows:

North	-	Fullerton Court/residential
East	-	Kingston Lane
South	-	Cromwell Road
West	-	Udney park Road

The nearest registered postcode for the site is TW11 9BB

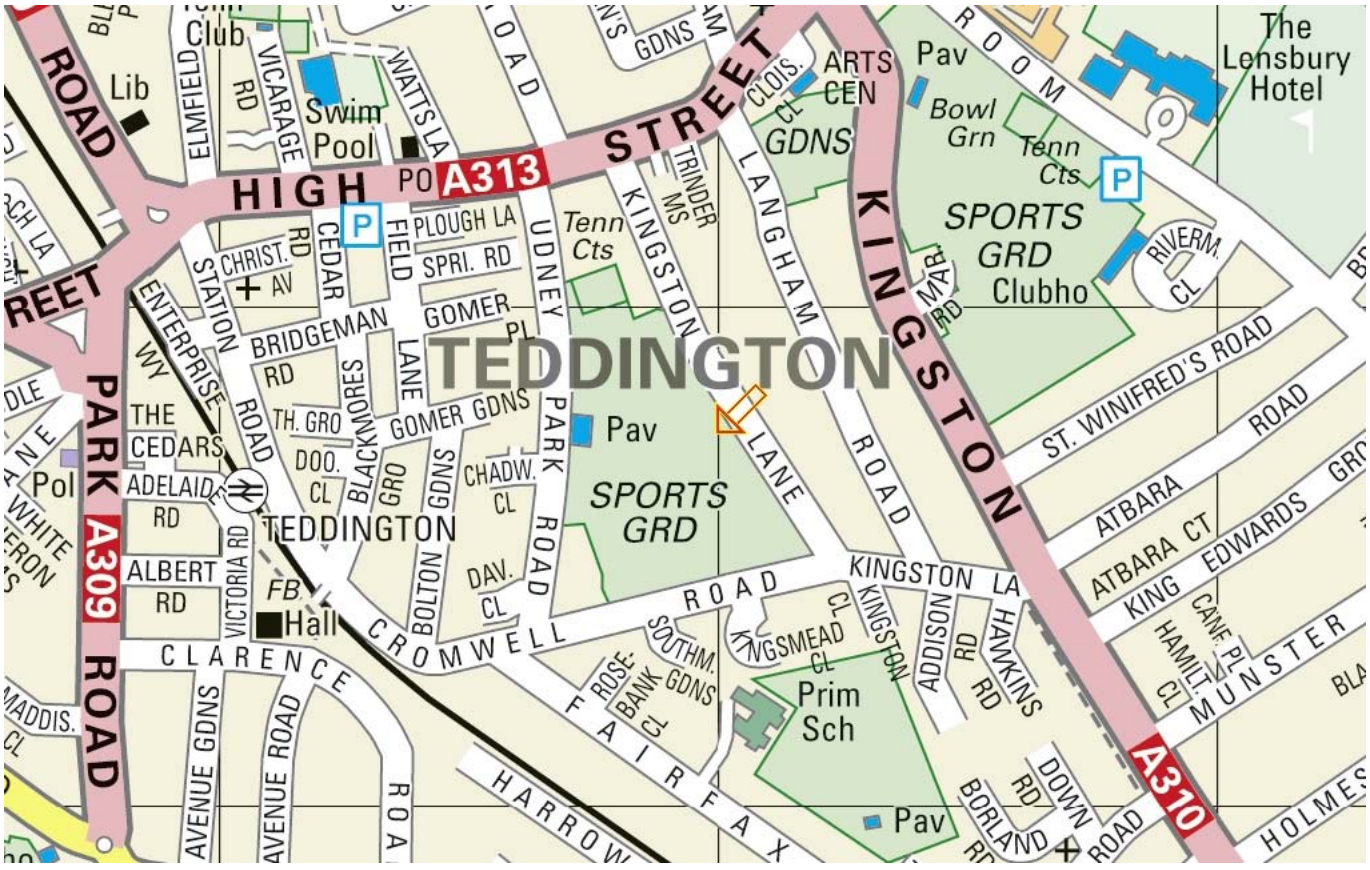


Figure 1: Location of the Proposed Development Site Plan 1

Figure 2: **Location of the Proposed Development Site Plan 2**

4.1.2 Existing Site

A previous use for the main part of the site was as playing fields.

4.2 Site Description

The site has a total area of approximately 5.2ha and has one building on the western boundary as offices, leisure use and flats. The remainder of the site is open space used for recreational purposes. Site National Grid Reference TQ 16437 70857 (E – 516437, N – 170857)

General Characteristics:

Current Use: Open Playing Fields

Area: approx. 5.2ha (Imp area = 12.8ha)

Topography: Site surveyed in December 2015 by LDS Surveys. The levels vary from a high of 10 to a low of 8.4. A typical level across the centre of the site is 9.1.

Surfacing: Majority is greenfield with only a small amount of impermeable area associated with the Old Club House building.

4.3 Geology and Hydrology

4.3.1

Inspection of the British Geological Society Mapping system suggests the principle ground conditions will be as follows:-

Superficial Deposits - Kempton Park Gravel Formation – Sand and Gravel. See figure 3 below.

Bedrock Deposits - London Clay Formation – Clay and Silt. See figure 4 below.

It is anticipated there is a certain amount of made ground sitting over the gravel deposits which will consist of clay, silt, sand and gravel.

4.3.2

A full Geotechnical Investigation has not yet been carried out, however, a 'Preliminary Geotechnical and Contamination Assessment Report dated October 2016' ref.AC/JW/SR/16325/PGCAR by Ruddlesdon Geotechnical has been provided. There were no intrusive investigations undertaken as part of this exercise which is primarily a 'Desk Study' review of the site.

A published historical BGS borehole record carried out approximately 15m to the south of the site, which is considered to be the most characteristic of the ground conditions likely to be present at this site, encountered the following conditions:

- MADE GROUND, to depth of 0.60m, underlain by,
- Interbedded sandy clay and gravel, to a depth of 6.70m, underlain by,
- Brown and blue clay, to the termination of the borehole at around 42.0m depth
- Groundwater was not encountered

See figure 5 below.

A soakaway test investigation undertaken on site by Ruddlesdon Geotechnical Ltd in September 2016 (report ref: AC/JW/SR/16325/PGCAR) reported the following salient points:

- Three trial pits were excavated to depths between 2.40mand 2.60m below existing ground level in the northern third of the playing fields (area of proposed development)
- Topsoil was encountered to depths of between 0.20m and 0.3m underlain by made ground, predominantly comprising sandy gravelly silt and gravelly sand to depths of between 0.65 and 1.20m.
- The made ground was underlain by slightly clayey silty sand and gravel (Kempton Park Gravel Formation) to the base of the trial pits to depths of 2.40m and 2.60m

