224 St Leonards Road, East Sheen, SW14 7BN (2 houses) – Flood Risk Assessment & Drainage Strategy

20/05/2024
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Revision History

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1.0 Introduction

RAB Consultants has prepared this Flood Risk Assessment (FRA) & Drainage Strategy (DS) in support of the proposed residential development located at 224 St Leonards Road, East Sheen, SW14 7BN.

The development site is located in Flood Zone 1 according to the Environment Agency's Flood Map for Planning (Rivers and Sea). A Flood Risk Assessment for this site is required under the Planning Practice Guidance for the National Planning Policy Framework (NPPF) as it located within a critical drainage area. The site-specific FRA is required to ensure that the development is safe from flooding and will not increase the risk of flooding elsewhere.

The Secretary of State for Communities and Local Government laid a Written Ministerial Statement in the House of Commons on 18th December 2014 setting out changes to planning that will apply for major development from 6 April 2015. Therefore, from 6 April 2015 local planning policies and decisions on planning applications relating to major development are required to ensure that sustainable drainage systems (SuDS) are used for the management of surface water. As the Lead Local Flood Authority, London Borough of Richmond upon Thames' is required under Article 18 of the Town and Country Planning (Development Management Procedure) (England) Order 2015 (the Development Management Procedure Order) to provide consultation response on the surface water drainage provisions associated with major development.

Major development is defined within the Development Management Procedure Order as development that involves any one or more of the following:

1. the winning and working of minerals or the use of land for mineral working deposits;
2. waste development;
3. the provision of dwelling houses where:
   - 3.1. the number of dwelling houses to be provided is 10 or more; or
   - 3.2. the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph 3.1;
4. the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
5. development carried out on a site having an area of 1 hectare or more.

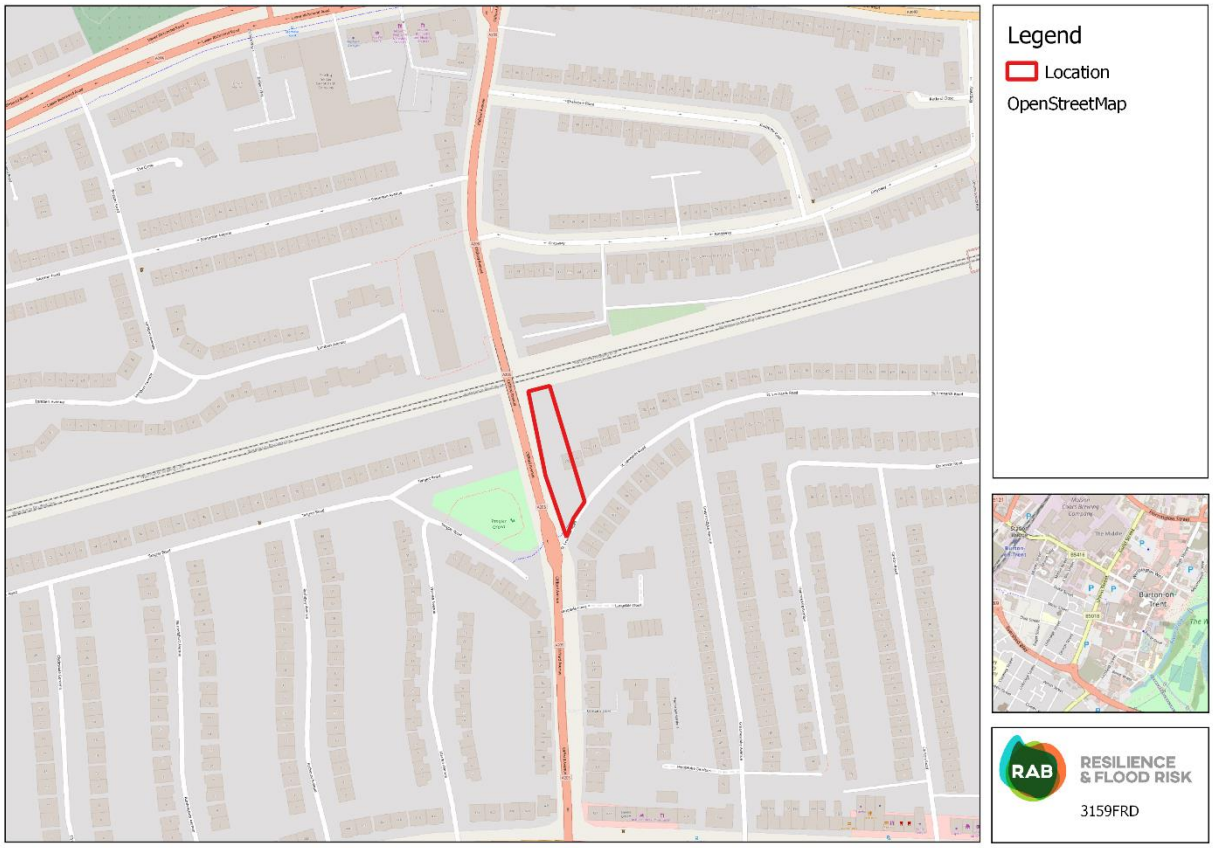
A surface water drainage strategy is required in this instance to identify suitable measures for the sustainable management of surface water runoff.

2.0 Site details

2.1 Site location

TABLE 1: SITE LOCATION

Site address:	224 St Leonards Road, East Sheen, SW14 7BN
Site area:	1300m^2
Existing land use:	Residential
OS NGR:	TQ 19822 75566
Local Planning Authority:	London Borough of Richmond upon Thames



2.2 Site description

The site is located within East Sheen and is located off St Leonards Road. The existing site has one dwelling with a garden to the rear. It is bounded by residential dwellings to the east, south and west with a railway line to the north.

2.3 Development proposal

Permission is sought for the construction of 2 dwellings with rear gardens and an access path. Access to the new dwellings will be the same as per the existing dwelling(s) off St Leonards Road.

3.0 Flood Risk

3.1 Sequential test

According to the Environment Agency's Flood Map for Planning the site lies in Flood Zone 1, which is described in the NPPF as land having a less than 1 in 1,000 annual probability of river or sea flooding (less than 0.1% AEP).

FIGURE 1: ENVIRONMENT AGENCY FLOOD MAP FOR PLANNING

The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas. NPPF Planning Practice Guidance (PPG) Annex 3 confirms the 'Flood risk vulnerability classification' of a site, depending upon the proposed usage. This classification is subsequently applied to Table 2 'Flood risk vulnerability and flood zone compatibility' to determine whether:

- The proposed development is suitable for the flood zone in which it is located; and
- Whether an Exception Test is required for the proposed development.

The proposed development is classed as a ‘more vulnerable’ development in accordance with NPPF PPG. The development is therefore appropriate for the Flood Zone.

