Hayes Park

Drainage Assessment and Strategy Report

May 2023

Whitby Wood

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Client: Shall Do Hayes Developments Limited

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P3	12/05/2023	Revised to include Proforma	TT	RS	RS
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1 INTRODUCTION

Whitby Wood have been commissioned for the design of the below ground foul and surface water drainage systems for the development at Hayes Park.

This Drainage Strategy report has been prepared accordance with National Planning Policy Framework (NPPF) in support of the detailed planning and listed building consent application being submitted by Shall Do Hayes Developments Ltd ('the Applicant') to the London Borough of Hillingdon ('the Council') for the proposed residential conversion of two listed buildings at Hayes Park, Hayes End Road, Hayes, UB4 8FE ('the site'). This is a supporting document to The Flood Risk Assessment (FRA). This report has been undertaken to ascertain the constraint of flooding in order to redevelop the site and allow to the introduction of Sustainable Urban Drainage Systems (SuDs) to act as the key aspect of flood mitigation.

The description of the proposed development for the detailed planning and listed building consent application is as follows:

"Change of use of the existing buildings to provide new homes (Use Class C3), together with internal and external works to the buildings, landscaping, car and cycle parking, and other associated works."

1.1 Sources of Information

A review of the relevant information from a range of sources has been undertaken and includes the following:

- Thames Water, Commercial Drainage and Water Enquiry (2022);
- National Planning Policy Framework (2022);
- Whitby Wood, Flood Risk Assessment (2022);
- BS EN12056-2:2000, Gravity drainage systems inside buildings (2010);
- CIRIA, The SuDs Manual (2016);
- Hillingdon Council, Local Plan Parts one (2012) and two (2020);
- West London Strategic Flood Risk Assessment (2017);
- Greater London Authority, The London Plan (2021);
- British National Geology Viewer [Accessed March 2023];
- Building Regulations Part H;
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections).

1.2 Site Location and Description

The site sits within a wider former business park know as 'Hayes Park'. The red line site area which forms the basis of this application is 3.73 hectares and comprises of Hayes Park South, Hayes Park Central, the

surrounding grassland area, and the associated car parking and road areas. The approximate centre of the site is located at an easting and northing of 508877 and 182442, respectively.

The site is bound to the east and south by the open parkland, which is private land owned by the Church Commissioners. To the west the site is bound by the agricultural land and the buildings of Home Farm. To the north, the site is bound by Hayes Park North and the adjacent multi-storey car park, with open farmland beyond that.

A site location plan has been included in Figure 1 which can also be found in **Appendix A**.

FIGURE 1 - SITE LOCATION PLAN

1.3 Existing Drainage

A Thames Water Asset search has been carried out and shows combined surface and foul water infrastructure within and surrounding the Site confines. The asset search information can be found in **Appendix B**. A Surface Water and Foul pre-planning enquiry with Thames will be submitted to confirm discharge location and check for sewer capacity. As the proposed development is a refurbishment, minimal excavation of the existing pipe network will be conducted, therefore a CCTV Survey will be tendered out to gain an insight into the condition and connectivity of the drainage runs up to the Thames Water Outfall.

1.4 Geology

The British Geological Survey's Geology of Britain map has been reviewed as shown in **Appendix C** and it indicates a bedrock geology of London Clay Formation (Clay, Silt and Sand), and superficial deposits of Boyn Hill Gravel Member (Sand and Gravel).

1.5 Proposed Development

The proposed development has evolved through an extensive pre-application and wider stakeholder consultation process, which has included collaborative discussions with the Council, Greater London Authority ('GLA'), Historic England ('HE'), and several other key stakeholders.

The proposed development will bring two long-term vacant office buildings, which are unique heritage assets, back into active use through their conversion to residential. The proposed development provides the opportunity of a second life for the buildings and presents a long-term sustainable use that will ensure the buildings are protected and celebrated for years to come.

From the outset, the Applicant has taken a carefully informed heritage-led design approach. The objective has been to enhance the listed buildings, their setting, and the contribution they make to the wider surroundings, whist at the same time delivering a range of planning benefits.

An area schedule of existing and proposed floorspace and residential mix has been incorporated in **Appendix D**.

For this proposed development, it can be stated that only the building footprint for Hayes Park Central and Hayes Park South buildings (0.517ha – total drained area) will be used when calculating the existing and proposed discharge rates. This is due to the development being a refurbishment so will not incur any increase in footprint and all landscaping areas are protected, therefore can't forgo any significant alterations. This expressed site area will be incorporated when considering calculations referred to in section 5.

2 DRAINAGE DESIGN POLICIES

The following design guidance will need to be adhered to for the proposed foul and surface water drainage system that will serve the site.

- Building Regulations Part H;
- National Planning Policy Framework (NPPF);
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections);
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- BS EN 12056-1:2000, Gravity Drainage Inside Buildings

2.1 Overall Site Drainage Requirements

There are a range of requirements which the proposed drainage system is expected to meet. These have been set out by various guidance documents and stakeholders. The main requirements from each guidance document or stakeholder have been set out in Table 1 below.

TABLE 1 - REQUIREMENTS FOR THE PROPOSED DRAINAGE SYSTEM

Source/Stakeholder	Requirements
DEFRA Non-statutory technical standards for sustainable drainage systems	• Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (i below) and volume control technical standards (ii below) need not apply. i) For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event. ii) Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

	• The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Design and Construction Guidance – Sewerage Sector Guidance Appendix C (2020)	• Where a component is designed to convey or store flows in excess of the 1 in 30-year return period event, the designer should demonstrate that the upstream system (including any inlets such as gullies or pervious paving) has the capacity to allow the flows to reach the component. • Where an overland flow route is used, it should not be designed to operate more frequently than in a 1 in 30-year return period design rainfall event. • Design foul water peak flow rates should be 4000L per dwelling per day.
Building Regulations Approved Document H	• Surface water shall discharge to one of the following listed in order of priority: a) An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable, b) A watercourse; or where that is not reasonably practicable, c) A sewer.
Sewerage Undertaker (Thames Water)	• A pre-development application is required to check the public sewer has capacity for the proposed discharge rates. At the time of writing a Thames Water pre-planning application has not been submitted. • A section 106 application to connect to the public sewer will need to be submitted for any new connections to the public sewer. • If the network is to be adopted, then a S104 application will need to be made in this instance. • If any existing sewers require diverting, then an application to Thames Water to divert a public sewer under section 185 will need to be made. • A section 116 application for the removal of public sewers will be required for any abandoned public sewers. • A build-over agreement is required to build over any existing assets.
Hillingdon Council (LLFA)	• Acting as the LLFA, any guidelines and policies outlined in the local Surface Water Management Plan or Local Plan should be adhered to. • Where possible the proposed discharge rates should be discussed and approved with the LLFA as early as possible. Conversations with the LLFA to agree discharge rates are ongoing.

