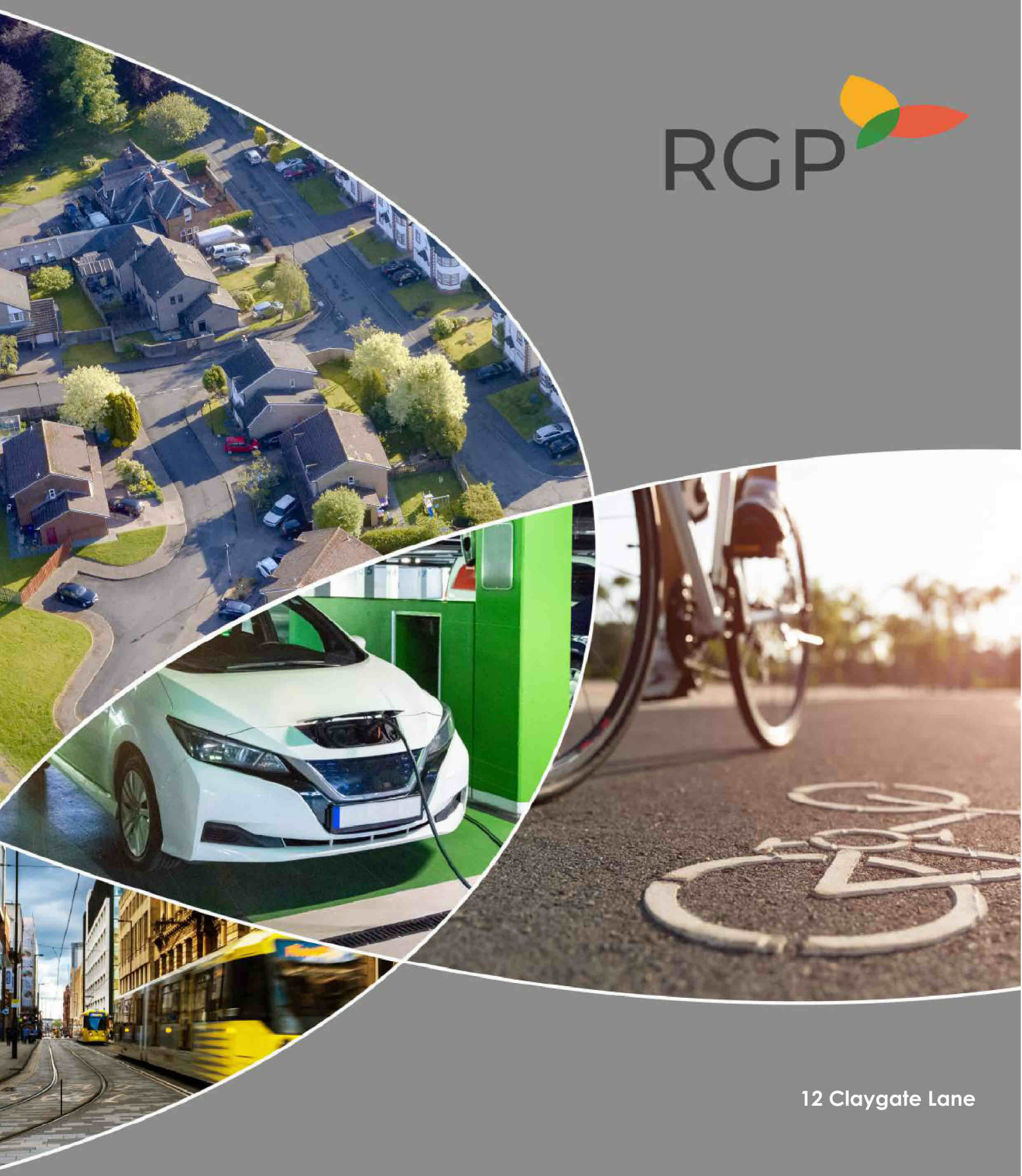

12 Claygate Lane

FLOOD RISK ASSESSMENT

For Residential Development

On behalf of Wynngate

7414-RGP-ZZ-00-RP-C-0500

August 2023

DOCUMENT CONTROL

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Project Location:	Land at the rear of 12 Claygate Lane, Hinchley Wood, KT10
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	Name	Date	Signature
Author:	Debby Booth (Technical Director)	18.08.2023	[redacted]
Checked by:	Helen Jolly (Associate)	18.08.2023	[redacted]
Approved by:	Debby Booth (Technical Director)	18.08.2023	[redacted]

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1 INTRODUCTION

RGP has been commissioned by Wynngate (the 'Client') to consider the flood risk associated with the proposed development at 12 Claygate Lane, Hinchley Wood from all potential sources of flooding, as defined by the National Planning Policy Framework (NPPF).

In compiling this Flood Risk Assessment, reference has also been made to the Strategic Flood Risk Assessment (SFRA), produced by AECOM for Elmbridge Borough Council ("EBC"), dated February 2019.

The aim of this FRA is to review the potential flooding impact on the proposed development site due to tidal, fluvial (Rivers), pluvial (Overland), sewer, reservoir, canal and other artificial flooding sources. The FRA will also review the potential impact of the development on the flooding in the surrounding area and the measures that could be incorporated as part of the design to mitigate the potential risk.

This FRA has been developed in accordance with the requirements of Chapter 14 of the NPPF, published February 2021, liaison with the Environment Agency (EA), the Lead Local Flood Authority (LLFA) and Thames Water.

Information used in preparing this Flood Risk Assessment was obtained from the following sources and Statutory Consultees:

(i) Environment Agency Flood Map

(ii) Environment Agency Main River Map

(iii) Environment Agency Long Term Flooding Map

(iv) SFRA produced by AECOM for Elmbridge Borough Council (2019)

(v) Surrey County Council Local Flood Risk Management Strategy (2017 – 2032)

(vi) Surrey County Council Sustainable Drainage System Design Guidance

2 PLANNING POLICY

2.1 Introduction

The proposed development will be designed in accordance with the requirements as set out in the National Planning Policy, the Surrey County Council Local flood risk management strategy and the Strategic Flood Risk Assessment for Elmbridge Borough Council.

2.2 National Planning Policy Framework (NPPF)

Section 14 of the NPPF (2021) outlines the requirements for determining if a Flood Risk Assessment is required to be undertaken for new developments. A site-specific FRA should be provided for all sites which are located in Flood Zones 2 and 3.

An FRA should be provided for sites located in Flood Zone 1 where:

- The development site area > 1ha;
- The site has been identified by the Environment Agency as having critical drainage problems;
- The site has been identified in a strategic flood risk assessment as being at increased flood risk in future;
- Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use; or
- The site is a small scale major development which where the number of residential units to be constructed is between 10 and 199 and:
    - Floor space to be built is between 1,000 m² and 9,999 m²; or
    - The site area is between 1ha and 2ha.

The development site is located within Flood Zone 1 in accordance with the EA flood maps. The site, however, may be at risk of surface water flooding and as such, an FRA is to be provided. The overall development area is approximately **3,500m² (0.35ha)**.

The NPPF sets out the strategy throughout the UK for future development. The key policy provision states that:

- Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.
- All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change so as to avoid, where possible, flood risk to people and property.

2.3 Local Policies

Surrey County Council have released a *Local Flood Risk Management Strategy (2017 – 2032)* providing a framework of flood management control & risks within the county, accompanied by a series of technical appendices providing additional information.

This FRA has been produced in line with the above-mentioned documentation.

2.4 Statutory Authority Consultation

The site is located within an area served by Thames Water.

The Environment Agency was contacted under the freedom of information act, it has been confirmed that there is no record of flooding from rivers and or the sea in this location.

3 PLANNING POLICY CONTEXT

3.1 Introduction

A site-specific FRA should be carried out to demonstrate how flood risk will be managed now and over the development's lifetime, taking into account climate change and with regards to the vulnerability of its users.

In order to adequately consider and demonstrate how the flood risk will be managed, we need to identify what the probability is of the site flooding, what the site is going to be used for, the associated flood risk vulnerability, and the compatibility between the flood risk vulnerability and the flood zones.

This section details how the planning policy is applied to this site-specific FRA. Items highlighted in 'Green' in the following tables detail the site specific classification for Flood Zones, Flood Risk Vulnerability and Compatibility.

3.2 Flood Zones

The flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

Table 1 – Flood Zones

Flood Zone	Probability	Definition
Flood Zone 1	Low	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Flood Zone 2	Medium	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Flood Zone 3a	High	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Flood Zone 3b	Functional Flood Plain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The particular flood zone(s) for the development are detailed on the Environment Agency's 'Flood Map for Planning', which is available online and is detailed further in Section 6 of this report.