3.2 Flooding history

The 2021 Level 1 London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA) suggests that the site is not located within the Environment Agency historic flood outlines.

3.3 Fluvial (Rivers)

According to the Environment Agency Flood Map for Planning, the site is located in Flood Zone 1 therefore, has less than 0.1% AEP risk of flooding from this source.

The 2021 SFRA shows there is a culverted ordinary watercourse 100m south of the site.

3.4 Flood defence breach or overtopping

3.4.1 Breach risk

The site is not formally protected, therefore it is not at risk of breach.

3.4.2 Overtopping risk

The site is not formally protected, therefore it is not at risk of overtopping.

3.5 Coastal/tidal

The site is located at a considerable distance from the sea and is not at risk of coastal or tidal flooding.

3.6 Pluvial (Surface water)

When the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded, excess rainwater flows overland. This water will collect in topographic depressions and at obstructions, which can inundate development in low lying areas. The severity of the rainfall event, the degree of saturation of the soil before the event, the permeability of soils and geology, and the gradient of the surrounding land and it’s use; all contribute to and affect the severity of overland flow.

The Environment Agency Flood Map for Surface Water (Figure 2), can be used to see the approximate areas that would experience surface water flooding from a range of AEPs, which is used to categorise the risk (Table 2).

The majority of the site is shown to be medium risk from surface water flooding with the access at very low risk. The map suggests that runoff from Clifford Avenue flows towards the site via an overland flow path. However, this is not the case as Clifford Avenue rises above the site to form the railway bridge. In addition, the existing fencing installed at the site boundary could potentially disrupt any overland surface water runoff flow paths, indicated on the surface water flood risk map. Nevertheless, a conservative approach has been adopted taking into consideration the identified surface water flood depths.