2.2 Planning Policy Requirements

The NPPF (National Planning Policy Framework) specifies that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development. Opportunities to reduce the flood risk to the site itself and elsewhere, taking climate change into account, should be investigated. The drainage proposals within this strategy have been prepared to meet planning policy requirements.

2.3 London Plan

The London Plan is a framework which should be used for all developments within London. Policy SI 12 of the London Plan 2021 is specific to flood risk management and all development proposals should adhere to; the policy has been reproduced below.

A. Current and expected flood risk from all sources across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers, and infrastructure providers.
B. Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.
C. Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.
D. Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.
E. Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.
F. Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.
G. Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

2.4 Local Plan

Hillingdon's Local Plan is a framework which should be used for all developments within the borough. Within the this documents are Polices that outlines the strategic principles, spatial strategy and technical criteria to follow and implement when considering flood risk management:

2.4.1 Local Plan Part one (2012)

The Council will require new development to be directed away from Flood Zones 2 and 3 in accordance with the principles of the National Planning Policy Framework (NPPF). The subsequent Hillingdon Local Plan: Part 2 -Site Specific Allocations LDD will be subjected to the Sequential Test in accordance with the

NPPF. Sites will only be allocated within Flood Zones 2 or 3 where there are overriding issues that outweigh flood risk. In these instances, policy criteria will be set requiring future applicants of these sites to demonstrate that flood risk can be suitably mitigated. The Council will require all development across the borough to use sustainable urban drainage systems (SUDS) unless demonstrated that it is not viable. The Council will encourage SUDS to be linked to water efficiency methods. The Council may require developer contributions to guarantee the long-term maintenance and performance of SUDS is to an appropriate standard.

2.4.2 Local Plan Part two (2020)

Management of Flood Risk:

A. Development proposals in Flood Zones 2 and 3a will be required to demonstrate that there are no suitable sites available in areas of lower flood risk. Where no appropriate sites are available, development should be located on the areas of lowest flood risk within the site. Flood defences should provide protection for the lifetime of the development. Finished floor levels should reflect the Environment Agency's latest guidance on climate change.
B. Development proposals in these areas will be required to submit an appropriate level Flood Risk Assessment (FRA) to demonstrate that the development is resilient to all sources of flooding.
C. Development in Flood Zone 3b will be refused in principle unless identified as an appropriate development in Flood Risk Planning Policy Guidance. Development for appropriate uses in Flood Zone 3b London Borough of Hillingdon Local Plan Part 2 - Development Management Policies 80 will only be approved if accompanied by an appropriate FRA that demonstrates the development will be resistant and resilient to flooding and suitable warning and evacuation methods are in place.
D. Developments may be required to make contributions (through legal agreements) to previously identified flood improvement works that will benefit the development site.
E. Proposals that fail to make appropriate provision for flood risk mitigation, or which would increase the risk or consequences of flooding, will be refused.

2.4.3 Local Plan Part two (2020)

Water Management, Efficiency, and Quality:

A. Applications for all new build developments (not conversions, change of use, or refurbishment) are required to include a drainage assessment demonstrating that appropriate sustainable drainage systems (SuDS) have been incorporated in accordance with the London Plan Hierarchy (Policy 5.13: Sustainable drainage).
B. All major new build developments, as well as minor developments in Critical Drainage Areas or an area identified at risk from surface water flooding must be designed to reduce surface water run-off rates to no higher than the pre-development greenfield run-off rate in a 1:100 year storm scenario, plus an appropriate allowance for climate change for the worst storm duration. The

assessment is required regardless of the changes in impermeable areas and the fact that a site has an existing high run-off rate will not constitute justification.

C. Rain Gardens and non householder development should be designed to reduce surface water run-off rates to Greenfield run-off rates.

D. Schemes for the use of SuDS must be accompanied by adequate arrangements for the management and maintenance of the measures used, with appropriate contributions made to the Council where necessary.

E. Proposals that would fail to make adequate provision for the control and reduction of surface water run-off rates will be refused.

F. Developments should be drained by a SuDs system and must include appropriate methods to avoid pollution of the water environment. Preference should be given to utilising the drainage options in the SuDS hierarchy which remove the key pollutants that hinder improving water quality in Hillingdon. Major development should adopt a 'treatment train' approach where water flows through different SuDS to ensure resilience in the system.

G. All new development proposals (including refurbishments and conversions) will be required to include water efficiency measures, including the collection and reuse of rainwater and grey water.

H. All new residential development should demonstrate water usage London Borough of Hillingdon Local Plan Part 2 - Development Management Policies 83 rates of no more than 105 litres/person/day. I) It is expected that major development8 proposals will provide an integrated approach to surface water run-off attenuation, water collection, recycling and reuse.

I. All new development proposals will be required to demonstrate that there is sufficient capacity in the water and wastewater infrastructure network to support the proposed development. Where there is a capacity constraint the local planning authority will require the developer to provide a detailed water and/or drainage strategy to inform what infrastructure is required, where, when and how it will be delivered.

2.5 West London SFRA

1. Boroughs should adopt a sequential approach for planning and development to identify areas that are not susceptible to flood risk impacts posed by climate change. Development should be encouraged in these identified areas to make properties more resilient to increasing flood risk and reduce the reliance on property level protection methods.

