INFORMER HOUSE

2 HIGH STREET, TEDDINGTON, TW11 8EW

FLOOD RISK ASSESSMENT

FOR

RHP

June 2016

Our Ref: HLEF40143/001R

RPS Health, Safety & Environment
35 New Bridge Street
London
EC4V 6BW

Tel: 020 7280 3240
Email: rpslon@rpsgroup.com

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	Name:	**Signature:**
Report Author:	Sarah Demetriou	
Technical Reviewer:	Alison Cadge	
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This report has been prepared in the RPS Group Quality Management System to British Standard EN ISO 9001:2008

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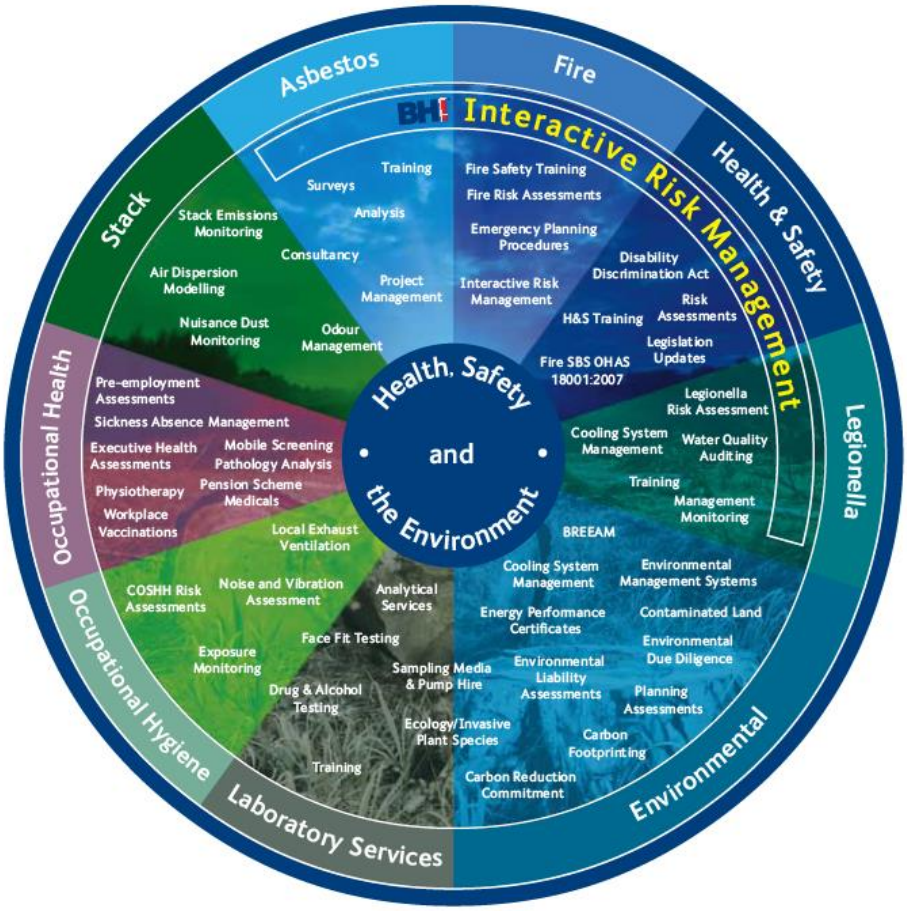

RPS HEALTH, SAFETY & ENVIRONMENT

General Notes

1. The following notes should be read in conjunction with the report:

2. This report contains only that available factual data for the site, which was obtained from the sources, described in the text. These data were related to the site on the basis of the location information made available to RPS by the client.

3. The assessment of the site is based on information supplied by the client. Relevant information was also obtained from other sources.

4. The report reflects both the information provided to RPS in documents made available for review and the results of observations and consultations by RPS staff.

5. Where data have been supplied by the client or other sources, including that from previous site audits or investigations, it has been assumed that the information is correct but no warranty is given to that effect. While reasonable care and skill has been applied in review of this data no responsibility can be accepted by RPS for inaccuracies in the data supplied.

6. This report is prepared and written in the context of the proposals stated in the introduction to this report and its contents should not be used out of context. Furthermore new information, changed practices and changes in legislation may necessitate revised interpretation of the report after its original submission.

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CONTENTS

1 INTRODUCTION

1.1 RPS was commissioned to undertake a Flood Risk Assessment (FRA) of *Informer House, 2 High Street, Teddington TW11 8EW* in relation to the proposed redevelopment of the site to a mixed residential and commercial use.

1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to the CIRIA SUDS manual (C753), the London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA) and the London Borough of Richmond upon Thames Surface Water Management Plan (SWMP).

1.3 This report has been produced in consultation with the Environment Agency (EA) and the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage Board (IDB) District.

1.4 This report is not intended to provide formal details of the final drainage design for the development. However, it provides information regarding the capabilities of the conceptual surface water drainage strategy to meet the requirements of the NPPF.

1.5 The desk study was undertaken by reference to information provided / published by the following bodies:

- EA
- British Geological Survey (BGS)
- Ordnance Survey (OS)
- Thames Water

2 PLANNING POLICY CONTEXT

National Planning Policy

2.1 The PPG released in March 2014, advises of the requirements for a site specific Flood Risk Assessment (FRA) for any of the following cases:

- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
- All proposals greater than 1ha in an area located in Flood Zone 1 (low probability);
- All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA); and
- Where proposed development may be subject to other sources of flooding.

2.2 In a written statement to Parliament on 18th December 2014, the Secretary of State for Communities and Local Government strengthened existing planning policy on sustainable drainage, making it clear that sustainable drainage systems should be provided in new developments, unless demonstrated to be inappropriate. The statement requires that:

'*in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate*'.

2.3 These changes took effect from 6 April 2015. This policy applies to all developments of 10 homes or more and to major commercial development.

2.4 Defra published their 'Non-statutory technical standards for sustainable drainage systems', in support of the above policy changes, in March 2015.

Regional Planning Policy

2.5 The development site is within the London Borough of Richmond upon Thames (LBRuT) which is covered by The London Plan, as amended March 2015. The London Plan contains various policies pertaining to flood risk and drainage, the relevant aspects of which are reproduced below.

Policy 5.11 Green roofs and development site environs

2.6 This policy promotes the use of green roofs and walls where feasible, to deliver objectives including sustainable urban drainage amongst other wider environmental and sustainability benefits.

Policy 5.12 Flood risk management

2.7 This Policy states that '*the Mayor will work with all relevant agencies including the Environment Agency to address current and future flood issues and minimise risks in a sustainable and cost effective way'.*

2.8 *'Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 and Catchment Flood Management Plans.'*

2.9 The Policy sets out requirements for developments for which the NPPF Exception Test is applicable and developments adjacent to flood defences.

Policy 5.13 Sustainable drainage

2.10 This policy states '*development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve Greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:*

- *store rainwater for later use;*
- *use infiltration techniques, such as porous surfaces in non-clay areas;*
- *attenuate rainwater in ponds or open water features for gradual release;*
- *attenuate rainwater by storing in tanks or sealed water features for gradual release;*
- *discharge rainwater direct to a watercourse;*
- *discharge rainwater to a surface water sewer/drain; and*
- *discharge rainwater to the combined sewer.*

Drainage should be designed and implemented in ways that deliver other policy objectives of the Plan, including water use efficiency and quality, biodiversity, amenity and recreation.'

2.11 The London Plan is supported by the Supplementary Planning Guidance: Sustainable Design and Construction, April 2014. In relation to Surface Water Flooding and Sustainable Drainage, the guidance states that developers should design Sustainable Drainage Systems (SuDS) that

incorporate attenuation for surface water runoff. The minimum expectation is to achieve 50% attenuation of the undeveloped site's surface water run off at peak times. The Mayor's priority is to achieve greenfield runoff rates. Development on greenfield sites must maintain a greenfield runoff rate. Development on previously developed sites should have a runoff rate no greater than three times the calculated greenfield runoff rate.

Local Planning Policy

2.12 The LBRuT Core Strategy contains the following Policies relating to flood risk and drainage:

CP3 Climate Change - Adapting to the Effects

2.13 *'3.A Development will need to be designed to take account of the impacts of climate change over its lifetime, including:*

- *Water conservation and drainage*
- *The need for Summer cooling*
- *Risk of subsidence*
- *Flood risk from the River Thames and its tributaries*

2.14 *3.B Development in areas of high flood risk will be restricted, in accordance with PPS25, and using the Environment Agency's Catchment Flood Management Plan, Borough's Strategic Flood Risk Assessment and site level assessments to determine risk.'*

2.15 The LBRuT Development Management Plan contains the following Policies relating to flood risk and drainage:

Policy DM SD 6- Flood Risk

2.16 *'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.*

2.17 *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.*

2.18 *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.'*

Policy DM SD 7 – Sustainable Drainage

2.19 *'All development proposals are required to follow the drainage hierarchy 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.*

2.20 *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.'*

2.21 LBRuT has also published a guidance document for the incorporation of SuDS within developments entitled 'Delivering SuDS in Richmond'. This FRA report has been undertaken with due consideration of the guidance detailed within.

2.22 The LBRuT Strategic Flood Risk Assessment (SFRA) identifies and maps flood risk from all sources at a borough-wide scale as well as providing guidance on producing site specific FRAs. Relevant information from the SWMP has been reproduced throughout this report.

2.23 The LBRuT Surface Water Management Plan (SWMP) assesses the risk of surface water flooding within Richmond and identifies options to manage risk to an acceptable level. Relevant information from the SWMP has been reproduced throughout this report.

3 CONSULTATION

3.1 The public sewer network within the vicinity of the site is operated by Thames Water. A pre-development enquiry has been made to Thames Water and they have confirmed that they have sufficient capacity for both the foul and surface water runoff from the site providing the surface water runoff is reduced by at least 50% compared to the current situation. The full response from the pre-development enquiry has been included within Appendix D.

3.2 The conceptual surface water attenuation scheme presented in this report (see section 10) is intended to demonstrate that a feasible surface water attenuation solution can be achieved on the site to meet the requirements of the NPPF. The detailed drainage design for the proposed development will be finalised in consultation with Thames Water at detailed design stage.

4 SITE DESCRIPTION

Site Description

4.1 The site is located at National Grid Reference TQ 15916 71032. It is roughly rectangular in shape, occupying an area of approximately 0.06 hectares. A site location plan is provided in Figure 1.

4.2 The site is currently occupied by a two-storey building in commercial use with lower ground floor and undercroft car parking.

4.3 The site is occupied approximately 80% by building footprint and 20% by hardstanding.

Surrounding Land Uses

4.4 The site is within a mixed residential and commercial area.

4.5 The Bushy Park and Home Site of Special Scientific Interest (SSSI) is located 600m south of the site. It is located at a higher elevation than the subject site, therefore runoff from the site would not discharge to the SSSI. However, the site is located within an SSSI Impact Risk Zone, with restrictions in place for any discharge of water or liquid waste that is more than 20m³/day.

Topography

4.6 The area to the north of the site slopes down to the northeast. Street level to the north of the site is approximately 4.5m higher than land to the south of the site. Level access to the building is available at lower ground floor level in the south of the site at approximately 8.15m AOD and at ground floor level, approximately 12.68m AOD, off High Street to the north of the site. The topographic survey has been included within Appendix A.

5 PROPOSED DEVELOPMENT

5.1 The proposal is for redevelopment of the site to a six storey building with lower ground floor and undercroft parking. Development plans are shown in Appendix B.