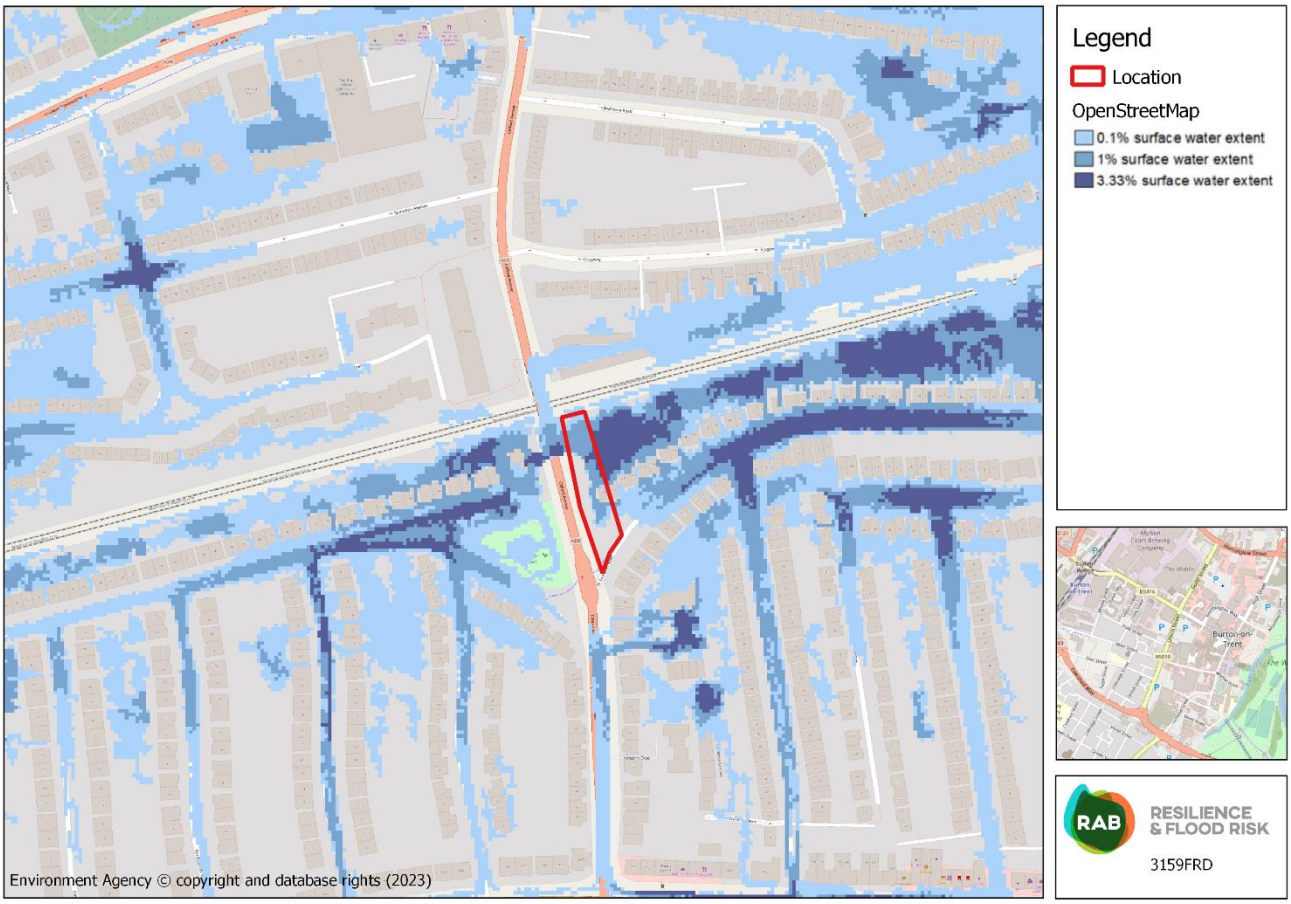


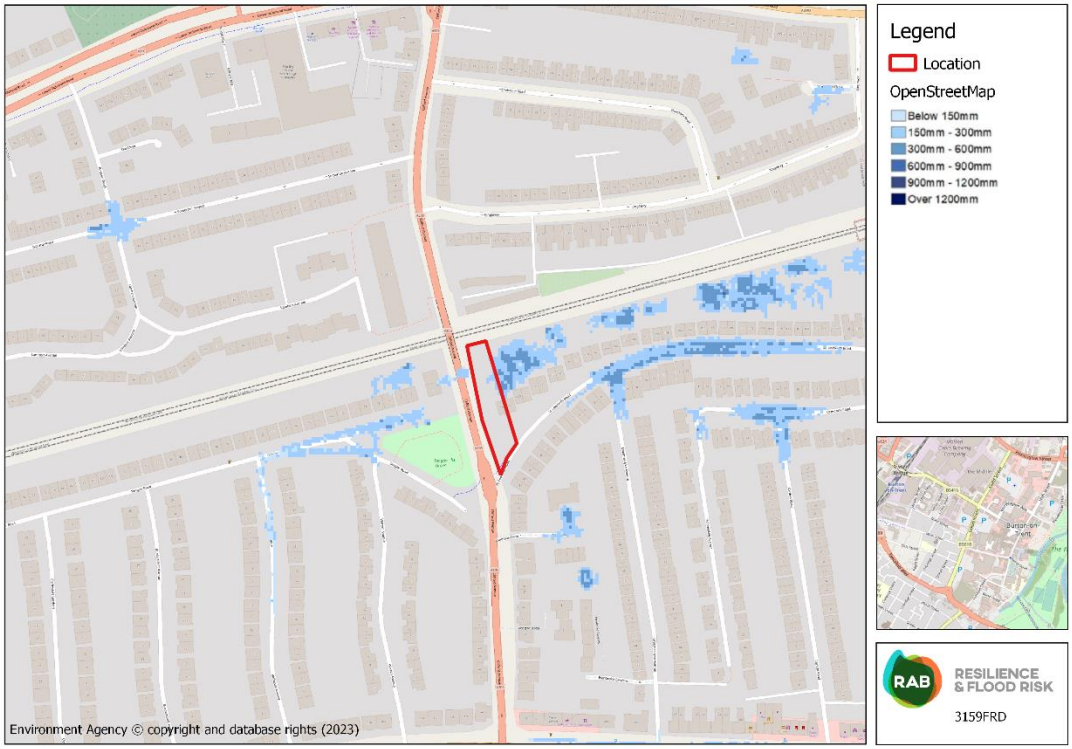
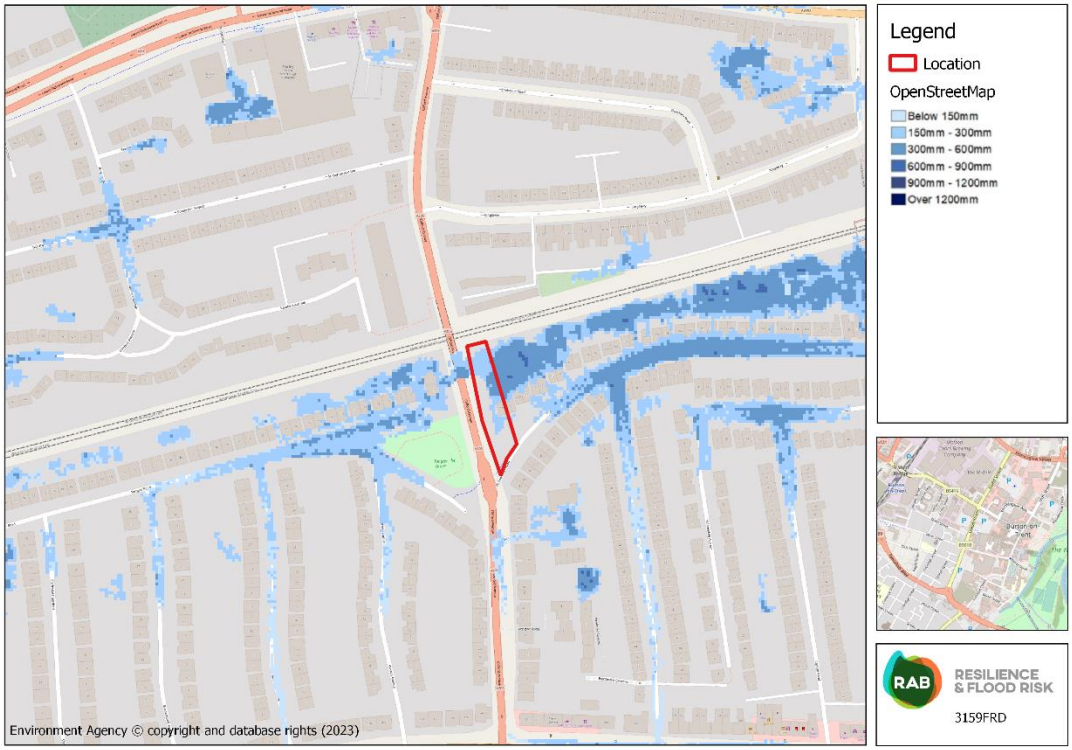
FIGURE 2: ENVIRONMENT AGENCY FLOOD RISK FROM SURFACE WATER

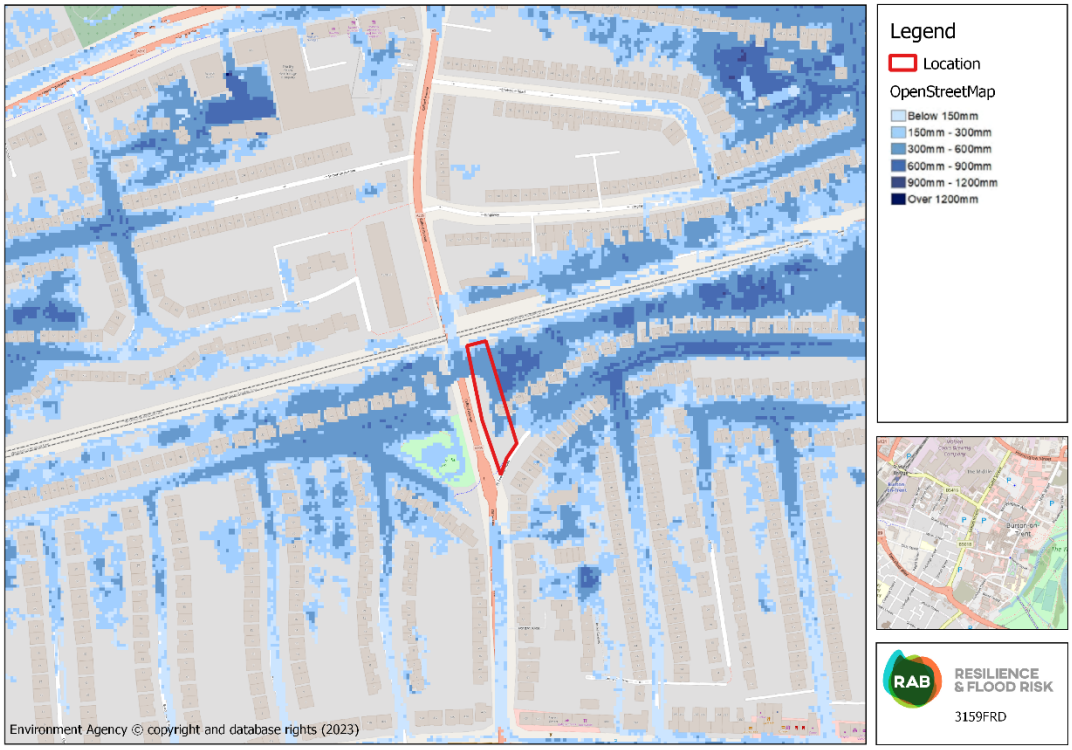
TABLE 2: ENVIRONMENT AGENCY SURFACE WATER RISK CATEGORIES

Surface Water Risk Category	Surface water flooding Annual Exceedance Probability
Very Low	< 0.1%
Low	Between 1% and 0.1% (1 in 100 years and 1 in 1000 years)
Medium	Between 1% and 3.3% (1 in 100 years and 1 in 30 years)
High	> 3.3% (1 in 30 years)

The majority of the site is shown to remain dry during the 3.33% AEP. During the 1% AEP the rear of the site is shown to flood to between 150mm – 300mm with a small area of 300mm – 600mm towards the centre, possibly to a local ground depression. During the 0.1% AEP the site is shown to flood between 300mm – 600mm however, the access is shown to remain dry.