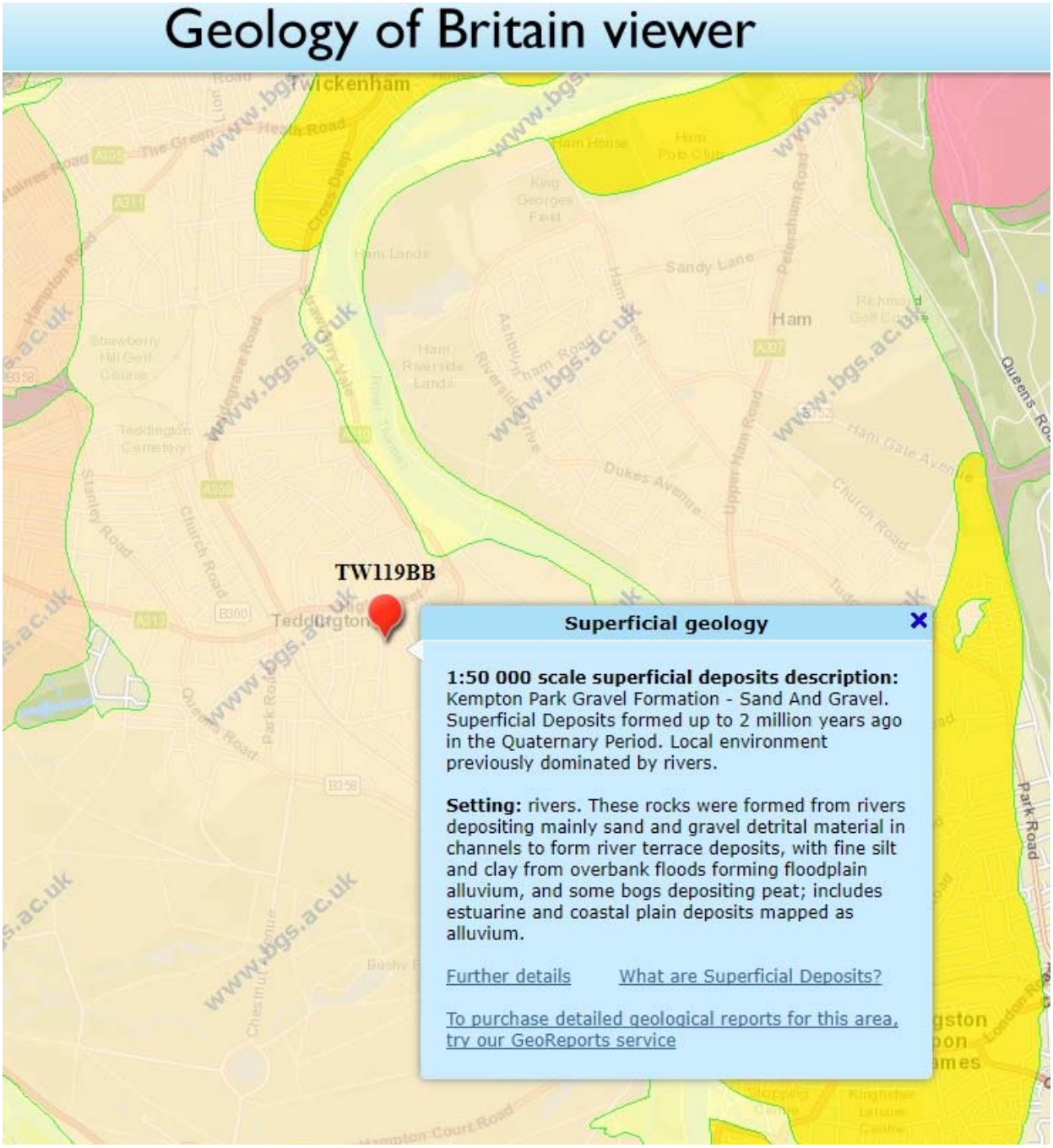


Figure 3: Superficial Deposits Geology

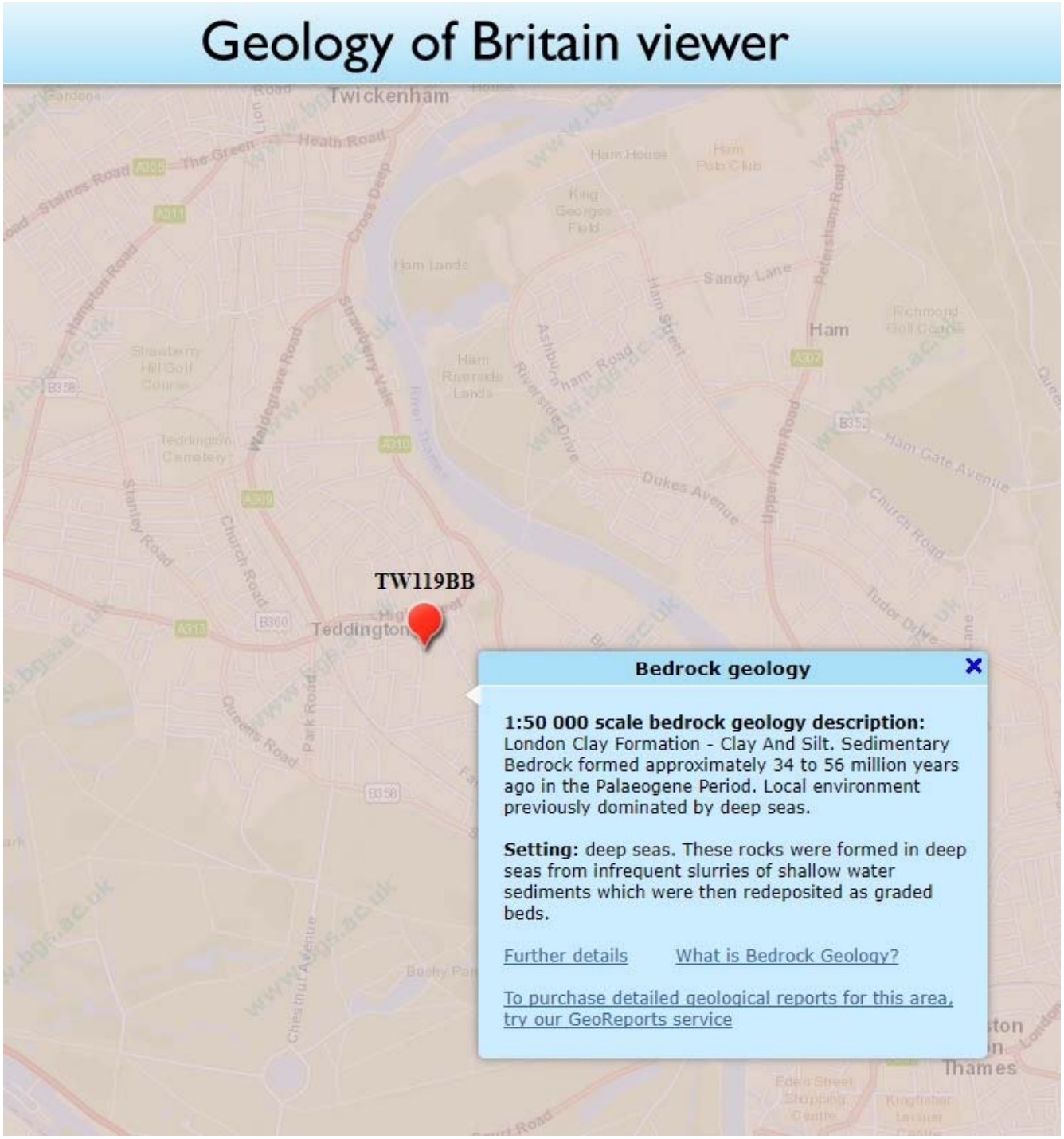


Figure 4: Bedrock Geology

5 Borehole Records Map

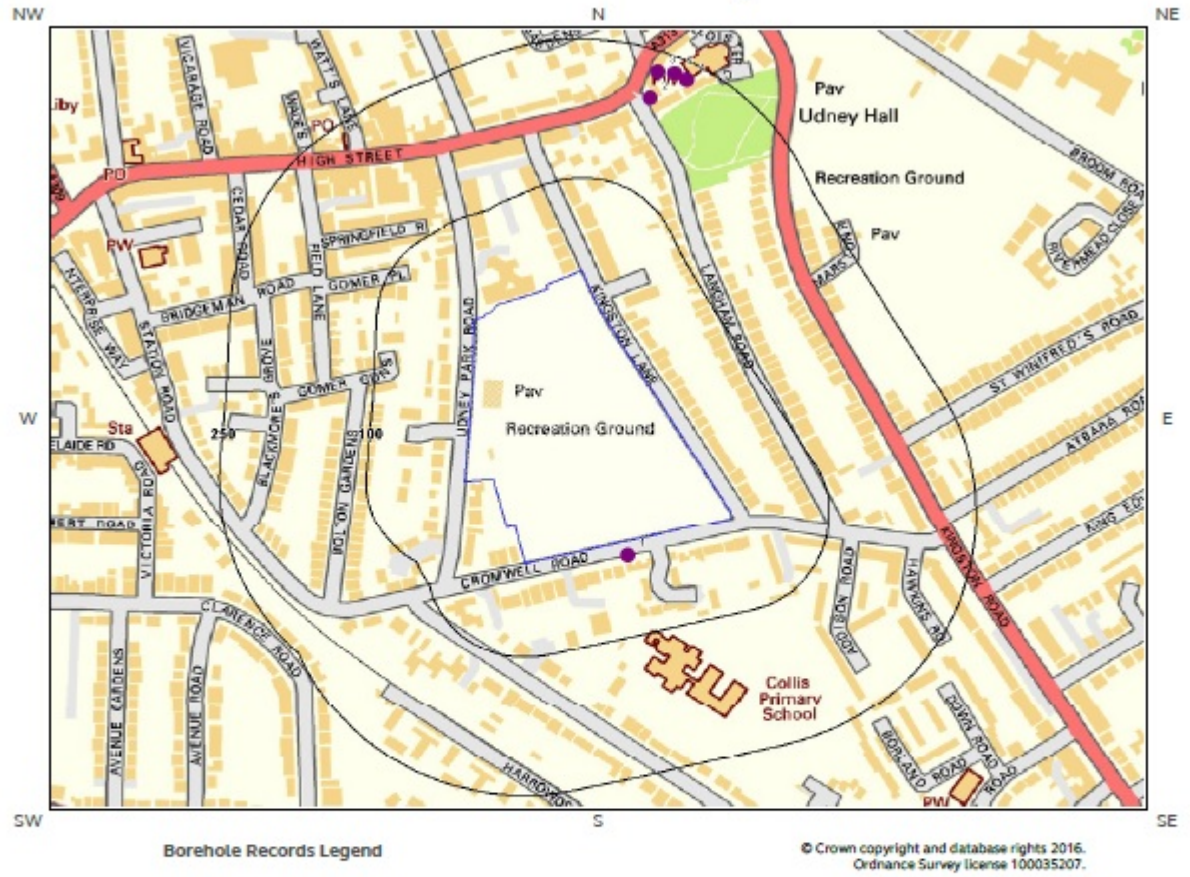


Figure 5: Borehole Records Plan

4.3.3

Other Key points from the Environment Agency Mapping site and text, places the site in the following relating to Hydrogeology and Hydrology of the site for Superficial and Bedrock designation.

- Site principally lies within a designated Principle Aquifer within Superficial Geology. See figure 6 below.

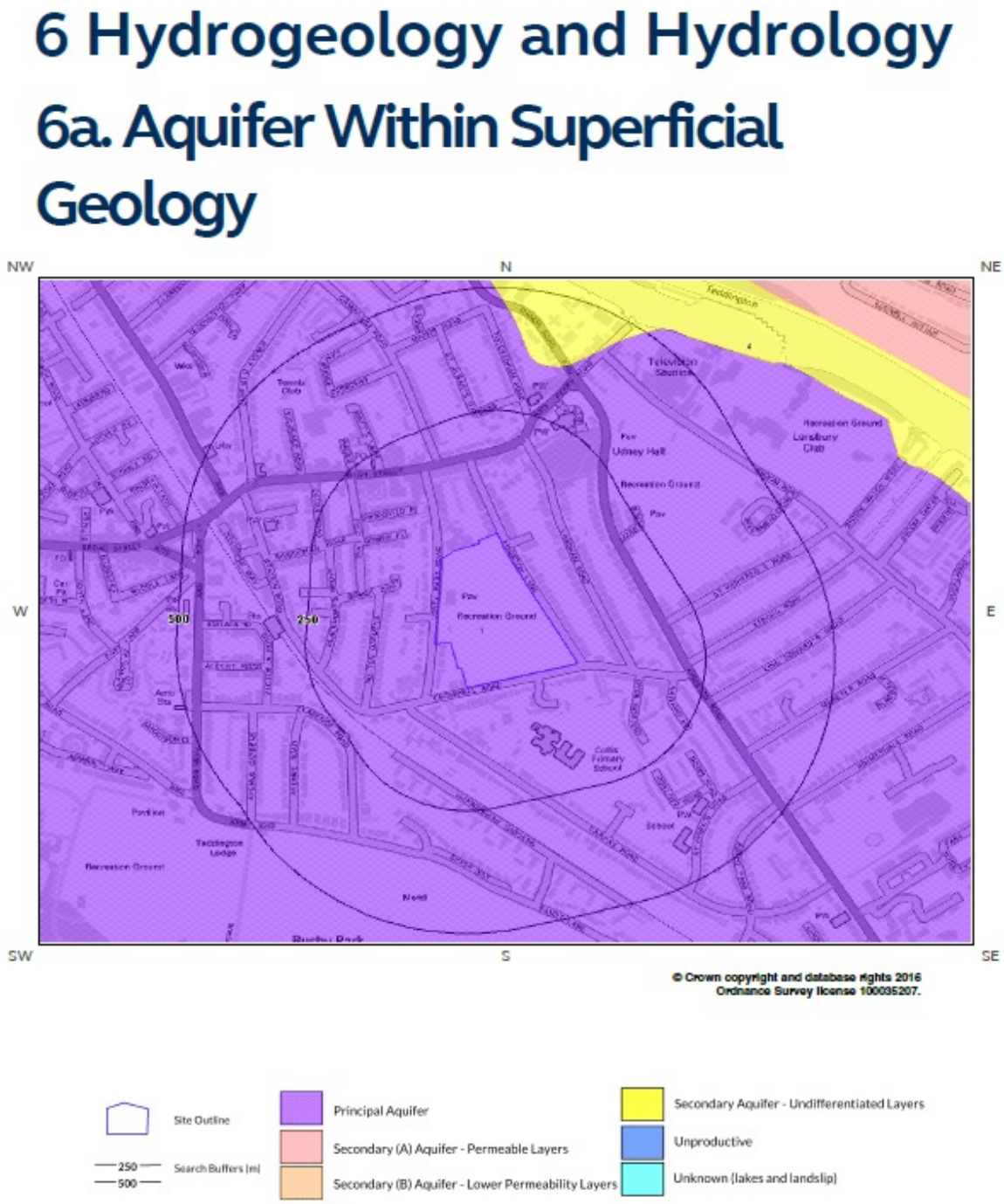


Figure 6: BGS Aquifer – Superficial Deposits

- Site lies within a designated unproductive Acquifer within Bedrock Geology (permeable layers). See Figure 7 below.

