3336

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

Drainage Strategy Statement

For

Quantum Land and Property Ltd

REPORT REFERENCE

3336/CIV/1707/01

PROJECT NUMBER

3336

PROJECT TITLE

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

CLIENT

Quantum Land and Property Ltd

Issue No:	1		
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Date:	June/ July 2017		
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Date:	14th July 2017		
Issue Status	Draft		

CONTENTS

Appendices

1 Executive Summary

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

1.2 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 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 and 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

1.3 The strategy discusses the intended method of disposal for foul water and surface water discharges.

1.4 Any drawings and calculations prepared at this time are only preliminary and should not be relied upon as a detailed design for construction.

1.5 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 surface water system can only be discharged at an equivalent rate to the greenfield run-off based on 5 l/s/ha for the area of the site.

1.6 The principles around the surface water strategy 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 in Kingston Lane, Cromwell Road and Udney Park Road to suit the various Areas 1, 2 and 3 of the development.

1.7 Foul water generated by the development discharges out through 3 outfalls around the site into the public foul sewers within Kingston Lane, Cromwell Road and Udney Park Road to suit the various Areas 1, 2 and 3 of the development.

1.8 This document has been prepared for the sole use of Quantum Land and Property Ltd to support the Planning Application for the construction of 107 apartments + 1 guest room, spread over 3 buildings, a new GP Surgery and new Community Sports Facility and recreational space. The contents should not be relied upon by others without the written authority of Calcinotto Limited.

2 Introduction

2.1 Site Location

Calcinotto Consulting Engineers have been appointed by Quantum Land and Property Ltd to undertake a review for a drainage strategy for the development of a mostly greenfield site in Teddington. The site under development has an area of circa 5.2 ha approx. (12.8 acres). This site has a Post Code of TW11 9BB. The national grid reference for the site is TQ 16437 70857 (E = 516437, Y = 170857). The layout of the site is detailed on Quantum Group Architects Dwg 900 Sk02 rev A in Appendix A.

The topographic survey carried out by LDS Surveys of Salisbury is shown on dwg LDS/13279-TP1, this records levels across the site in values of AOD.

The typical variation in ground levels around the site taken from the survey are as follows:-

Southern Boundary	**9.70 down to 8.80**
Eastern Boundary	**9.80 down to 8.40**
Northern Boundary	**9.80 down to 8.80**
Western Boundary	**9.50 down to 8.80**

For a general site location and the site boundary see figures 1 and 2 below.

Figure 1 – Site Location

Figure 2 – Site Location

2.2 This report is made in support of a Planning Submission for the proposed mix development. A brief comment on Flood Risk is contained within this report. A more detailed Flood Risk Assessment has been produced by Calcinotto as a standalone document to support the submission.

2.3 Prior to this report being produced Calcinotto have had outline discussions with Thames Water over drainage proposals for the project. These have included identifying discharge points for disposal of foul and surface water and the method of how flows reach the public sewer.

3 Existing Site

3.1 Existing Use

3.1.1 The existing site is currently mostly greenfield with 1 no. building on the plot which houses the old playing fields Club House. There is a small sports stand with seating for people to watch events form on the fields. Old tennis courts are also present on the site.

3.1.2 The site is bounded by Fullerton Court to the north, Kingston Lane to the east, Udney Park Road to the west and Cromwell Road to the south.

3.2 Foul and Surface Water Drainage

3.2.1 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. See existing drainage drawings JB-3336- 001 rev P2 and 002 rev P2 in Appendix B.

3.3 Ground Investigation

A full Ground Investigation has not been carried out to date. This will be instructed once the project has received a Planning Consent and the detailed design is progressed.

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.

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

A soakaway test investigation undertaken at the 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

4 Public Sewers

4.1 Water Authority Apparatus

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 there are details for quite a number of cover and invert levels for manholes missing.

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 Proposed Development Philosophy

5.1 Development Proposals

The mixed use development within the creation of the Teddington Community Sports Ground Community Company establishes the following three main areas of the proposal:

1. Assisted living, extra care, residential development (107 apartments + 1 guest apartment)
2. Open Parkland with community Orchard and outdoor gym
3. Community sports facilities

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

5.2 Drainage Design Guidelines and Parameters

All new private drainage will be designed in accordance with Approved Document H of the National Building Regulations 2000:2015 Edition and BS EN 752:2008.

All new surface water drainage will be designed to comply with current Ciria design guidance C697 and C753, using the storm return periods listed below and latest climate change allowances as contained within the Guidance Document dated 19th February 2016 – Flood Risk Assessments: Climate Change Allowances.

- 1 in 1 year no climate change
- 1 in 30 year + 20-10% climate change
- 1 in 100 year + 40-20% climate change

In accordance with Part H of Building Regulations the hierarchy for consideration of dealing with surface water run-off is as given in table 1 below. This basis of this hierarchical approach is also reflected in the London Borough of Richmond Upon Thames and the London Plan criteria.

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 1 : Part H3 Hierarchy

The London Borough of Richmond Upon Thames has specific drainage policies within their Local Development Framework Development Management Plan adopted November 2011. These policies are Policy DM SD7 and Policy DM SD10. The wording of these polices is given below:

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.

It is a prerequisite that the developer must satisfy the criteria in Policy DM SD10, such that if a discharge is to be made into the public sewers confirmation is obtained from the appropriate water company that the public sewers have capacity to accept flows from the development.

In response to that requirement to satisfy compliance with DM SD10 discussions have been held with Thames Water along with the submission of a pre development enquiry application to identify any capacity constraints within the public sewers outside of the site. A copy of the basic application and letter of request and response from Thames Water is in Appendix C.

Having consideration for the above design criteria and reviewing the information available to date, the response from Thames Water has enabled a considered drainage strategy to be developed for the purposes of this report to help support the Planning Submission.

The strategy for each element of foul and surface water systems is described in more detail in paragraphs 5.3 and 5.4 below.

5.3 Foul Drainage

5.3.1 The response from Thames Water on the pre-development enquiry has been based on the information supplied as part of the application which confirms the public system has capacity to accept flows generated by the development.

5.3.2 The peak flow from the complete development based on the guidance given in 'Sewers for Adoption 7th Edition' i.e. 4000 l/d/day has been assessed as 5.3 l/s.

5.3.3 Taking into consideration the layout of the development proposals there will be 3 no. separate connections into the public system, one into Kingston Lane for the GP Surgery and Large Apartment Block A, one in Cromwell Road servicing the new Club House/Community facilities building and the third in Udney Park Road serving the converted Club House, Block B and the new smaller apartment Block C.

5.3.4 The foul system serving Block A has package pump stations included as part of the infrastructure proposals as a result of the apartments within the basement level which cannot drain by gravity directly to the public system. The other areas Block B & C and the community facilities building will drain out through gravity connections into the public system.