2. Boroughs should apply the Sequential Test to Allocated Sites within the LPA area at an early stage in the Local Plan development process to help identify any lower flood risk areas that may not be suitable for development. This can be used to inform spatial planning and identify key growth locations, increasing the possibility of facilitating development which is not exposed to flood risk whilst meeting development objectives.

3. Boroughs should implement measures through their Local Plans to deal with the Sequential Test acceptability of windfall site development proposals at the strategic level. The measure could set out locations and quantities of windfall sites that would or would not be acceptable in Sequential

Test terms (to provide input to the process defined in *Section 4.2.1*). This would help create efficiencies in the process.

4. If it is determined by evidence that there are insufficient sites within Flood Zone 1 to meet the borough's housing development targets, then windfall developments in Flood Zone 2 or 3 might be acceptable and should be considered (preferably with support of a Level 2 SFRA). This would inform an approach determining locations where the Sequential Test would be passed. Conversely, if the borough has sufficient land available in Flood Zone 1 to accommodate windfall development sites, then it may not be possible or prudent to consider windfall development in Flood Zone 2 or 3 as acceptable.
5. Existing and planned flood alleviation schemes should be incorporated into Borough Infrastructure Delivery Plans (IDPs). Where these IDPs, or similar corporate work programmes (e.g. planned highway improvement works or Green Infrastructure Plans), identify predicted or actual flood risks, new potential strategic level flood alleviation schemes should be developed.
6. Boroughs should make space for water storage by identifying strategic locations that are required for current and future flood risk management. These identified areas of land should be safeguarded via Local Plans to facilitate links between flood risk management and other environmental priorities.
7. Boroughs should adopt a Catchment Based Approach to ensure recognition of catchment wide flood issues to justify the collection and use of S106 funding to investigate and develop flood alleviation schemes within the catchment the development falls within. CDAs defined by the Borough SWMPs (for surface water flooding) or policy sub-areas defined by EA CFMPs (for fluvial / tidal flooding) provide an established technical basis for this approach.
8. Boroughs should set up mechanisms to enable the use of CIL charges to be used for flood alleviation schemes across the borough to address the cumulative impact of development on flood risk.
9. Boroughs should use their Local Plans to ensure developments within CDAs (as defined by SWMPs) provide increased surface water drainage requirements. Examples could include increased storage through the use of SuDS to restrict off-site runoff rates to greenfield (or lower) conditions.
10. Boroughs should develop standing advice for the assessment of minor development planning applications with surface water implications. This will aid LPAs in making informed and consistent decisions where the EA and / or LLFA has no statutory duty to provide comments as part of an application's review exercise.
11. Boroughs should review the benefits of removing Permitted Development rights for sites which fall within Flood Zones 3a and / or 3b, collaborating on Article 4 Directions where justifiable, defendable and beneficial. This could include provisions around sub-divisions, extensions and paving of gardens in specific areas.
12. Boroughs should use their Local Plans to ensure developments with a high susceptibility to groundwater flooding (as identified in the Sewer, Groundwater & Artificial Flood Risk Interactive Web Map and other available data) demonstrate that increased groundwater mitigation and

management measures have been implemented to protect people from groundwater flooding. Any known groundwater and flow routes should be safeguarded to ensure ground water flood risk is not increased on site or elsewhere.

13. Boroughs should consider implementation of further surface water flood risk mitigation requirements for proposed developments within Flood Zone 3a (surface water) where the development is also within the 1 in 30yr RoFSW mapped extents. These requirements could be similar to those adopted for Flood Zone 3b (fluvial / tidal) Functional Floodplain with modifications as follows:

    A. Development within the 1 in 30yr RoFSW mapped extent will be treated as if it were Flood Zone 3b (Functional Floodplain) as defined in PPG Table 1 (Paragraph 065).

    B. Development may be possible within the 1 in 30yr RoFSW mapped extents outside of existing infrastructure or solid building footprints.

    C. To enable development, the proposals must provide mitigation and resilience against flood risks (taking advice from the LLFA as appropriate) and provide appropriate compensation on existing flood risk levels (addressing the predicted 1 in 30yr and 1 in 100yr RoFSW mapped depths as a minimum), supported by detailed flood risk modelling if appropriate.

    D. The development must not increase flood risk elsewhere and where possible reduce flood risk overall.

    E. Where beneficial to flood risk and/or other planning requirements, it may also be possible for development to occur within the functional floodplain through the relocation (but not increase of footprint size) of an existing building's footprint within a site.

2.6 Greenfield Runoff Rates and Volumes

Greenfield runoff rates have been calculated using IH124 methodology which can be found in **Appendix E**. The table below shows the greenfield runoff rates for the Central Hayes and South Hayes buildings footprint (0.517 ha – total drained area) and factored to provide a runoff rate per hectare. The table also shows the current brownfield discharge rates, calculated using the modified rational method. A percentage of impermeable area (PIMP) of 100% and a time of concentration of 5 minutes were assumed at this stage. A runoff coefficient (Cv) of 1 has been used in the calculations.

TABLE 2 - GREENFIELD RUNOFF AND EXISTING DISCHARGE RATES

Return Period	Greenfield runoff rates		Existing Discharge Rates (l/s)
	Buildings Footprint [0.517 ha] (l/s)	Per hectare (l/s/ha)	
QBAR	2.18	4.21	-
1-year	1.85	3.58	102.2
30-year	5.01	9.69	241.6
100-year	6.95	13.43	306.3

2.6.1 Existing discharge rates

As shown in table 2, the existing discharge rates for the buildings footprint have been calculated for the specified return periods. As the proposed development is a refurbishment, the proposed discharge rate as a minimum should be greater than a 50% betterment than existing as an alternative to QBar. Figure 2 states the existing discharge and betterment for the development. With this in consideration, a discharge of 51.1 l/s is proposed which is a 50% betterment is provided. These rates will be coordinated with Thames Water during a pre-planning enquiry to ensure drainage capacity.