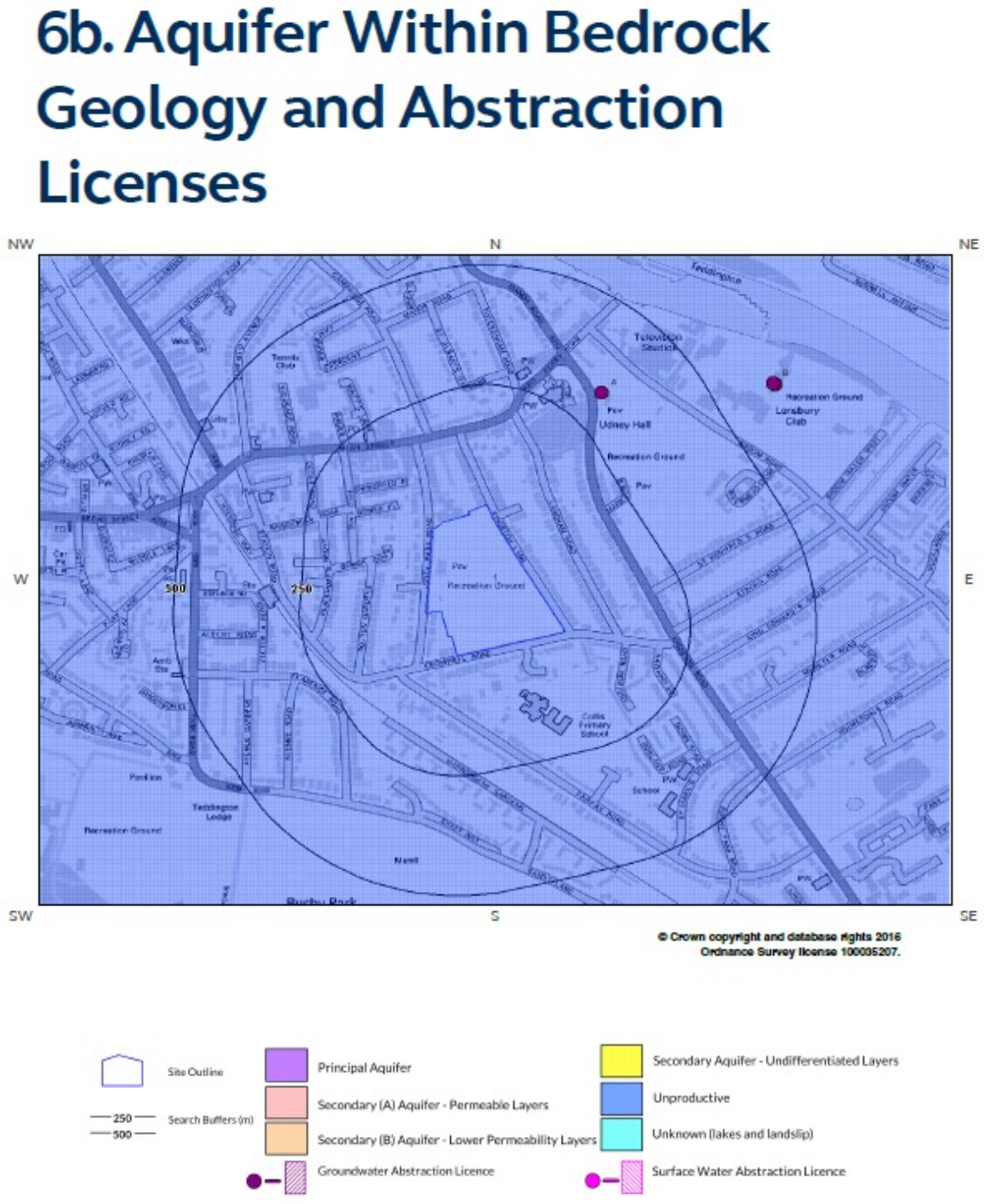


Figure 7: BGS Acquifer – Bedrock Deposits

- The site is not within a high risk Flood Plain. Further consideration and comment on the risk or consequence of flooding is made within sections 4.5 and 6.0.
- The site does not lie within a Groundwater Source Protection Zone
- There are 5 no. Groundwater abstraction licences within 2000m of the site

- There are 2 no. Surface Water abstraction licences within 2000m of the site
- There are no potable water abstraction licenses within 2000m of the site
- There are no Source Protection Zones within 500m of the study site
- The nearest water feature is the River Thames which is over 700m from the site to the east
- There are no other surface water features within 250m of the study site
- Site is located within a surface water Safeguard Zone as shown in figure 8 below

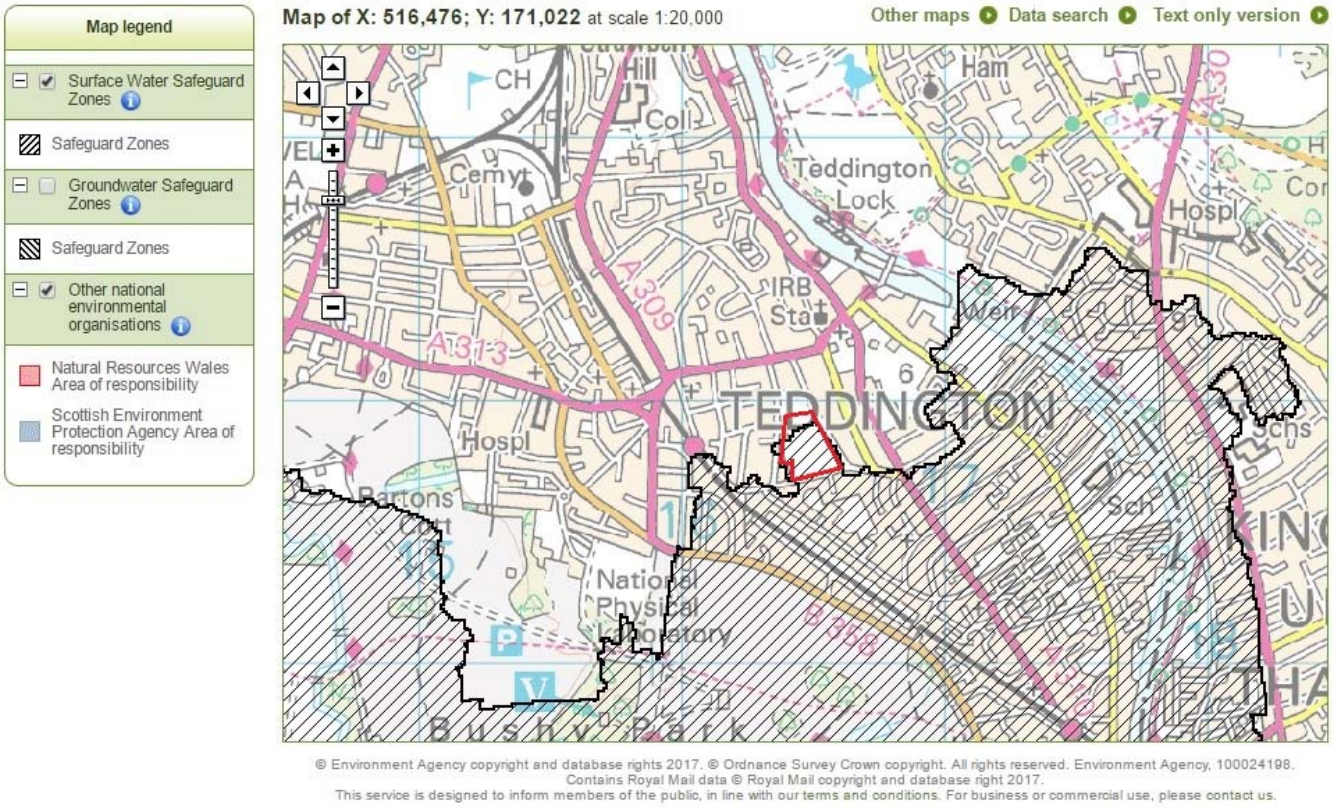


Figure 8: Surface Water Safeguard Zone

4.4 Historic Flood Records

4.4.1

The London Borough of Richmond Upon Thames as the Lead Local Flood Authority (LLFA) has in the past commissioned and prepared three important reports as listed below to help inform them on surface water issues within the Borough:

Report 1 – Local Flood Risk Management Strategy

Report 2 – Preliminary Flood Risk Assessment 2011

Report 3 – Strategic Flood Risk Assessment 2010

Report 4 – Surface Water Management Plan 2011

4.4.2

Within the PFRA 2011 Table 4-1 records 'Part Floods and Consequences' data. Neither the development or the roads immediately around the boundary of the site are referenced as having an issue with flooding.

4.4.3

Within the Surface Water Management Plan report figure 1, the development site is designated as not being in a critical drainage area. See copy of Plan in Appendix D.

4.4.4

Within the Strategic Flood Risk Assessment the sewer flooding incidents (from DG5 data ref.) are recorded in Figure 1. The development site is within TW119 which is identified in an area of 1-5 flooding incidents. See copy of figure in Appendix D.

4.4.5

Figure 1 in the Local Flood Risk Management Study report also confirms there are no historic flooding incidents in the immediate area of the development. See figure in Appendix D.

4.5 Flood Mapping

Inspection of the Environment Agency Flood Maps has confirmed the site is located in Flood Zone 1 (low risk). Flood Zone 1 is assessed as having less than 1 in 1000 (0.1%) annual probability of ever flooding form Fluvial and Tidal sources. See figure 9 below.

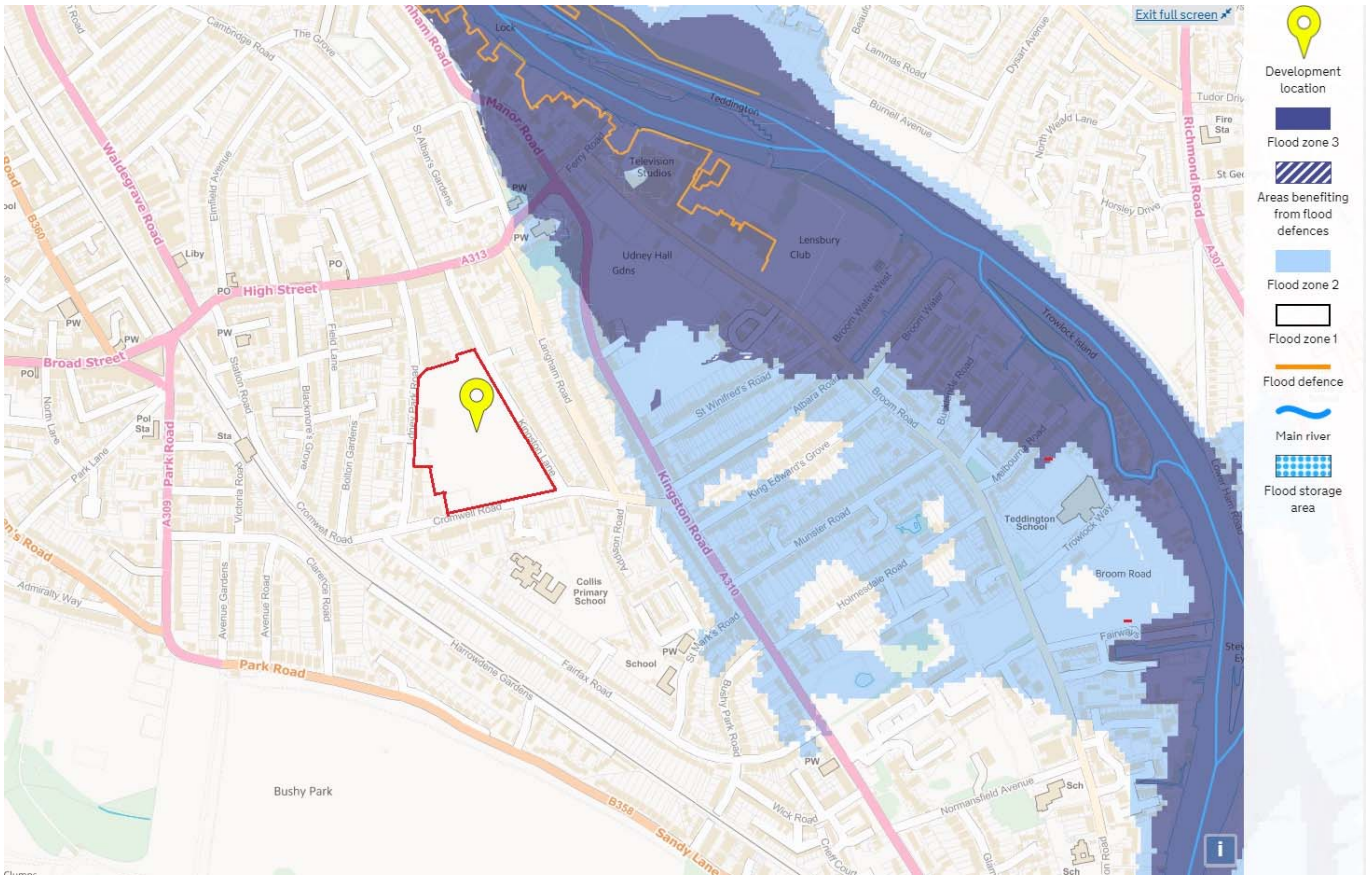


Figure 9 – Extract from EA Flood Mapping

The Strategic Flood Risk Assessment SFRA confirms this site is in Flood Zone 1.