5.2 The ground floor is proposed for commercial use with residential flats on the five storeys above. The lower ground floor would be only beneath the north of the site and will comprise plant room, cycle storage and refuse storage. The south of the lower ground floor level is proposed for undercroft parking with cycle and bin storage. There will be internal access to the upper floors from the lower ground floor level.

5.3 Finished floor levels of the lower ground floor with be 8.15m AOD, 12.65m AOD for the ground floor level in the north (and 11.850m AOD in the south) and 15.85m AOD for the first floor level.

5.4 Vehicular access to the car park will be from Enterprise Way, through Teddington Business Park, to the south of the site into the lower ground floor of the development. Primary access to both the commercial and residential aspects will be from Teddington High Street to the north of the site.

5.5 The site will remain entirely surfaced with hardstanding following redevelopment.

5.6 The proposed residential use of the site is classified as ‘more vulnerable’ within the PPG.

5.7 At this stage, an indicative drainage layout has not been designed for the site. However, it is anticipated that surface water runoff will pass to the existing surface water sewer beneath the site. The acceptable discharge rate to the existing mains sewer will need to be agreed with Thames Water in consultation with the LLFA. Thames Water have advised there is sufficient capacity within receiving surface water sewers for the proposed development providing runoff is reduced by 50% compared with current rates.

5.8 The potential to provide surface water attenuation, including the use of Sustainable Drainage Systems (SuDS), has been considered as part of the preliminary design process (see Section 10 – Surface Water Management).

6 HYDROLOGICAL SETTING

Nearby Watercourses

6.1 Reference to OS Mapping indicates that there are no surface water features within 500m of the subject site. The nearest is a short length of surface water drain located 700m southwest of the site, which flows in an easterly direction.

6.2 The nearest main watercourse is the River Thames, located 780m northeast of the site. It flows in a northwesterly direction and is not tidally influenced in the vicinity of the site.

Flood Risk Classification

6.3 The EA flood map (available online) indicates that the site is located within Flood Zone 1, whereby the annual probability of flooding from fluvial or tidal sources is classified as less than 1 in 1000. The EA Flood Map is provided in Figure 2.

6.4 The EA Risk of Flooding from Surface Water map (available online) indicates that the site itself is at a 'very low' risk of surface water flooding. This corresponds with an annual probability of flooding that is less than 1 in 1000. The access road to the south of the site is shown to be at a 'medium' risk of surface water flooding which corresponds to an annual probability of flooding which is greater than 1 in 100 but less than 1 in 30. Flood depths of up to 900mm are shown on the access road during a 1 in 100 year rainfall event.

6.5 EA mapping also indicates that the site is not located within an area potentially at risk from reservoir flooding.

6.6 The LBRuT SFRA Level 1 Update was published in August 2010. It provides an overview of flood risk from various sources within the borough. Information of relevance to this assessment is summarised below:

- The vicinity of the site is identified as an area with intermediate susceptibility to surface water flooding. RPS notes that the SFRA highlights this map is not suitable for identifying surface water flood risk to individual properties.
- There are no records of historical groundwater flooding within the vicinity of the site.
- The site is not indicated to have localised drainage issues.

6.7 The LBRuT SWMP was published in September 2011. It assesses the risk of surface water flooding within the borough. Key information of relevance to this assessment is summarised below:

- The site is located within a Critical Drainage Area (CDA).
- Modelling undertaken as part of the SWMP shows surface water flood depths of up to 1.5m in the north of the site during a 1 in 100 year event. This corresponds with a hazard rating of 'Danger for all'. The south of the site is indicated to have flooding less than 0.1m across the site. This corresponds with a 'very low' hazard. RPS notes that this modelling was undertaken in July 2011. This is considered to be superseded by more recent EA surface water mapping.
- The site is within an area indicated to have an increased potential for elevated groundwater within the permeable superficial deposits beneath the site.
- Thames Water hold records of 6-10 sewer flooding incidents occurring in the postcode area of the site.
- There are no recorded incidents of surface water flooding within the vicinity of the site.

7 HYDROGEOLOGICAL SETTING

7.1 Reference to the BGS online mapping (1:50,000 scale) indicates that the site is underlain by the Kempton Park Gravel Formation comprising sand and gravels. This overlays the London Clay Formation.

7.2 A nearby BGS borehole located approximately 70m west of the site records clay at 4m below ground level (bgl) beneath the superficial deposits and encountered groundwater at 3.2m bgl.

7.3 The soils are described as 'Freely draining slightly acid loamy soils' by the National Soils Research Institute.

7.4 According to the EA's online Groundwater Vulnerability Mapping, the Kempton Park Gravel Formation at the surface is classified as a Principal Aquifer. These formations provide a high level of water storage and may support water supply and / or river base flow on a strategic scale.

7.5 This is underlain by an Unproductive Stratum relating to the London Clay Formation. These formations have a low permeability and have negligible significance for water supply or base flow.

7.6 Reference to the EA's online groundwater Source Protection Zone maps indicates that the site is not located within a groundwater Source Protection Zone.

8 EXISTING DRAINAGE / WATER MAINS

8.1 Reference to Thames Water plans of public sewers (shown in Appendix C) indicates that the site is likely served by a 450mm surface water sewer which travels beneath High Street to the north of the site and crosses beneath the site itself. Manhole and sewer invert levels are not available for sewers in the vicinity of the site.

8.2 Reference to water network plans provided by Thames Water indicates that the site is served by a water main shown beneath the south of the site.

8.3 Consultation should be undertaken with Thames Water in regard to the possibility of diversion or standoff requirements for the existing sewer and water mains beneath the site.

9 FLOOD RISK AND MITIGATION

9.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

9.2 The EA Flood Map (see Figure 2) indicates that the site is located within Flood Zone 1. The annual probability of flooding is classified as less than 1 in 1000 in the absence of any defences.

9.3 The PPG details the suitability of different land uses within each flood zone. The proposed land use is classified as 'more vulnerable' and such uses are generally considered appropriate within Flood Zone 1.

Proposed Mitigation

9.4 No mitigation is deemed necessary with regard to fluvial / tidal flooding.

Flooding from sewers

9.5 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. The site is currently served by a Thames Water surface water sewer beneath the north of the site (detailed in Section 8).

9.6 The SFRA shows records of 6-10 sewer flooding incidents occurring within the postcode area of the site. In the event of sewer flooding in the vicinity of the site, residential units are located on first floor level and above only and therefore significantly above any potential flood waters.

Proposed Mitigation

9.7 It is recommended that that a cut-off drain or raised speed hump are positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.

Surface water flooding (overland flow)

9.8 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems. Although the site is within a CDA, and significant flood depths on site were modelled within the SWMP, more recent EA mapping shows the entire site is at a 'very low' risk of surface water flooding.

9.9 The lower ground floor of the site is primarily proposed for undercroft parking with cycle and bin storage. The vulnerability of this area to flooding is therefore low. Residential units are proposed in the first floor and above only which is elevated significantly above potential flood levels from any source.

9.10 Enterprise Way to the south of the site is shown to have flood depths of up to 900mm during a 1 in 100 year event rainfall event. In the event of significant surface water flooding on the access road to the south of the site and in the lower ground floor of the development (used for parking, refuge and plant only), all residents and site users will be able to exit the building at ground floor level on to High Street to the north of the site into an area of 'very low' surface water flood risk.

9.11 Surface water flooding from on-site sources is considered in Section 10 of this report.

Proposed Mitigation

9.12 It is recommended that that a cut-off drain or raised speed hump are positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.

Groundwater flooding

9.13 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the site is underlain by Kempton Park Gravels and London Clay. A nearby BGS borehole encountered groundwater at 3.2m bgl.

9.14 Although the SWMP identified that the site is within an area indicated to be at an increased potential for elevated groundwater within the permeable superficial deposits beneath the site, the SFRA shows no records of historic groundwater flooding in the vicinity of the site.

9.15 The proposed redevelopment has no below ground floors which may be more susceptible to groundwater flooding. The lower ground floor level is created by the changes in ground level from the railway bridge rather than by excavation into the natural ground.

Proposed Mitigation

9.16 No mitigation is deemed necessary in relation to groundwater flooding.

Other Sources

9.17 There is a limited risk of flooding occurring as a result of a break in a water main. The locations of the water mains in the immediate vicinity of the site are described in Section 8 and include a water main beneath the south of the site. In the event of flooding from this water main, flooding would occur in the lower ground floor of the proposed development which is primarily used as undercroft parking and therefore less vulnerable to flooding. The proposed residential uses are on the first floor level and above and therefore raised significantly above potential flood waters from any source.

9.18 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

9.19 The site is not located within an area potentially at risk from reservoir flooding according to EA mapping.

Proposed Mitigation

9.20 It is recommended that that a cut-off drain or raised speed hump are positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.

Event Exceedence and Residual Risk

9.21 The mitigation measures proposed as part of the development scheme are considered appropriate to mitigate against any residual risks or event exceedence scenarios.

10 SURFACE WATER MANAGEMENT

Introduction

10.1 The proposed redevelopment of the site will result in no change to the amount of hardstanding at the site.

10.2 Under the PPG, SuDS should be provided for major developments unless demonstrated to be inappropriate. The non-statutory technical standards for SuDS (Defra, March 2015) states that the peak runoff rate from the development for the 1 in 1 year and 1 in 100 year rainfall event should not exceed the equivalent greenfield rate for greenfield developments, or the pre-development rate for previously developed sites. Where reasonably practicable, the runoff volume from the development for the 1 in 100 year, 6 hour rainfall event should be constrained to the greenfield volume for greenfield developments, and the pre-development volume for previously developed sites.

10.3 The LBRuT, as the LLFA, advocates the use of SuDS at all sites with policy stating that any discharge should be reduced to greenfield run-off rates wherever feasible, in accordance with the London Plan.

10.4 Using Micro-Drainage WinDes modelling, the QBAR greenfield discharge rate from the site has been calculated as 1.5 litres / second. Runoff rates of less than 2 litres / second are considered unsuitable as they can cause blockage within the drainage system. Proposed runoff rates have therefore been limited to 2 litres / second for the site as the lowest practical minimum rate.

10.5 The proposed impermeable area is 600m^2. In order to attenuate runoff from the site during a 1 in 100 year plus 40% climate change event, whilst meeting the required runoff rate of 2 litres / second, it has been calculated that 22.4m^3 of attenuation would be required. The micro-drainage calculations used to calculate this requirement are provided in Appendix E. A 40% climate change allowance has been used in accordance with EA guidance on climate change released in February 2016.

Consideration of Sustainable Drainage Systems

10.6 The potential for the use of SuDS has been considered at this stage.

Swales, detention basins and ponds

10.7 The site will be occupied almost entirely by building footprint and therefore incorporating large landscaped features such as ponds and detention basins would not be possible.

Soakaways

10.8 Reference to BGS mapping indicates that the site is underlain by Kempton Park Gravels, which are likely to be of a high permeability. The soils are described as 'freely draining slightly acid loamy soils' by the National Soils Research Institute. Given the reported geological conditions beneath the site, it is considered that soakaways could provide a feasible method for the disposal of surface water runoff from the site. However, given the space constraints at the site, soakaways have not been considered. Furthermore, infiltration SuDS may not be suitable given the railway adjacent to the west of the site.

Rainwater Harvesting

10.9 The attenuation benefits provided through the use of rainwater harvesting are considered to be limited, and would only be realised when the tanks were not full. Rainwater harvesting has therefore not been proposed for use at the site.

Green Roofs

10.10 Green roofs have not been proposed for use at the site.

Porous / Permeable Paving

10.11 The site will be occupied almost entirely by building cover and therefore the potential for permeable paving is limited. Permeable paving has therefore not been proposed for use at the site.