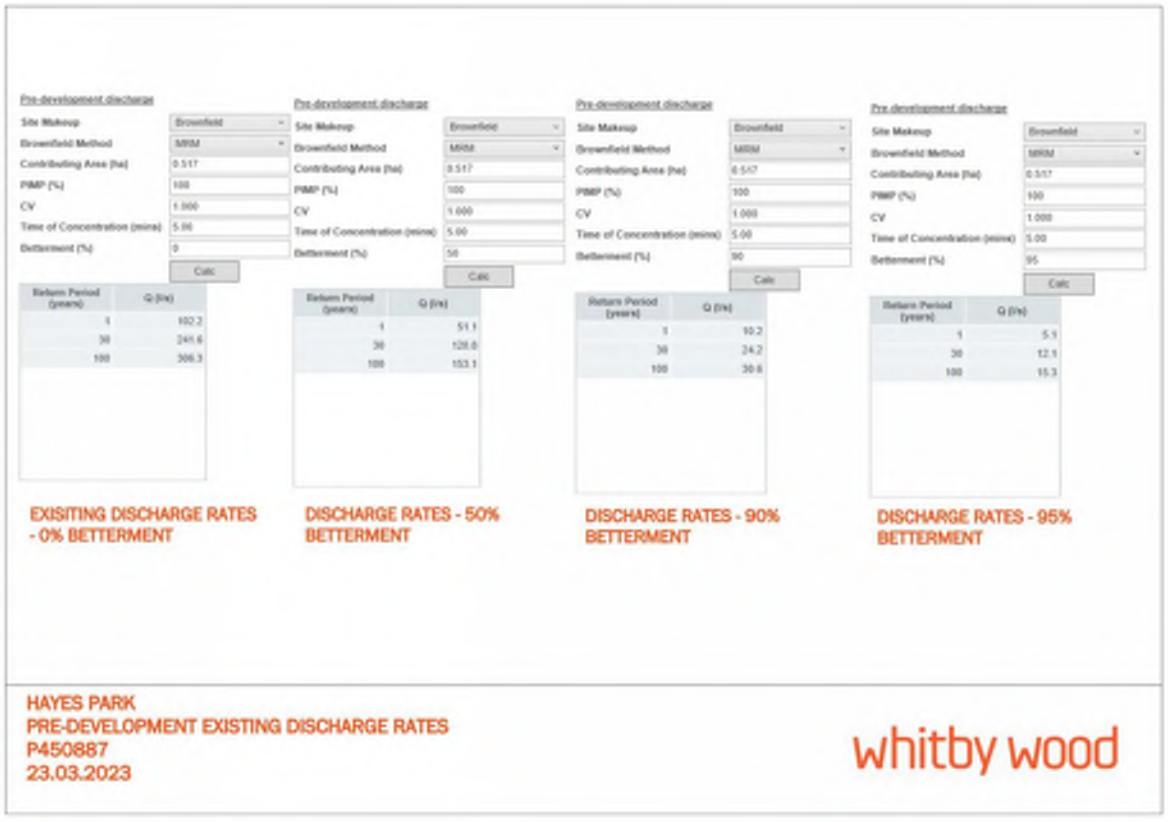


FIGURE 2 – PRE-DEVELOPMENT EXSISTING DISCHARGE RATES AND BETTERMENT CALULATIONS

2.6.2 Storage Volumes

Using the a 50% betterment of existing discharge rate of 51.1 l/s, a quick storage estimate for the site can be calculated using the UK SuDs surface water storage volume estimation tool, as shown in **Appendix F**. The output value shows that 90m^3 of attenuation will be required. This is based on no flooding of the network or Site up to and including the 1 in 100year storm event plus a 40% allowance for climate change. The storage requirements are subject to change upon development of the design and impermeable areas.

2.7 Delivering a SuDS Scheme

The philosophy of SuDS is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas. The 'four pillars' of SuDS design as described by the SuDS Manual are;

- Water Quantity;
- Water Quality;
- Amenity; and
- Biodiversity.

SuDS deliver high quality drainage while supporting areas to cope better with severe rainfall both now and in the future. SuDS can improve the quality of life in developments by making them more vibrant, visually attractive, sustainable and more resilient to change, by improving urban air quality, regulating building temperatures, reducing noise and delivering recreation and education opportunities.

SuDS design should maximise the use of the available space by delivering efficient drainage together with other functions to help meet the objectives of the site. The SuDS design should, as much as possible, be based around the following;

- Using surface water runoff as a resource;
- Managing rainwater close to where it falls;
- Managing runoff on the surface;
- Allowing rainfall to soak into the ground;
- Promoting evapotranspiration;
- Slowing and storing runoff to mimic natural runoff characteristics;
- Reducing contamination of runoff through pollution prevention and controlling the runoff at source; and
- Treating runoff to reduce the risk of urban contaminants causing environmental pollution.

Any proposed development on the site has the potential to maximise SuDS and conform to SuDS best practice. Ultimately a well designed and constructed SuDS scheme will provide a robust and reliable surface water drainage network, whilst providing increased amenity and biodiversity.

2.7.1 SuDS Component Performance

The effectiveness of SuDS components in improving development surface water run-off quality is summarised in, Table 3 on the following page. Combinations of treatments can be used to reduce potential pollutants from reaching the receiving course.

TABLE 3 - SUDS TREATMENT TRAIN

SuDS Component	Interception	Peak flow control: Low	Peak flow control: High	Volume reduction	Volume control	Gross sediments	Fine sediments	Hydrocarbons/PAHs	Metals	Nutrients
Rainwater Harvesting	Y	Y	S	Y	N	N	N	N	N	N
Pervious Pavement	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varies
Filter Strips	Y	N	N	N	N	Y	N	Y	Y	Varies
Swales	Y	Y	S	Y (*)	N	Y	Y (+)	Y	Y	Y (-)
Trenches	Y	Y	S	Y (*)	N	N	N	Y	Y	Y (-)
Detention Basins	Y	Y	Y	N	Y	Y	Y (+)	Y	Y	Varies
Ponds	N	Y	Y	N	Y	N (~)	Y	Limited	Y	Varies
Wetlands	N	Y	S	N	Y	N (~)	Y	Limited	Y	Y
Green Roofs	Y	Y	N	N	N	N	N	Y	N	N
Bioretention Systems	Y	Y	S	Y (*)	N	N (~)	Y	Y	Y	Y
Proprietary Treatment Systems	N	N	N	N	N	Y	Y	Y (!)	Y (!)	Y (!)
Subsurface Storage	N	Y	Y	N	Y	N (~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N (~)	N	N	N	N

Notes:

- S: Not normally with standard designs, but possible where space is available and designs mitigate impact of high flow rates.
- Y (*): Where infiltration is facilitated by the design.
- N (~): Gross sediment retention is possible, but not recommended due to negative maintenance and performance implications.
- Y (+): Where designs minimise the risk of fine sediment mobilisation during larger events.
- Y (!): Where designs specifically promote the trapping and breakdown of soils and PAH based constituents.
- Y (“): Where subsurface soil structure facilitates the trapping and breakdown of oils and PAH based constituents.
- Varies: The nutrient removal performance is variable, and can be negative in some situations.
- Y (~): Good nutrient removal performance where subsurface bio-filtration system with a permanently saturated zone included within the design.