3.3 Flood Risk Vulnerability Classification

The different types of flood risk vulnerability classifications are detailed in Table 2 below:

Table 2 - Flood Risk Vulnerability Classification

Classification	Description
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to

Classification	Description
	remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for **residential houses**, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Classification	Description
Water Compatible	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

3.4 Flood Risk Vulnerability and Flood Zone Compatibility

Table 3 - Flood Risk Vulnerability and Flood Zone Compatibility

	Flood Risk Vulnerability Classification				
Flood Zone	Essential Infra	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	×	✓	✓	✓	✓
Flood Zone 3a†	Exception Test	×	Exception Test	✓	✓
Flood Zone 3b*	Exception Test	×	×	×	✓*

✓ Development Appropriate

× Development Should not be Permitted

† Essential Infrastructure should be designed and constructed to remain operational and safe in times of flood

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

The site is located within Flood Zone 1 in accordance with the EA flood maps. However, the site is at risk of surface water flooding.

3.5 Sequential Test & Exception Test

The proposed development area of the site falls completely within Flood Zone 1, and in accordance with Table 3 above, the development can appropriately proceed without any potential risks to the surrounding areas.

An exception test is not required as the entirety of the site falls within Flood Zone 1.

4 EXISTING SITE INFORMATION

4.1 Site Location

The proposed development includes 9 residential units within the land at and behind 12 Claygate Lane, Hinchley Wood.

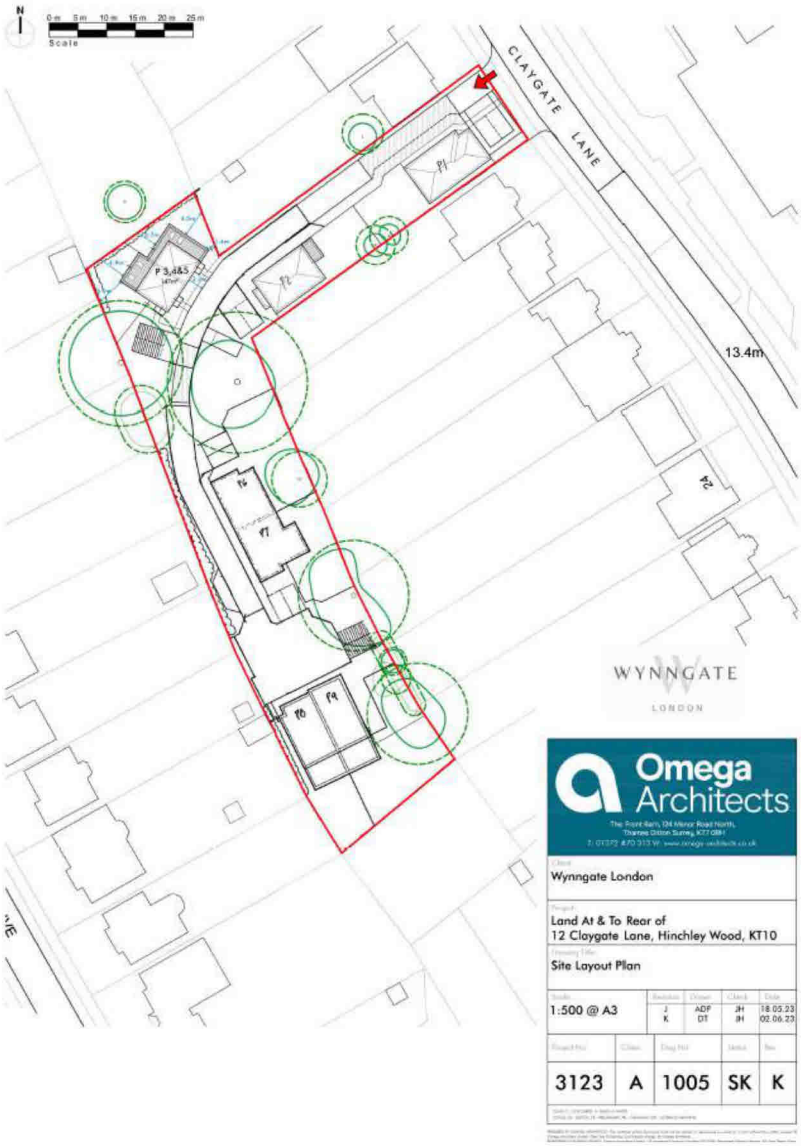


Figure 1 - Site Location Plan with an indicative Redline Boundary

4.2 Existing Site Description

The existing site is predominantly a greenfield site, with one existing residential unit (12 Claygate Lane), which comprises an overall area of approximately 3,500m² (0.35ha), and includes open green space and some small outbuildings.

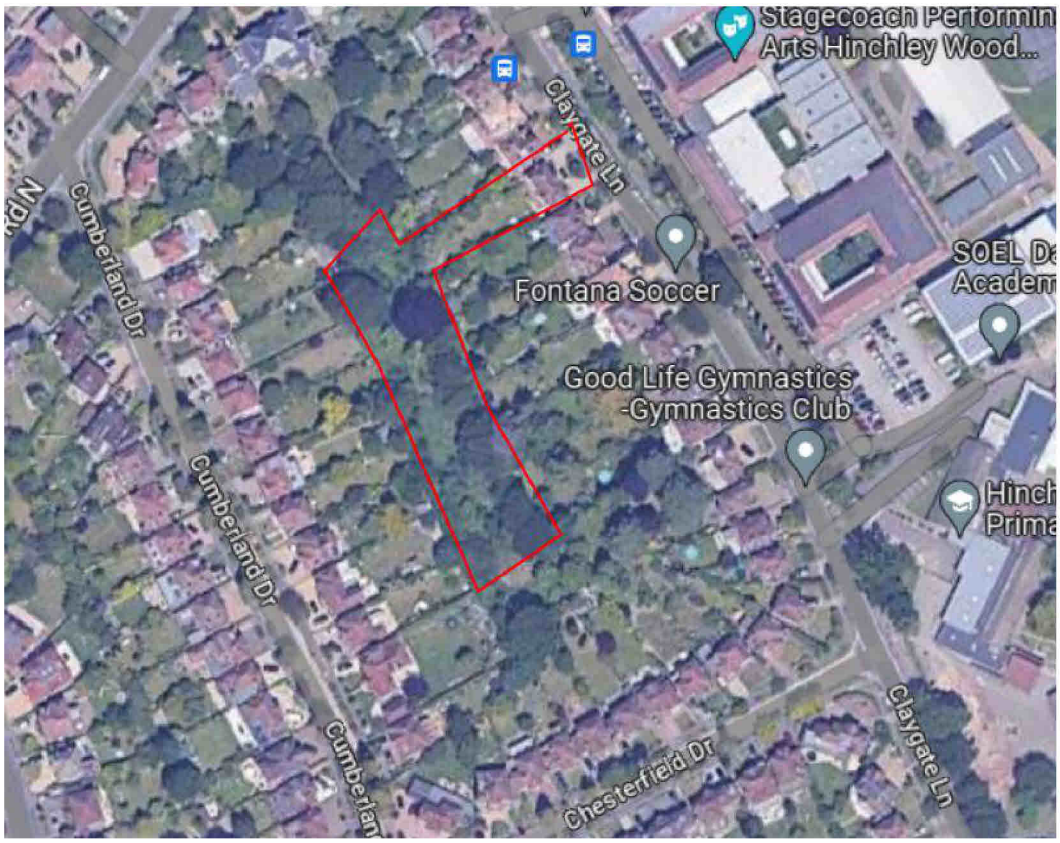


Figure 2 - Existing site ref Google satellite image

The approximate OS Grid Location for the development site is E: 516119, N: 165727.

4.3 Source Protection Zone

The site is not located in a Source Protection Zone, as is illustrated in Figure 3 below. The extract of the latest ground water designation maps, obtained from the EA Magic Map, shows the site isn't located within a source protection zone.

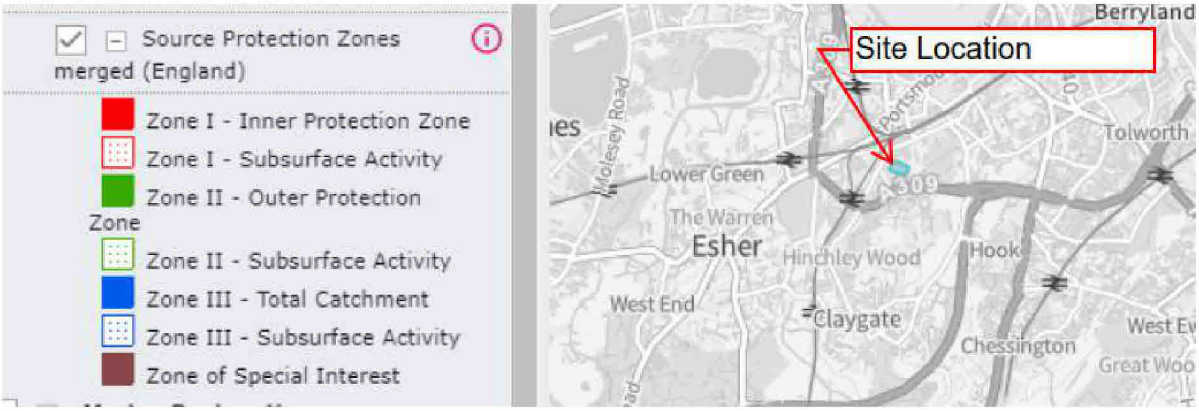


Figure 3 - Source Protection Zone Layout

4.4 Existing Geology and Hydrogeology

Having reviewed the existing British Geological Society (BGS) online mapping, the existing site is shown to be located in an area underlain by London Clay with superficial deposits of Kempton Park Gravel Member. Please refer to FIGURE 4, below, which details the existing bedrock, superficial deposits and the site location.