Modular Underground Attenuation Tanks

10.12 An underground attenuation tank has been proposed beneath the undercroft car parking area.

Conceptual Surface Water Attenuation Scheme

10.13 On the basis of the WinDes Micro Drainage calculations above, a total attenuation volume of 22.4m^3 will be required to reduce runoff to the lowest practical minimum.

10.14 The proposed underground attenuation tank will have dimensions: 4m x 5m x 1.2m and a void ratio of 95%. This therefore has the potential to provide 24m^3 of attenuation.

10.15 Following the Drainage Hierarchy, the potential for storage and infiltration of runoff has been considered. Storage within open features and infiltration methods are not feasible given the site constraints. However, storage will be provided within the underground attenuation tank for gradual release. This method will ensure that runoff is managed as close to the source as possible. Runoff will be discharged to the on-site sewer (as at present) which is also in accordance with the Hierarchy. The necessary consents will be obtained from the LLFA and Thames Water, with whom the final discharge rate would be agreed. The proposed attenuation

provides a substantial reduction in surface water runoff compared to the current situation and will reduce rates significantly beyond the 50% reduction required by Thames Water.

10.16 Given that the impermeable area will remain the same after redevelopment, the volume of runoff discharged from the site will remain as present following completion of the development. However, discharge is proposed at the lowest practical minimum rate to allow for long term storage.

10.17 A conceptual surface water attenuation plan has been produced outlining the potential location for an underground attenuation tank. This has been provided in Appendix F.

10.18 Overall, an underground attenuation tank has been proposed beneath the car park area of the site. This will result in a reduction in runoff rates to the lowest practical minimum rate of 2 litres / second. As a result of the proposed measures, there will be a significant reduction in flood risk within the area.

10.19 The LBRuT SuDS Design Assessment Checklist has been completed and is included within Appendix G.

Maintenance of Sustainable Drainage Systems

10.20 The detailed design of the surface water attenuation scheme will take account of the construction, operation and maintenance requirements of surface and subsurface components. Access will be allowed for future maintenance of SuDS elements. A Maintenance Plan has been prepared and is included as Appendix H.

Event Exceedence

10.21 The proposed indicative surface water drainage concept provides underground storage up to the 1 in 100 year plus climate change event. In an event exceeding this magnitude, detailed drainage design will identify mitigation measures to ensure that the resulting above-ground flooding will not affect the buildings on site or significantly increase flood risk to off-site locations.

10.22 Event exceedence planning will be undertaken as part of the final design process. Suitable mitigation measures will be incorporated into the development to ensure water is retained on-site should surcharging of on-site drains occur during extreme rainfall events.

11 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

11.1 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding. Given that the subject site has not been allocated as one of the Council's proposed future development sites, it has not been specifically assessed within the SFRA. Therefore the Sequential Test is based on the EA Flood Zones and information contained within the SFRA.

11.2 The site is located in Flood Zone 1 and is at a 'very low' risk of surface water flooding. No other significant risks have been identified from any of the other sources of flooding assessed in this report. Furthermore, the layout of the proposed development follows a sequential approach with the least vulnerable elements on the lower ground and ground floor level. All residential units are proposed on the first floor level and above, in the area at the lowest risk of flooding from all sources. The proposed development is therefore considered to pass the Sequential Test.

The Exception Test

11.3 According to Table 3 of the PPG to the NPPF, 'more vulnerable' developments are considered appropriate within Flood Zone 1 without the requirement to apply the Exception Test. Therefore, application of the Exception Test is not required for the proposed development.

12 SUMMARY AND CONCLUSIONS

12.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF. Reference has also been made to the CIRIA SUDS manual (C753), the SFRA and the SWMP and following consultation with the LLFA.

12.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in the table below:

Source of flooding	Identified Risk			Mitigation proposed	Residual risk		
	L	M	H		L	M	H
Fluvial / Tidal	✓			No mitigation deemed necessary.	✓		
Sewers	✓			It is recommended that that a cut-off drain or raised speed hump are positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.	✓		
Surface Water	✓			It is recommended that that a cut-off drain or raised speed hump are positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.	✓		
Groundwater	✓			No mitigation deemed necessary.	✓		
Other Sources (e.g. reservoirs, water mains)	✓			It is recommended that that a cut-off drain or raised speed hump are	✓		

				positioned at the entrance to the lower ground floor level and that ground floor levels are raised 150mm above surrounding ground levels as a best practice measure to prevent the ingress of water from any source.			

12.3 The site is within Flood Zone 1 and no significant risks have been identified from the other sources of flooding assessed.

12.4 It has been demonstrated that the development meets the Sequential Test imposed under the NPPF.

12.5 Overall, it has been demonstrated that the development would be safe, without increasing flood risk elsewhere, and that a positive reduction in flood risk would be achieved through the use of an underground attenuation tank which will reduce runoff rates to the lowest practical minimum rate.

FIGURES

Figure 1: Site Location Plan

Map Date: Current

Scale: Not to scale

RPS
35 New Bridge Street
London
EC4V 6BW

☎ 020-7280-3240
www.rpsgroup.com

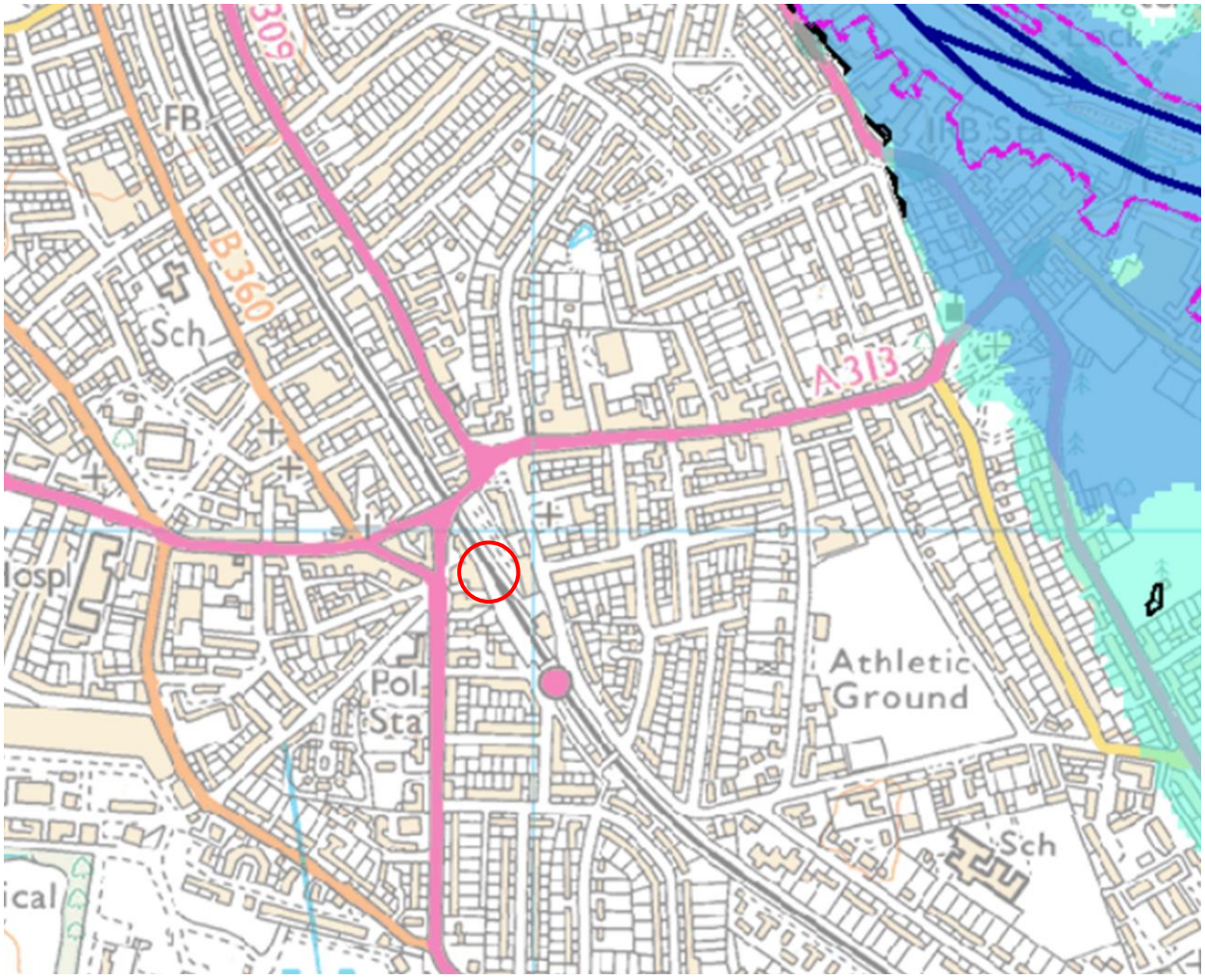


Figure 2: Environment Agency Flood Map

Map Date: Current

Scale: Not to scale

RPS
35 New Bridge Street
London
EC4V 6BW

☎ 020-7280-3240
www.rpsgroup.com

APPENDIX A

Topographic Survey

KEY

BT	British Telecom
BOL	Bollard
CB	Control Box
CL	Cover Level
CTV	Cable Television
EL	Electric
EP	Electricity Pole
FH	Fire Hydrant
GSV	Gas Stop Valve
HT	Height
HVC	High Voltage Cable
IC	Inspection Cover
IL	Invert Level
LP	Lamp Post
MH	Man-Hole
MKR	Marker
MW	Monitoring Well
O/H	Overhead
G	Road Gully
PB	Post Box
PC	Pram Crossing
RNP	Road Name Plate
RS	Road Sign
S/A	Soakaway
ST	Stay / Strut
SV	Stop Valve (Unidentified)
TB	Telephone Box
TC	Telecom
TH	Trial Hole
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable to Lift
VP	Vent pipe
WM	Water Meter
WSV	Water Stop Valve

FENCES

BWF	Barbed Wire Fence
CBF	Closed Board Fence
CP	Concrete Post
CPF	Chestnut Paling Fence
CWF	Chicken Wire Fence
IRF	Iron Railing Fence
PKF	Picket Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence

SURVEY STATION INFORMATION

STATION	EASTING	NORTHING	LEVEL	TYPE
T1	5918.450	1022.052	8.065	NAIL
T2	5914.060	1025.247	8.157	NAIL
T3	5928.310	1038.814	8.401	NAIL
T4	5956.600	959.626	7.884	NAIL
T5	5904.450	1033.453	10.985	NAIL
T6	5917.940	1048.696	13.572	NAIL
T7	5908.970	1037.668	12.678	NAIL
T8	5912.420	1037.016	12.629	NAIL
T9	5901.260	1044.533	12.809	NAIL
T10	5884.070	1029.136	13.449	NAIL
T11	5922.640	1064.030	11.471	NAIL

Revisions A

Additional building heights added. 11/08/2015

NOTES:

The survey grid has been related to a local determination of OS National Grid using a flat earth projection and metric scale factor of 1, centred on Station T9. Levels are related to OS datum determined from the National GPS Network using OSGM02.

The position and height of adjacent buildings have been obtained using higher level reflectorless measurement and may not take account of single storey extensions or conservatories below the line of sight.