2.7.2 Hydraulic Design Criteria

The below outlines the best practice criteria for hydraulic control required for interception, runoff rate control and volume control.

- Interception

To fulfil the requirements for Interception, there should normally be no runoff from the site for an initial depth of rainfall, usually 5mm. This is usually achieved through the use of infiltration, evapotranspiration, or rainwater harvesting. Introducing soft landscaping to brownfield sites will also help achieve this.

- Flow and Volume Control

Discharge rates for all storm events should be restricted to current Greenfield run-off rates or as close as is reasonably practicable.

- Attenuation and hydraulic controls will be used to manage flow rates

Rainwater harvesting, or the use of Long-Term Storage can be used to achieve Greenfield runoff volume control. 90m^3 of attenuation for surface water flooding up to and including 1in100 + climate change allowances will be provided.

- Water Quality Design Criteria

Current best practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

- Hazard Classification

Runoff from clean roof surfaces (i.e. not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

- Treatment requirements for disposal to surface water systems

As the site is brownfield, roof runoff will require at least 1 treatment stage prior to discharge. Runoff from other parts of this site such as roads, parking and other areas will require ideally 2 treatment stages prior to discharge.

3 DRAINAGE DESIGN PROPOSALS

3.1 Surface Water

The design of a surface water drainage system to serve the new development considers both water treatment and on-site attenuation in accordance with CIRIA C753. The SuDS components proposed aim to emulate the natural drainage system of the site through attenuation of flows and imitating natural percolation where possible. This has the added benefit of alleviating water quality issues associated with urban drainage runoff.

The current proposal for the surface water drainage strategy for the development can be found in **Appendix G** which includes the introduction of filter drains and attenuation tank to provide attenuation of surface water and including the 1in100 year storm event + climate change. The water is temporarily stored before controlled discharge downstream. Filter Drains are also proposed in areas of low landscaping. The proposed surface water outfall will be confirmed by Thames Water after a pre-planning enquiry is submitted.

The external hardstanding areas such as road, pathways and car parks will drain as existing.

3.1.1 Drainage Hierarchy

The drainage hierarchy that should be considered for any new development. The following list details these requirements and which elements can be achieved for this site. Where possible elements as high up the hierarchy have been selected:

- Rainwater use a resource (for example rainwater harvesting, green roofs for irrigation);
  - This is not the current strategy.
- Rainwater infiltration to ground at or close to source;
  - Infiltration is not currently deemed feasible due to the presence of London Clay and the potential for groundwater flooding as referred to in the supporting Flood Risk Assessment.
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);
  - This is not feasible due to the development being a listed building.
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;
  - This is the current strategy with the use of separate attenuation tanks for both Hayes Park Central and South buildings and Filter Drains in low spot areas.
- Discharge rainwater direct to a watercourse;
  - This is deemed unfeasible due to the requirement of excavation across a protected green bolt area to the nearest watercourse.
- Discharge rainwater to a surface water sewer/drain;
  - This is proposed method.

- Discharge rainwater to the combined sewer;
    - A more effective method in the drainage hierarchy can be achieved with discharge into surface water sewer networks.

3.1.2 Water Cycle

The water cycle strategy puts emphasis on four key areas of interest:

- Consumption;
- Quality;
- Re-use; and
- Re-cycle.

Rainwater will be heavily 'treated' through its discharge process by passing through numerous stages through its cycle. Attenuation tanks and Filter drains will provide treatment at roof level to improve water quality of runoff imminently from inception of the precipitation.

3.2 Foul Water

Foul wastewater is to increase from the existing development due to the increase in number of units and change in building use, as there is an increase in the number of appliances required for the residential accommodation. Foul water design flow rates have been estimated using 4000L/dwelling/day and 0.6l/hectare of developable land for commercial uses. The design flow rate for the entire site was estimated to be 5.74 l/s, subject to capacity in the public sewer.

3.3 Internal Drainage

Foul water stacks and rainwater pipes dropping below slab level internal to the building will be picked up by inspection chambers situated outside the building. Where this is not possible, due to site constraints and building foundations, inspection chambers may need to be positioned internally. In this instance, the chambers will be double sealed and situated within areas that are publicly accessible to ensure the system can be inspected or accessed at all times. Any internal chambers will be positioned at the next design stage once a set of frozen MEP drawings are available.

4 ADOPTION AND MAINTENANCE

It is assumed that drainage on site will not be adopted by Thames Water. However, where applicable, drainage will be designed to adoptable standards set out by the Design and Construction Guidance; Sewerage Sector Guidance Appendix C.

4.1 Typical SuDS Maintenance Schedule

The CIRIA SuDS manual has been reviewed and the operation and maintenance guidance for different surface water systems has been extracted and is provided in the following tables.

4.1.1 Attenuation tanks

Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before infiltration, controlled release or use. The table below is extracted from table 21.3 of the SuDS manual and provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

TABLE 4 - MAINTENANCE REQUIREMENTS FOR ATTENUATION STORAGE TANKS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface water or filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and / internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually.
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

4.1.2 Filter Drains

Filter drains are shallow trenches filled with stone/gravel that create temporary subsurface storage for the attenuation, conveyance, and filtration of surface water runoff. For filter drains to operate as designed it is

important to conduct regular inspection and maintenance. The table below has been extracted from Table 16.1 of the SuDS Manual and details the maintenance requirements for filter drains.