5.3.5 The foul drainage for each element and its outfall will be designed on peak flows derived from BS EN 12056-2 : 2000. The package pump stations will be specialist design units to suit the site conditions of level differences, peak flows and length of rising main.

5.3.6 The final point and general arrangement on how the connections are made to the public system will be agreed with Thames Water at detailed design stage through a Section 106 Application for approval to communicate with the public sewer.

5.3.7 The individual foul drainage systems on the site will be designed in accordance with criteria laid in paragraph 5.3.5 above. The pipework in each area will be based around 100mm and 150mm diameter pipework. Within Block A there is suspended pipework which Is hung from the underside of the podium deck and gravitates out into the main collector pipelines outside of the building footprint.

5.4 Surface Water Drainage

5.4.1 As part of the review for the strategy, reference has been made to the London Borough of Richmond policy documents with specific reference to the Planning Guidance Document 'Delivering SuDS in Richmond' February 2016. This document reinforces the response to the consultation on Delivering Sustainable Systems, Department for Communities and Local government and Defra announced in late 2014 that SuDS should be provided in new developments wherever appropriate. The document provides advice on how to incorporate SuDS in a range of developments from small to large. It also supports applicants and developers in complementing the requirements of the adopted Development Management Plan (2011) Policy DMSD7 as referenced earlier.

5.4.2 Ruddlesdon Geotechnical were commissioned by the developer to undertake an investigation of insitu soakaway testing to confirm the permeability of the ground to be found on site. The field works were carried out on site on 8th September 2016. The findings have been recorded in the document – 'Soakaway Report by Ruddlesdon Geotechnical October 2016 – AC/SW/SR/16325/STR'. The soakaway test results are recorded in Table 1 'Summary of Test Results' which has been extracted from the report and given below:

Table 1: Summary of Soakaway Test Results

Test No.	Total recorded Fall of Water Level (m)	Duration of Test (minutes)	Soil Infiltration Rate (m/s)
SA1	0.28	321	*
SA2	0.55	277	*
SA3	0.54	226	*

* Test failed to reach 75% of the effective depth. No soil infiltration rate calculation possible

The report acknowledges that there was some movement in water which indicates the ground has some permeability. However, the lack of full compliance tests with BRE Digest 365 meant that an 'infiltration value' to be used in any formal infiltration design could not be given. Clarification was sought from Ruddlesdon on whether the adoption of a surface water system designed wholly around infiltration which was totally compliant with design criteria could be achieved. A copy of the response is in Appendix D. Inspection of Figure 4 in the Surface Water Management Plan document suggests that the site lies in an area where Infiltration SUDS suitability is uncertain and site investigation is required.

5.4.3 In connection with formulating a suitable surface water strategy Thames Water were consulted on the capacity of the public surface water systems outside of the site on the basis that a complete infiltration system could not be technically justified or adopted on site. Checking off site capacities in the public systems ties in within the Policy DM S10 as referenced earlier in the report in paragraph 5.3. A pre-development enquiry application was made to Thames Water. The final response received from Thames Water on surface water capacities is as outlined in Appendix C. The letter dated 18th May 2017 from Thames Water confirms the following restricted flow rates that can be used in a design on the basis a discharge to ground through soakaways cannot be proven and that flows are limited on the basis they should not exceed 5 l/s/ha.

Area 1 discharging into Kingston Lane = 4.5 l/s

Area 2 discharging into Udney Park Road = 3.0 l/s

Area 3 discharging into Cromwell Road = 12.9 l/s

5.4.4 The principle elements of the strategy for the Areas 1 and 2 which include Blocks A, B and C, and the GP Surgery incorporate a number of sustainable drainage techniques along with traditional drainage. Run-off from the various areas of roof and paving are collected in pipework before discharging into a combination of swale/ditch, permeable paving and finally a below ground attenuation tank formed from modular crates. The final discharge from each area is limited to the flow rates referenced above. Permeable paving has been specified to temporarily store water for extreme rainfall events and to aid in the control of pollution through hydrocarbons in run-off from trafficked areas. The swale/ditch arrangements are to be used for a similar purpose as well as being conveyors of water through the system. In recognition that there was some movement in water levels recorded in the soakaway testing carried out by Ruddlesden it is being recommended that additional shallow infiltration testing is carried out later during detailed stage to see if an infiltration value can be ascertained to add into the equation of managing surface water run-off on site to help in lowering the actual volume of water directly leaving the site through the outfalls and allowing water to infiltrate on site.

5.4.5 The surface water strategy for Area 3 which consists of the main part of the leisure facilites i.e. playing surfaces/fields, new Community Facility Building and car parking area includes a piped network, permeable paving and infiltration basin/swale prior to a controlled discharge off-site into the public system. In addition, to help minimise peak flows from the large MUGA sports pitch a system of land drainage in conjunction with porous sub base will be specified under the surface finishes. This is again to encourage water to infiltrate water naturally into the ground if it can be proven as part of the shallow infiltration testing the upper layers of exisitng ground will support this principle.

5.4.6 As a minimum, the modular crate attenuation tanks included in Area 1 and Area 2 have been sized to accommodate below ground the total storage volume for the 1 in 30 yr + 20% Climate Change rainfall event. In the case of Area 2 because of the site limitation the attenuation tank actually has a provision for storage up to the 1 in 100 yr + 40% Climate Change. The ditch / swales upstream of the attenuation tank serving Area 1 are to provide the additional attenuation required for the extreme event of the 1 in 100 yr + 40% Climate Change. In the event of exceedance excess water will overflow onto the soft landscaped areas between Block A and B.

5.4.7 By incorporating deep pot trapped gullies in the access road areas, permeable paving construction in parking areas followed by ditch / swales and an infiltration basin at various points within the overall strategy for the site will provide an acceptable level of treatment for the low risk pollution that will be generated by the site. All of the above form the basis of an acceptable management train in line with the SuDS manual.

5.4.8 The surface water pump station serving parts of the basement and those rainwater pipes that cannot be taken out at ground floor level will be a specialist design element. The specification for the pump station will recommend dual pumps to cover for breakdowns and explosion proof pumps with intrinsically safe controls.

5.4.9 The criteria used for the design of the new surface water drainage systems is as detailed in paragraph 5.2 above. Simple drainage models have been made using the design software Microdrainage to simulate the strategy and to inform on the storage volume that will be required. The volume required for each of those features are as indicated on the drainage strategy drawings JB-3336-003, 005, 006, 007, 008, 009 and 015 rev P2 in Appendix E.