Geomatic Surveyors

siteline

Unit E, Woodside
34 Parham Drive
Eastleigh
SO50 4NU

t: 023 8081 1081
f: 023 8081 1012
w: siteline.co.uk

RICHMOND HOUSING PARTNERSHIP	Client
No. 2 HIGH STREET TEDDINGTON LONDON	Contract
SITE SURVEY	Title
863HS01A	Drawing No.
JUNE 2015	Date
1:100 (A1)	Scale
TL	Surveyor

APPENDIX B

Development Plans

In abeyance

6775

6775

5000

2400

Recycling (1280 Eurobin)

Recycling (1280 Eurobin)

Recycling (1280 Eurobin)

Recycling (1280 Eurobin)

Recycling (1280 Eurobin)

Recycling (1280 Eurobin)

0 2m

Rev	Date	Notes
-	08.04.16	FIRST ISSUE

drawing:
PROPOSED LOWER GROUND PLAN

project:
WP-0410 - INFORMER HOUSE

drawing ref: WP-0410-GA-P-LB -

revision:

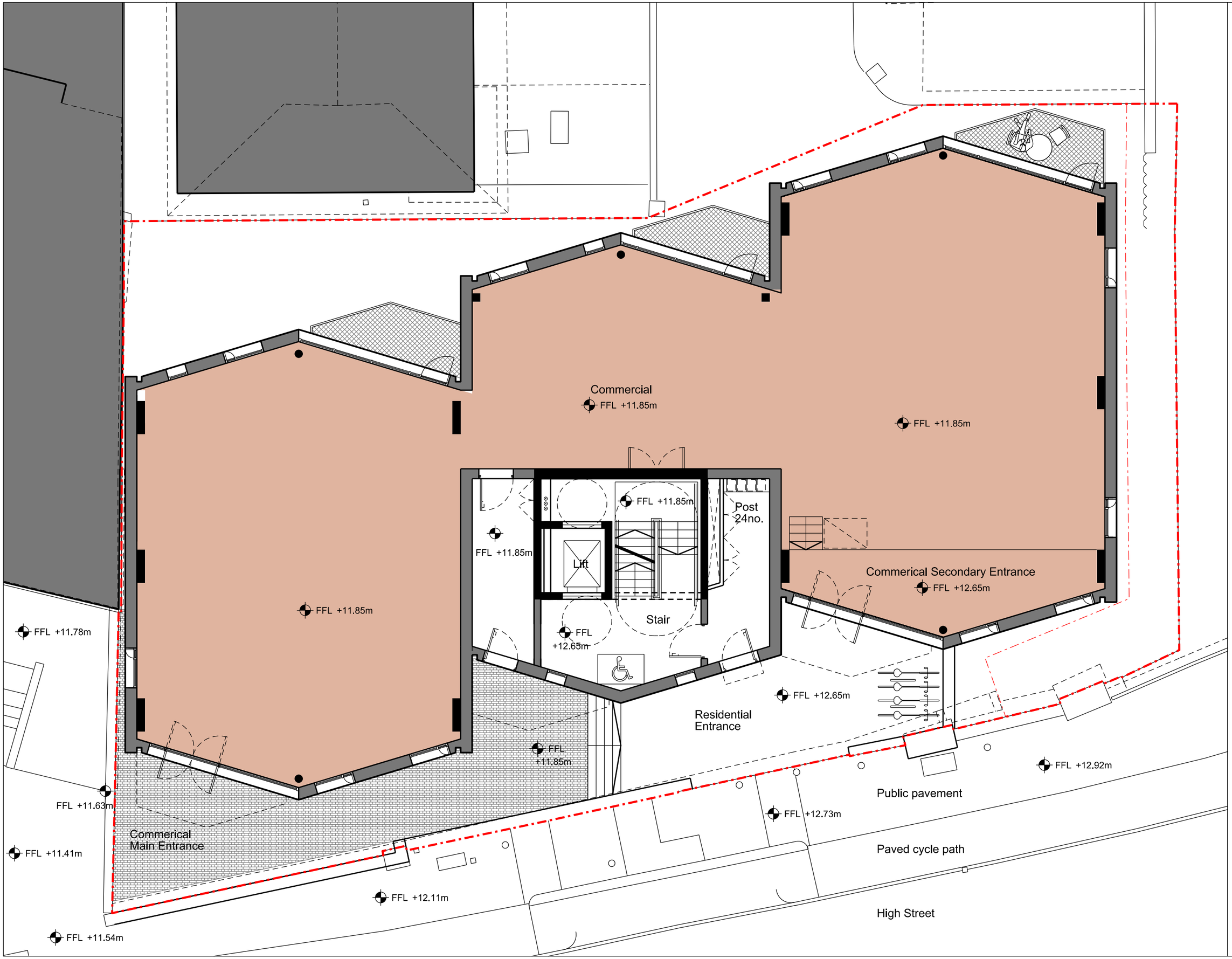
scale @ A3: 1:100

date: 08.06.2016

status:
DRAFT PLANNING

WIMSHURST PELLERITI

0208 780 2206
info@wimshurst.uk.com
wimshurst-pelleriti.com



0 2m

Do not scale-off this drawing. Wimshurst Partners take no responsibility for any dimensions obtained by measuring or scaling from this drawing and no reliance may be placed on such dimensions. If no dimension is given, it is the responsibility of the recipient to ascertain the dimension specifically from the Architect or by site measurement.

The sizing of all structural and service elements must always be checked against the relevant engineers drawings. No reliance should be placed upon sizing information shown on this drawing.

Rev	Date	Notes
-	08.04.16	FIRST ISSUE

drawing:
GROUND FLOOR PLAN

project:
WP-0410 - INFORMER HOUSE

drawing ref: WP-0410-GA-P-L0 | revision: P01

scale @ A3: 1:100 | date: 08.06.2016

status:
DRAFT PLANNING

WIMSHURST PELLERITI

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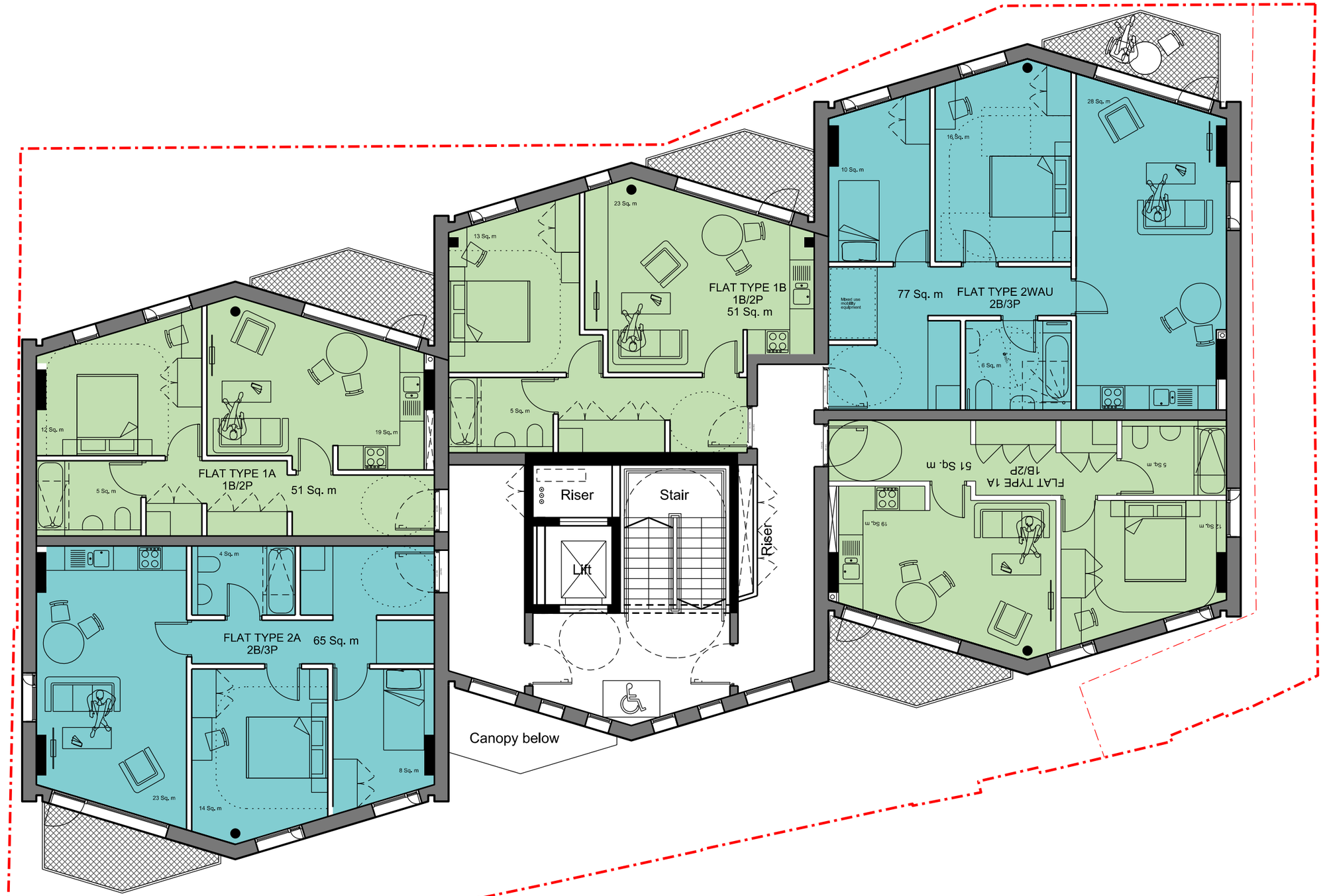
info@wimshurst.uk.com
wimshurst-pelleriti.com



0 2m

Do not scale-off this drawing. Wimshurst Partners take no responsibility for any dimensions obtained by measuring or scaling from this drawing and no reliance may be placed on such dimensions. If no dimension is given, it is the responsibility of the recipient to ascertain the dimension specifically from the Architect or by site measurement.

The sizing of all structural and service elements must always be checked against the relevant engineers drawings. No reliance should be placed upon sizing information shown on this drawing.