TABLE 3: SURFACE WATER FLOOD DEPTHS FOR A RANGE OF AEP'S

AEP	Flood depth
3.33%	
1%	

AEP	Flood depth
0.1%	

3.7 Artificial water bodies

The Environment Agency Reservoir Map (Figure 3) identifies the site to be at risk from breach at the following reservoirs when there is also flooding from rivers:

- Staines South (grid reference TQ0500072500)
- Walton - Bessborough (grid reference TQ1220068000)
- Wraysbury (grid reference TQ0250074500)
- Brent (aka Welsh Harp Reservoir) (grid reference TQ2150087000)
- Queen Elizabeth II (grid reference TQ1180067100)
- Queen Mother (grid reference TQ0090076800)
- Staines North (grid reference TQ0500073600)
- Walton - Knight (grid reference TQ1170068000)

FIGURE 3: ENVIRONMENT AGENCY RESERVOIR FLOOD MAP

Reservoir flooding is extremely unlikely to happen. The Environment Agency as the enforcement authority for the Reservoirs Act 1975, ensures that reservoirs are inspected regularly, and essential safety work is carried out.

3.8 Groundwater

Groundwater flooding is water originating from sub-surface permeable strata which emerges from the ground, either at a specific point or over a wide diffuse location and inundates low lying areas. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land.

British Geological Survey (BGS) records indicate that the proposed development site overlies bedrock composed of London Clay Formation - clay and silt. This is overlain (superficial deposits) by Kempton Park Gravel Member - sand and gravel. Sand and gravel are permeable therefore, do not provide a barrier to rising groundwater.

Borehole TQ17NE61 located approximately 190m west of the site supports the above findings with a dominance of clay overlayed by gravel.

According to the 2021 SFRA, the site is located within an area demonstrating 75% or more susceptibility to groundwater flooding.

As there is a high degree of variability when considering groundwater flooding, using historic flooding is not a robust measure of the risk of flooding in future years.

3.9 Sewers

Thames Water is responsible for the adopted surface and foul sewer networks within the area and maintain a DG5 register of sites affected by sewer flood incidents on a post code basis. The 2021 SFRA shows the site is within an area with 0 to 10 incidents reports, however no more information is provided.

It is important to note that previous sewer flood incidents, or the lack thereof, do not indicate the current or future risk to the site. Upgrade work could have been carried out to alleviate any issues or conversely, in areas that have not experienced sewer flooding incidents, the local drainage infrastructure could deteriorate leading to future flooding.

4.0 Mitigation measures

4.1 Risk to buildings

4.1.1 Finished floor levels

In accordance with BS8533:2017 'Assessing and managing flood risk in development – code of practice', in order to afford a level of protection against flooding it is recommended that finished floor levels should be set at a nominal 300mm above either the 1% AEP of fluvial flooding or the 0.5% AEP of tidal flooding depending on which is greater (both including climate change).

During the 1% AEP surface water event the site is shown to flood between 150mm – 300mm, therefore finished floor levels should be set 600mm above local ground level.

4.1.2 Flood resistance

Flood resistance is a strategy of temporary or permanent measures taken to reduce the amount of flood water that will enter buildings.

It is not considered appropriate to adopt a water exclusion (or 'resistance') strategy given the proposed finished floor level of the dwellings.

4.1.3 Flood recoverability

Flood recoverability measures are not designed to keep water out of your property but are installed to try and reduce the impact of a flood. This can be done by incorporating waterproof surfaces into your home and making some design changes that would limit the impact of flooding.

It is not considered appropriate to adopt a flood recoverability strategy given the proposed finished floor level of the dwellings.

4.2 Risk to occupiers

4.2.1 Safe access/egress

The site is shown to flood to depths of up to 300mm during the 1% AEP surface water event. Assuming a velocity of 0.5 m/s, the site is at *'Danger for Most'* based on the DEFRA FD2320 hazard classification suggesting that access might be challenging but emergency services would still be able to access the site,

if required. In addition, the dwellings will offer a temporary refuge given the recommended finished floor level.

However, St Leonards Road is shown not to flood during the 1% AEP surface water event suggesting safe access/egress is achievable. Should residents need to evacuate they should follow Figure 5 until dry ground is reached. Although flooding is shown on Clifford Avenue, this is unrealistic due to the road being raised above the surrounding land, as discussed above in this report.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:
- Danger for some
- Danger for most
- Danger for all

FIGURE 4: EXTRACT FROM DEFRA FD2320 REPORT

FIGURE 5: EVACUATION ROUTE (BLACK ARROWS)

4.2.2 Flood warning and evacuation plan

The proposed site is not included in an Environment Agency Flood Warning or alert area.

Residents have the option to monitor the Met Office Severe Weather Warnings and the 5-day flood risk. This will enable them to make appropriate decisions to safeguard their health and safety. Table 4 includes a list of useful links residents can use to monitor flood risk and weather warnings.

Residents should be aware of water levels near the site and adjacent roads and maintain visual observations of the surroundings to check for flooding. In an emergency, if evacuation is not possible, residents should seek refuge on the first floor of the dwelling.

TABLE 4: USEFUL WEBSITE LINKS

USEFUL WEBSITE LINKS	
Description	**Website Link**
Weather Warning Guide	https://www.metoffice.gov.uk/weather/guides/warnings
EA Live Flood Alert information	https://flood-warning-information.service.gov.uk/
Flood Guidance Statement User Guide	http://www.ffc-environment-agency.metoffice.gov.uk/services/FGS_User_Guide.pdf
Guide to email alert service	https://www.metoffice.gov.uk/about-us/guide-to-emails

USEFUL WEBSITE LINKS	
Description	**Website Link**
5-day flood risk for England and Wales	https://flood-warning-information.service.gov.uk/5-day-flood-risk
5-day flood risk for England and Wales – What the Risk Types Mean	https://flood-warning-information.service.gov.uk/5-day-flood-risk/things-you-should-do
Severe Weather Warning Service including weather warning impacts and what they mean	https://www.metoffice.gov.uk/weather/guides/severe-weather-advice
Met Office Live Severe Weather Warnings	https://www.metoffice.gov.uk/weather/warnings-and-advice/uk-warnings#?date=2020-10-02
BBC Weather	https://www.bbc.co.uk/weather

4.3 Risk to others

4.3.1 Floodplain compensation

The site is located in Flood Zone 1 so floodplain compensation would not normally be applicable.