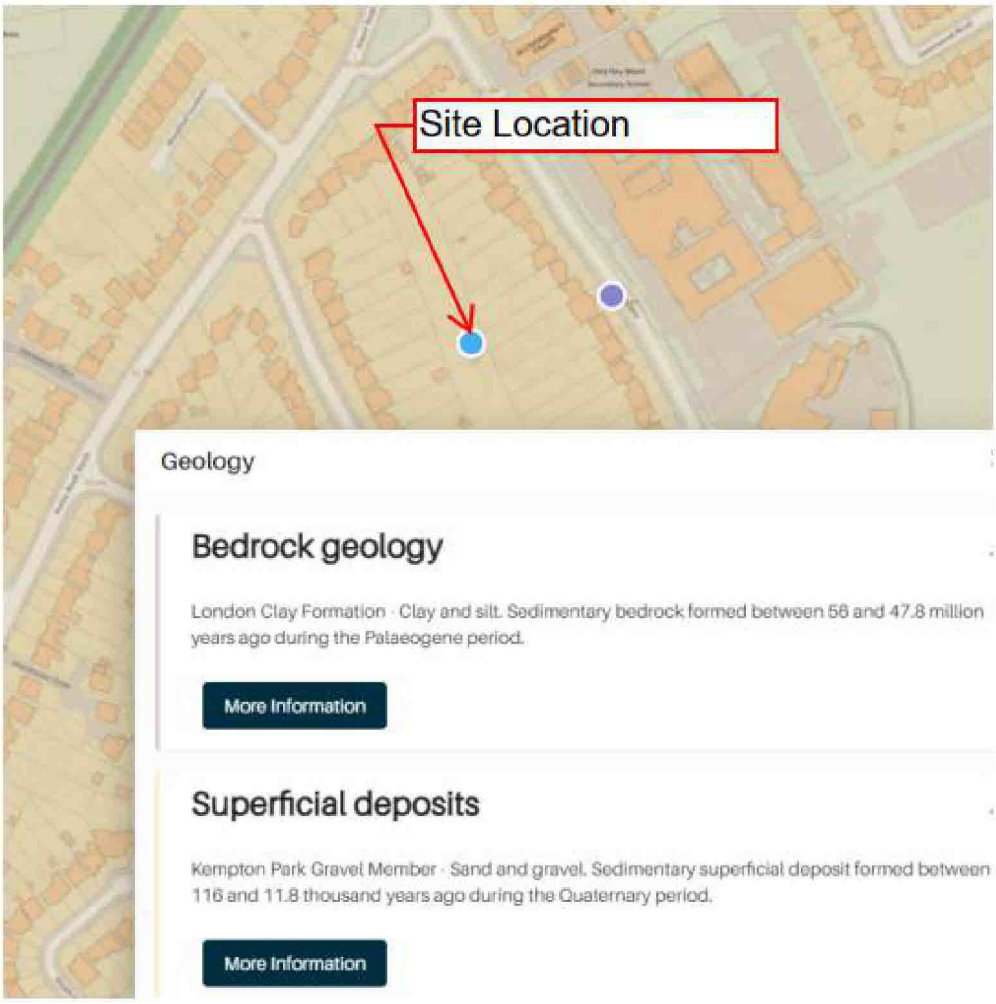


Figure 4 - Bedrock and Superficial deposits

The site is located above a "Principal" aquifer (superficial drift), as shown in Figure 5, below.

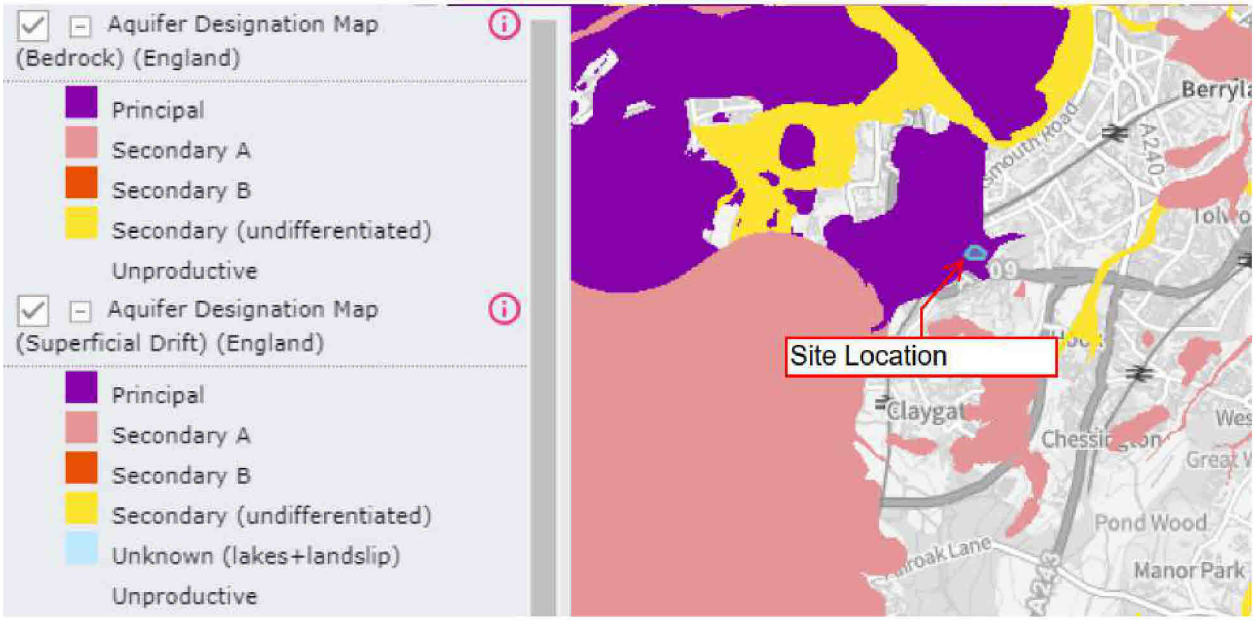


Figure 5 - Aquifer Designation Map

4.5 Surrounding Hydrology

There are no main or ordinary watercourses located in the vicinity to the proposed development site. Please refer to Figure 6, below, (red outline at proposed site) which is an extract from the EA online mapping tool.

Figure 6 - EA River Map Extract

5 PROPOSED DEVELOPMENT INFORMATION

5.1 Proposed Development Description

Please refer to APPENDIX 1 of this report for the site layout plans provided to RGP by the client.

The proposed development will include the construction of 9 residential units, with an access road off Claygate Lane.

The proposed development will be accessed from 12 Claygate Lane.

The proposed development footprint of permeable paving area and residential building falls completely within Flood Zone 1.

The proposed development will cause an increase in impermeable area of approximately 80%. Refer to section 7 for more information on the proposed drainage strategy.

6 FLOOD RISK

6.1 Flooding from Seas (Tidal)

The site is located inland and as such, the site is not affected by tidal flooding.

The site is not located close to any rivers which are subject to tidal surges and as such, is not affected by these events.

Please see Figure 7, which detailed the location of the site in relation to the wider surrounding area.