Rev	Date	Notes
-	08.04.16	FIRST ISSUE

drawing:
PROPOSED FIRST FLOOR PLAN

project:
WP-0410 - INFORMER HOUSE

drawing ref: WP-0410-GA-P-L1
revision: P01

scale @ A3: 1:100
date: 08.06.2016

status:
DRAFT PLANNING

WIMSHURST PELLERITI

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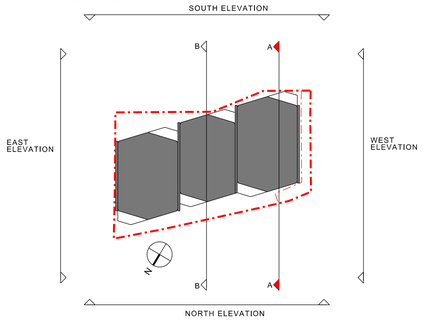
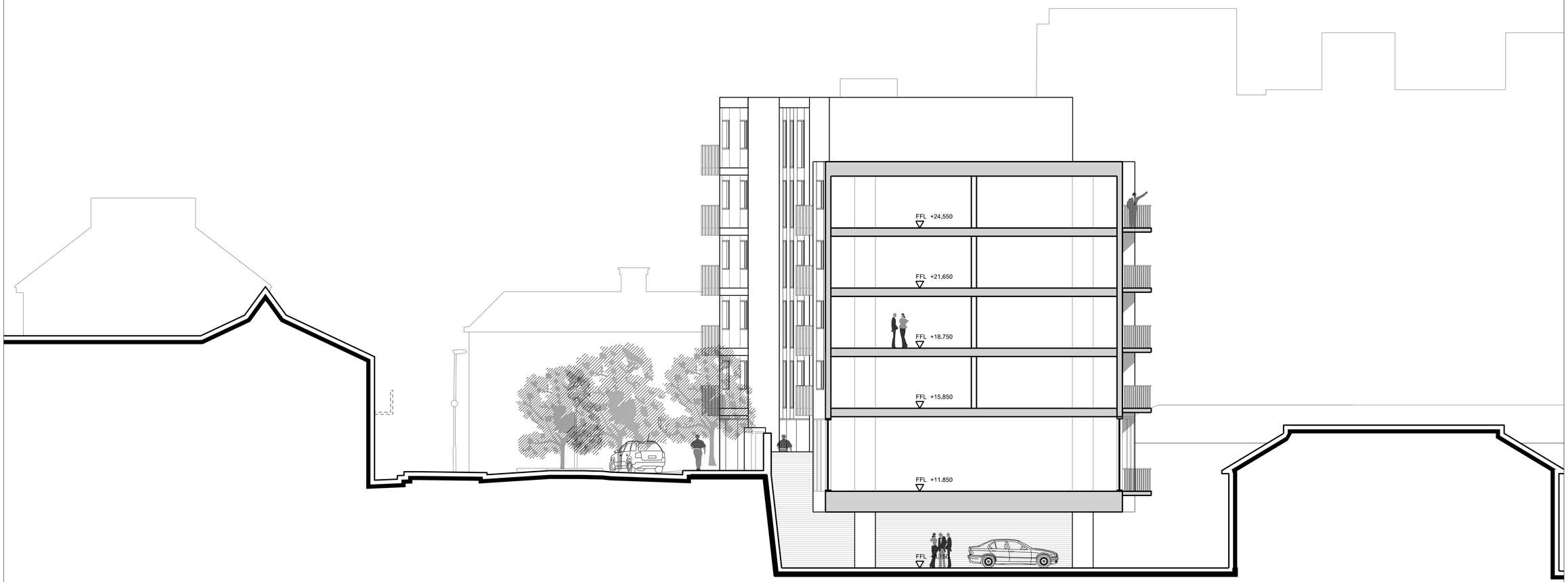
info@wimshurst.uk.com
wimshurst-pelleriti.com

KEY PLAN





0 2m 4m

1:100 @ A1

Rev	Date	Notes
-	08.04.16	FIRST ISSUE
P01	15.04.16	PRE-APP-AMENDMENT

drawing:

Section AA

project:

WP-0410
INFORMER HOUSE

drawing ref: WP-0410-GA-S-AA

revision: P01

scale @ A1/A3: 1:100/1:200

date: 08.06.16

status:

DRAFT PLANNING

WIMSHURST PELLERITI

0208 780 2206
info@wp.uk.com
wimshurst-pelleriti.com

APPENDIX C

Thames Water Sewer Plans

CommercialDW
Drainage and Water Enquiry

Russell-Cooke
DX59456 PUTNEY

Search address supplied

Informer House
2
High Street
Teddington
TW118EW

Your reference 14/PJN/141340/1

Our reference CDWS/CDWS Standard/2011_2058810

Received date **4 August 2011**

Search date **4 August 2011**

Please Note:

This report provides £2m of capped liability cover for the details contained within this enquiry. Our commercial customers have requested that we develop products with higher levels of indemnity cover, so in response Thames Water can now provide commercial drainage and water enquiries with £5m and £10m cover. For full details and costs, please contact customer service team on 0118 9251504 or visit www.twpropertyinsight.co.uk for full details.

COMMERCIALDW
DRAINAGE AND WATER ENQUIRY

Thames Water Utilities Ltd

Property Insight
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
F 0118 923 6655/57
E searches@thameswater.co.uk
I www.twpropertyinsight.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

CommercialDW

Drainage and Water Enquiry

Order Summary

	Question	Answer
Maps		
1	Where relevant, please include a copy of an extract from the public sewer map.	Map Provided
2	Where relevant, please include a copy of an extract from the map of waterworks.	Map Provided
Drainage		
3	Does foul water from the property drain to a public sewer?	Connected
4	Does surface water from the property drain to a public sewer?	Connected
5	Is a surface water drainage charge payable?	Charge Payable
6	Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundary of the property?	Yes
7	Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?	Yes
8	Are any sewers or lateral drains serving, or which are proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement?	No
9	Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?	No
10	Is any building which is or forms part of the property, at risk of internal flooding due to overloaded public sewers?	See Details
11	Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.	See Details
Water		
12	Is the property connected to mains water supply?	Connected
13	Are there any water mains, resource mains or discharge pipes within the boundary of the property?	Yes
14	Is there any water main or service pipe serving, or which is proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement?	No
15	Is the property at risk of receiving low water pressure or flow?	No
16	Please include details of a water quality analysis made by the water undertaker for the water supply zone in respect of the most recent calendar year.	See Details

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CommercialDW
Drainage and Water Enquiry

17	Please include details of any departures, authorised by the Secretary of State or by the National Assembly for Wales under Part 6 of the 2000 Regulations from the provisions of Part 3 of those Regulations.	Passed

Charging

18	Please include details of the location of any water meter serving the property.	See Details
19	Who is the sewerage and water undertakers for the area?	See Details
20	Who bills the property for sewerage services?	See Details
21	Who bills the property for water services?	See Details
22	What is the current basis for charging for sewerage and / or water services at the property?	Metered

Optional Additional Information

23	Are there any trade effluent consents relating to this site/property for disposal of chemically enhanced waste?	No
24	Is there a wayleave agreement giving Thames Water the right of access to pass through private land in order to reach the Company's assets?	No
25	Is there an easement agreement giving the Company the right of access to Assets located in private land which prevent the landowner from restricting the Company's access?	No
26	Details of any manhole cover and invert levels applicable to this site are enclosed.	See Details

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Clearwater Court, Vastern Road
Reading RG1 8DB

CommercialDW
Drainage and Water Enquiry

Search address supplied: Informer House, 2, High Street, Teddington, TW118EW

Any new owner or occupier will need to contact Thames Water on 0845 9200 888 or log onto our website www.thameswater.co.uk and complete our online form to change the water and drainage services bills to their name.

The following records were searched in compiling this report: - the map of public sewers, the map of waterworks, water and sewer billing records, adoption of public sewer records, building over public sewer records, the register of properties subject to internal foul flooding, the register of properties subject to poor water pressure and the drinking water register. Thames Water Utilities Ltd (TWUL) holds all of these.

TWUL, trading as Property Insight, are responsible in respect of the following: -

(i) any negligent or incorrect entry in the records searched

(ii) any negligent or incorrect interpretation of the records searched

(iii) any negligent or incorrect recording of that interpretation in the search report

(iv) and compensation payments

Please refer to the attached Terms & Conditions. Customers and clients are asked to note these terms, which govern the basis on which this Commercial Drainage and Water search is supplied.

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No. 2366661, Registered office
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Reading RG1 8DB

CommercialDW
Drainage and Water Enquiry

Maps

Q1 Where relevant, please include a copy of an extract from the public sewer map.

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

Q2 Where relevant, please include a copy of an extract from the map of waterworks.

A copy of an extract of the map of waterworks is included, showing water mains, resource mains or discharge pipes in the vicinity of the property.

Drainage

Q3 Does foul water from the property drain to a public sewer?

Yes, records indicate that foul water from the property drains to a public sewer.

Q4 Does surface water from the property drain to a public sewer?

Yes, records indicate that surface water from the property does drain to a public sewer.

Q5 Is a surface water drainage charge payable?

Records confirm that a surface water drainage charge is payable for the property.

Q6 Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundary of the property?

The public sewer map included indicates that there is a public sewer, disposal main or lateral drain within the boundaries of the property.

Q7 Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?

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

Thames Water Utilities Ltd

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Q8 Are any sewers or lateral drains serving, or which are proposed to serve, the property the subject of an existing adoption agreement or an application for such an agreement?

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

Q9 Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?

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

Q10 Is any building which is or forms part of the property, at risk of internal flooding due to overloaded public sewers?

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

Q11 Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.

The nearest sewage treatment works is 4.376 kilometeres to the north of the property. The name of the nearest sewage treatment works is MOGDEN STW.

Water

Q12 Is the property connected to mains water supply?

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

Q13 Are there any water mains, resource mains or discharge pipes within the boundary of the property?

The map of waterworks indicates that there are water mains, resource mains or discharge pipes within the boundaries of the property.

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I www.twpropertyinsight.co.uk

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No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Q14 Is any water main or service pipe serving, or which is proposed to serve, the property the subject of an existing adoption agreement or an application for such an agreement?

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

Q15 Is the property at risk of receiving low water pressure or flow?

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

Q16 Please include details of a water quality analysis made by the water undertaker for the water supply zone in respect of the most recent calendar year.

The analysis confirmed that all tests met the standards prescribed by the Water Supply (Water Quality) Regulations 2000, except on six occasions. 6 out of 38 tests failed to meet the standard for metaldehyde.

Q17 Please include details of any departures, authorised by the Secretary of State or by the National Assembly for Wales under Part 6 of the 2000 Regulations from the provisions of Part 3 of those Regulations.

There are no such authorised departures for the water supply zone.

Charging

Q18 Please include details of the location of any water meter serving the property.

Records indicate that the property is served by multiple water meters.

Q19 Who is the sewerage and water undertakers for the area?

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

Thames Water Utilities Ltd

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I www.twpropertyinsight.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Q20 Who bills the property for sewerage services?

The property is billed for sewerage services by;

Thames Water Utilities Limited
Clearwater Court
Vastern Road
Reading
Berkshire
RG1 8DB

Tel: 0845 9200 888
Internet: www.thameswater.co.uk.

Q21 Who bills the property for water services?

The property is billed for water services by;

Thames Water Utilities Limited
Clearwater Court
Vastern Road
Reading
Berkshire
RG1 8DB

Tel: 0845 9200 888
Internet: www.thameswater.co.uk.

Q22 What is the current basis for charging for sewerage and / or water services at the property?

The charges are based on actual volumes of water measured through a water meter ("metered supply").

Optional Additional Information

Q23 Trade Effluent Consent

Are there any trade effluent consents relating to this site/property for disposal of chemically enhanced waste?

No.

Thames Water Utilities Ltd

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Slough SL1 4WW

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I www.twpropertyinsight.co.uk

Q24 Wayleaves

Is there a wayleave agreement giving Thames Water (from here on known as "the Company") the right of access to pass through private land in order to reach the Company's assets?

No.

Q25 Easement

Is there an easement agreement giving the Company the right of access to assets located in private land which prevent the landowner from restricting the Company's access?

No.

Q26 Manhole Cover and Invert Levels

Details of any manhole cover and invert levels applicable to this site are enclosed.

Payment for this Search

The charge will be added to the NLIS Account. This search was ordered through National Land Information Services, Russell Square House, 10-12 Russell Square, London WC1B 5LF.