5.4.10 It will most likely only be in the very extreme rainfall events, or if there are long periods of continuous rainfall which could result in water collecting in the open features for any length of time. The final profiles of these open features of ditch/swale/infiltration basin will be finalised at detailed design stage to suit final working volumes but also to ensure safe access and egress i.e. 1 in 4 side slopes on at least one side.

5.4.11 In the unlikely event of exceedance i.e. a storm greater than the design events listed or a failure in any parts of the system, the following principles have been identified and will be adopted fully within the detailed design on levels for the site:

(i) FFL's for the buildings will be set to a minimum of 150mm above adjacent paving or landscaped areas accept where flush thresholds are required

(ii) External levels will generally fall away from habitable buildings with low points forced in non-critical areas

(iii) Overland routes for the water leaving the open water features will direct water into the wider open landscaped areas of the site between Block A and B to ensure buildings are not put at risk on site and reducing the risk of water being able to leave the site.

5.4.12 The preliminary calculations for the surface drainage water drainage are located in Appendix F.

5.4.13 The Architectural proposals for Block A include for elements of green roof on the building and podium. By incorporating measures such as permeable paving whether it works as system 'C' tanked or System 'B' partial infiltration, swale / ditches and an infiltration basis there is sufficient opportunity within the strategy to show compliance with the requirement of 'Interception' (no run-off for majority of rainfall events up to 5mm).

5.4.14 The checklist in Appendix 1 has been completed as far as possible based on information available to date. A copy of this document is in Appendix G. This will be treated as a live document and will be updated with more information when the detailed design is progressed.

5.4.15 In recognition of the need for various SuDS elements to be maintained to ensure continued efficient working throughout the lifetime of the development a fully considered and appropriate Maintenance Plan Manual and Schedule will be produced once the design has been finalised. The basic elements which will be covered by the Maintenance Plan / Schedule are as follows:-

(A) Permeable Paving –
- (i) Regular brushing of surfacing to keep joints clear from a build-up of – once a season
- (ii) Based on current evidence after a period of approximately 20-25 years the permeable blocks will be removed, the existing bedding layer and permeable geotextile will be removed and replace with new for each. The existing blocks will be cleaned and re-laid in position with new grit in joints.

(B) Catch Pits –
- (i) Clean out bases of catchpits within drainage system of build-up of debris
- (ii) Clean out twice a year

(C) Swales / Ditches / Infiltration Basin
- (i) Maintain the sides and base to prevent build-up of weeds – once a month
- (ii) Rake out the bases to check for a build-up of silt/debris and pollutants in the upper layers – check yearly

(D) Attenuation Tanks –
- (i) Inspect for any build-up of silt inside base of tank by CCTV Survey – check once a year
- (ii) Clean out any build up using high pressure cleaning

(E) Flow Control Manholes –
- (i) Inspect flow control devices are working efficiently and not blocked or failing in any way – inspect twice a year or if earlier after periods of major rainfall.

The above list is by no means exhaustive or definitive and as stated would be subject to a more detailed review at detailed design stage to produce a complete and robust maintenance plan and schedule to meet the Local Authority requirements. Final responsibility for the maintenance of the elements would be discussed between the Developer and Local Planning Authority.

5.5 Environment Agency Flood Map

5.5.1 Examination of the Environment Agency flood mapping website confirms the site is located in Flood Zone 1 which is designated as LOW risk and has a less than 0.1% probability of flooding (i.e. <1 – 1000yr) for rivers and sea.