Figure 10 below from the Environment Agency mapping highlights there is a risk of surface water flooding occurring in two lower lying areas on site.

Both of these areas are outside of any planned new buildings and as such are presented in existing low lying areas of the field.

See figure 10 below.

This consequence is also represented in places within the Surface Water Management Plan Report.

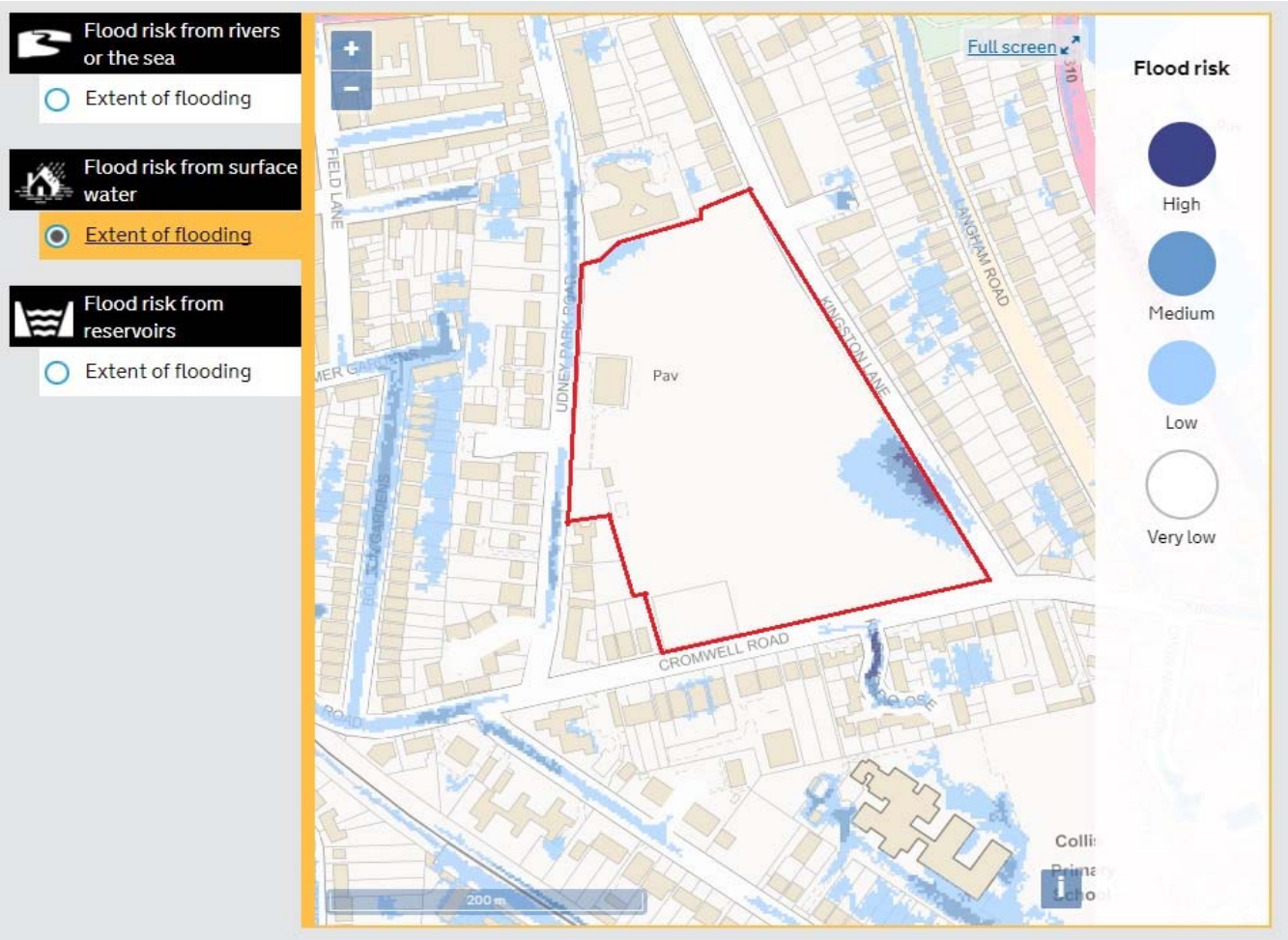


Figure 10: Extract from EA Surface Water Flooding Mapping

4.6 Existing Off Site Public Drainage

Thames Water records indicate the presence of public foul and surface water sewers within the surrounding roads of Kingston Lane, Cromwell Road and Udney Park Road. A copy of the public sewer records received through a statutory assets search by the client is in Appendix B. The chamber schedule for the area is not comprehensive in details for cover and invert levels for manholes.

Kingston Lane has 225mm diam foul and surface water sewers. The surface water system appears to break its back part way along the length of site to flow north and south.

Cromwell Road across the southern boundary of the site has two foul sewers and a surface water sewer. One foul is 762mm diam and the other 450 mm diam. The former runs east to west and latter west to east. The surface water is 225mm diameter and again appears to break its back around Kingsmead Close junction.

Udney Park Road alongside the western boundary has a 225mm diam foul sewer and a 300mm diam surface water. Both pipelines appear to be running northwards.

Also noted on the Water Supply plan is the 102 inch Thames Lee Tunnel which cuts across the site from south west to east direction. No depth information was supplied on the records.

5 Scope of Flood Risk Assessment

5.1 Scope of Flood Risk Assessment

5.1.1

The detail and complexity of a Flood Risk Assessment should reflect the level of the risk to the site. Environment Agency Flood Risk Standing Advice (FRSA), available online, indicates the general requirements of a Flood Risk Assessment and provides that Flood Risk Assessment should:

- Be proportionate to the risk and appropriate to the scale, nature and location of the site;
- Consider the risk of flooding arising from development in addition to the risk of flooding to the site;
- Take the impacts of climate change into account;
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
- Consider the vulnerability of those that could occupy and use the site, taking account of the Sequential and Exception Tests and the vulnerability classification (see national Planning Policy Framework Guidance), including arrangements for safe access;
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions to be made;
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- Include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems;
- Be supported by appropriate data and information, including historical information on previous events.

6 Sources of Flooding

6.1 Fluvial Flooding from Inland Watercourses and Tidal Influences

The existing flood risk to the site is referenced in Section 4.5 above. It is shown that the development site is located in Flood Zone 1 – Low Risk. Therefore, the risk of flooding form these sources is deemed very low.

6.2 Flooding from Groundwater

The British Geological Website designates the area in which the development is sited as being within 50m of ground susceptible to groundwater flooding from superficial deposits, and the highest potential for this is at the surface. The confidence rating for this result is 'Moderate'.

Within the surface water management plan figure 3 'Increased Potential for Elevated Groundwater' places the development site in the area for increased potential for elevated groundwater in permeable superficial deposits.

Figure E from the Strategic Flood Risk Assessment 2016 records the development to be within an area of 'Potential for Groundwater Flooding to occur at the Surfaces' from the BGS mapping system.

Also on the Historic Flooding Map Figure 1 within Appendix D the nearest groundwater flooding incident recording is to the south of site in the area if Fairfax Road and Harrowdene Gardens 200m away. It is very difficult to pinpoint the location any more accurate than that.

The records to date show that the risk of groundwater flooding in the immediate area if the site is low. However, there is a possibility that this could rise as a result of outside influences through the lifetime of the development i.e. climate change or changes to flood management, or future trends in River stage and changes to/increased flood defences. Consideration will therefore be given to installing a monitoring well in a suitable location which can periodically inspect over the future years to check to see if there is any material risk in groundwater levels to give advance warning of possible issues. This monitoring can be added into the Maintenance Plan for the SuDS elements in the surface water drainage scheme.

The basement within Block A will be designed structurally and waterproofed / tanked accordingly to minimise the risk from future groundwater level rises.

6.3 Flood from Overland Flows

There are no residual incidents for overland flows within the various reports. However, it is recognised that throughout England much of the drainage (sewer) network is typically designed to cater for no greater than a 1 in 30 yr (3.33%) chance in any one year design storm. For this reason, any one event that exceeds this probability can be expected to result in overland flow. It is difficult to predict accurately this occurrence and it is heavily dependent upon local conditions during the passing of the storm. There are no excessive topographic level changes in the area and the site itself is not situated in a particular lower lying area which increases the risk of any overland flow collecting on site.

Any water leaving the drainage systems will be channelled along the kerbed roads in which they sit. Finish Floor levels of buildings at ground level will be set a minimum of 150mm above the immediate surrounding ground levels to minimise the risk of water getting inside the buildings.

6.4 Flooding from the Existing Drainage System

There are no recorded flooding incidents within the immediate area of the site as recorded on the DGS register held by the Water Company. There is a more detailed comment on recorded flooding incidents within paragraph 4.4.

To ensure the development proposals are not going to impact on the existing public drainage system and therefore increase the risk of flooding from these systems a pre-development enquiry application has been submitted to Thames Water who have confirmed there is a sufficient capacity within the public foul system to accept flows from the site. Any surface water flows directed to the public water system must be limited to an equivalent rate of 5 l/s/ha.

Therefore, based on the above and the comment from Thames Water it is not anticipated the development will be at risk of flooding from the existing drainage systems.

6.5 Reservoirs, Canals and other Artificial Sources

As the site does not lie near or downstream of artificial structures such as these there is no risk associated with breach events from these sources.

6.6 Assessment of Flooding Consequences

It is considered that the possibility of flooding from any of the above and consequences of flooding ranges from minimal, very low risk or none. However, to mitigate against a higher risk from elevated/rising groundwater consideration will be given to installing a monitoring well.

7 Drainage Design Standards

7.1 Development Life Span

Based on the typical life span for the residential development of 100 years the contingency allowances for climate change are set out in current guidelines issued by the Environment Agency in April 2016 under the heading of Flood Risk Assessments: Climate Change Allowances. See note in paragraph 7.5.

7.2 Proposed Scheme

The outline development includes the following:

(i) Three blocks of residential buildings including 107 apartments and 1 guest apartment. The mix will be 1 bed, 2 bed and 3 ned apartments
(ii) New GP Surgery
(iii) New Community Sports Facility including Playing Field, Artificial and Grass
(iv) Hard landscaping including new access and car parking
(v) Comprehensive soft landscaping proposal
(vi) New Drainage infrastructure

See Architects general site layout plan and a more detailed Landscape Architects plan in Appendix A

7.3 Existing On Site Drainage Regime

The site has minimal foul and surface water drainage serving the existing clubhouse building which discharges out into Udney Park Road. It is assumed there may be some form of land drainage serving the playing fields but there is nothing visible at ground level and therefore has not been picked up within the topographic survey.