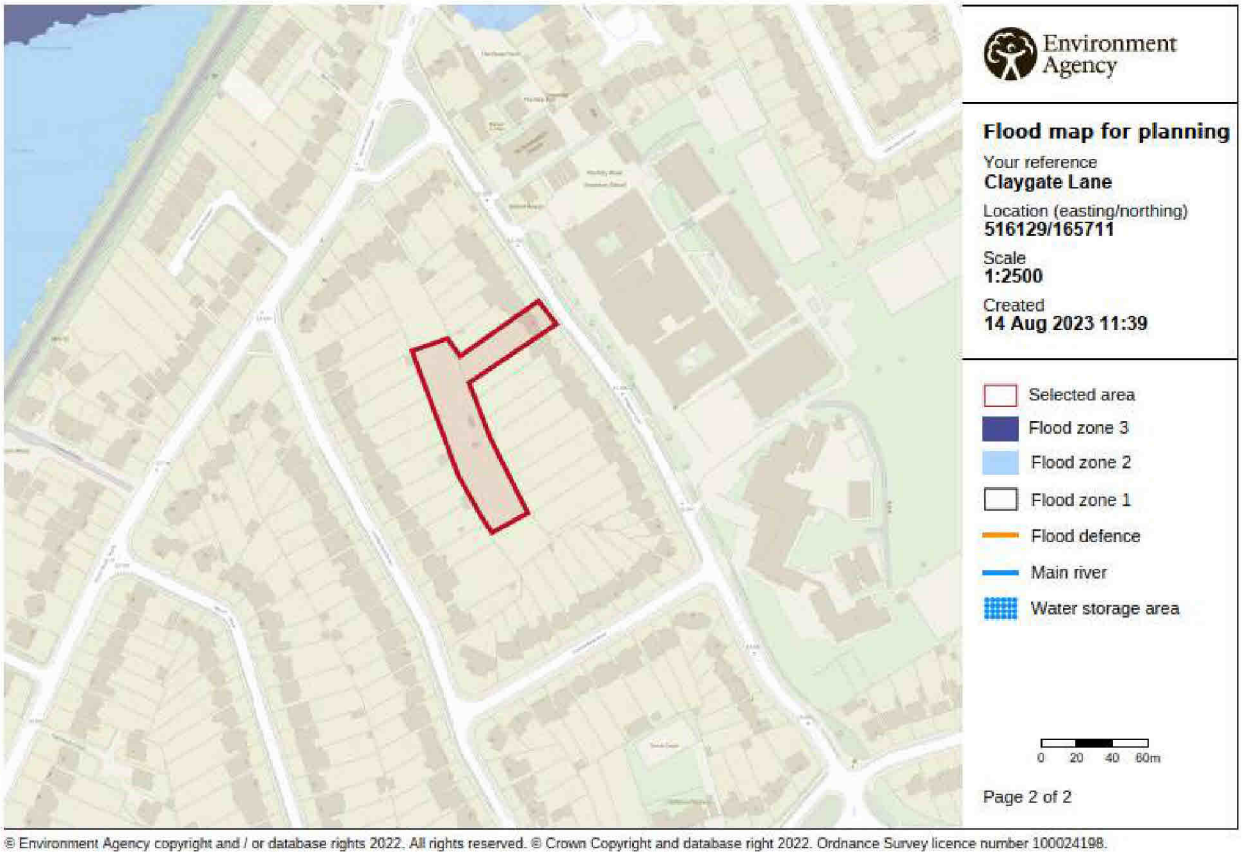


Figure 7 - EA Flood Map - Wider Area

6.2 Flooding from Rivers (Fluvial)

There are no other main rivers or ordinary water courses in the vicinity of the works which pose a flood risk to the site.

The Environment Agency Flood Map for Planning shows the overall site to be located fully within Flood Zone 1. Please see Figure 7 above, which details the EA flood map zone at the location of the site.

The future potential flood risk from rivers and watercourses has been assessed as ***very low***.

6.3 Flooding from Surface Water (Pluvial)

In the event of excessive rainfall, where the ground has become saturated and rainfall is not able to infiltrate into the ground, the overland flow would typically flow towards the nearest drainage system.

The existing topography of the site indicates that a majority of overland flow will be from south to north across the development site.

The EA Surface Water Flood Map confirms that the risk from surface water flooding is very low for the majority of the site, however the proposed entrance to the development is subject to flood risk (high risk), with a chance of flooding of between 1% and 3.3%, illustrated in Figure 8. The proposed drainage system will mitigate this flooding via a piped system and attenuation.

Figure 8 - EA Surface water flood risk map

The risk of overland flooding on the development site is considered ***low***.

6.4 Flooding from Groundwater

There are typically seven sources, or mechanisms, of groundwater flooding. These were described by Defra (Jacobs 2007) as:

- The rise of typically high groundwater levels to extreme levels due to prolonged extreme rainfall;
- The rise of groundwater levels in aquifers in hydraulic continuity with high in-bank river levels or extreme tidal conditions;
- The increase in groundwater levels and change of ground water flow paths due to artificial obstructions or pathways, like foundations, and the loss of natural storage and drainage paths;
- Rising groundwater levels due to a reduction in ground water extraction in Urban areas;
- Rising groundwater levels due to leaking sewers, drains and water mains;

- Faulty borehole headworks or casings causing upward leakage of groundwater through confining layers driven by artesian heads;

- Subsidence of the ground surface below the current groundwater level.

Of the abovementioned potential causes of groundwater flooding, only the first two are directly affected as a result of environmental conditions. The remaining five potential causes of groundwater flooding are mainly the result of man-made activities, or the stopping of such activities.

There are no works currently being undertaken at the development site, or planned to be undertaken at the development site that would have an impact on the five man-made causes of ground water flooding.

In addition, groundwater flooding from extreme water level rise at the development site is unlikely.

6.5 Flooding from Public Sewers/Highway Drains

Sewer flooding can occur when sewer systems become overloaded. Flooding of properties usually happens when either; flood water backs up in the pipes and enters directly into low lying properties or where the capacity of the system is exceeded and water discharges from the manholes and runs overland into properties.

It has traditionally been thought that in areas where the ground water level is shallow, the risk of groundwater entering the sewer network through pipe joints and cracks is high. As a result, the capacity of the pipe network is reduced. As has been discussed above in Section 6.4, the risk of ground water flooding to the development site area is low and as such, the risk of sewer flooding is also low.

According to the EBC Strategic Flood Risk Assessment 'Recorded Incidents of Internal Sewer Flooding' there are two recorded incidents across the post code region of Claygate KT10. Figure 9 below illustrates the area. The light blue shading reflects the post code region.

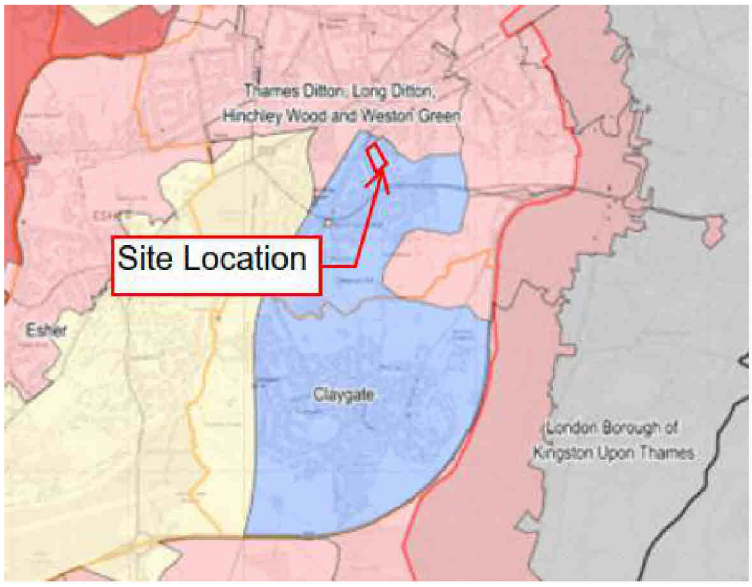


Figure 9 - Internal Sewer Flooding by post code

The sewer is located in the public highway (Claygate Lane), and that the proposed developments does not include any basements. So therefore this flooding will not affect the development.

According to the EBC Strategic Flood Risk Assessment 'Recorded Incidents of External Sewer Flooding' there are seven recorded incidents across the post code region of Claygate KT10. Figure 10 below illustrates the area. The light green shading reflects the post code region.