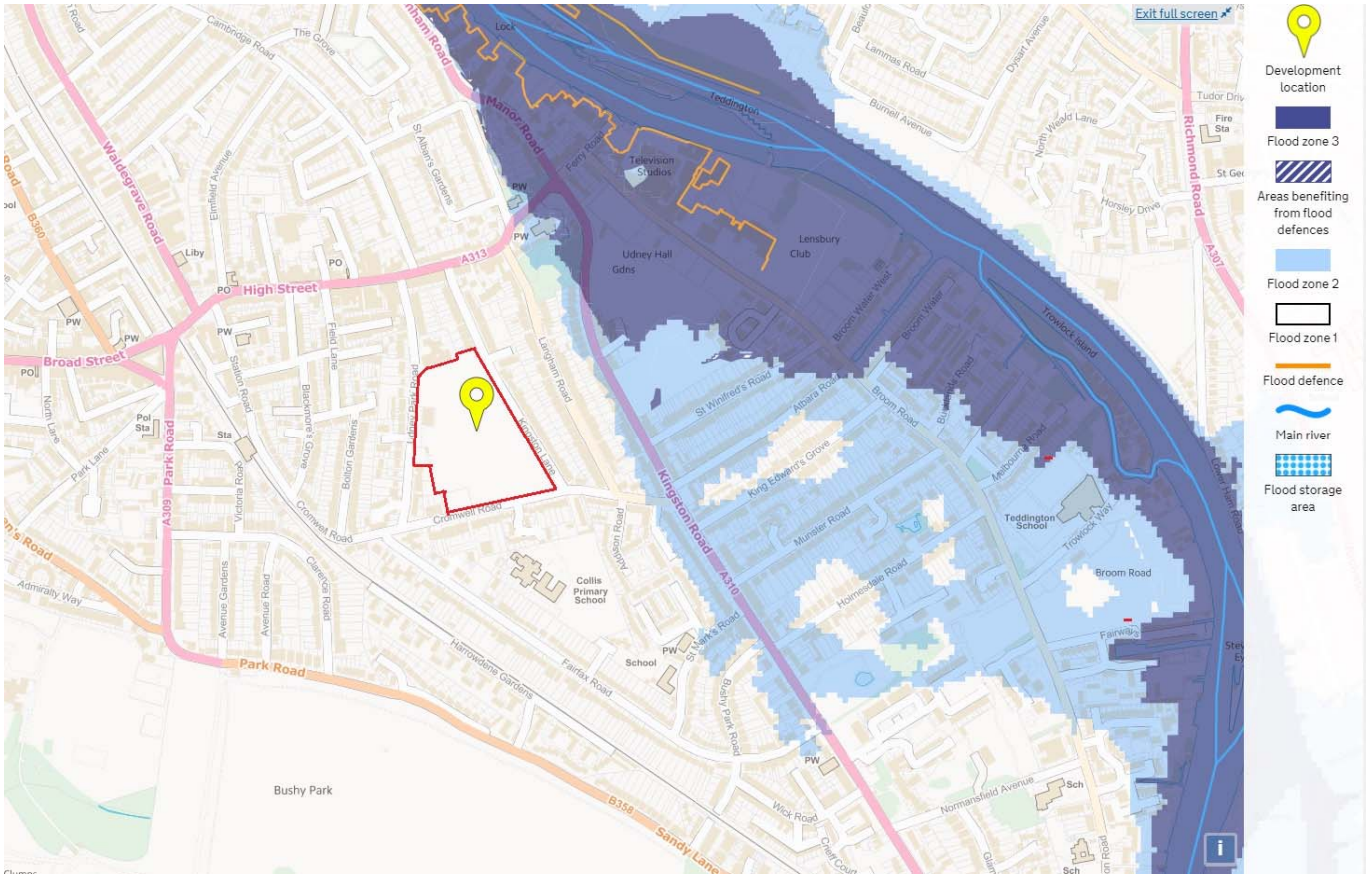

Figure 3 – Environment Agency Planning Flood Map

5.5.2 Examination of the Environment Agency Flood mapping website for surface water flooding identifies the majority of the site as being outside of any predicted 'Risk' from surface water flooding. However, there is a small area of standing surface water in the east/south east side of the development which reflects the existing lower levels of that part of the fields. This area is outside of any proposed buildings. The remainder of any predicted surface water flooding is in Udney Road and by adopting the mitigating points in paragraph 5.4.10 above, Blocks B and C will not be at any risk.

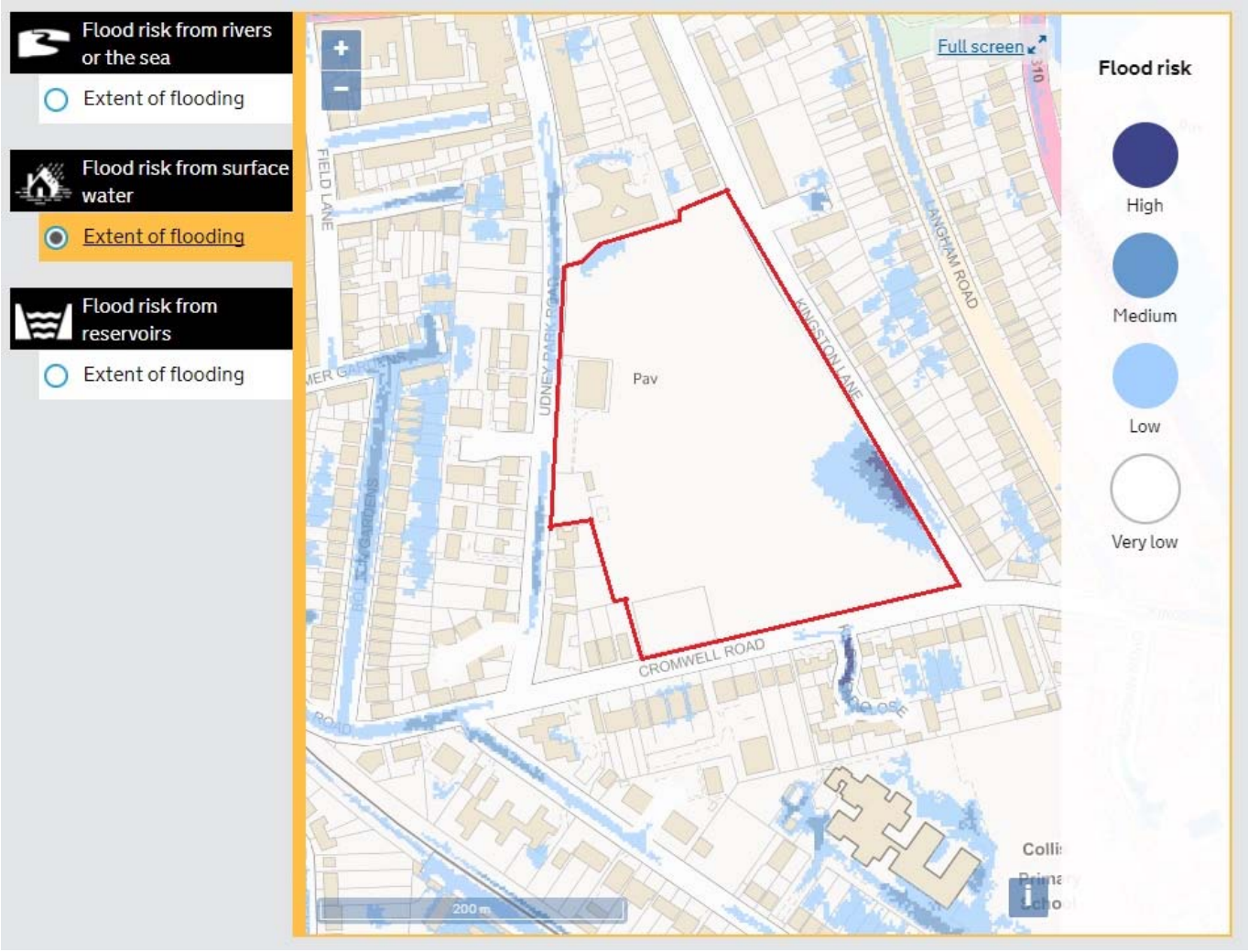

Figure 4 – Environment Surface Water Flooding Map

5.5.3 The Flood Mapping information within this report 'Contains Public Sector information licensed under the open Government Licence V3.0. Information has been downloaded from the gov.uk website link https://flood-warning-information.service.co.uk

6 Conclusions

6.1 Detailed principles for the strategy of foul and surface water systems are indicated on the drawings JB-3336-003, 005, 006, 007, 008, 009 and 015 rev P2 within Appendix E.

6.2 The predicted foul flows generated by the site can be accommodated within the public system. This has been confirmed by Thames Water.

6.3 Soakaway Testing carried out on site as part of initial investigations by Ruddlesdon Geotechnical could not prove an infiltration value for ground conditions found on site. Without this value a design to manage and control surface water run-off for the whole site through infiltration cannot be technically supported.

6.4 On that basis Thames Water have been approached through a pre development enquiry application to check on the capacity of the public surface water sewers off site. Thames Water confirmed flows controlled to limits based around the criteria of 5 l/s/ha can be accommodated within the public system.

6.5 The surface water strategy proposed for each of the three development areas given below have been developed using the appropriate design criteria including an allowance for climate change. The new system utilises sustainable drainage techniques including permeable paving, ditch/swales, infiltration basin, attenuation tanks and hydrobrake flow control devices to maximise attenuation within features and to limit peak flows leaving the site during the various storm events and durations to the limits agreed. The architect has also specified areas of green roof for the Block A.

Area 1 – Block A + GP Surgery

Area 2 – Blocks B + C

Area 3 – Community Leisure Facility / Playing Fields

It has been shown from testing carried out to date that the existing ground has marginal permeability albeit not to an extent that can be equated fully into a permeability value.