TABLE 5 - MAINTENANCE REQUIREMENTS FOR FILTER DRAINS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface access chambers and pre-treatment devices.	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six Monthly
	Remove sediment from pre-treatment devices	Six Monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required
	Clear perforated pipework of blockages	As required

4.1.3 Pipework

In addition to the above pipework should usually be jetted and cleaned as and when blockages appear to have occurred. Pipes should be checked for build-up of debris and other waste that could cause blockages or damage to the pipework. Occasional maintenance should be carried out annually or as required.

4.1.4 Flow Controls

Little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur, they do so at the intake.

Following the installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced contact the manufacturer so that an investigation may be made.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

4.1.5 Timetable

Maintenance should be carried out and timetabled from the date of installation. Each SuDS feature and component has a recommended and typical frequency for inspection which should be adhered to as close as practically possible. Where not adopted, the landowner or private management company are responsible for its implementation.

5 RISKS AND UNCERTAINTIES

The following outlines the current uncertainties and associated risks for aspects related to drainage for this development.

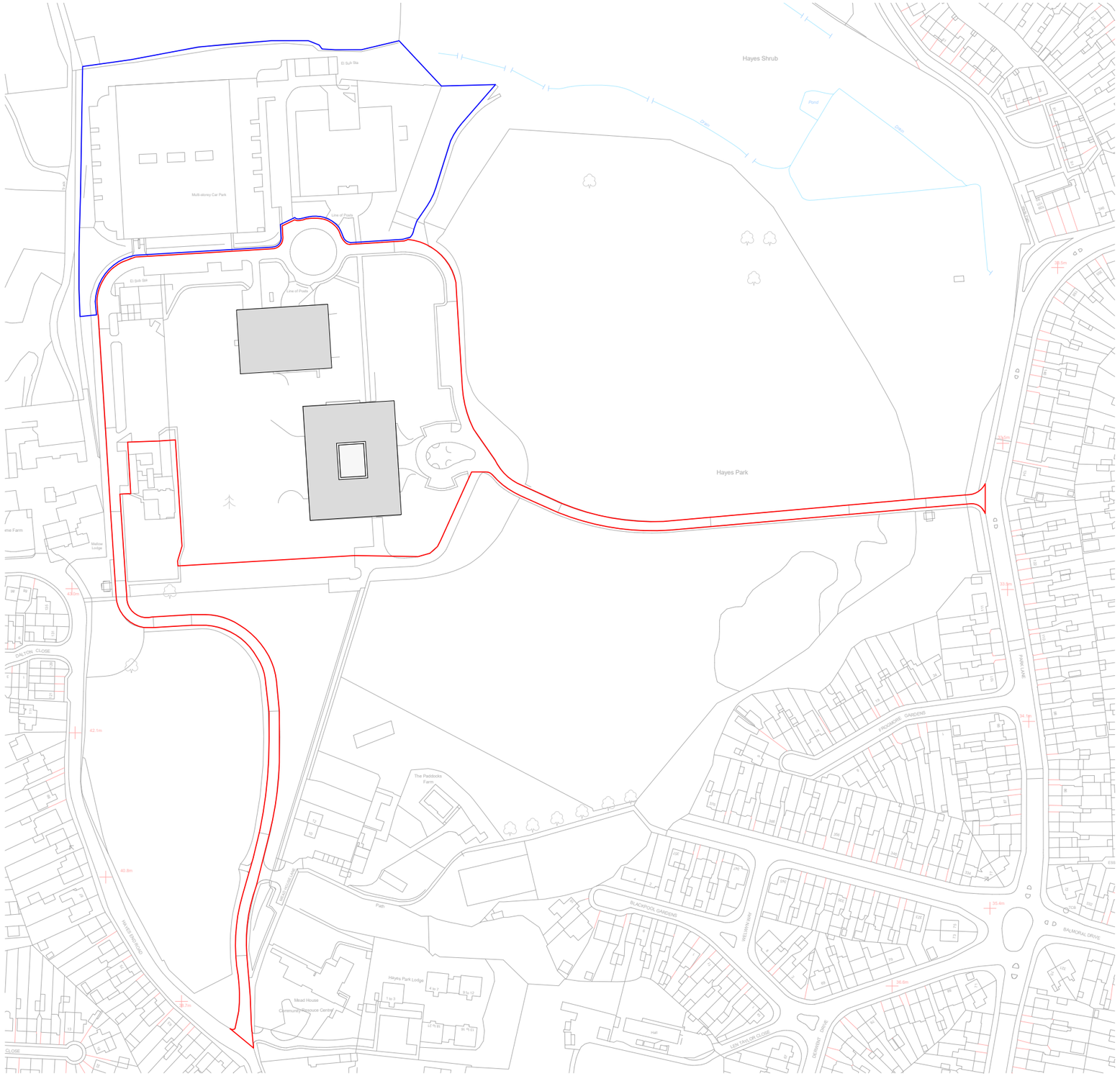
- **MEP coordination** – The proposed drainage layout is subject to change upon receipt of a proposed above ground drainage plan from the appointed MEP engineer. Any amendments made to the above ground drainage design is likely to cause subsequent changes to the below ground drainage design.
- **Connection Levels** – The network is designed on the assumption that the proposed drainage to reuse elements of the pre-existing pipe network and current line and levels will allow for connections.
- **Foul/Surface Water capacity** – A pre-planning enquiry has not been submitted to determine sufficient capacity, yet if there is an increase in foul water then this will have to be revised.

6 CONCLUSIONS AND RECOMMENDATIONS

The main conclusions from this drainage strategy report are detailed below.

- There is existing drainage within proximity to the site, the outfall location will be agreed via a pre-planning enquiry with Thames Water to ensure for capacity within the network.
- Ultimately surface water will discharge into the nearest Thames Water surface water public sewer, with foul water to the nearest available foul water sewer, where feasible.
- Currently the surface water is proposed to discharge at 51.1 l/s, with foul water unrestricted. Overall, a betterment of 50% will be achieved.
- The discharge of foul water is calculated to be 5.74 l/s;
- The attenuation required for storage is 90 cubic meters;
- The surface water network will utilise Attenuation Tanks and Filter Drains, to attenuate peak flows and provide water quality, biodiversity and amenity; and
- Typical maintenance for the drainage network has been identified in section 4.