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

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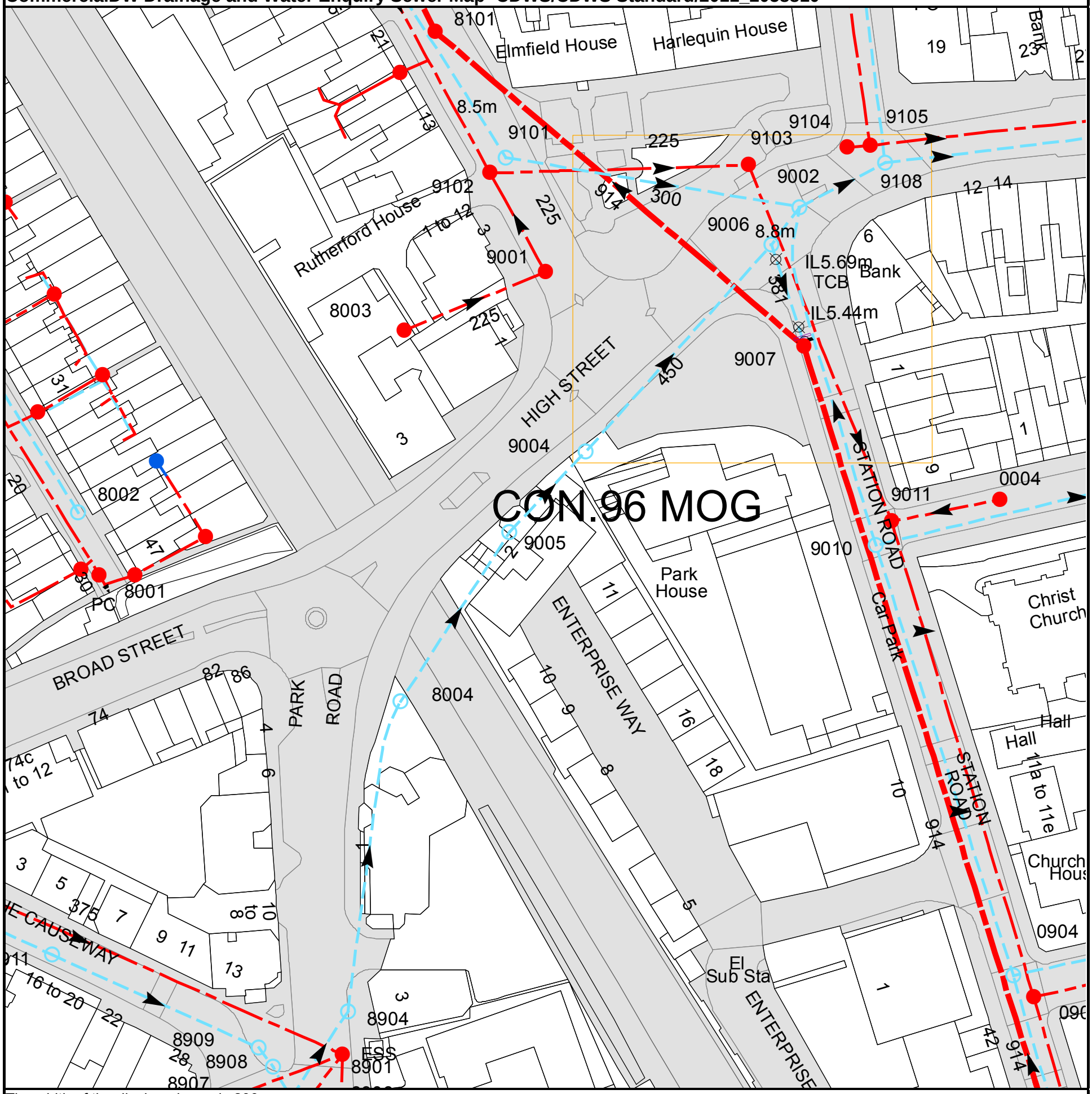
CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2011_2058810



The width of the displayed area is 200m

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. WU298557 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
0004	n/a	n/a
9006	8.88	5.66
80ZY	n/a	n/a
80ZW	n/a	n/a
80ZV	n/a	n/a
8908	n/a	n/a
81ZY	n/a	n/a
8004	n/a	n/a
8003	n/a	n/a
8909	n/a	n/a
9004	n/a	n/a
9001	n/a	n/a
9005	n/a	n/a
9101	n/a	n/a
9102	n/a	n/a
8101	8.69	-3.36
9002	n/a	n/a
9007	8.58	-3.26
9103	n/a	n/a
0905	8.88	3.65
0904	8.82	6.57
9104	n/a	n/a
9010	n/a	n/a
9011	n/a	n/a
9108	n/a	n/a
9105	n/a	n/a
8911	n/a	n/a
8001	n/a	n/a
80WV	n/a	n/a
8002	n/a	n/a
80YS	n/a	n/a
80YT	n/a	n/a
80ZS	n/a	n/a
81ZQ	n/a	n/a
8901	8.68	3.73
8904	n/a	n/a

Sewer Key - Commercial Drainage and Water

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.

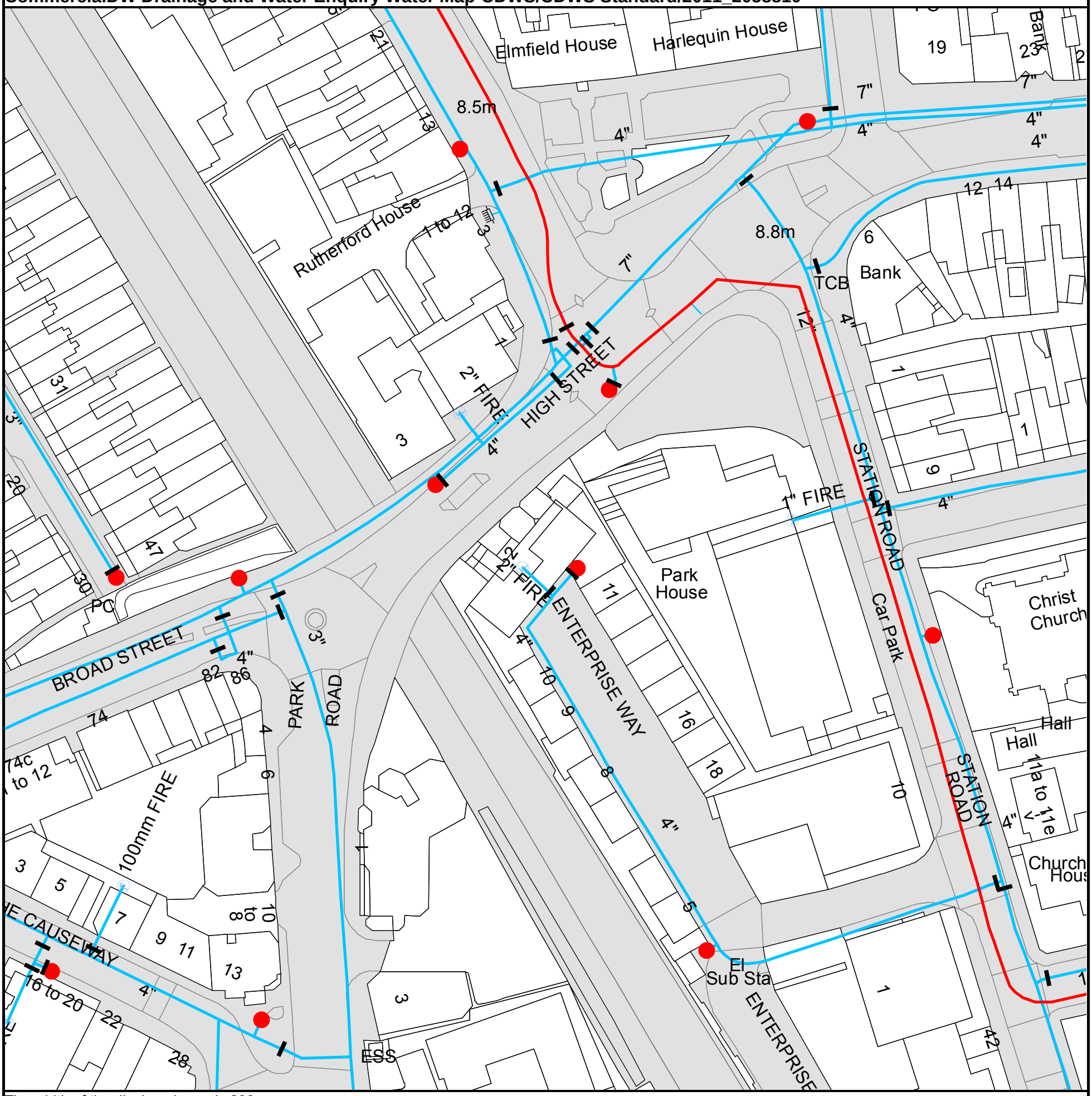
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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 Insight on 0118 925 1504.

CommercialDW Drainage and Water Enquiry Water Map-CDWS/CDWS Standard/2011_2058810



The width of the displayed area is 200m

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.

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.

CommercialDW Drainage and Water Enquiry Terms and Conditions

Customer and Clients are asked to note these terms, which govern the basis on which this Commercial DW Drainage & Water Enquiry is supplied

Definitions

'Client' means the person, company or body who is the intended recipient of the Report with an actual or potential interest in the Property.
'Company' means a water service company or their data service provider producing the Report.
'Customer' means the person, company, firm or other legal body placing the Order, either on their own behalf as Client, or, as an agent for a Client.
'Order' means any request completed by the Customer requesting the Report.
'Property' means the address or location supplied by the Customer in the Order.
'Report' means the drainage and/or water report prepared by The Company in respect of the Property.
'Thames Water" means Thames Water Utilities Limited registered in England and Wales under number 2366661 whose registered office is at Clearwater Court, Vastern Road, Reading, Berks, RG1 8DB;

Agreement

1 Thames Water agrees to supply the Report to the Customer and the Client subject to these terms. The scope and limitations of the Report are described in paragraph 2 of these terms. Where the Customer is acting as an agent for the Client then the Customer shall be responsible for bringing these terms to the attention of the Client. The Customer and Client agree that the placing of an Order for a Report indicates their acceptance of these terms.

The Report

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

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

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

2.3 The information contained in the Report is based upon the accuracy, completeness and legibility of the address and other information supplied by the Customer or Client.

2.4 The Report provides information as to the location and connection of existing services and should not be relied on for any other purpose. The Report may contain opinions or general advice to the Customer and the Client and Thames Water cannot ensure that any such opinion or general advice is accurate, complete or valid and accepts no liability therefore.

2.5 The position and depth of apparatus shown on any maps attached to the Report are approximate, and are furnished as a general guide only, and no warranty as to its correctness is given or implied. The exact positions and depths should be obtained by excavation trial holes and the maps must not be relied on in the event of excavation or other works made in the vicinity of apparatus shown on any maps.

Liability

3 Thames Water shall not be liable to the Client for any failure, defect or non-performance of its obligations arising from any failure of, or defect in any machine, processing system or transmission link or anything beyond Thames Water's reasonable control or the acts or omissions of any party for whom Thames Water are not responsible.

3.1 Where the Customer sells this report to a Client (other than in the case of a bona fide legal adviser recharging the cost of the Report as a disbursement) Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss or damage whatsoever and the Customer shall indemnify Thames Water in respect of any claim by the Client.

3.2 Where a report is requested for an address falling within a geographical area where Thames Water and another Company separately provide Water and Sewerage Services, then it shall be deemed that liability for the information given by Thames Water or the Company as the case may be will remain with Thames Water or the Company as the case may be in respect of the accuracy of the information supplied. Where Thames Water is supplying information which has been provided to it by another Company for the purposes outlined in this agreement Thames Water will therefore not be liable in any way for the accuracy of that information and will supply that information as agent for the Company from which the information was obtained.

3.3 Except in respect of death or personal injury caused by negligence, or as expressly provided in these Terms:

3.3.1 The entire liability of Thames Water or the Company as the case may be in respect of all causes of action arising under or in connection with the Report (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) shall not exceed £2,000,000 (two million pounds); and

3.3.2 Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss of profit, loss of goodwill, loss of reputation, loss of business or any indirect, special or consequential loss, damage or other claims, costs or expenses;

Copyright and Confidentiality

4. The Customer and the Client acknowledge that the Report is confidential and is intended for the personal use of the Client. The copyright and any other intellectual property rights in the Report shall remain the property of Thames Water or the Company as the case may be. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided

4.1 The Customer or Client is entitled to make copies of the Report but is not permitted to copy any maps contained in, or attached to the Report

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

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

Payment

5. Unless otherwise stated all prices are inclusive of VAT. The Customer shall pay for the price of the Report specified by Thames Water, without any set off, deduction or counterclaim.