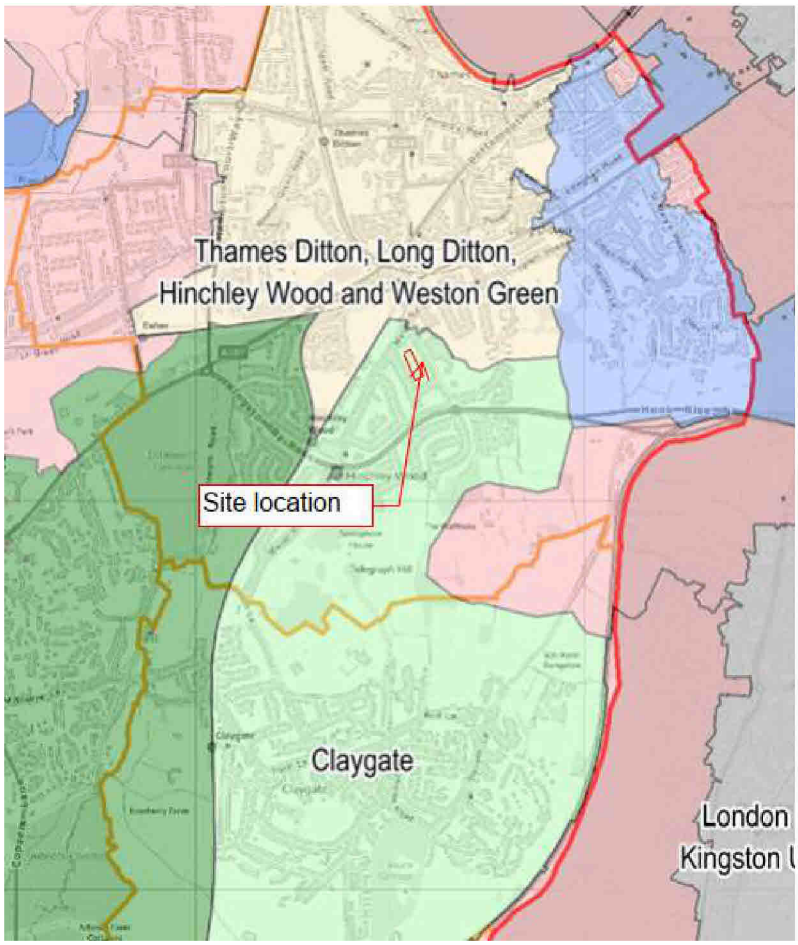


Figure 10 - External Sewer Flooding by post code

The risk of internal flooding to the proposed new dwellings, from the ingress of ground water to the system, will be unlikely. Further to this, the risk of internal foul water flooding to the development is considered low.

It is assumed that any external sewer flooding will replicate the flow paths as shown in the surface water flooding and therefore the risk is very low to the proposed development.

6.6 Flooding from Artificial Sources

Based on the Environment Agency's 'Long Term Flood Risk' map, the site is not affected by the failure of any reservoir or other man-made infrastructure. Please refer to Figure 11, below, which indicates that there is no risk of flooding from the failure of reservoirs in the surrounding area.

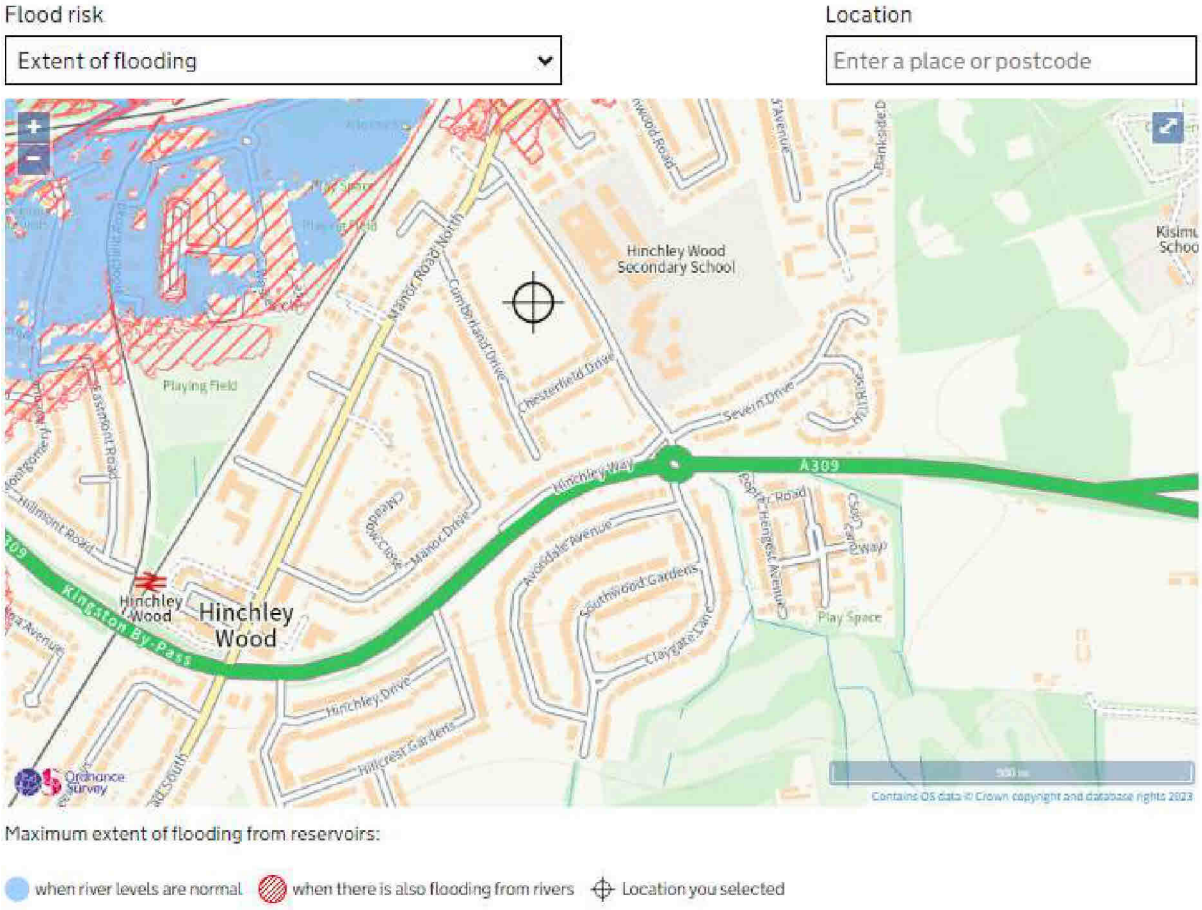


Figure 11 - EA Flood Risk from Reservoirs Map

6.7 Peak River Flow Flood Allowance for Climate Change

The site is not located within the vicinity of an existing watercourse. No provision has been included for Peak River Flow Flood Allowance.

6.8 High ++ Allowances for Climate Change

The EA defines High ++ Allowances as to "only apply in assessments for developments that are very sensitive to flood risk, and with lifetimes beyond the end of the century. For example, infrastructure projects or developments that significantly change existing settlement patterns. This includes urban extensions and new settlements." Although the life expectancy of the proposed development will extend into the next century, we do not believe that the development of a single dwelling meets the requirements for a High ++ Allowance and as such have not included for this allowance.

6.9 Peak Rainfall Intensity Allowance for Climate Change

Having reviewed the Environment Agency's Climate change allowances, the Mole Management Catchment peak rainfall allowances require a 40% allowance on the 1% exceedance event.

7 DRAINAGE AND BACKGROUND INFORMATION

7.1 Background Information

A desktop study was done in preparation for this drainage strategy.

The site at Claygate Lane is classified as a greenfield site.

The bedrock underlying the site is by London Clay with superficial deposits of Kempton Park Gravel Member as per the BGS Geology Viewer.

The BGS online mapping also shows the site has a Primary Aquifer and is not in a Source Protection Zone.

There is a surface water drain within Claygate Lane, it is 915mm in diameter and at an approximate depth of 2.4m below the road surface. (From 'Thames Water Asset Location search'), see appendix 4 for the Thames Water asset plans.

A 225mm diameter foul sewer is also located in Claygate Lane at an approximate depth of 1.8m below the road surface. (From 'Thames Water Asset Location search').

7.2 Existing Surface Water Run-Off

The existing surface water generally infiltrates, and any exceedance flow will drain to the north as illustrated by the surface water flooding map in figure 8.

The greenfield runoff rate was estimated using the UKSuDS.com tool. Using the IH124 runoff estimation approach, Q_{bar} is ***0.55l/s***. The greenfield runoff rate estimation is included in APPENDIX 3. A value of 2l/s will be the proposed discharge rate for the site.

The site covers an area of approximately 3,500 m² (0.35ha). It is assumed that the site will become 80% impermeable.

7.3 Proposed Surface Water Run-Off

The surface water drainage proposal is to have a piped drainage network with attenuation.

The proposed drainage layout is included in Appendix 2.

The attenuation volume based on the 80% impermeable area will be approximately 300m³. This has been estimated using the UKSuDS.com tool using a discharge rate of 2l/s. the calculations are in Appendix 3.

7.4 Outfall Proposals

The following options were considered for the outfall of the surface water:

- **Option 1:** Infiltration;
- **Option 2:** Discharge to surface waters such as watercourses, rivers or seas;
- **Option 3:** Discharge to a surface water sewer, highway drain or another drainage system;
- **Option 4:** Discharge to a combined sewer.

Option 1: Infiltration testing will be required to prove the viability of infiltration, however the site is underlain by London Clay, so infiltration is unlikely. The EBC Strategic Flood Risk Assessment shows 'very significant constraints are indicated' in the area for infiltration SUDs.

Option 2: There are no watercourses or rivers within the vicinity of the development.

Option 3: There is an existing surface water sewer in Claygate Lane, it is proposed that the development connects to this drainage network, subject to agreement and confirmation of capacity with Thames Water.