However, it may be sufficient to allow run-off from part of the rainfall events to percolate naturally into the ground and not form part of the final discharge into the public system. Therefore, during the detailed design post planning during the next phase of Geotechnical Investigations a series of shallow infiltration tests will be carried out to try and quantify what that permeability could be and add that formally into the overall strategy of the site. This permeability can then be applied to areas of permeable paving, along the swale / ditches and within the infiltration basin to manage run-off at its source even more effectively in line with the sustainable drainage principles. This is in addition to acting as attenuation features for the more extreme rainfall events where the uptake within the ground will be insufficient to cope with run-off generated by the development

6.6 Provision of a pumped outfall from the basement will provide mitigation against possible flooding from sewers or systems draining into the basement. Where appropriate cut off drainage channel/s will be provided on the access ramp to the basement to intercept drainage minimising the risk to the basement area.

6.7 The proposed drainage strategy detailed within this report for foul and surface water disposal is sufficiently detailed and robust for this submission. The proposals will be taken into co-ordinated detailed design, based on the principles outlined in the report when the scheme is developed further architecturally post planning approval.

6.8 The site is not at risk of flooding as designated on the Environment Agency Flood mapping system. Its status is lying in Flood Zone 1 LOW risk which has a less than 1 in 1000 (0.1 %) probability of flooding. The areas of predicted surface water flooding are outside the areas proposed for the new buildings.

Appendix A

Architects Site Plan

PLANNING

This drawing is the copyright of Quantum Group and may not be copied/reproduced or altered in anyway without written authority.

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

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Project:

Former Imperial College Private Ground , Udney Park Road, Teddington

Drawing Title:

Proposed Site Plan

Discipline:

ARCHITECTURAL

Drawn by:	Checked by:
JC	SH

Scale:	Date:
1:500@A1	Aug 2017

Drawing Number: 900-P200

Revision: .

Where Scaled correctly this bar measures 100mm

0m 10m 20m 30m 40m 50m
1:500m

Fullerton Court

Fairclough Court

Appendix B

Extract of Thames Water Plan and Existing Drainage Plans

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

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.

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.

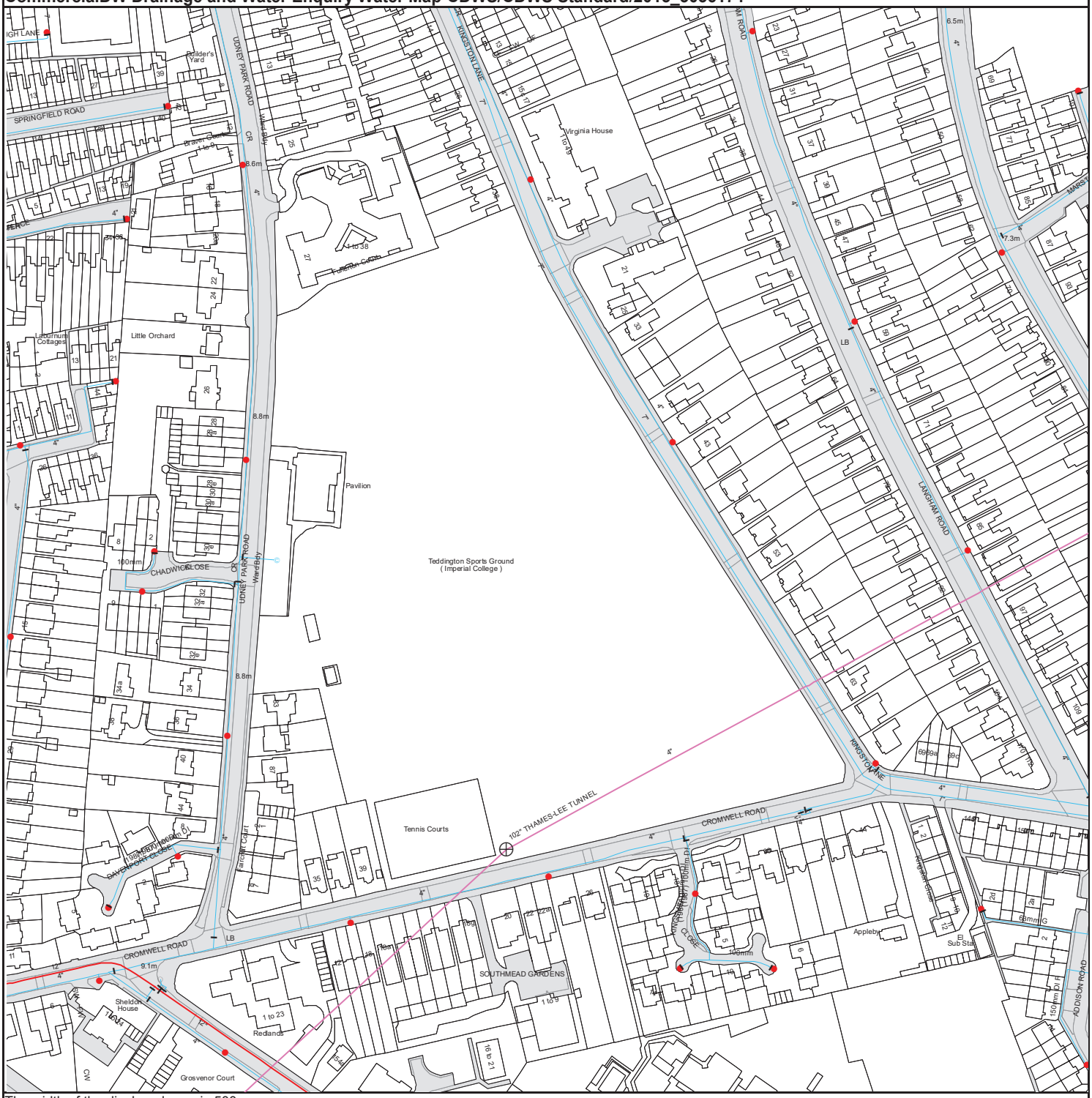
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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.

Existing Drainage Legend

- Existing Private Surface Water Sewer (& Manhole)
- Existing Private Foul Water Sewer (& Manhole)
- Existing Private Combined Sewer (& Manhole)
- Existing Public Surface Water Sewer (& Manhole)
- Existing Public Foul Water Sewer (& Manhole)
- Existing Public Combined Sewer (& Manhole)

0m 10m 20m 30m 40m

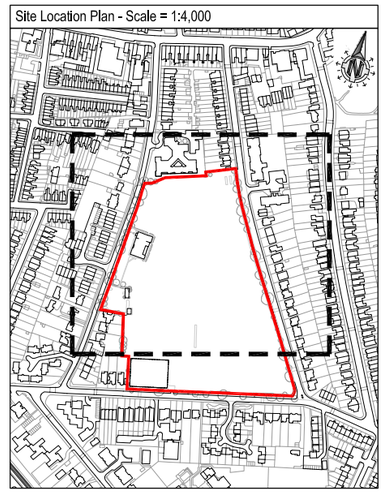
Scale = 1:500

Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.