However, due to the surface water risk at the north part of the site installing dwellings at that location could potentially impact the site's ability to store flood water associated with surface water flooding and impact others downstream. To mitigate this risk, the proposed dwellings must be installed on stilts/voids to ensure flood (surface) water can still be stored at the rear of the site, as per the existing condition.

In detail, the invert of the structural slab of the dwellings must be installed 300mm above local ground level to ensure that runoff during the 1% AEP surface water event can move freely throughout the rear of the site. Exact structural configuration must be confirmed by others.

4.3.2 Surface water run-off

Information surrounding potential methods to further reduce surface water run-off, such as through the incorporation of incorporate Sustainable Drainage Systems (SuDS), can be found within Chapter 5.0 below.

5.0 Drainage Strategy

5.1 Existing runoff condition

5.1.1 Existing drainage arrangements

The topographic survey (Appendix B) shows a manhole to the south of the site therefore, it is assumed that the site currently drains surface water runoff to the Thames Water sewer network although, this could not be confirmed.

5.1.2 Natural flow path

The general slope on site is from south to north with levels ranging between 47.503m (access to site) – 46.638m at the wider site. There is a bank to the west which rises up to Clifford Avenue with levels reaching around 51.817m.

FIGURE 6: NATURAL FLOW PATH

5.1.3 Greenfield runoff

The greenfield runoff rate was calculated using the IH124 method for determining Greenfield runoff rate built into Microdrainage:

- SAAR (mm) = 600
- Area (ha) = 1

- Soil = 0.300
- Region = 6

The QBAR was calculated at 1.5 l/s/ha (see Appendix C) which was based off 1ha due to the small site area. These rates have been multiplied by the proposed hardstanding area of 0.0218ha to estimate the greenfield rates of the site.

TABLE 5: GREENFIELD RUNOFF RATES

AEP (%)	Greenfield peak flow rate (l/s/ha)	Greenfield peak flow rate (l/s)
100	1.30	0.03
QBAR	1.50	0.03
3.33	3.40	0.07
1	4.90	0.11
1 +17% Climate Change*	5.73	0.13

* 2080s Central London Management Catchment peak river flow allowances

5.2 SuDS feasibility

The SuDS Manual (2015) discusses the SuDS approach to managing surface water runoff which is intended to mimic the natural catchment process as closely as is possible. The approach sets out the design objectives in respect of SuDS:

- Use of surface water runoff as a resource;
- Manage rainwater close to where it falls (at source);
- Manage runoff on the surface (above ground);
- Allow rainwater to soak into the ground (infiltration);
- Promote evapotranspiration;
- Slow and store runoff to mimic natural runoff rates and volumes;
- Reduce contamination of runoff through pollution prevention and by controlling the runoff at source; and
- Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

Depending on the characteristics of the site and local requirements, these may be used in conjunction and varying degrees. Table 6 presents the functions of the SuDS components (from which a management train can be created) and their feasibility in respect of the site.

TABLE 6: FEASIBILITY OF SUDS TECHNIQUES AT THE DEVELOPMENT SITE

Technique	Description	Feasibility Y / N / M (Maybe)
Good building design and rainwater harvesting	Components that capture rainwater and facilitate its use within the building or local environment.	**Maybe** – water butts could be installed on rainwater pipes to irrigate the garden.
Porous and pervious surface materials	Structural surfaces that allow water to penetrate, thus offering attenuation potential, while reducing the rate of runoff (green roofs, pervious paving).	**Yes** – permeable pavement could be incorporated onto the driveway and path areas on site.
Infiltration Systems	Components that facilitate the infiltration of water into the ground. These often include temporary storage zones to accommodate runoff volumes before slow release to the soil.	**No** - infiltration systems are unlikely due to the high susceptibility of groundwater flooding within the area, suggesting a high-water table.
Conveyance Systems	Components that convey flows to downstream storage systems (e.g. swales, watercourses).	**Maybe** – conveyance features such as filter drains could be featured during the detailed design stage however, this is unlikely due to the lack of space on site.
Storage Systems	Components that control the flows and, where possible, volumes of runoff being discharged from the site, by storing water and releasing it slowly (attenuation). These systems may also provide further treatment of the runoff (e.g. ponds, wetlands, and detention basins).	**Yes** – storage systems such as cellular storage could be utilised if required.
Treatment Systems	Components that remove or facilitate the degradation of contaminants present in the runoff.	**Yes** – the above SuDS features can provide treatment benefits to the surface water.

The site has the potential to incorporate a number of SuDS options to manage surface water. These are discussed in more detail below.

5.3 Proposed discharge

The 2015 SuDS Manual recommends a specific hierarchy in terms of surface water discharge destinations:

1. Discharge into the ground.
2. Discharge into a surface water body.

3. Discharge to a surface water sewer.
4. Discharge to a combined sewer.

Policy SI 13 Sustainable drainage of the London Plan states Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain
6. controlled rainwater discharge to a combined sewer

Features such as water butts can be used to capture rainwater at the source and reused however, full rainwater harvesting, or green roofs are not viable due to design layout.

British Geological Survey (BGS) records indicate that the proposed development site overlies bedrock composed of London Clay Formation - clay and silt. This is overlain (superficial deposits) by Kempton Park Gravel Member - sand and gravel. Soilscapes describes the local soils as acid loamy. Given the limited area on site to achieve more than 5m away from buildings (as per building regulations), and that the site is embedded within an urbanised area, the use of infiltration is not appropriate as the primary discharge method for surface water.

There are no watercourses within close proximity to the site.

Therefore, surface water from the site will be discharged into to the local Thames Water surface water sewer at MH 8504 at a controlled rate of 1.5 l/s (including urban creep), subject to a Section 106[1] agreement. In actuality, the site will discharge to the proposed drainage infrastructure from another planning application, which ultimately discharges to MH 8504 (see Appendix C). The low flow control rate will ensure that the downstream drainage system will not become inundated during high intensity storms. Nevertheless, detailed drainage design should confirm the exact hydraulic behaviour of the proposed system.

Please note that any recommendation made by the LLFA to further reduce the discharge rates will be documented in this report as such. RAB would not support this recommendation and cannot be held liable for any incident of blockage and/or flooding, as a result of an overly restrictive flow control device below 1.5 l/s.

5.4 Proposed surface water management

The proposed drainage scheme has been modelled in Microdrainage Source Control to understand the evolving flow regime under flood conditions and the potential for flooding.

[1] Please note that Thames Water do not provide capacity checks for sites with less than 10 dwellings.