7.4 Drainage Strategy Requirements

The proposed surface water drainage strategy should as a minimum reduce the risk to any off site flooding either in the immediate vicinity or further downstream and minimise the risk to buildings from inundation on site with a scheme designed to the appropriate design standards applicable at the time of compiling the report.

See correspondence with Thames Water in Appendix C detailing comment on capacity of public systems and flow limit to be applied to the off-site discharge of surface water flows.

7.5 Proposed Surface Water Drainage Strategy

Detailed comment is made within a separate statement document titled 'Drainage Strategy Statement' by Calcinotto ref 3336/CIV/1707/01 and dated 14th July 2017.

This statement discusses and describes in detail the drainage strategy for the new foul and surface water systems to service the site.

Particular reference has been made to the London Borough of Richmond upon Thames Planning Guidance document 'Delivering SUDS in Richmond'. Dated February 2016

In accordance with Building Regulations the hierarchical approach taken in compiling a surface water strategy should be as shown in Table 2 below:

Building Regulations Part H3 (2002):
(1) Adequate provision shall be made for rainwater to be carried from the roof of the building. *(2) Paved areas around the building shall be so constructed as to be adequately drained.* *(3) Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority:* *(a) An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,* *(b) A watercourse; or, where that is not reasonably practicable,* *(c) A sewer*

Table 2

Figure 4 in the Surface Water Management Plan study identifies the site to be in an area where Infiltration SUDS suitability is uncertain and should be proved by Site investigation. See figure 4 in Appendix D. In the same document Figure 1 confirms the site is not in a critical Drainage Area. See figure 1 in Appendix D.

The development site is broken down into three key elements as given below :-

Area 1 = Block A and GP Surgery

Area 2 = Block B and C,

Area 3 = New Community Facility Building and playing Fields.

Each area has its own foul and surface water drainage systems with separate connections out into the public sewers in the adjacent roads of Kingston Lane, Udney Park Road and Cromwell road respectively.

The surface water strategy for each element includes Sustainable drainage elements as listed below. Not all elements are included in each area. Inspection of the drainage drawings referenced in paragraph 7.10 will clarify the proposed strategy in each area.

i) Permeable Paving,
ii) Swale / Ditch,
iii) Infiltration Basin/ Detention Basin,
iv) Green roofs,
v) Attenuation Tank,
vi) Flow control devices in chambers to limit and regulate flows through the individual systems on site and off site to maximise the attenuation in each of the above features and to control off site flow rates to then limits agreed with Thames Water and referenced in the strategy report.

In accordance with the current best practice guidelines in Ciria C607 and C753 the new surface water systems have been designed in the strategy using the criteria given below :

1 in 1 year no climate change

1 in 30yr + 10-20% climate change

1 in 100yr + 20 -40% climate change

A full infiltration system has not been proposed as a consequence of the results from the on site soakage tests which could not produce a complete compliant test and so a permeability value could be recommended. However, in recognition of the fact that the upper layer of ground may have some permeability in that there were drops in water level recorded in the original tests it is anticipated that there will be some infiltration and evapourisation from the permeable paving, swale/ditch and infiltration /detention basin features which will help manage run off generated in the majority of the lower frequency storm events producing rainfall of 5mm or below and therefore keeping it on site.

Calculations completed to date to confirm the size of the attenuation tanks, swales and infiltration basin are in Appendix E.

On the basis of the above it has been recommended that during the detailed design further on site shallow infiltration testing is undertaken to ascertain any permeability value to substantiate the amount of rainfall that can be managed on site through infiltration for the lower intensity storm events.

The piped network on site will be also be designed and detailed to comply with Building Regulations 2015 Part H and BS EN 752:2008 as a minimum.

Post Planning at the next design stage in the development of the project the drainage strategy will be progressed into detailed design. Where appropriate consultations will continue with Thames Water and the London Borough of Richmond Upon Thames.

7.6 Sustainability Comments

Using the hierarchy set out in the Environment Agency's guide dated October 2006, options are listed in Table 3 below.

SUDS	Viability	Rationale
Green / Brown Living Roofs	Yes	There is an allowance for areas of green roofs within the proposals at this stage in Block A roof area and podium level.
Ponds/Wetlands/ Detention Basins	Yes	An infiltration / Detention basin is proposed for the drainage from the Area 3 Community Sports building playing fields.
Swales/Filter Drains	Yes	Included within the drainage infrastructure for Areas 1 and 2 serving Block A + GP Surgery and Blocks B & C.
Soakaways	No	Based on current geotechnical investigation results of on site soakage test no permeability value was obtained.
Porous Paving (Infiltration/storage)	Yes	Permeable paving is being specified for the car parking areas to help control water. Following the results of further shallow infiltration testing the permeable paving construction will be either specified as a Type C – Attenuation no infiltration, or a Type B with Partial Infiltration. and some attenuation.
Attenuation/ Source Control	Yes	Thames Water have identified any surface water discharge from the site would have to be heavily restricted at a rate of 5l/s/ha. Related to each of the area within the development i.e. Area 1, 2or 3. The volume to be attenuated on site for each area will equate to the excess flows up to and including the 1in 100yr + 40% climate change storm events.

Table 3

7.7 Foul Drainage

Thames Water have provided comment by letter in response to a formal Pre Development Enquiry Application to ascertain whether the public foul system has sufficient capacity to accept unrestricted foul flows from the development proposals.

The new foul drainage systems will be designed to comply with Building Regulations 2015 Approved Document H and BS EN 752:2008 as a minimum.

In the larger Block A foul flows from the upper residential floors will be picked up by downpipes passing down the building structure to connect into suspended drainage fixed below the soffit of the podium level below the podium

and taken out to the perimeter of the building where possible into new pipelines. Pipelines will be 100mm and 1500mm diameter.

Where this cannot be achieved foul drainage will be taken to the lower basement levels to link in with the drainage from the apartments in the basement. leisure facility areas and collected in a below basement level foul pumping station. Flows will then be pumped up to and out of the building to link in with new drainage on the outside of the buildings. Thames Water do not permit gravity connections from basements in to the public systems because of the risk of surcharging in the public system which would then leave the private system in the basement first rather than the outside systems.

Any pumped system included within the basement will be a specialist design and allowance will be specified for emergency storage to be provided in the event of mechanical or electrical failures. The storage will be in accordance with Building Regulation requirements, Clause 2.39. The likely occurrence of such events will be partly mitigated by ensuring the pump system is specified with a dual pump set and subject to a regular maintenance regime to minimise the 'Risk' of flooding from of these events.

The final connection from the Area 1 -Block A/ GP Surgery part of the development at ground level will be a gravity one into the public system in Kingston Lane.

The foul drainage from the Area 2 - Blocks B and C will drain out through new 100mm and 150mm dimeter pipework with a final connection out into Udney Park Road.

The foul drainage form the Community Building will drain out through 100 mm and 150mm dimeter pipework into Cromwell Road.

The final points of connection and arrangement for each of these connections will be agreed with Thames Water at detailed design stage.

7.8 Adoptions

Generally, all the new foul and surface water drainage systems on site will remain private and not offered for adoption by the Water Company. The only exception to that may be the final connections out into Kingston Lane, Cromwell Road and Udney Park Road which may be treated as public laterals. All of this will be clarified with Thames Water at detailed design stage.

7.9 Drainage Strategy and Contamination Risk

The principle of minor contamination results from the washing of hydrocarbon into the drainage system and the ground picked up within run-off from the paved areas, in particular trafficked areas. Contamination from any issue from the foul system in the basement is unlikely as the system will be designed to meet current guidelines.

In order to mitigate against the 'low' risk of contamination for this site the following measures are included and will be fully specified at detailed design stage:-

(i) Deep pot trapped gullies for access way and basement car park area

(ii) If deemed appropriate a Bypass separator for the basement Car Park. Alarm to be included in the system to warn of build-up of hydrocarbon levels may be considered.

(iii) Permeable paving systems for Parking areas.

(iv) Emergency Storage volume will be provided in the foul package pump system in the event of pump or an electrical failure to minimise the risk of pollution from surcharging foul sewage.

All of the above items (i) – (iii) incl. are proven and acceptable measures from the Environment Agency's point of view to reduce the risk of contamination to drainage systems and subsoils.

7.10 Outline Drainage Proposals

The foul and surface water concept strategy for the development is shown on the Calcinotto plan drawings JB-3336 003,005, 006, 007, 008, 009 all rev P2 in Appendix E. These are all subject to further investigations and final discussions with Thames Water and a final detailed design following Planning consent being awarded to the project.

8 Flood Risk Management Measures

8.1 Existing Flood Mitigation

The site is located with Flood Zone 1 therefore at an annual probability of less than 1 in 1000 of being flooded (Low Risk).

8.2 Post Development Flood Mitigation

The proposed development is outside the 1 in 1000 year flood plain.

Safe access and egress from the site is achievable via all the surrounding main roads.

The surface water drainage system for the site shall provide sufficient working capacity and incorporate a strategy of drainage design to ensure in the extreme event up to a 1:100yr + 20-40% climate change event buildings on site are not compromised.

By adopting a system to manage and control surface water on site the run-off generated will partly infiltrate into the ground in conjunction with being stored in attenuation systems on site and released under strict control at the rates agreed with Thames Water at Pre Development Enquiry Application stage.

By controlling run-off from the site into the public sewers to the rate stipulated by Thames Water and incorporating other sustainable drainage techniques where conditions and space allow there is no increase in risk to flooding off site.

9 Residual Risk

9.1 Flood Related Residual Risks

The finished floor levels of the buildings will be set above adjacent external levels so any ponding or overland flows that may occur will not affect the properties. Particular attention will be made to ensure there are no obstructions to allow a safe route through the site for any flows that may be generated off site whilst retaining overland flow routes to areas for exceedance storage generated directly by the development site. Consideration will also be given to the levels where disabled/flush access is required to minimise the risk to property.

Safe access and egress from the site is achievable along the main roads outside of the development.

9.2 Residual Risks Management

The new foul and surface water drainage systems on site will be either managed directly by the site owners or put in the responsibility of a management company or if appropriate The London Borough of Richmond upon Thames to maintain both systems to continue to work effectively through the lifetime of the development.

10 Conclusions

The new mixed development includes three main components :-

i) Assisted Living, Extra Care, residential development and a new GP Surgery,
ii) Open Park Land with Community Orchard and Outdoor Gym,
iii) Community Sports Facilities.

Inspection of the Environment Agency Flood Mapping identifies the site to be in Flood Zone 1, classified as low risk and have an annual probability of less than 1:1000yr chance of being affected by flooding from Rivers and the Sea.

The London Borough of Richmond upon Thames Strategic Flood Risk Assessment update March 2016 by Metis Consultants confirms the development site to be located in Flood Risk Zone 1 which has a less than 0.1 % (1 in 1000yr) probability of being flooded

From the National Planning Policy Framework Guidance Document Table 2 – Flood Risk Vulnerability Classification clarifies the building used for residential use is 'more vulnerable'. From the same document Table 3 Flood Zone Vulnerability and Flood Zone Compatibility identifies more vulnerable development in Flood Zone 1 as appropriate.

Overall it is not considered that the existing site is at notable risk of flooding from any source considered in this report. The proposed development will not increase the flood risk of the site assuming that the surface water run-off is managed in accordance with the proposed surface water strategy proposals outlined in this report.