2. All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.

Site Location Plan - Scale = 1:4,000



Ex 300Ø Pub SWS
Ex 225Ø Pub FWS
Ex 225Ø Pub SWS
Ex 225Ø Pub FWS
EX-SWMH Ref: 3905 CL 8,610 IL 6,280
EX-SWMH Ref: 3901 CL 8.500 IL Unknown
EX-SWMH Ref: 4907 CL 10.360 IL 8.340
EX-FWMH Ref: 4905 CL 10,360 IL 7,950
EX-FWMH Ref: 3904 CL 8,800 IL 6,280
EX-FWMH CL 9,090 IL Unknown
EX-SWMH CL 9.190 IL Unknown
EX-SWMH CL 9.180 IL 8,310
Ex 100Ø SWS
EX-FWMH CL 9,270 IL 7,730
EX-SWMH CL 9.250 IL 8,610
EX-FWMH CL 9.240 IL Unknown
EX-SWMH CL 9,320 IL 8,680
EX-SWMH CL 9,380 IL 9,010
EX-SWMH CL 9,360 IL 8,830
EX-SWMH CL 9.240 IL 8,710
EX-SWMH CL 9.230 IL Unknown
EX-SWMH CL 9.240 IL 8.070
EX-SWMH Ref: 3803 CL 8,830 IL 5,730
EX-SWMH Ref: 2806 CL 8,910 IL Unknown
EX-SWMH Ref: 3802 CL 9,020 IL Unknown
EX-FWMH Ref: 3806 CL 8,990 IL Unknown
EX-SWMH Ref: 2802 CL 8,980 IL Unknown
EX-SWMH Ref: 3801 CL Unknown IL Unknown
EX-FWMH Ref: 3805 CL Unknown IL Unknown
EX-FWMH Ref: 3804 CL 8,810 IL 6,800
EX-SWMH Ref: 3701 CL 9,000 IL 5,770
EX-FWMH Ref: 3702 CL 8,960 IL 7,090
EX-FWMH Ref: 5901 CL 9,980 IL Unknown
EX-SWMH Ref: 5902 CL 9,860 IL Unknown
EX-FWMH Ref: 5801 CL 8,950 IL Unknown
EX-SWMH Ref: 5802 CL 8,780 IL Unknown
Existing (102') Thames Tunnel

Rev.	Date	Description	Issued By
P2	14.07.17	Issued for Planning Approval	GEB
P1	15.06.17	Drawn	GEB

Planning

calcinotto

CONSULTING STRUCTURAL CIVIL AND ENVIRONMENTAL ENGINEERS

ADDRESS : 2nd Floor, Jonsen House, 43 Commercial Road, Poole, Dorset BH14 0HU

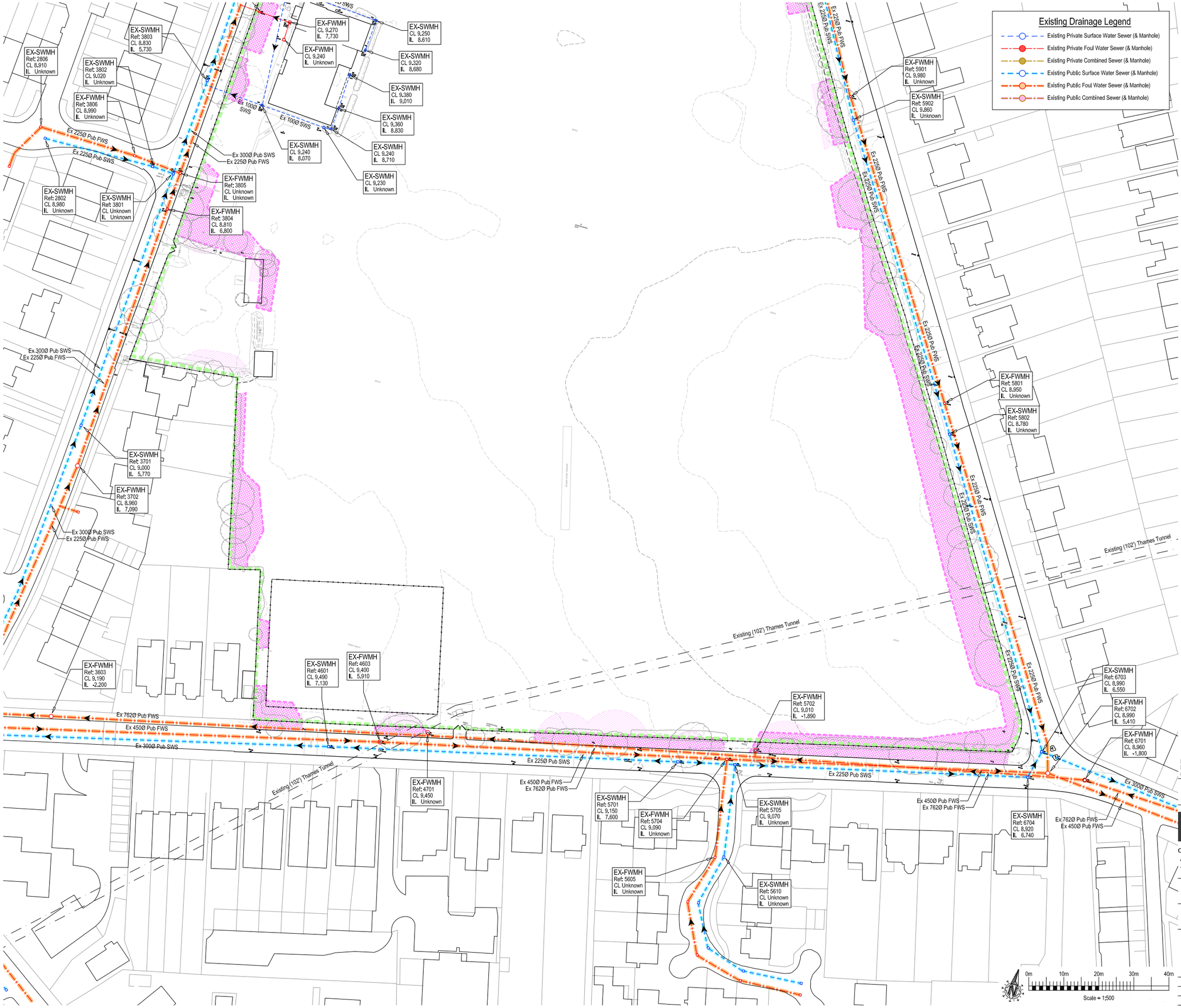
T: 0044 1202 237237 **W:** www.calcinotto.co.uk **E:** admin@calcinotto.co.uk