The proposed scheme (see Appendix C) will integrate a range of features, in line with the SuDS Manual philosophy, taking into consideration site constraints. In detail, roof and footpath runoff will discharge into the permeable pavement sub-base and will then be conveyed via a perforated piped network into a flow control chamber. From here, discharge will be reduced to 1.5 l/s for all events up to and including the 1% AEP + 40% climate change event (including 10% urban creep).

Surface water will then be conveyed to the Thames Water sewer system MH 8504 via a piped network (see Appendix C). In addition, water butts should be installed at suitable locations to reduce the volume of runoff entering the drainage system and to provide opportunity for re-use on site.

It should be noted that gravity fall is available given that the cover depth of the Thames Water surface sewer (see Appendix C).

5.4.1 Permeable pavement

A Type C (see Table 20.1 of the SuDS Manual) permeable pavement will be used to manage roof and patio runoff at the site. The permeable pavement will be used on the proposed path, as shown in Appendix C.

It is recommended to discharge roof runoff directly onto the permeable pavement surface where possible. Alternatively, or where it is not practicable roof runoff should discharge to the sub-base on the permeable pavement via catchpits and diffusers, as described in the Interpave Guidance document (Figure 7).

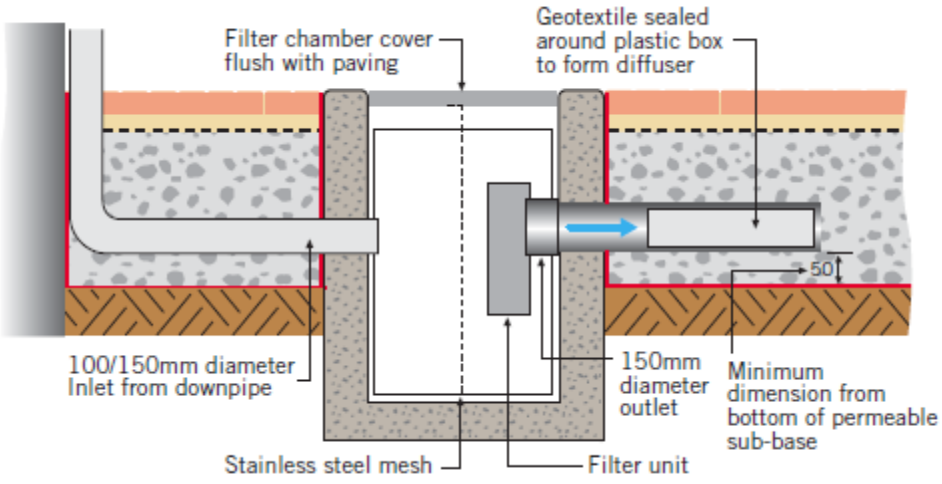


FIGURE 7: TYPICAL ROOF DRAINAGE OUTLET (INTERPAVE GUIDANCE DOCUMENT, 2008)

The laying course material must be sufficiently coarse to allow the free vertical flow of water and to prevent its intrusion into the underlying coarse-graded aggregate, yet sufficiently fine to permit the accurate installation of the paving blocks. The material should comply with the requirements of a material of type 2/6.3 Gc 80/20 according to BS EN 13242:2002. The requirement for a capping material should be identified once detailed soil investigations have been undertaken at the site. All capping materials should meet the requirements of either 6F1 or 6F2 of Table 6.1 of Highways Agency's '*Specification for Highway Works – Series 600 – Earthworks*'.

Exact details should be confirmed at the detailed design stage.

5.4.2 Water quantity benefits

The scheme cannot offer significant reductions in greenfield runoff rates, due to the extremely low rate. It is not possible to reduce the discharge rate this low due to the flood risk and blockage risk therefore, the rate has been set as low as reasonably practical.

5.4.3 Water quality benefits

In line with the SuDS Manual, the water must receive a certain degree of treatment. There are no significant risks of pollution as a result of the development as it is classed a low density residential with no major risks.

According to Table 26.2 of the SuDS Manual and based on the land use, the site has a low pollution hazard level. In detail, the pollution hazard indices are:

- Total Suspended Solids= 0.5
- Heavy Metals= 0.4
- Hydrocarbons= 0.4

Consequently, the proposed SuDS feature must have a higher mitigation index. Mitigation indices for various SuDS components can be found in Table 26.3 of the SuDS Manual (2015).

Total SuDS Mitigation Index = mitigation index$_1$ + (0.5 x mitigation index$_n$)

Where mitigation index$_n$ = mitigation index for component n.

The proposed drainage scheme utilises a permeable pavement.

Using Table 26.3 of the SuDS Manual (2015), the mitigation indices for each pollutant and for each feature were identified:

- TSS – permeable pavement = 0.7 > 0.5.
- Heavy Metals – permeable pavement = 0.6 > 0.4.
- Hydrocarbons – permeable pavement = 0.7 > 0.4.

Consequently, the proposed scheme is in line with the water quality requirements of the SuDS Manual (2015).

5.5 Future resilience

5.5.1 Designing for exceedance

It is inevitable that as a result of heavy or extreme rainfall, the capacities of sewers and other drainage systems will be exceeded on occasion. Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, when the outfall becomes restricted due to flood levels in the receiving water, or due to poor maintenance of the SuDS features.

The proposed scheme has been designed to manage the 1% AEP + 40% CC event with no flooding. Should a blockage occur, exceeded runoff would follow the natural topography towards the southeast. Due to the flood risk issues on site the proposed building is proposed to be set at 600mm above local ground

level providing a suitable freeboard. In addition, the voids will allow surface water runoff to mimic the existing condition ponding at the rear of the site, until the water level recedes.

5.5.2 Urban creep

An increase of 10% has been applied for urban creep which increased the proposed drained area to 0.024ha. During this scenario, the site is shown not to flood and has a controlled discharge rate of 1.4 l/s. The urban creep results have been discussed above.

5.6 Amenity and biodiversity

Primary consideration should be given to locally native species, and plants that benefit wildlife through their nectar, fruit, or berries. Generally, the choice of plant species should reflect the usual design decisions relating to their location in terms of aspect, sun or shade, height, from, colour, whether evergreen or deciduous, native or ornamental, and soil factors such as pH, depth, nutrient status and organic content. However, the consideration has to be their ability to withstand the fluctuations in soil moisture that will occur.

6.0 Maintenance and Management Plan

The following maintenance and management plan has been formed to assist with ensuring the longevity of the surface water scheme to provide multiple benefits throughout its lifetime. The plan will also aim to prevent any blockages or damage occurring to each component of the scheme to minimise the risk of flooding as much as possible.