Option 4: This option is discounted due to the presence of a surface water drain in Claygate lane.

7.5 Surface Water Design Criteria

The climate change allowance for the 1% exceedance event is 40%.

The climate change allowance for the 3.3% exceedance event is 35%.

This allowance is taken from 'Flood risk assessments: climate change allowances' and is the upper end allowance for the Mole Management Catchment.

The surface water drainage system will be sized to accommodate the 3.3%.

The 1% exceedance event +40% will be checked to ensure that there is no flooding off site and will be contained to not adversely affect the site infrastructure.

A 10% allowance is required for urban creep.

7.6 SUDs Assessment

The following table illustrates the types of SUDs that could be used as part of the development proposal

Table 4 - SuDS Assessment

SuDS Feature	Description	Pro's	Con's	Suitable for Use
Trees	Tree can be used to improve the performance of a number of SuDS features as root growth and decomposition increase infiltration capacity. They can also be used as standalone features within tree pits, collecting and storing run-off and providing treatment.	Shallow bioretention systems which can reduce small runoff rates and flows, while also providing habitat and biodiversity, and an attractive landscape feature that are self-irrigating and fertilising	Does not work effectively for large catchments that discharge into the system at a single location without a flow control.	✓
Pervious Pavements	Surface Water run-off is allowed to flow through the structural paving (block paving, block work or porous asphalt paving). Water can be stored in the sub-base of the construction make-up and often permitted to infiltrate into the underlying ground.	Reduced peak flows to watercourses reducing the risk of flooding downstream, reduced effects of pollution in runoff on the environment, can be used in high density developments with a range of surface finishes that accept surface waters over their area of use, reduced need for deep excavations for drainage.	Cannot be used where large sediment loads may be washed/carried onto the surface, in the UK, current practice is to use on highways with low traffic volumes, low axle loads and speeds of less than 30 mph, risk of long-term clogging and weed growth if poorly maintained.	✓
Attenuation Storage	Storage is typically provided in large underground storage features that are used to temporarily store the surface water run-off before being infiltrated, discharged under controlled conditions or re-used on site. Typically constructed from geo-cellular storage systems, concrete tanks or oversized pipes. They can be lined to make them impermeable or enclosed in a geotextile which allows for infiltration into the surround soil.	Modular and flexible, dual usage (i.e. infiltration and/or storage), high void ratios, lightweight and easy to install and robust, capable of managing high flow events, can be installed beneath trafficked or non-trafficked areas, long-term physical and chemical stability, can be installed beneath public open spaces, e.g. play areas.	No water quality treatment or amenity provision, performance can be difficult to monitor, can be difficult to maintain.	✓
Swales	Shallow grass channels for water collection and conveyance	Easy to incorporate into landscaping · Good removal of urban pollutants · Reduces runoff rates and volumes ·Low capital cost.	Although low maintenance they do require regular maintenance including vegetation management. As a shallow surface feature, a swale requires sufficient space so retrofit opportunities can be limited in narrow urban streets.	✓
Filtration strips	A vegetated strip next to a paved area prior to a drainage collection element	Easy to incorporate into landscaping · Good removal of urban pollutants	Although low maintenance they do require regular maintenance including vegetation management. As a surface feature, sufficient space is required so retrofit opportunities can be limited.	✓

Based on the above assessment, the outline drainage strategy for the development will include some of the following SuDS features into the design (subject to detail design and agreement with the local authority, LLFA and the EA):

- Attenuation Storage
- Pervious Pavements
- Trees
- Swales
- Filtration strips

Other SuDS features were not suitable for inclusion into the drainage strategy due to site constraints, land limitations and the general size of the development.

7.7 Surface Water Quality

The quality of surface water collected and discharged to the surrounding environment, by direct discharge to watercourses or by infiltration should be managed such that the receiving entities are protected from pollution.

Residential roofs are considered a "very low" pollution hazard level as shown in Table 4.3 of the CIRIA SuDS Manual 2015 and does not need to be treated.

The run-off from the roofs is proposed to discharge directly into the surface water drainage network.

The low traffic roads, individual property driveways and residential car parks have a "low" pollution hazard level.

7.8 Exceedance Routes

Exceedance routes (flow from events greater than the 1% +climate change) will be kept within the carriageway and will flow in the direction of the Claygate Lane. This will reduce the risk of flooding to the properties to the North. The routing would increase the flow in Claygate Lane, but no additional properties would be at risk from this exceedance route. There is no increased risk to the downstream infrastructure as per the current arrangement.

7.9 Lead Local Flood Authority (LLFA) and Internal Drainage Board

The LLFA for this site is Surrey County Council, and there is no Internal Drainage Board for this site.

8 SAFE ACCESS

The development site is not at risk of flooding from rivers, seas, surface water, groundwater or reservoirs. As such, the need to assess safe access and egress has not been undertaken.

Claygate lane is at risk from surface water flooding, however the depth is less than 300mm and as such this will not prevent access and egress from the site. The entrance and footpath are outside the extents of this flooding.

This FRA demonstrates that the risk to human life associated with access and egress at the development site is ***very low***.

9 CONCLUSION

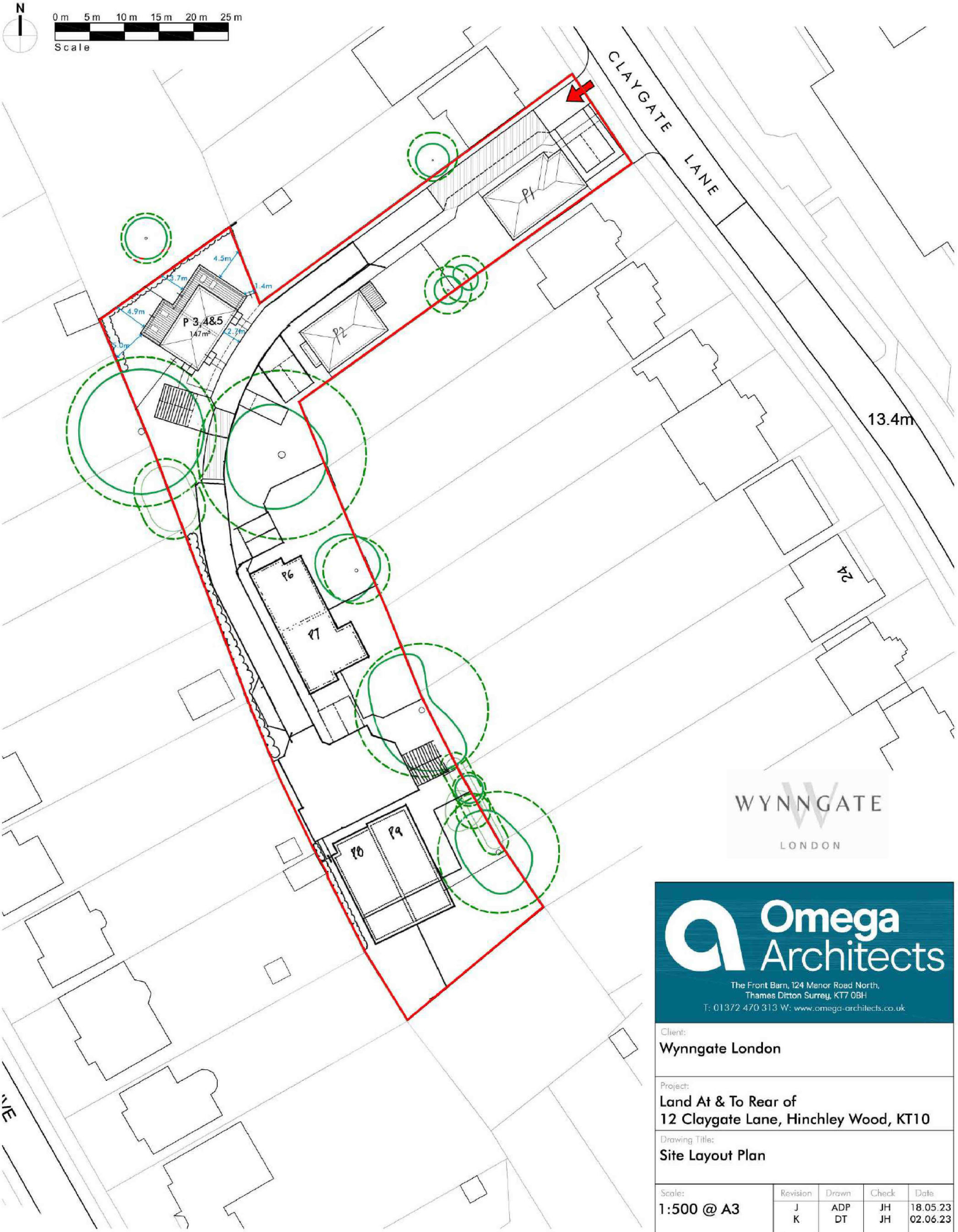
This FRA has been undertaken in accordance with the requirements of the NPPF and Hastings Council Strategic Flood Risk Assessment. The FRA has considered the potential risk of flooding for all sources, including the specific requirements to review the risk from ground water flooding and fluvial flooding associated with the existing watercourse.