5.1 Unless payment has been received in advance, Customers shall be invoiced for the agreed fee once their request has been processed. Any such invoice must be paid within 14 days. Where the Customer has an account with Thames Water, payment terms will be as agreed with Thames Water.

5.2 No payment shall be deemed to have been received until Thames Water has received cleared funds.

5.3 If the Customer fails to pay Thames Water any sum due Thames Water shall be entitled but not obliged to charge the Customer interest on the sum from the due date for payment at the annual rate of 2% above the base lending rate from time to time of Natwest Bank, accruing on a daily basis until payment is made. Thames Water reserves the right to claim interest under the Late Payment of Commercial Debts (Interest) Act 1998.

5.4 Thames Water reserves the right to increase fees on reasonable prior written notice at any time.

Cancellations or Alterations

6. Once an Order is placed, Thames Water shall not be under any obligation to accept any request to cancel that Order and payment for the Order shall still be due upon completion of the Report. In cases where an error has been made in the original Order (e.g. the Customer has supplied an incorrect address), the Customer will need to place a second Order, detailing the correct information, and shall be liable to pay a second charge in accordance with clause 5 above.

Delivery

7. On receiving your order the reports will be posted to you within 10 working days from receipt.

7.1 Delivery is subject to local post conditions and regulations. All items should arrive within 12 working days, but Thames Water cannot be held responsible should delays be caused by local post conditions, postal strikes or other causes beyond the control of Thames Water.

General

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

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

8.2 Nothing in this notice shall in any way restrict the Customer or Clients statutory or any other rights of access to the information contained in the Report.

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

APPENDIX D

Thames Water Pre-development Enquiry Response

Mr Oliver Pocock
RPS Planning and Development
Highfield House
5 Ridgeway
Quinton Business Park
Birmingham
B32 1AF

Your account number
DS6016505

thameswater.co.uk

0800 009 3921
Mon – Fri 9am-5pm,

20th May 2016

Pre Development Enquiry

Site Address: 2 High Street, Teddington, Greater London, TW11 8EW

Development Details: 24 Apartments and 310m^2 of Commercial Space

Dear Mr Pocock,

I write in relation to the above site regarding the proposed development here.

Please note: your initial fee of £398+ VAT covers the expense of our asset planners reviewing your proposed discharges in relation to the capacity in our existing network. They also carry out flood risk assessments. At this stage if your proposal is accepted, we issue an approval letter for you to progress with your development.

Foul Water

From the information you have provided, I 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 be not 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 Store rain water for Later Use; 2nd Use infiltration techniques, such as porous surfaces in non-clay area; 3rd Attenuate rainwater in ponds or open water features for gradual release to a watercourse; 4th Attenuate rainwater by storing in tanks or sealed water features for gradual release to a watercourse; 5th Discharge rainwater direct to a watercourse; 6th Discharge rainwater to a surface water drain; 7th Discharge rainwater to the combined sewer.

You should be aware that in the public sewer system will be unable to accommodate any storm greater than a 1 in 20 year event. You should assume this level of storm when calculating the current discharge rate. Please ensure that storm flows are attenuated or regulated into the receiving public network through on or off site storage.

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. A reduction of at least 50% on existing flows from the same site area would be sought for a range of storm conditions.

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 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

Sarah Swallow
Development Engineer

APPENDIX E

Micro-Drainage WinDes Modelling Assessment

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	1.000	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	1.5
QBAR Urban	1.5
Q100 years	4.9
Q1 year	1.3
Q30 years	3.4
Q100 years	4.9

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	100.536	0.536	1.9	13.4	O K
30 min Summer	100.678	0.678	1.9	17.0	O K
60 min Summer	100.767	0.767	1.9	19.2	Flood Risk
120 min Summer	100.765	0.765	1.9	19.1	Flood Risk
180 min Summer	100.727	0.727	1.9	18.2	O K
240 min Summer	100.685	0.685	1.9	17.1	O K
360 min Summer	100.602	0.602	1.9	15.1	O K
480 min Summer	100.512	0.512	1.9	12.8	O K
600 min Summer	100.429	0.429	1.9	10.7	O K
720 min Summer	100.358	0.358	1.9	8.9	O K
960 min Summer	100.246	0.246	1.9	6.1	O K
1440 min Summer	100.117	0.117	1.8	2.9	O K
2160 min Summer	100.043	0.043	1.6	1.1	O K
2880 min Summer	100.022	0.022	1.3	0.6	O K
4320 min Summer	100.004	0.004	0.9	0.1	O K
5760 min Summer	100.000	0.000	0.7	0.0	O K
7200 min Summer	100.000	0.000	0.6	0.0	O K
8640 min Summer	100.000	0.000	0.5	0.0	O K
10080 min Summer	100.000	0.000	0.5	0.0	O K
15 min Winter	100.612	0.612	1.9	15.3	O K
30 min Winter	100.774	0.774	1.9	19.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.942	0.0	15.7	24
30 min Summer	91.303	0.0	20.5	37
60 min Summer	56.713	0.0	25.5	64
120 min Summer	34.038	0.0	30.6	106
180 min Summer	24.922	0.0	33.6	138
240 min Summer	19.863	0.0	35.8	172
360 min Summer	14.376	0.0	38.8	242
480 min Summer	11.430	0.0	41.1	308
600 min Summer	9.562	0.0	43.0	368
720 min Summer	8.260	0.0	44.6	428
960 min Summer	6.553	0.0	47.2	544
1440 min Summer	4.721	0.0	51.0	770
2160 min Summer	3.397	0.0	55.0	1108
2880 min Summer	2.686	0.0	58.0	1472
4320 min Summer	1.927	0.0	62.4	2172
5760 min Summer	1.522	0.0	65.7	0
7200 min Summer	1.266	0.0	68.4	0
8640 min Summer	1.089	0.0	70.6	0
10080 min Summer	0.959	0.0	72.5	0
15 min Winter	139.942	0.0	17.6	24
30 min Winter	91.303	0.0	23.0	37

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	100.885	0.885	1.9	22.1	Flood Risk
120 min Winter	100.895	0.895	1.9	22.4	Flood Risk
180 min Winter	100.845	0.845	1.9	21.1	Flood Risk
240 min Winter	100.788	0.788	1.9	19.7	Flood Risk
360 min Winter	100.669	0.669	1.9	16.7	O K
480 min Winter	100.540	0.540	1.9	13.5	O K
600 min Winter	100.405	0.405	1.9	10.1	O K
720 min Winter	100.303	0.303	1.9	7.6	O K
960 min Winter	100.163	0.163	1.9	4.1	O K
1440 min Winter	100.048	0.048	1.6	1.2	O K
2160 min Winter	100.017	0.017	1.2	0.4	O K
2880 min Winter	100.005	0.005	1.0	0.1	O K
4320 min Winter	100.000	0.000	0.7	0.0	O K
5760 min Winter	100.000	0.000	0.5	0.0	O K
7200 min Winter	100.000	0.000	0.4	0.0	O K
8640 min Winter	100.000	0.000	0.4	0.0	O K
10080 min Winter	100.000	0.000	0.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	56.713	0.0	28.6	64
120 min Winter	34.038	0.0	34.3	116
180 min Winter	24.922	0.0	37.7	146
240 min Winter	19.863	0.0	40.1	184
360 min Winter	14.376	0.0	43.4	262
480 min Winter	11.430	0.0	46.1	336
600 min Winter	9.562	0.0	48.2	392
720 min Winter	8.260	0.0	49.9	448
960 min Winter	6.553	0.0	52.8	556
1440 min Winter	4.721	0.0	57.1	762
2160 min Winter	3.397	0.0	61.6	1104
2880 min Winter	2.686	0.0	65.0	1468
4320 min Winter	1.927	0.0	69.9	0
5760 min Winter	1.522	0.0	73.6	0
7200 min Winter	1.266	0.0	76.6	0
8640 min Winter	1.089	0.0	79.0	0
10080 min Winter	0.959	0.0	81.2	0

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.415	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.060

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.020	4	8	0.020	8	12	0.020

Model Details

Storage is Online Cover Level (m) 101.000

Tank or Pond Structure

Invert Level (m) 100.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	25.0	0.700	25.0	1.400	0.0	2.100	0.0
0.100	25.0	0.800	25.0	1.500	0.0	2.200	0.0
0.200	25.0	0.900	25.0	1.600	0.0	2.300	0.0
0.300	25.0	1.000	25.0	1.700	0.0	2.400	0.0
0.400	25.0	1.100	0.0	1.800	0.0	2.500	0.0
0.500	25.0	1.200	0.0	1.900	0.0		
0.600	25.0	1.300	0.0	2.000	0.0		

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0067-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	67
Invert Level (m)	99.950
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

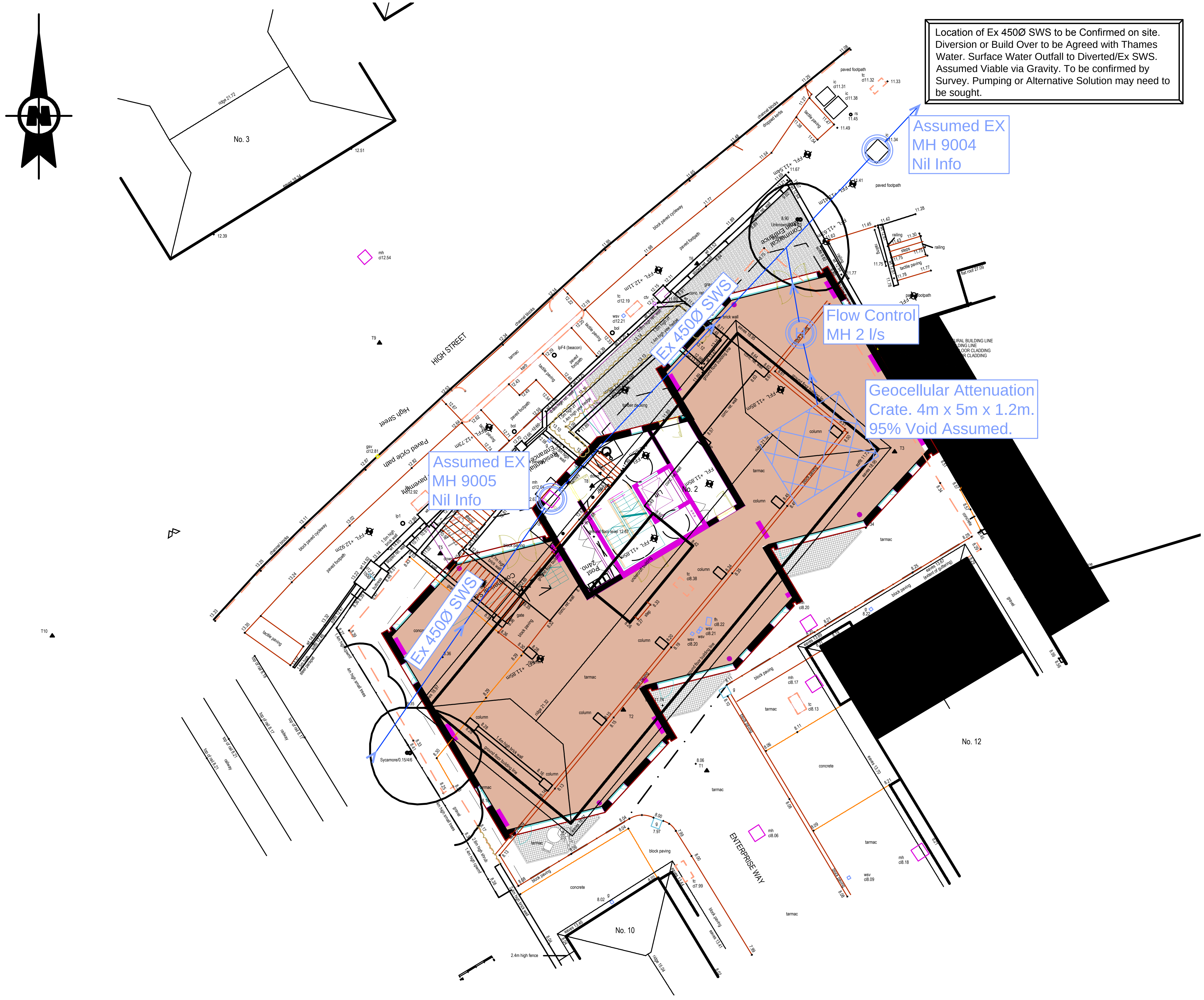
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.0
Flush-Flo™	0.296	1.9
Kick-Flo®	0.599	1.6
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	1.200	2.2	3.000	3.3	7.000	4.9
0.200	1.9	1.400	2.3	3.500	3.5	7.500	5.1
0.300	1.9	1.600	2.5	4.000	3.8	8.000	5.2
0.400	1.9	1.800	2.6	4.500	4.0	8.500	5.4
0.500	1.8	2.000	2.7	5.000	4.2	9.000	5.5
0.600	1.6	2.200	2.9	5.500	4.4	9.500	5.7
0.800	1.8	2.400	3.0	6.000	4.6		
1.000	2.0	2.600	3.1	6.500	4.7		

APPENDIX F

Conceptual Surface Water Attenuation Plan



Notes
1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.