The level of inspection and maintenance will vary depending on the type of SuDS component and scheme, the land use, and the type of vegetation. It is vital that SuDS construction is supervised and inspected on completion if owners are to avoid taking on liabilities and to ensure the specified materials are being used and placed correctly. Incorrect materials or installation should be rejected as they will adversely affect the performance, maintenance costs and ultimately the design life of the SuDS components.

The site manager must maintain maintenance logs for all elements.

The SuDS features incorporated to this particular design have to be maintained in order to ensure efficient water treatment and water management.

6.1 SuDS features checklist

- **Permeable surfaces** as permeable block paving, porous Asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc.
- **SuDS flow control structures** are usually small orifices in control chamber, slots or V notches in weirs. They are usually near the surface so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection Chambers** and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.

6.2 Sustainable Drainage Maintenance Specification

6.2.1 General requirements

Maintenance	Frequency	Owner
Maintenance activities comprise: • Regular maintenance • Occasional tasks • Remedial Work	Will vary depending on activity	(Private or adopted)

Regular maintenance (including inspections and monitoring). Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

Occasional maintenance Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

Remedial maintenance Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design.

Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

Avoid use of weedkillers and pesticides to prevent chemical pollution.

6.2.2 Landscape maintenance

TABLE 7: MAINTENANCE SCHEDULE FOR SURROUNDING LANDSCAPE

Maintenance	Frequency	Owner
Regular maintenance Litter management: • Pick up all litter in SuDS and Landscape areas and remove from site.	Monthly	Private management company (to be confirmed by developer)
Grass Maintenance: • Mow all grass verges, paths and amenity at 35-50mm with 75mm max. Leaving grass *in situ*. • Wildflower areas trimmed to 50mm on 3 year rotation	As required or monthly	
Occasional tasks • Prune (trim) tree branches to allow for sunlight to reach ground level flora.	Annually or as required	

6.2.3 Permeable pavement

TABLE 8: MAINTENANCE SCHEDULE FOR PERMEABLE PAVEMENTS, ADAPTED FROM CIRIA RP992/23 AND C753

Maintenance	Frequency	Owner
Regular Monitoring • Brush regularly and remove sweepings from all hard surfaces.	Quarterly and after flood events	Private management company (to be

Maintenance	Frequency	Owner
• Inspect all inflows/outflows along with manholes for blockages. • Check monitoring wells for any signs of siltation.		confirmed by developer)
Occasional Tasks • Brush and vacuum surface to prevent silt blockage and enhance design life. • Check operation of perforated pipes by inspection of flows after rain	Every six months	
Remedial Work • Monitor effectiveness of permeable paving and if water does not infiltrate immediately a reinstatement of the top layers or specialist cleaning. The manufacturer should be contacted to provide further guidance. • Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material. • Rehabilitation of surface and upper substructure by remedial sweeping. • Check monitoring wells and replace permeable layer and sand-bed layer if heavily silted.	As required and after flood events	

6.2.4 Controls and inspection chambers

Please note that the flow control chambers will require regular maintenance. The maintenance schedule for the chamber must be specified by the manufacturer as different features have different requirements.

TABLE 9: MAINTENANCE SCHEDULE FOR THE INLETS, OUTLETS, CONTROL STRUCTURES, PUMPS AND INSPECTION CHAMBERS/MANHOLES

Maintenance	Frequency	Owner
Regular maintenance Inspection chambers/manholes and below ground flow control chambers: • Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. • Undertake inspection after leaf fall in autumn.	Monthly for 12 months, then annually.	Private management company (to be confirmed by developer)
Occasional tasks • Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage.	As necessary	
Remedial Work • Repair physical damage if necessary.	As required	

6.2.5 Drainage network

TABLE 10: MAINTENANCE SCHEDULE FOR PIPED DRAINAGE NETWORK

Drainage Element	Maintenance	Frequency	Owner
Downpipes and gullies	**Regular maintenance** • Open any covers, inspect integrity of gullies and repair as necessary.	Monthly	Private management company (to be confirmed by developer)
	• Remove silt / debris by suction.	Annually or as required	
Pipe network	**Regular maintenance** • Remove any sediment within the network and inspection chambers.	Every 3 years or as required	
	• Open covers inspect integrity of chambers and repair as necessary. • Remove silt / debris by suction.	Annually	

7.0 Conclusion

The proposed development at 224 St Leonards Road, East Sheen, SW14 7BN is located in Flood Zone 1, as defined in the NPPF. The proposal includes the construction of two dwellings with associated garden and footpaths (Appendix A).

On the basis of the available information from the Environment Agency and London Borough of Richmond upon Thames, the site is at low risk from fluvial flooding, however, is at medium risk from surface water flooding. In addition, the site is susceptible to groundwater flooding.

The proposed development must incorporate SuDS as described in Chapter 5.0 of this report.

The proposed development can be deemed appropriate, provided that the recommendations in this report are adhered to, it will not increase the flood risk to other people, and it will provide multiple benefits with respect to the sustainable management of surface water runoff.