The development site is located within Flood Zone 1. Based on the information collated as part of this FRA, the proposed development flood risk from all sources has been assessed as low. The area of the site being developed upon is located within Flood Zone 1 and the assessment of the potential future flooding of the site illustrates that this will be maintained in the future.

The surface water drainage will be restricted to predevelopment greenfield runoff rates, so there will be no change to the flood risk downstream.

The development proposed for this site should not be precluded based on flood risk grounds.

APPENDIX 1 SITE LAYOUT



WYNNGATE
LONDON

Omega Architects
The Front Barn, 124 Manor Road North,
Thames Ditton Surrey, KT7 0BH
T: 01372 470 313 W: www.omega-architects.co.uk

Client:
Wynngate London

Project:
Land At & To Rear of
12 Claygate Lane, Hinchley Wood, KT10

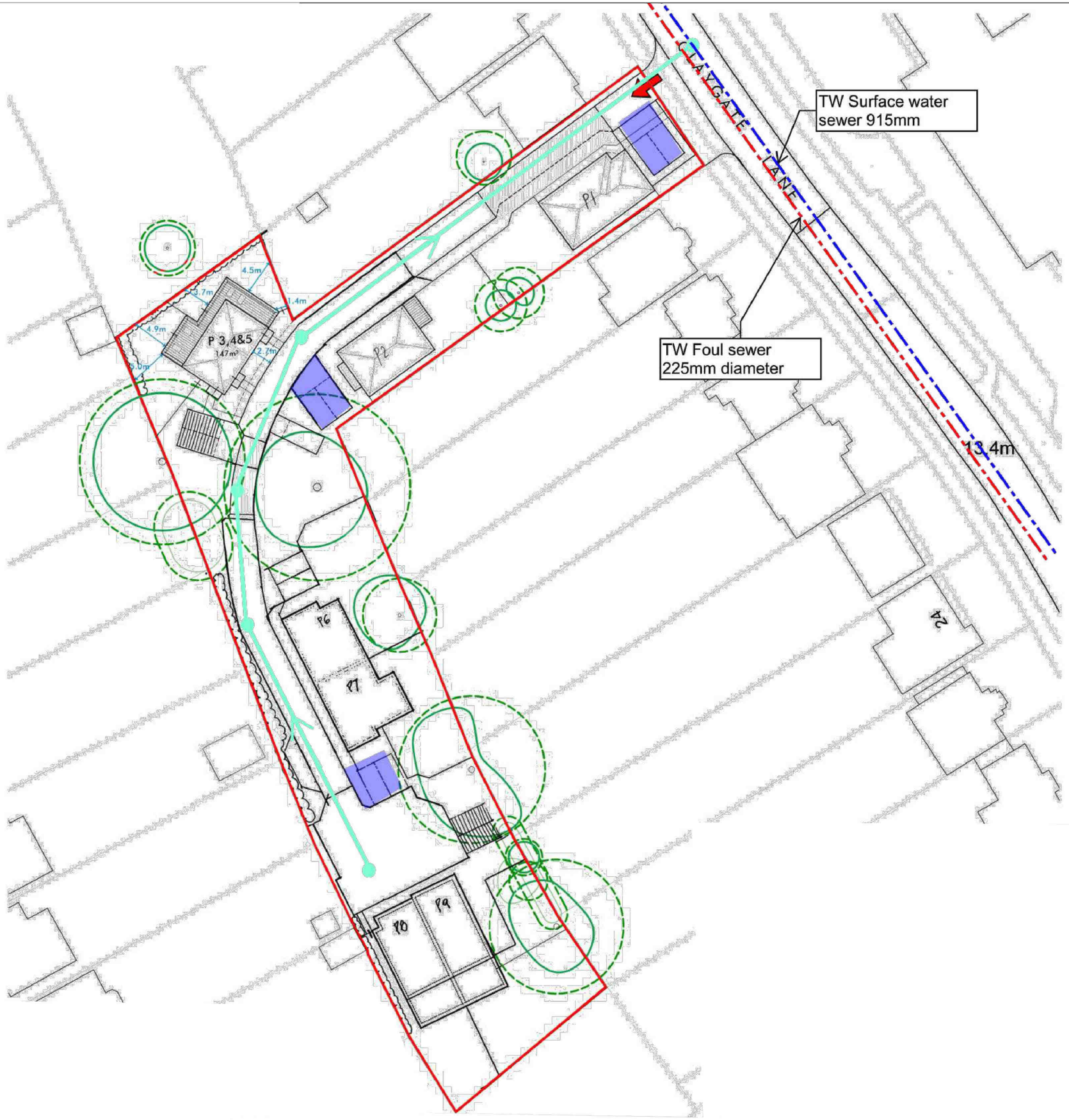
Drawing Title:
Site Layout Plan

Scale:	Revision	Drawn	Check	Date
1:500 @ A3	J	ADP	JH	18.05.23
	K	DT	JH	02.06.23

Project No'	Class	Dwg No'	Status	Rev
3123	A	1005	SK	K

CLASS: C - COLOURED, A - BLACK & WHITE
STATUS: SK - SKETCH, PR - PRELIMINARY, PL - PLANNING, WD - WORKING DRAWING

APPENDIX 2 DRAINAGE LAYOUT



NOTES:

1. DO NOT SCALE OFF THE DRAWING
2. ALL MEASUREMENTS IN mm UNLESS OTHERWISE NOTED ON THE DRAWING

Key

Attenuation

Private Surface water drain

REV	DESCRIPTION	BY	DATE
P1	ISSUED FOR INFORMATION	DB	15.08.23

RGP
London Office
1-2 Paris Garden
London, SE1 8ND

[T]: 020 7078 9662 [e]: enquiries@rgp.co.uk
www.rgp.co.uk

Transport Planning and Infrastructure Design Consultants
Godalming and London

Client
WYNNGATE LONDON

Project
LAND AT AND TO THE REAR OF
12 CLAYGATE LANE, HINCHLEY WOOD

Drawing Title
OUTLINE DRAINAGE SKETCH

Scale	Drawn By	Checked By	Approved By
NTS @ A3	DB	TKG	DB

Date	Drawing No.	Rev.
AUGUST 2023	7414-RGP-ZZ-00-SK-C-0001	P1

APPENDIX 3 DRAINAGE CALCULATIONS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Debby Booth
Site name:	Claygate Lane
Site location:	Hinchley Wood

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.37857° N
Longitude:	0.33266° W
Reference:	535953703
Date:	Aug 15 2023 13:04

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.35

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	619	619
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.55	0.55
1 in 1 year (l/s):	0.47	0.47
1 in 30 years (l/s):	1.27	1.27
1 in 100 year (l/s):	1.76	1.76
1 in 200 years (l/s):	2.07	2.07

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Debby Booth
Site name:	Claygate Lane
Site location:	Hinchley Wood

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.37823° N
Longitude:	0.33259° W
Reference:	1131931538
Date:	Aug 15 2023 13:07

Site characteristics

Total site area (ha):	0.35
Significant public open space (ha):	0
Area positively drained (ha):	0.35
Impermeable area (ha):	0.28
Percentage of drained area that is impermeable (%):	80
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.35
Net impermable area for storage volume design (ha):	0.29
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	101.64
FEH / FSR conversion factor:	1.32	1.32
SAAR (mm):	619	619
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.62	1.62

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

	Default	Edited
Growth curve factor 30 year:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Q_{BAR} for total site area (l/s):	0.55	0.55
Q_{BAR} for net site area (l/s):	0.55	0.55

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	272	272
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	272	272

APPENDIX 4 THAMES WATER UTILITY RECORDS

Asset location search

Property Searches

Wynngate
ramli beech close
COBHAM
KT11 2EN

Search address supplied 12
Claygate Lane
Esher
KT10 0AQ

Your reference n/a

Our reference ALS/ALS Standard/2022_4576758

Search date 30 January 2022

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: 12, Claygate Lane, Esher, KT10 0AQ