In summary the surface water drainage strategy proposed for the site is for the collection of run-off from the roof and hardstanding areas into new networks which include pipelines and elements of sustainable drainage prior to a discharge into the off site pubic surface water systems in Kingston Lane, Udney Park Road and Cromwell Road.

The attenuation tank and any infiltration systems where it can be proven following further on site investigations and tests, will be sized to accommodate the critical storm period for the 1 in 30yr + 10-20 % climate change and the 1 in 100yr + 20 – 40 % climate change for an increase in rainfall intensities over the anticipated lifetime of the development.

The risk of a system failure is considered 'low' and further mitigated by the fact that there will be a fully developed a maintenance plan in place to regularly inspect and maintain all the various elements of the new drainage systems.

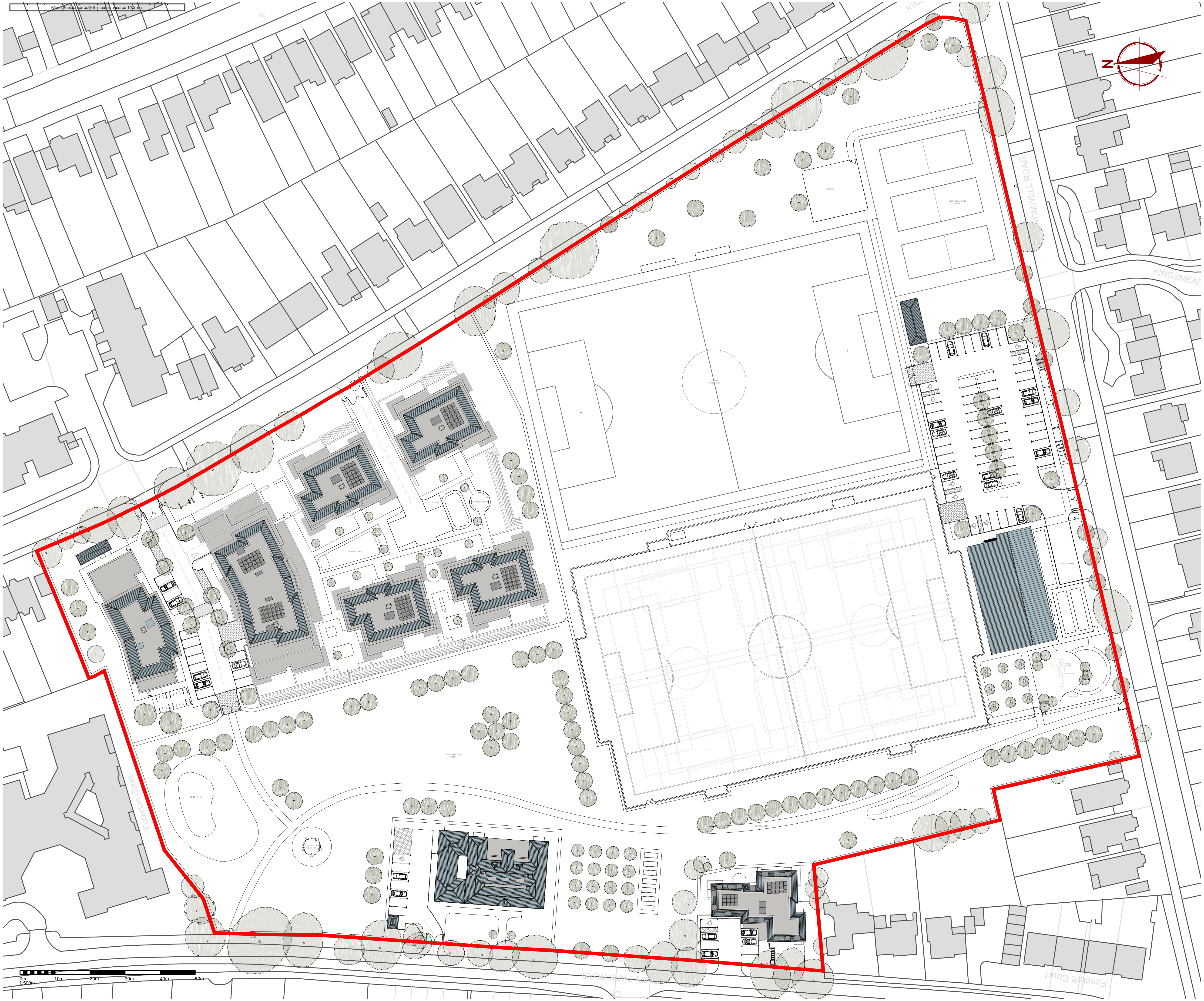
The Drainage Strategy and concept outlined in the report is subject to a detailed design and co-ordination with all other design elements. Further discussions will be held with Thames Water and The London Borough of Richmond upon Thames as required during the detailed design process.

It is therefore demonstrated that the proposals for the site surface water drainage strategy is robust to be taken forward into a detailed design and furthermore will not result in an increase in flood risk to the development site or surrounding areas and properties.

Therefore, there is no reason not to award a Planning Consent on the grounds of issues with Flood Risk and / or Drainage Strategy.

Appendix A

Architects Layout Plan



PLANNING

Do Not Scale, Use figure dimensions.

Check all dimensions on site before work proceeds, report discrepancies to Architect.

If In Doubt Ask!!

NOTES:

Location Plan
Scale - 1:5000

Rev	Date	Description	Initials

Quantum Group

Quantum House, 170 Charminster Road, Charminster, Bournemouth, BH8 9RL
Email: info@quantumhomes.co.uk | Web: www.quantumhomes.co.uk
Tel: 01202 531635 | Fax: 01202 531650

Project:
Former Imperial College Private Ground , Udney Park Road, Teddington

Drawing Title:
Proposed Site Plan

Discipline:
ARCHITECTURAL

Drawn by: JC
Checked by: SH

Scale: 1:500@A1
Date: Aug 2017

Drawing Number: 900-P200
Revision: .

Appendix B

Thames Water Records Plan

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2015_3056174

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
281F	n/a	n/a
581D	n/a	n/a
581C	n/a	n/a
5801	n/a	n/a
5802	n/a	n/a
5001	n/a	n/a
5002	n/a	n/a
5903	n/a	n/a
691A	n/a	n/a
6904	n/a	n/a
6802	n/a	n/a
601D	n/a	n/a
601H	n/a	n/a
681B	n/a	n/a
601G	n/a	n/a
601E	n/a	n/a
691B	n/a	n/a
601F	n/a	n/a
6801	n/a	n/a
3905	8.61	6.28
301B	n/a	n/a
4907	10.36	8.34
4905	10.36	7.9
5902	n/a	n/a
5901	n/a	n/a
581B	n/a	n/a
2806	8.91	n/a
2802	8.98	n/a
3806	8.99	n/a
3802	9.02	n/a
3801	n/a	n/a
3001	n/a	n/a
3803	8.83	5.73
3804	8.81	6.8
3805	n/a	n/a
3904	8.8	6.28
3901	8.5	n/a
5702	9.01	-1.89
5603	n/a	n/a
5608	n/a	n/a
5607	n/a	n/a
5602	n/a	n/a
5606	n/a	n/a
5601	n/a	n/a
581A	n/a	n/a
6704	8.92	6.74
6703	8.99	6.55
6702	8.99	5.41
6701	8.96	-1.8
671B	n/a	n/a
671A	n/a	n/a
2601	9.1	6.07
2604	9.05	6.41
3601	9.21	6.34
5604	n/a	n/a
5609	n/a	n/a
3603	9.19	-2.2
4601	9.49	7.13
461A	n/a	n/a
5605	n/a	n/a
5610	n/a	n/a
461B	n/a	n/a
4603	9.4	5.91
461C	n/a	n/a
4701	9.45	n/a
5701	9.15	7.6
5705	n/a	n/a
5704	n/a	n/a
371A	n/a	n/a
3702	8.96	7.09
3701	9	5.77

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.

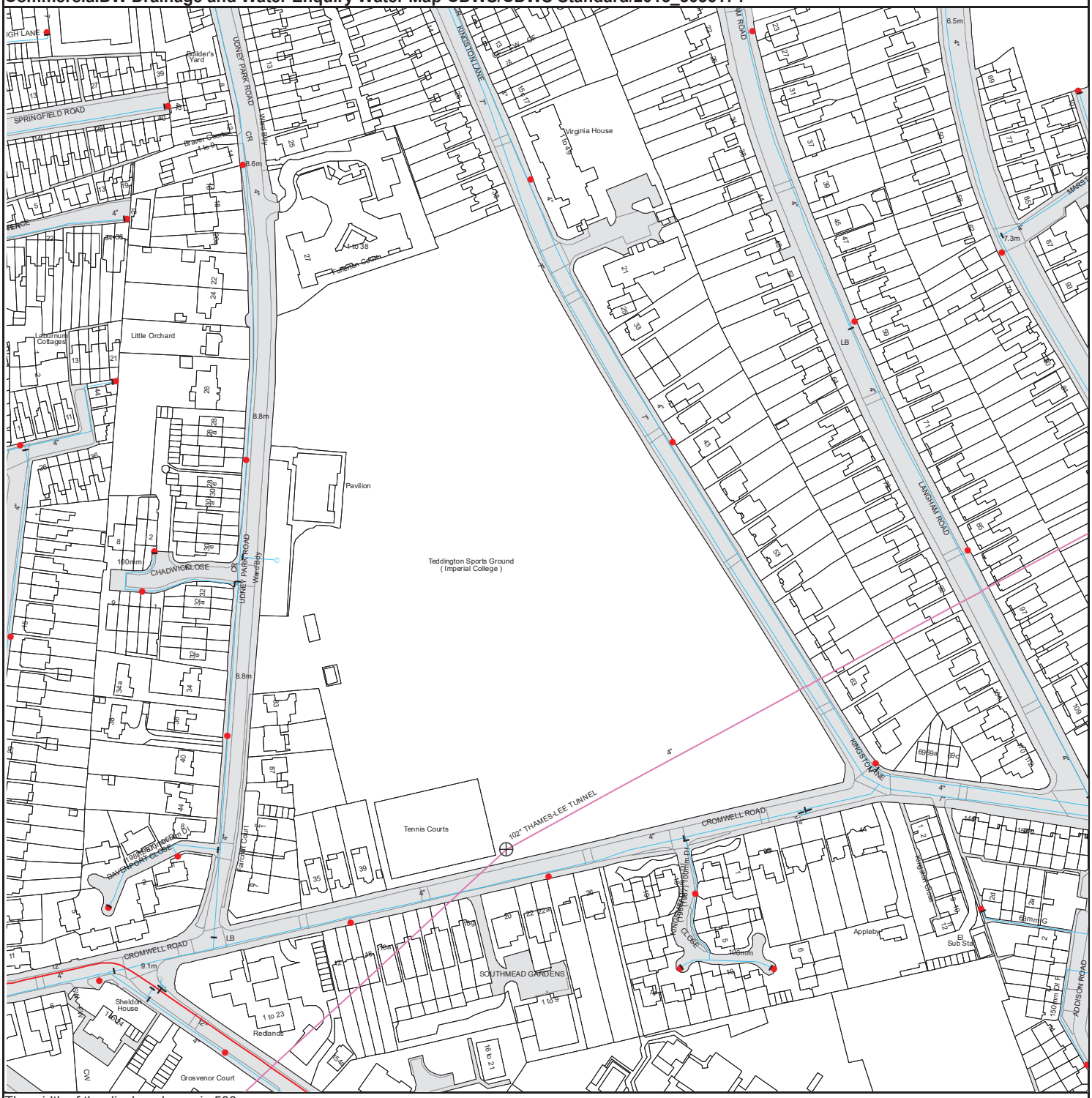
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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.