Client.
Quantum Land and Property Limited

Project Title.
Former ICL Private Ground

Drawing Title.
Existing Drainage Plan
Sheet 1 of 2

Drawn by	GEB	Project No.	Drwg No. [Rev]
Scale	1:500	**3336**	**001 P2**
Date	May' 17		



Existing Drainage Legend

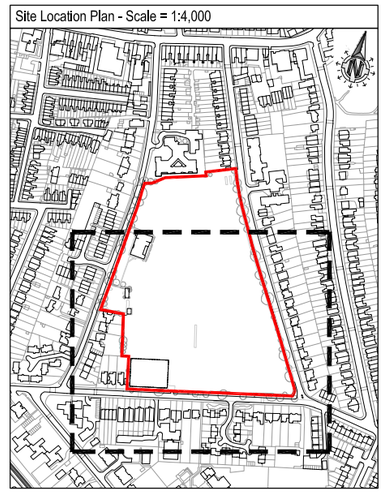
- Existing Private Surface Water Sewer (& Manhole)
- Existing Private Foul Water Sewer (& Manhole)
- Existing Private Combined Sewer (& Manhole)
- Existing Public Surface Water Sewer (& Manhole)
- Existing Public Foul Water Sewer (& Manhole)
- Existing Public Combined Sewer (& Manhole)

Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.

2. All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.

Site Location Plan - Scale = 1:4,000



Rev.	Date	Description	Issued By
P2	14.07.17	Issued for Planning Approval	GEB
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Planning

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Client.

Quantum Land and Property Limited

Project Title.

Former ICL Private Ground

Drawing Title.

Existing Drainage Plan Sheet 2 of 2

Drawn by	GEB	Project No.	Drwg No. [Rev]
Scale	1:500	3336	002 P2
Date	May' 17		

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.

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

Managing Director: Eur Ing Mr J Calcinotto BSc (Hons) CEng MIStructE MICE C. Build E MCABE
Director: Mr M Singleton BEng (Hons) CEng MIStructE C. Build E MCABE
Director: Mr D Adorisio BSc (Hons) MSc CEng MICE FFBE
Associate Director: Mr A Wait
Calcinotto is the trading name of Calcinotto Ltd. (Registered No. 09010135)

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
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Director: Mr M Singleton BEng (Hons) CEng MIStructE C. Build E MCABE
Director: Mr D Adorisio BSc (Hons) MSc CEng MICE FFBE
Associate Director: Mr A Wait
Calcinotto is the trading name of Calcinotto Ltd. (Registered No. 09010135)

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

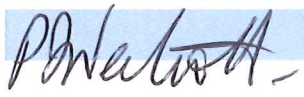
I have completed the application form and attach the following information:

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

Correspondence with Ruddlesdon Geotechnical

Paul Westcott

From: Charles Rafipay <charles@ruddlesden.co.uk>
Sent: 27 March 2017 11:57
To: Paul Westcott
Cc: samh@quantumgroup.org.uk; Simon Ruddlesden
Subject: Teddington Playing Fields - Soakaways

Hi Paul

Following our discussion, it is envisaged that soakaways are unlikely to provide a suitable drainage solution for your site in Teddington. This is primarily because each of the tests failed to reach 75% of the effective depth and an infiltration rate calculation was therefore not possible. Based on the values obtained during the testing and that the rate of infiltration usually reduces during the second and third tests (required as per BRE DG 365), it is considered that the infiltration rate would be in the region of 10^{-6}m/s, which, following our discussion, is unlikely to provide sufficient infiltration for soakaways.

I trust this is sufficient for your purposes at present, but should you have any further queries, please do not hesitate to contact me.

Regards

Charles Rafipay

Charles Rafipay
Geo-Environmental Engineer

Ruddlesden geotechnical ltd
The Stables, 65 Langaton Lane, Pinhoe, Exeter, EX1 3SP
T 01392 678082 | **M** 07958 271505
E charles@ruddlesden.co.uk | **W** www.ruddlesden.co.uk

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Registered offices and trading address: As above

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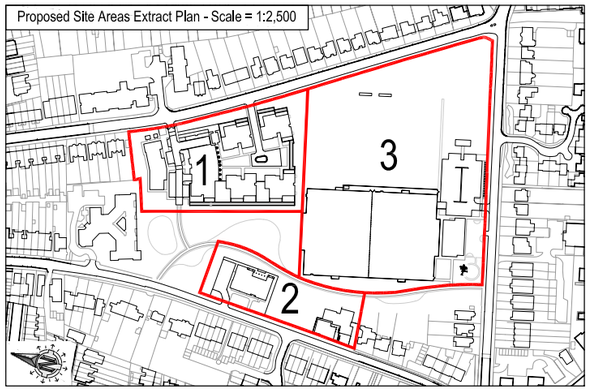
Appendix E

Proposed Drainage Strategy Drawings



FW Outfall 1:
Outfall from Area 1 to the existing public foul water sewer. No flow restrictions have been imposed by Thames Water

SW Outfall 1:
Outfall from Area 1 to the existing public surface water sewer. A maximum flow rate of 4.5 l/s has been agreed with Thames Water based on the existing green field run-off rate from Area 1

SW Outfall 3:
Outfall from Area 3 to the existing public surface water sewer. A maximum flow rate of 12.9 l/s has been agreed with Thames Water based on the existing green field run-off rate from Area 3

Detention Basin:
Used to attenuate and infiltrate the flows generated by Area 3 before overflowing to the public surface water sewer. Sized for a peak 1:100 yr + 40% storm.

Tree and root protection zones

MUGA Tennis Courts
Surface run-off to be picked up by a perimeter drain. Subject to on-site ground conditions investigation.

Pump Stations:
Foul and surface water pump stations used to lift the drainage from Area 1 up into the outfalls draining via gravity to the public sewers

Pitch drainage outfall location

3 New MUGA Tennis Courts

Grass Sports Pitch
Additional drainage requirements for grassed pitch subject to on-site ground conditions investigation

SW Attenuation Tank:
Sized for a peak 1:30 yr +20% storm. Serving Area 1 only.

3 New Grass Sports Pitch

SW Attenuation Tank:
Optional if required

Permeable Paving:
Permeable paved car park used as a type B or C system (meaning it will either be used for collection and attenuation only or as attenuation and partial infiltration). subject to on-site infiltration tests.

Pump Stations:
Foul and surface water pump stations located within the lower ground floor car park, used to lift the drainage up from the lower level into the drainage running at ground floor level.

1 Surgery

1 Block A

Pitch drainage outfall location

Permeable Paving:
Permeable paved car park used as a type B or C system (meaning it will either be used for collection and attenuation only or as attenuation and partial infiltration). subject to on-site infiltration tests.