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

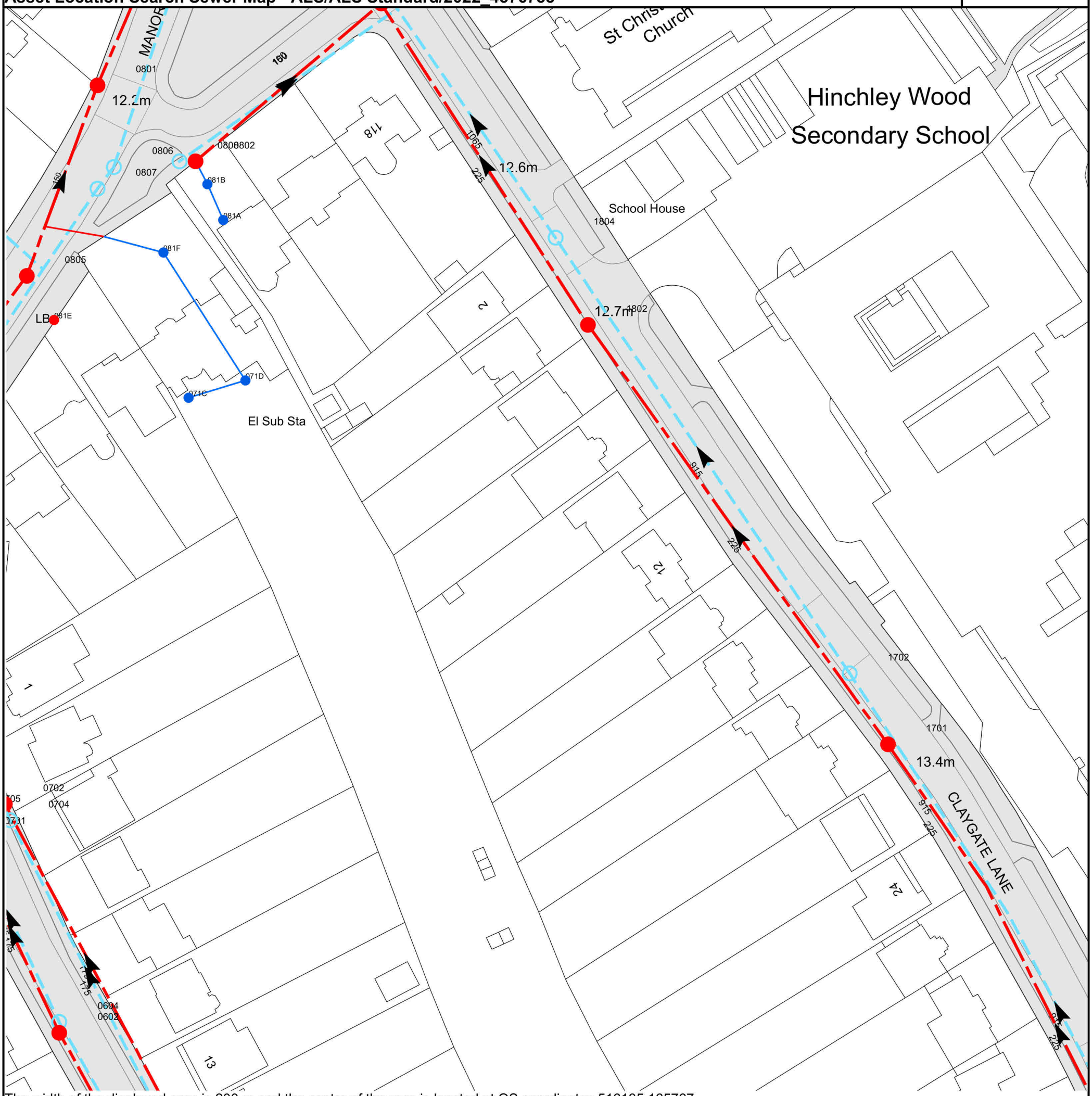
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4576758



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 516135,165767

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.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
1701	13.42	11.84
1702	13.27	10.86
071C	n/a	n/a
071D	n/a	n/a
1802	12.86	11.03
081F	n/a	n/a
1804	n/a	n/a
081A	n/a	n/a
0807	12.3	11.21
081B	n/a	n/a
0806	12.22	n/a
0802	12.5	11.72
0808	12.48	11.81
0801	12.33	11.28
1801	12.28	10.08
0702	n/a	n/a
0704	12.93	n/a
0805	12.35	11.38
081E	n/a	n/a
0602	13.32	12.12
0604	13.35	n/a

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.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

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
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- 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.

- Inlet
- Outfall
- Undefined End

Other Symbols

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

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

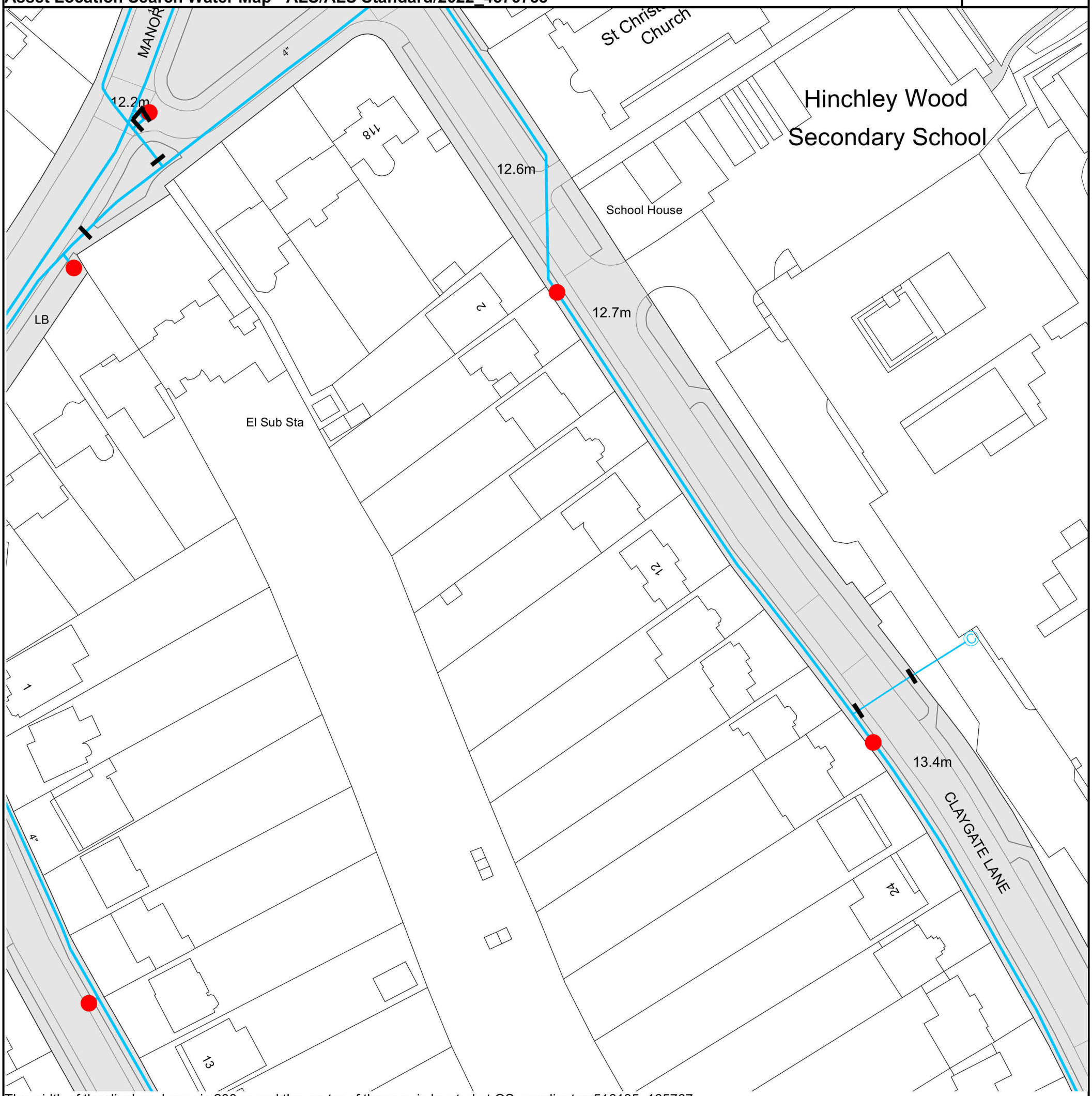
Ducts or Crossings

- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the 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 indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters.
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, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2022_4576758



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 516135, 165767.

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.

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

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

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.

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

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

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
- **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

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: Indicates 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.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

RGP – Transport Planning and Infrastructure Design Consultants

enquiries@rgp.co.uk www.rgp.co.uk

Surrey Office Shackleford Suite, Mill Pool House, Mill Lane, Godalming, Surrey GU7 1EY T: 01483 861 681

London Office 30 Stamford Street, London SE1 9LQ T: 020 7078 9662

RGP Consulting Engineers Limited • Registered in England No. 4237910 • Registered Office: Shackleford Suite, Mill Pool House, Mill Lane, Godalming, Surrey GU7 1EY • VAT Registration no. 771 9281 04