CommercialDW Drainage and Water Enquiry Water Map-CDWS/CDWS Standard/2015_3056174



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.

Waterworks Key - Commercial Drainage and Water Enquiry

Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

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

3" SUPPLY

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

3" FIRE

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

3" METERED

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

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

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

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

Appendix C

Correspondence with Thames Water

29th March 2017

Our Ref: JB-3336

Thames Water
Developer Services
Clearwater Court
Vastern Road
Reading
Berkshire, RG1 8DB

Dear Sirs

Proposed Development at Former ICL Private Ground, Teddington, Richmond Upon Thames

Please find attached a completed pre-development enquiry application form for a proposed development on the former ICL Private Ground site off Kingston Lane.

The developer is the Quantum Group based in Bournemouth. The development is to be a mix of residential, new GP Surgery and an upgrading of the play facilities on the site. These will include new pitches, i.e. 3G, MUGA and turf pitch. The residential element is a mix of 1, 2 and 3 bed apartment style units. The total number of units at present is 115 no., however there is a chance this number will reduce as the proposals develop further in design and towards a Planning Application.

The existing site currently consists of turf based playing facilities, macadam tennis courts and an existing club house.

A copy of the public sewer records has been obtained by the client through a services search enquiry through Thames Water Services.

The client has commissioned an investigation to confirm the soakage potential of the site. This was carried out by Ruddlesden Geotechnical and the findings recorded in a report ref. AC/JW/SR/16325/STR dated October 2016.

The report stated that infiltration rates could not be confirmed from the testing carried out because of the slow movement in water levels in test holes. Without an infiltration value to work from a fully compliant SuDS with on site disposal cannot be technically justified. See copy of email received from Geotechnical Specialist with comment about suitability of site for an infiltration solution.

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Jonsen House
43 Commercial Road
Poole
Dorset BH14 0HU

The proposed layout lends itself to be split into three elements.

Site 1 – GP Surgery – Plot A and underground car park
Site 2 – Plot B & C
Site 3 - New Clubhouse, car park and new playing surfaces

An assessment of the site as a whole for foul flows based on the proposals has been made and a copy of the calculation from the spreadsheet attached. This confirms a predicted peak foul flow of 5.3 l/s for the whole site. In reality this total discharge could be split to suit the various site elements.

A preliminary assessment of the surface water flows being generated from the developments of the basis of a 1 in 1 yr storm return period, split into the three sites confirms predicted flow rates as given below. The flow rate obtained in site 3 has taken into account the type of playing field surface and being drained formerly because of the ground conditions. The impermeable value for these areas has been adjusted to 30% against a true impervious surface like a car park.

Site 1 – Q = 105 l/s
Site 2 – Q = 26 l/S
Site 3 – Q = 77 l/s

Can you please review the contents and make comment on what the capacity of the existing public systems have outside of the site to accept flows from the development proposals.

Can you please provide a reply direct back to ourselves as we are commissioned to produce a Flood Risk Assessment and Drainage Strategy documents to support a future planning application and obviously your responses will help inform various elements within our reports.

If you need to speak with us during your review of the proposals, please do not hesitate to contact the undersigned.

Yours faithfully

Paul Westcott
Senior Civil Engineer
On behalf of Calcinotto

cc. Sam Hobson, Quantum Group

WEB :www.calcinotto.co.uk
EMAIL :admin@calcinotto.co.uk
TEL :+44 (0) 1202 237 237

ADDRESS :Calcinotto (Head Office)
Jonsen House
43 Commercial Road
Poole
Dorset BH14 0HU

Application for a pre-development enquiry

Please read the Guidance Notes and complete all sections of this form. Please write clearly in BLOCK CAPITALS.

For office use only

For office use only

Section A

Applicant details

Title: QUANTUM GROUP

Forname: SAM

Surname: MOBSON

Address: QUANTUM HOUSE, 170, CHARMINSTER ROAD CHARMINSTER, BOURNEMOUTH

Post code: BH8 9RL.

Phone: 01202 - 531635

Mobile: -

Fax: 01202 - 531650.

Email: samh@quantumgroup.org.uk

Section B

Development site details

Site name: FORMER ICI PRIVATE GROUNDS

Address: KINGSTON LANE/CROMWELL ROAD, TEDDINGTON RICHMOND UPON THAMES,

Post code: TW11 9BB

12 figure OS site grid reference

5 1 6 4 4 0 1 7 0 8 6 6.

What was the site previously used for?

- [x] Greenfield/Agricultural
- [ ] Industry
- [ ] Housing
- [ ] Landfill

Other, please specify

Section C

Planning status of site

	Y/N	Date	Reference
Is the site identified on the local plan?	See Comment in letter.		
Does the site have Outline Planning Permission?	N	/	/
Does the site have Full Planning Permission?	N	/	/
Does the site have Building Regulation Permission?	N	/	/

Section D

Proposed development and flows

Please provide your connection point

Foul water	MH ref:	TBC See attached
Surface water	MH ref:	TBC letter.
Size of proposed development (No of units/hectares)		5.2 Ha.
Proposed Fw discharge rate		5.3 L/S
Proposed Sw discharge rate		Various L/S See letter

Does the site have existing sewerage connnections?

Foul water	Yes ✓	No
Surface water	Yes ✓	No
Existing f/w discharge rate	0.4	L/S
Existing s/w rate	9.7	L/S

From Existing Club House off Udney Park Road.

Section E

Checklist and declaration

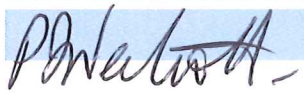
I have completed the application form and attach the following information:

Application fee of £398 + VAT

A scaled location plan ie. site plans showing existing and proposed layouts.

Declaration

I agree, that for the purpsoses of the Water Industry Act 2003 and the Data Protection Act 1998, the information provided in this form and in any accompanying documents, may be held on a computer and processed by Thames Water Ltd and its servants and agents for all purposes conneted with the Company's statutory water and sewerage undertakings.

Print Name	PAUL WESTCOTT
Position within Company	SENIOR ENGINEER
Company	CALCINOTTO.
Date	28/03/2017.
Signature	

Mr Sam Hobson
Quantum Group
170 Charminster Road
Bournemouth
BH8 9RL

Your account number
DS6032151

Developer.services@thameswater.co.uk

0800 009 3921

Mon – Fri 9am-5pm,

18/05/2017

Pre Development Enquiry

Site Address: Former Imperial College London Ground TW11 9BB

Development Details: Development proposal for GP visitors per day would be 475 (Park Road) + 145 (Thameside) Plot A (North East Corner) 1 bed 38, 2 bed 59, 3 bed 3, Plot B (Converted Clubhouse) 1 bed 2, 2 bed 5, Plot C (Existing Car Park), 2 bed 5, 3 bed 3 Total 1 bed 40, 2 bed 69, 3 bed 6, surface water = 5L/S/HA = Area 1 is to discharge into Kingston Lane Q = 4.5 l/s, Area 2 is to discharge into Udney Park Road, Q = 3.0 l/s, Area 3 is to discharge into Cromwell Road. Q = 12.9 l/s.

Dear Sam,

I write in relation to the above site concerning the proposed development here. We have completed the assessment of your application, in relation to the sewer capacity. At this stage your proposal is accepted, please accept this letter as approval for you to progress with your development.

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.

Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

Only when it can be proven that soakage into the ground or a connection into the adjacent watercourse is not possible would we consider a restricted discharge into the public surface water sewer network.

We would encourage techniques such as green roofs and/or permeable paving that restricts surface water discharge from your site.

Discharges shall be attenuated to reduce the likelihood of flooding downstream of the point of connection. As a guide a discharge rate of 5 litres /second /Hectare will be use in most instances, however more onerous constraints may be imposed to fit local circumstances. The system shall not show signs of flooding above ground for the worst 1 in 30 year storm, and shall be tested for exceedance in a 1 in 100 year storm to demonstrate any flooding that may occur will not flood properties.

Thames Water Planning team would ask to see why this is not practicable on the site if they are consulted as part of any planning application.

Please Note

All connection requests are subject to a full Section 106 (Water Industry Act 1991) application before the Company can confirm approval to the connection itself. Please also note that capacity in the public sewerage system cannot be reserved.

The discharge of non-domestic effluent is not permitted until a valid trade effluent consent has been issued by Thames Water. If anything other than domestic sewage is discharged into the public sewers without the above agreement an offence is committed and the applicant will be liable to the penalties contained in Section 109(1) (WIA 1991).

Applicants should contact Trade Effluent prior to seeking a connection approval, to discuss trade effluent consent and conditions of discharge. A Trade Effluent reference number should be obtained and included in the relevant box of the attached application form. The address for Trade Effluent is - Thames Water Utilities Limited, Waste Water Quality, Crossness Sewage Treatment Works, Belvedere Road, Abbeywood, London SE2 9AQ. Alternatively you can telephone them on 020 8507 4321.

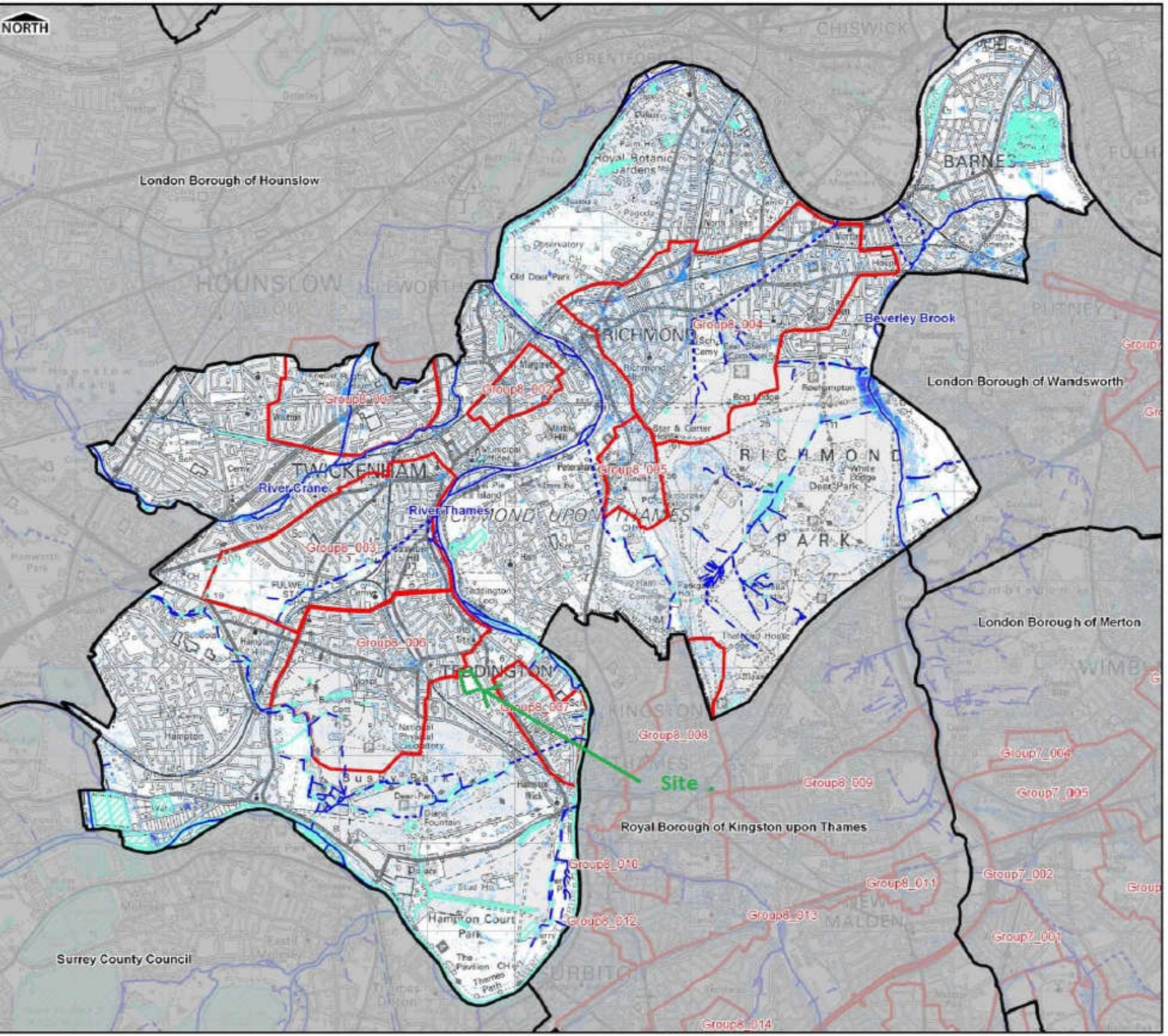
The views expressed by Thames Water in this letter are in response to this pre development enquiry at this time and do not represent our final views on any future planning applications made in relation to this site.