Flooding Exceedance Zone
Site levels to allow for any surface water flooding to overspill safely into this area during any storm exceeding a peak 1:100yr+40% event.

Area Boundaries
Outlines of Site Areas 1, 2 and 3

MUGA Sports Pitch
Drained by a sub-pitch drainage system. Subject to on-site ground conditions investigation.

3 New MUGA Sports Pitch

3 Leisure Facility

FW Outfall 3:
Outfall from Area 3 to the existing public foul water sewer. No flow restrictions have been imposed by Thames Water

SW Ditch / Swale:
Ditches used to channel and attenuate flows. Flow control measures can be implemented on the ditch outfalls to increase the efficiency of attenuation within the system creating a cascade effect through the site. The ditches will provide the additional storage needed for a peak 1:100 yr +40% storm.

SW Ditch / Swale:
Ditches used to channel and attenuate flows. Flow control measures can be implemented on the ditch outfalls to increase the efficiency of attenuation within the system creating a cascade effect through the site.
The ditches will provide the additional storage needed for a peak 1:100 yr +40% storm.

Permeable Paving:
Permeable paved car park used as a type B or C system (meaning it will either be used for collection and attenuation only or as attenuation and partial infiltration). subject to on-site infiltration tests.

2 Block B

SW Attenuation Tank:
Sized for a peak 1:30 yr +20% storm. Serving Area 2 only.

Tree and root protection zones

2 Block C

SW Ditch / Swale:
Ditches used to channel and attenuate flows. Flow control measures can be implemented on the ditch outfalls to increase the efficiency of attenuation within the system creating a cascade effect through the site. The ditches will provide the additional storage needed for a peak 1:100 yr +40% storm.

Permeable Paving:
Permeable paved car park used as a type B or C system (meaning it will either be used for collection and attenuation only or as attenuation and partial infiltration). subject to on-site infiltration tests.

FW Outfall 2:
Outfall from Area 2 to the existing public foul water sewer. No flow restrictions have been imposed by Thames Water

SW Outfall 2:
Outfall from Area 2 to the existing public surface water sewer. A maximum flow rate of 3.0 l/s has been agreed with Thames Water based on the existing green field run-off rate from Area 2

Hydrobrake MH:
Hydrobrake manhole located on the outlet from the attenuation tank to manage the off-site flow

0m 10m 20m 30m 40m
Scale = 1:500

Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
2. All setting out to be in accordance with the schedules, any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
3. All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2002 Edition).
4. All adoptable drainage is to be in accordance with 'Sewers for Adoption 7th Edition' - a design and construction guide for developers and the local highway authority requirements where appropriate.
5. Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
6. Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
7. All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
8. All materials for adoptable drainage are to be Kitemarked as appropriate.
9. All adoptable manhole covers are to be badged as appropriate i.e. 'FW' or 'SW'.
10. Rising main trench to have warning tape fitted. Allow for 1.0m of tape coiled inside the pump chamber at the upstream end of the rising main.
11. Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
12. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
13. Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
14. Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
15. Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
16. Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
17. For adoptable drainage, a reinforced concrete cover slab is to be provided where the effective cover to the crown of the adopted pipe(s) is less than 0.9m in verges or 1.2m in carriageways and / or footpaths. Where effective cover is 1.0m or less in carriageways and / or footpaths, pipework will need to be ductile iron (ie, Stanton Pam St, Gobain type "Integral").
18. For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
19. 'Effective cover' is the minimum depth of cover over the pipe crown at any time during the construction process.
20. All adopted foul drainage to be located a minimum of 1.2m finished depth to soffit. Unless specifically identified as otherwise with relevant protective measures.
21. The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
22. Chamber annotation references are as follows:
    AC - Denotes a polypropylene or vitrified clay access chamber, depth not exceeding 600mm, diameter not exceeding 300mm.
    IC - Denotes a polypropylene Inspection chamber, depth not exceeding 3.0m, diameter not exceeding 600mm, Standard diameter 450mm unless specified otherwise.
    MH - Denotes a manholes constructed from either brick, polypropylene or P.C.C. sections. Chamber depth to be in excess of 1.2m.
    CP - Denotes a catchpit chamber.
    Annotations are indicative only and final depths are to be checked on site prior to installation.
23. The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
24. All surface water drainage to be min 100mm dia. laid at a gradient no slacker than 1/80. And all foul water drainage to be min 100mm dia. unless stated otherwise.
25. The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections Inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
26. The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.
27. Any connection into a public sewer is to be inspected by the local water authority and carried out fully in accordance with their requirements, The contractor is to allow for obtaining the appropriate 'connection to a public sewer' forms and paying all necessary fees.
28. The contractor is to allow for obtaining the appropriate road opening licences from the local highway authority and paying all necessary fees for any works associated with off-site sewer connections. All reinstatement works within the public highway are to be carried out in accordance with the requirements of the local highway authority.
29. Package pumping station(s) to be 'a specialist design element' or equivalent. For installation guidance refer to manufacturer's specification. Any vent pipe to be taken to a position agreed with the architect. A three phase electricity supply is required to provide power to the control panel of the pumping station. The control panel, if external, is to be located inside a kiosk within close proximity of the pumping station. If internally located within a building, the control panel may be positioned on a wall. Localised re-grading of the ground around the pumping station may be required to accommodate new levels. An informative notice plaque should be located on or near the control panel stating 'In the event of the alarm sounding or warning light flashing please contact the number below 'insert contact telephone number'.
30. Drainage channel(s) to be 'Aco' or equivalent. For installation guidance refer to the manufacturer's specification. Refer to landscape architects details for surfacing treatments around units where applicable. All drainage channels are to be constructed with in-built falls where possible, Relevant units are to be incorporated to provide the necessary length of channel gradient from the head of the run to the sump unit.
31. Modular crate attenuation tank system(s) to be 'Wavin Aquacell'. Size, unit types and arrangement to be confirmed.
32. Permeable paving to be to 'The architects specification'. It is intended to use the permeable paved parking areas as either a Type B or a Type C system. A 'Type B' system provide collection, attenuation and partial infiltration while a 'Type C' system will provide collection and attenuation only. This will be subject to detailed design and on-site infiltration testing.

Rev.	Date	Description	Issued By
P2	14.07.17	Issued for Planning Approval	GEB
P1	19.06.17	Drawn	GEB

Planning

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Client.
Quantum Land and Property Limited

Project Title.
Former ICL Private Ground

Drawing Title.
Proposed Drainage Strategy Plan

Drawn by	GEB	Project No.	Drwg No. [Rev]
Scale	1:500	**3336**	**003 P2**
Date	Jul' 17		