Appendix A – Site Location



General Notes

No implied licence exists. This drawing should not be used to calculate areas for the purposes of valuation.
Do not scale this drawing for construction purposes. All dimensions to be checked on site by the contractor and such dimensions to be their responsibility.
All work must comply with relevant British Standards and Building Regulations
requirements. Drawing errors and omissions to be reported to the architect.

Notes

Key:

Planning Application Boundary

Land Owned by Applicant

0 100m
@ 1:2500

Key Plan

Studio Egret West
3 Brewhouse Yard
London, EC1V 4JQ
hello@egretwest.com
+44 (0) 20 7549 1730

For Planning

Project No. 0419

Project Name

Hayes Park

Drawing Title

Existing Location Plan

Client	Shall Do Hayes Developments Limited
Scale @A3	1 : 2500
Date	12/05/23
Drawn by	PJ
Checked by	GLJ

Rev	Date	Reason	Chk
P1	12/05/23	For Planning	SEW

Drawing Number	Rev.
0419-SEW-ZZ-ZZ-DR-A-000003	P1

whitby wood

91-94 Lower Marsh, London, SE1 7AB

HAYES PARK
P450887
22/03/2023

SITE LOCATION

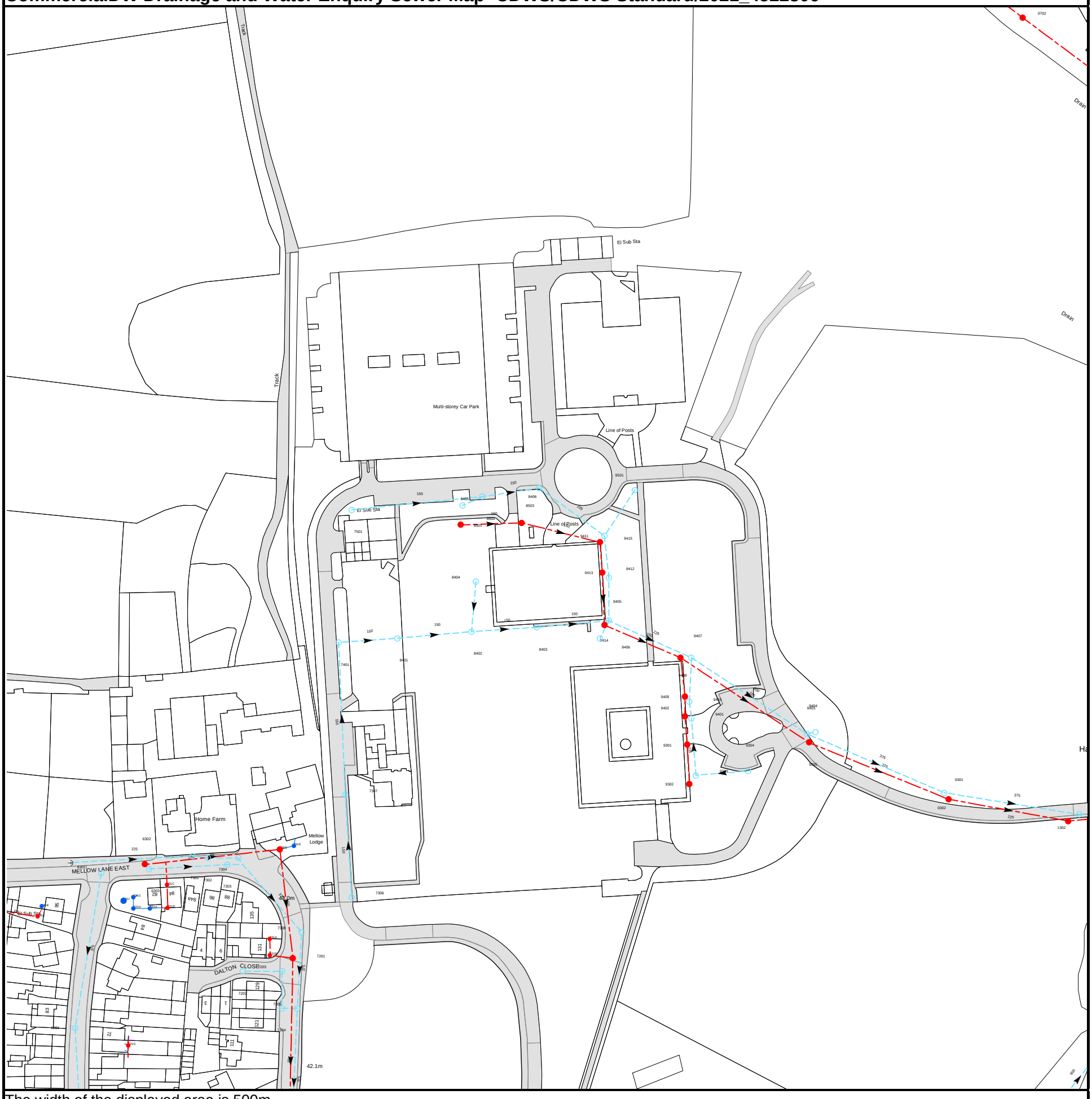
Legend

Site Boundary

1:15,000
1:3,000

Appendix B – Thames Water Asset Location Map

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2021_4522806

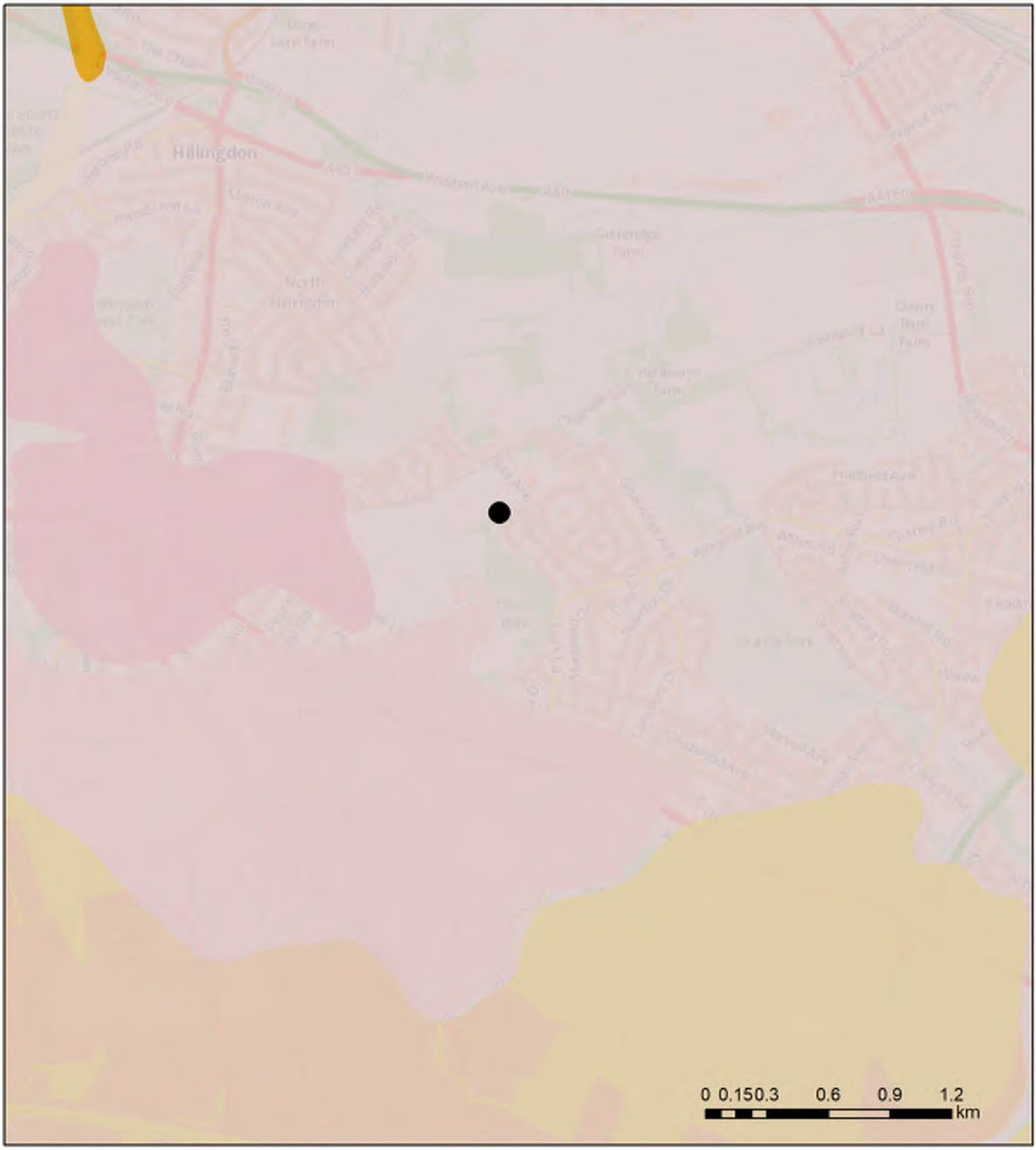


The width of the displayed area is 500m

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

Appendix C – British Geology Society Map

GeoIndex Report



Map Key

Superficial deposits 1:50,000 scale

- BOYN HILL GRAVEL MEMBER - SAND AND GRAVEL
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- TAPLOW GRAVEL MEMBER - SAND AND GRAVEL
- BLACK PARK GRAVEL MEMBER - SAND AND GRAVEL