PRELIMINARY

This drawing illustrates a sketch proposal only and as such is subject to detailed site investigation including ground conditions/contaminants, drainage, design and planning/density negotiations. The layout maybe based upon an enlargement of an OS sheet or other small scale plans and its accuracy will need to be verified by survey. Full risk analysis under the CDM Regulations has not been undertaken.

Impermeable Area = 599m².
QBar Greenfield Rate = 1.5 l/s/ha
Proposed Restriction = 2 l/s (practical minimum)
Approx. Attenuation Required for 1:100+40% CC = 22.4m³. Provided by way of crate assumed size 4m x 5m x 1.2m deep, 95% Void Ratio. Location of Crate subject to Detailed Engineering and Structural Designs.

Rev	Description	Date	Initial	Checked

For guidance only. Do not scale off this drawing

1:20 - 0 | 200mm | 400mm | 600mm | 800mm | 1000 | 1200
1:100 - 0 | 1m | 2m | 3m | 4m | 5m | 6m
1:50 - 0 | 1m | 2m | 3m
1:5 - 0 | 100mm | 200mm | 300mm

RPS

Highfield House, 5 Ridgeway, Quinton Business Park,
Birmingham B32 1AF
T: 0121 213 5500 **E:** rpsbm@rpsgroup.com **F:** 0121 213 5502

Client RHP

Project Informer House

Title Illustrative Surface Water Attenuation Provision

Status	Drawn By	PM/Checked by
Preliminary	OP	AR
Job Ref	**Scale @ A3**	**Date Created**
IH	1:200	14/06/2016
Drawing Number		**Rev**
SK1		-

rpsgroup.com/uk

APPENDIX G

London Borough of Richmond upon Thames SuDS Design Assessment Checklist

Treatment – Improving the quality of water by physical, chemical and/or biological means.
Watercourse – A term including all rivers, streams, ditches, drains, cuts, culverts, dykes, sluices, and passages through which water flows.

Water table (or groundwater table) – The point where the surface of groundwater can be detected. The water table may change with the seasons and the annual rainfall.

Appendix 1:

DESIGN ASSESSMENT CHECKLIST: SCHEME

Table 1: Scheme Design Assessment Checklist

Requirements			
Site ID	INFORMER HOUSE		
Site Location and co-ordinates	2 HIGH ST, TEDDINGTON, TW11 8EW (515917, 171029)		
Site description	BROWNFIELD COMMERCIAL	Drawing Reference(s)	FRA APPENDICES A-G
Date of assessment	24/6/16	Specification Reference	
Type of development	RESI + COMMERCIAL	Site Area	0.06ha.

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
PRINCIPLES					
Is the runoff managed at or close to its source, wherever possible? If not, give reasons.	790	✓		SITE ENTIRELY BUILDING COVER - TANK PROPOSED BENEATH CAR PARK	
Is the runoff managed at or close to the surface, wherever possible? If not, give reasons e.g. infiltration systems are being used to manage the runoff.	21/28	✓		STORAGE IN UNDERGROUND ATTENUATION TANK PRIOR TO DISCHARGE TO SEWERS	
Where the drainage system serves more than one property, is public space used and integrated with the drainage system in an appropriate and beneficial way ? If not, give reasons.	20			NO EXTERNAL PUBLIC SPACE WITHIN THE SCHEME	
Have the opportunities afforded by the drainage system in terms of green infrastructure, biodiversity, urban design, climate adaptation and amenity provision been maximised?	20			ALMOST ENTIRE SITE IS BUILDING COVER - TANK BELOW CAR PARK	
Has an appropriate SuDS Management train been provided?	27/575	✓		YES	
Are the operating and maintenance requirements of the drainage system adequately defined?	252/430	✓		SEE FRA APPENDIX H	
Is operation and maintenance achievable at an acceptable cost?	252/430	✓		"	
POINT OF DISCHARGE					
Does the design meet the following discharge hierarchy 1. Infiltration is preferred where it is safe and acceptable to do so; 2. If infiltration is not possible discharge to water course; 3. Discharge to sewer as last resort.	41			1. INFILTRATION NOT FEASIBLE DUE TO ADJ RAILWAY 2. NO NEARBY WATERCOURSES 3. THAMES WATER HAVE ADVISED FEASIBLE WITH 50% REDUCTION	
If infiltration is used: Confirm that an acceptable infiltration assessment has been undertaken and submitted?				N/A	

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
If discharge is to sewer, rather than a surface water body, provide justification.		✓		INFILTRATION NOT FEASIBLE + NO NEARBY WATERCOURSES	
If discharge to a sewerage asset is proposed, has evidence been provided that the design criteria have been agreed with the sewerage undertaker and that an appropriate connection detail has been agreed?	41	✓		PRE-DEV ENQUIRY WITH THAMES WATER HAS BEEN UNDERTAKEN - APP. D	
Have adequate and appropriate exceedance routes been provided and are they protected from future development?	47/48		✓	TBC AT DETAILED DESIGN STAGE	
INTERCEPTION					
Does the scheme design demonstrate on-site retention of approximately the first 5mm of runoff from impermeable surfaces for most events? How is Interception to be delivered (e.g. infiltration, green roofs, permeable pavements, vegetated surfaces, bespoke design - provide details)?	59		✓	TBC AT DETAILED DESIGN	
PEAK FLOW RATE CONTROL					
Does the design demonstrate control of the 1 year, critical duration site event to the equivalent 1 year greenfield peak flow rate or below?	46	✓		RATES RESTRICTED TO 2 L/S - LOWEST PRACTICAL RATE	
Does the design demonstrate control of the 100 year, critical duration site event to the equivalent 100 year greenfield peak flow rate or below?	46	✓		"	
Do the design calculations take account of future development (urban creep) and climate change?	47	✓		40% CC CONSIDERED + SITE OVER SAME FOOTPRINT AS PREVIOUS BUILDING	
VOLUMETRIC CONTROL (FOR THE 100 YEAR, 6 HOUR EVENT)					
Does the design demonstrate that, for the 100 year 6 hour event: *Either:* The discharged site runoff volume is not greater than the equivalent greenfield runoff volume? *Or:* The discharged site runoff volume over and above the equivalent greenfield runoff volume (i.e. the Long Term Storage Volume) is discharged at a rate < 2 l/s/ha (or another rate that is considered acceptable in not negatively impacting flood risk of the receiving water body) *Or:* Peak flow rates from the site are restricted to 2 l/s/ha or Qbar, whichever is the greater ha (or another rate that is considered acceptable in not negatively impacting flood risk of the receiving water body).	45	✓	✓	RATES RESTRICTED TO 2 L/S	
WATER QUALITY TREATMENT					
Is the receiving water body (surface or groundwater) environmentally sensitive (E.g. Groundwater Source Protection Zone? What is its designation? Are any implications for drainage design clearly defined?				N/A	

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
Does the design include an appropriate treatment strategy that ensures: 1. Sediment is trapped and retained on site in accessible and maintainable areas? 2. Has a sufficient number of drainage components been provided in series prior to discharge? 3. Suitable pollution removal capability e.g. % TSS removal (where this is a requirement of the SAB)	575 58			RUNOFF PRIMARILY CLEAN ROOF RUNOFF	
FUNCTIONALITY					
Are the design features sufficiently durable to ensure structural integrity over the system design life (residential 100 years and commercial 60 years), with reasonable maintenance requirements?	252/430	✓		SEE APP. H OF FRA	
Are all parts of the SuDS system outside any areas of flood risk? If not, provide justification and evidence that performance will not be adversely affected.	47	✓		SEE FIG. 2 OF FRA	
Is pumping a requirement for operation of the system? If yes, provide justification and set out operation and maintenance/adoption arrangements.				TBC AT DETAILED DESIGN	
Has runoff and flooding from all sources (both on and off site) been considered and taken into account in the design?	47	✓		SITE NOT AT RISK OF FLOODING	
Are 1 in 30 year flows fully conveyed within the SuD system ?	47	✓		SEE APP. E OF FRA	
Are 1 in 100 year flows contained or stored on-site within safe exceedance storage areas and flow paths? Note some approving authorities may require greater return periods.	46	✓		1 IN 100 YR + 40% CC ACCOMODATED	
CONSTRUCTABILITY					
Has an acceptable construction method statement been submitted and approved?	679/86		✓	TBC AT DETAILED DESIGN	
MAINTAINABILITY					
Has an acceptable Maintenance Plan been submitted and approved?	252/430	✓		APP. H	
INFORMATION PROVISION					
Do the design proposals include sufficient provision for community engagement and awareness raising?	717	✓		TBC AT DETAILED DESIGN	

(*) to be added on completion of SuDS Manual update

SYSTEM DESIGN ACCEPTABILITY	Summary details including any changes required	Acceptable (Y/N)	Date changes made
Acceptable: Minor changes required: Major changes required / re-design:			

APPENDIX H

SuDS Maintenance Plan

SuDS Maintenance Plan

This Maintenance Plan has been produced in order to ensure that the SuDS incorporated at the site remain functional for the lifetime of the development. This will ensure a continued reduction in local flood risk through the attenuation of surface water run-off on-site. It is proposed to provide an underground attenuation tank capable of storing 24m^3 at the site. These measures have been shown to reduce surface water run-off rates to the lowest practical minimum rate. This plan demonstrates that the maintenance and operation requirements of the SuDS are economically proportionate to the development.

Type of SuDS	Illustration	Maintenance required	Regularity	Indicative cost
Underground attenuation tank	 Underground plastic geocellular / modular systems can be used to create a below ground storage structure. Due to the modular nature of the systems, they can be tailored to suit the specific requirements of any site. Water can be attenuated on site, before discharging at a controlled rate to a watercourse or other drainage system.	Cleaning inlets / outlets, manholes, associated pipework and silt traps	Annual, or as required	c.£200 - £500

This document was compiled with reference to the Ciria Susdrain website, the CIRIA SuDS Manual (2015) and to 'Cost estimation for SUDS - summary of evidence' (Environment Agency, March 2015) and references therein.