Yours sincerely

David Stamateris – BSc
Development Engineer

Appendix D

Plans from Various London Borough of Richmond Upon Thames Reports



Borough Administrative Boundary
Critical Drainage Area
Permanent Water Body
Main River
Ordinary Watercourse
Culverted Watercourse

Flood Depth

- <0.1m
- 0.1m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- >1.5m

Notes

1. This map only shows the predicted likelihood of surface water flooding (this includes flooding from sewers, drains, small watercourses and ditches that occurs in heavy rainfall) for defined areas, and due to the coarse nature of the source data used, are not detailed enough to account for precise addresses.
2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.
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
1:45,000	20/07/11	A.HARRIS	J.ROBINSON

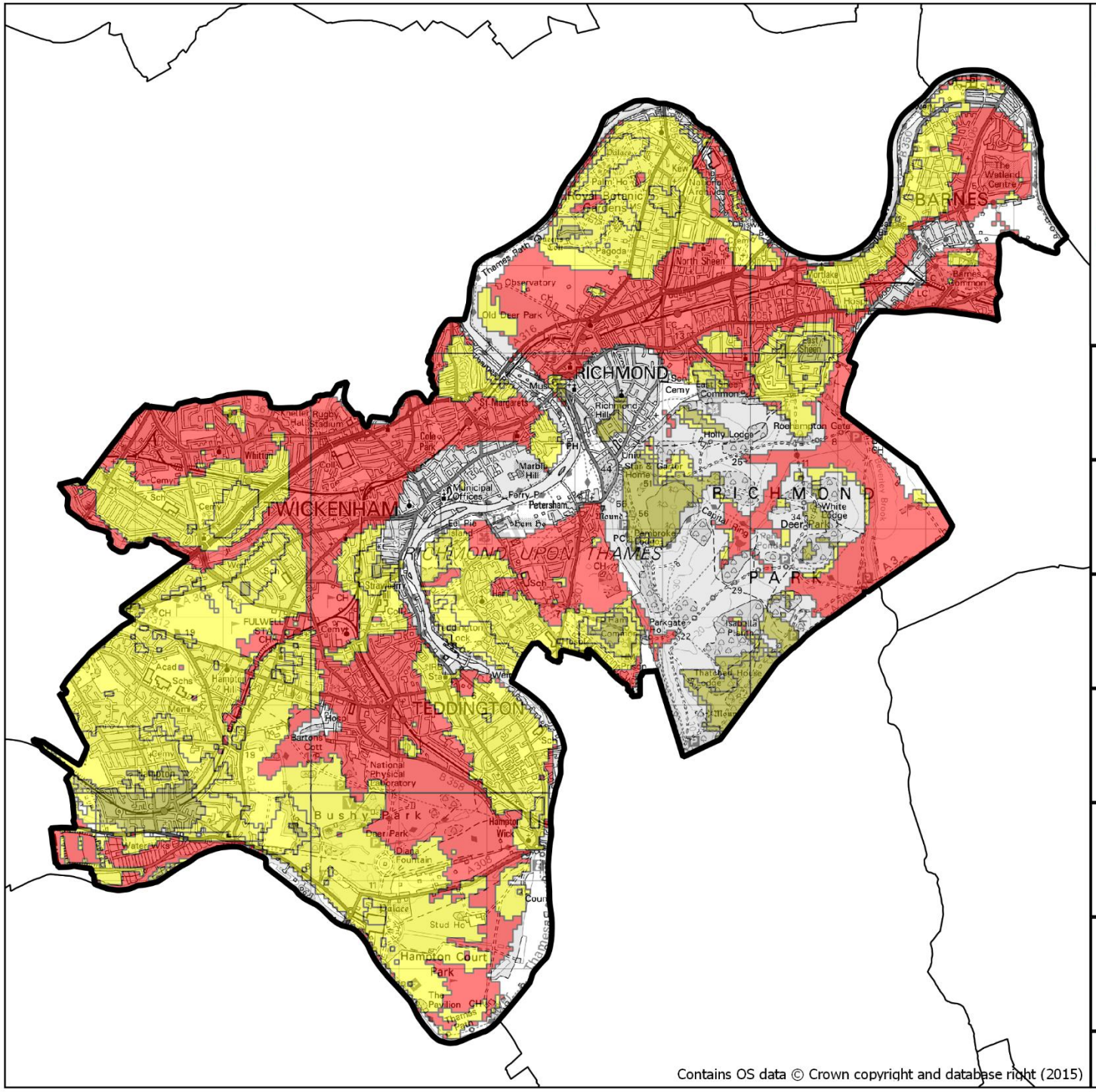
Surface Water Depth (m)
1 in 100 Chance of rainfall event occuring in any given year (1% AEP)

Consultants
CAPITA SYMONDS Flood Risk Management
URS / Scott Wilson
6 - 8 Greencoat Place
London
SW1P 1PL

Drain London Programme Board Members

Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

FIGURE 1



Legend

Borough Boundary

BGS Susceptibility to Groundwater Flooding

- Limited potential for groundwater flooding to occur
- Potential for groundwater flooding of property situated below ground level
- Potential for groundwater flooding to occur at surface

in association with

Environment Agency

Metis Consultants Limited

METIS

Client

LONDON BOROUGH OF RICHMOND UPON THAMES

Project Title

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

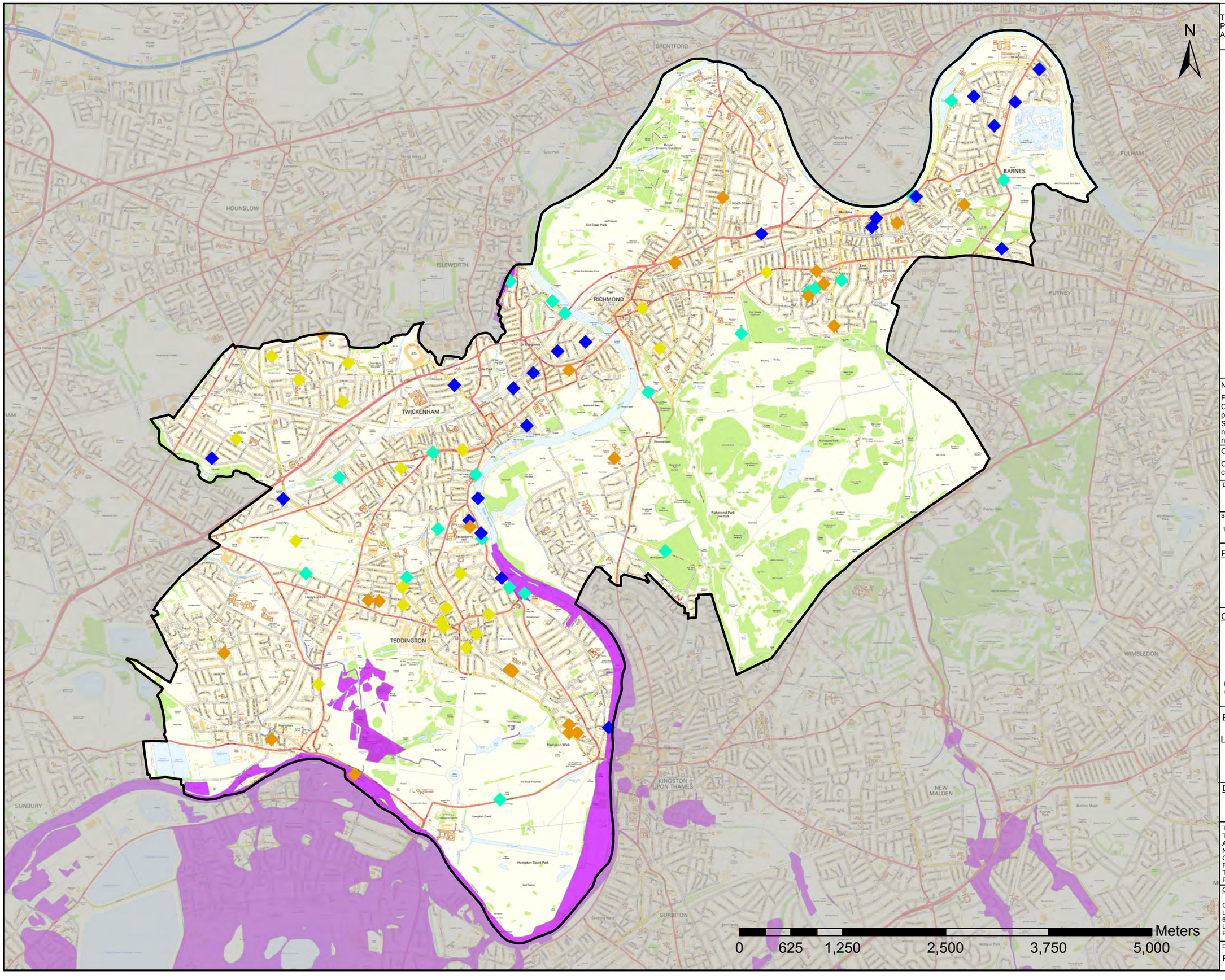
Drawing Title

BGS Susceptibility to Groundwater Flooding

Drawing Number

FIGURE E

1:65,000



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
- Surface Water
- Groundwater
- Sewer

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 been reported to the Council and will therefore not be shown on this map.

DRAWN BY	CHECKED BY	PASSED BY	DATE
GA	LM	LM	August 2015

SCALE @ A3	ISSUING OFFICE
1:42,000	Gresham Street

Purpose of Issue

FINAL

Client

Wandsworth, merton, LONDON BOROUGH OF RICHMOND UPON THAMES, CROYDON www.croydon.gov.uk, Sutton, Royal Kingston

Project Title

LONDON BOROUGH OF RICHMOND LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

HISTORIC FLOODING

Consultant

Capita
Level 4,
65 Gresham Street
London
EC2V 7NQ

CAPITA | AECOM

DRAWING NUMBER	REV
FIGURE 1	A