- HEAD - CLAY AND SILT
- SHEPPERTON GRAVEL MEMBER - SAND AND GRAVEL
- LYNCH HILL GRAVEL MEMBER - SAND AND GRAVEL
- LANGLEY SILT MEMBER - CLAY AND SILT

Bedrock geology 1:50,000 scale

- LONDON CLAY FORMATION - CLAY, SILT AND SAND
- LAMBETH GROUP - CLAY, SILT AND SAND

Appendix D– Area Schedule

APPENDIX 1: SCHEDULE OF EXISTING AND PROPOSED FLOORSPACE

Table 1 – Site Wide Total Existing and Proposed Floorspace (GIA)

Use Class	Existing Sqm (GIA)	Proposed Sqm (GIA)	Variance Sqm (GIA)
Office (Class E)	12,655	0	-12,655
Residential (Class C3)	0	11,684	+11,684
Total	12,655	11,684	**-971**

Table 2 – Hayes Park South - Existing and Proposed Floorspace (GIA)

Use Class	Existing Sqm (GIA)	Proposed Sqm (GIA)	Variance Sqm (GIA)
Office (Class E)	7,381	0	-7,381
Residential (Class C3)	0	7,325	+7,325
Total	**7,381**	7,325	**-56**

Table 2 – Hayes Park Central - Existing and Proposed Floorspace (GIA)

Use Class	Existing Sqm (GIA)	Proposed Sqm (GIA)	Variance Sqm (GIA)
Office (Class E)	5,274	0	-5,274
Residential (Class C3)	0	4,359	+4,359
Total	**5,274**	4,359	**-915**

APPENDIX 2: SCHEDULE OF THE PROPOSED RESIDENTIAL MIX

Table 1 – Total Site Wide Housing Mix

	Low Cost Rent	Intermediate	Private	Total
1 bedroom (+ Studio)			65	65
2 bedrooms			41	41
3 bedrooms			17	17
4 bedrooms			1	1
Total			124	**124**

Table 2 – Hayes Park South Housing Mix

	Low Cost Rent	Intermediate	Private	Total
1 bedroom (+ Studio)			39	39
2 bedrooms			21	21
3 bedrooms			15	15
4 bedrooms			0	0
Total			75	**75**

Table 3: Hayes Park Central Housing Mix

	Low Cost Rent	Intermediate	Private	Total
1 bedroom (+ Studio)			26	26
2 bedrooms			20	20
3 bedrooms			2	2
4 bedrooms			1	1
Total			49	**49**