8.0 Recommendations

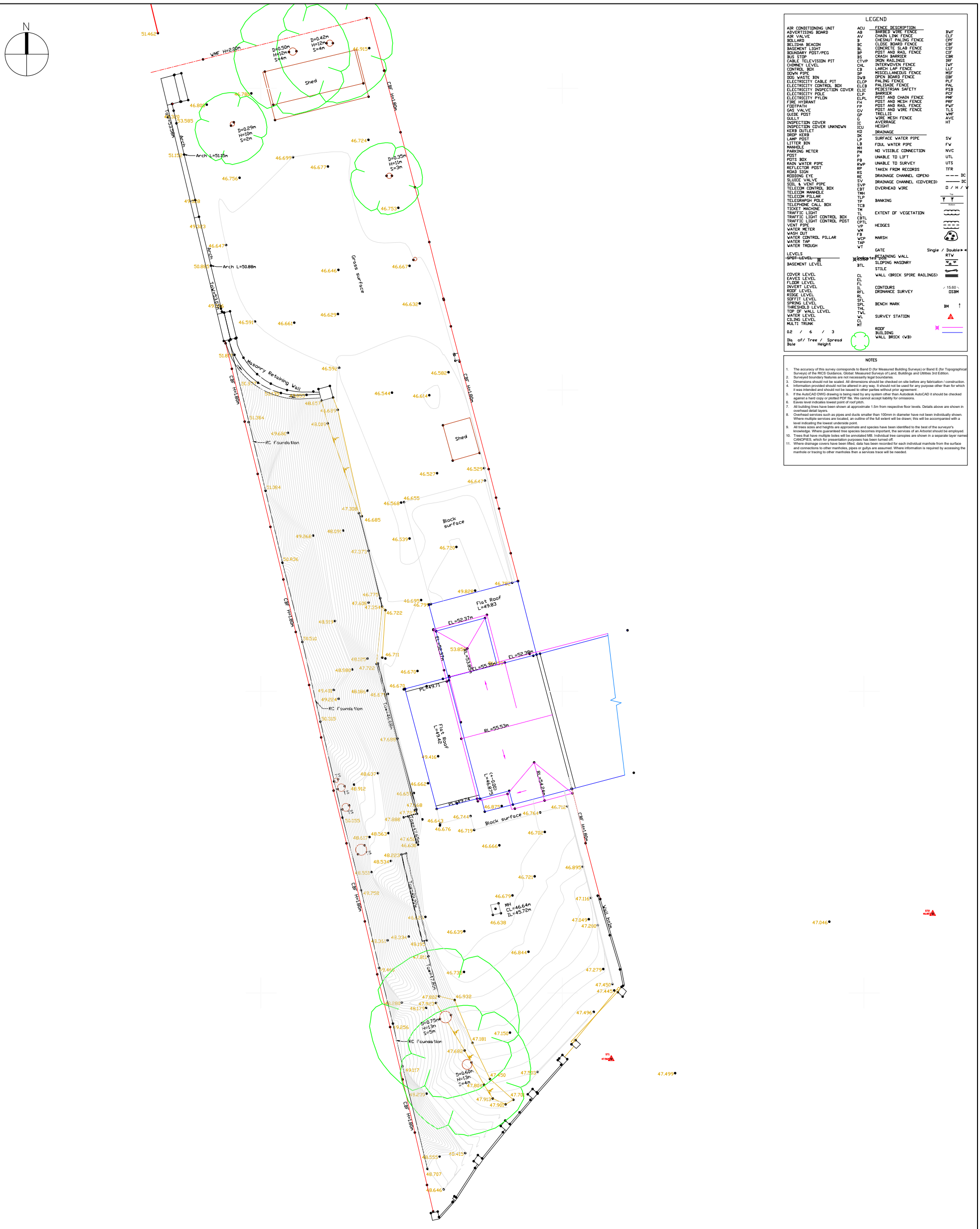
- Finished floor level should be set at a minimum of 600mm above local ground level (the exact level should be confirmed in meters Above Ordnance Datum during the detailed design).
- Proposed dwellings should be constructed with voids beneath the groundfloor slab with the invert level of the structural slab being 300mm above local ground level (the exact level should be confirmed in meters Above Ordnance Datum during the detailed design).
- The site should manage surface water through the use of SuDS, as described in Section 5.4 of this report.
- Contractor to submit a S106 to the Water Company prior to connecting to the public sewer.

- All SuDS features must be constructed in line with recommendations made in CIRIA Guidance on the Construction of SuDS (2017).
- All SuDS features should be maintained in line with Table 7, Table 8, Table 9 and Table 10.
- Detailed drainage design should be undertaken at the detailed design stage.
- Developer to confirm details of the SuDS maintenance owner.
- Permeable pavement must be installed strictly to manufacturer's specification.
- Should the CBR value be <5%, a capping layer must be installed.
- The permeable pavement sub-base may require the installation of geogrids to further strengthen the feature. Contractor must liaise with permeable pavement provider(s), accordingly, prior to installation.
- Construction (Design and Management) Regulations 2015:
    - The revised CDM Regulations came into force in April 2015, which defines the duties for all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities is to ensure that the client organisation, in this instance UKR Group, is made aware of their duties (please see link for Commercial Client) under the CDM Regulations.

Appendix A – Development proposals

To be provided by the client.

Appendix B – Topographic Survey



LEGEND

AIR CONDITIONING UNIT	ACU	FENCE DESCRIPTION	
ADVERTISING BOARD	AB	BARBED WIRE FENCE	BWF
AIR VALVE	AV	CHAIN LINK FENCE	CLF
BOLLARD	B	CHESNUT PALING FENCE	CPF
BELISHA BEACON	BC	CLOSE BOARD FENCE	CBF
BASEMENT LIGHT	BL	CONCRETE SLAB FENCE	CSF
BOUNDARY POST/PEG	BP	POST AND RAIL FENCE	CIF
BUS STOP	BS	CRASH BARRIER	CBR
CABLE TELEVISION PIT	CTVP	IRON RAILINGS	IRF
CHIMNEY LEVEL	CHL	INTERWOVEN FENCE	IWF
CONTROL BOX	CB	LARCH LAP FENCE	LLF
DOWN PIPE	DP	MISCELLANEOUS FENCE	MSF
DOG WASTE BIN	DWB	OPEN BOARD FENCE	OBF
ELECTRICITY CABLE PIT	ELCP	PALING FENCE	PLF
ELECTRICITY CONTROL BOX	ELCB	PALISADE FENCE	PAL
ELECTRICITY INSPECTION COVER	ELIC	PEDESTRIAN SAFETY BARRIER	PSB
ELECTRICITY POLE	ELP	POST AND CHAIN FENCE	PCF
ELECTRICITY PYLON	ELPL	POST AND MESH FENCE	PMF
FIRE HYDRANT	FH	POST AND RAIL FENCE	PRF
FOOTPATH	FP	POST AND WIRE FENCE	PWF
GAS VALVE	GV	TRELLIS	TLS
GUIDE POST	GP	WIRE MESH FENCE	WMF
GULLY	G	AVERRAGE HEIGHT	AVE
INSPECTION COVER	IC		HT
INSPECTION COVER UNKNOWN	ICU		
KERB OUTLET	KO	DRAINAGE	
DROP KERB	DK	SURFACE WATER PIPE	SW
LAMP POST	LP	FOUL WATER PIPE	FW
LITTER BIN	LB	NO VISIBLE CONNECTION	NVC
MANHOLE	MH	UNABLE TO LIFT	UTL
PARKING METER	PM	UNABLE TO SURVEY	UTS
POST	P	TAKEN FROM RECORDS	TFR
POTS BOX	PB	DRAINAGE CHANNEL (OPEN)	DC
RAIN WATER PIPE	RWP	DRAINAGE CHANNEL (COVERED)	DC
REFLECTOR POST	RP	OVERHEAD WIRE	O / H / W
ROAD SIGN	RS	BANKING	Top / Bottom
RODDING EYE	RE	EXTENT OF VEGETATION	
SLUICE VALVE	SV	HEDGES	
SOIL & VENT PIPE	SVP	MARSH	
TELECOM CONTROL BOX	CBT	GATE	Single / Double
TELECOM MANHOLE	TMH	RETAINING WALL	RTW
TELECOM PILLAR	TLP	SLOPING MASONRY	
TELEGRAPGH POLE	TP	STILE	
TELEPHONE CALL BOX	TCB	WALL (BRICK SPIRE RAILINGS)	
TICKET MACHINE	TM		
TRAFFIC LIGHT	TL	CONTOURS	15.60
TRAFFIC LIGHT CONTROL BOX	CBTL	ORDNANCE SURVEY	OSBM
TRAFFIC LIGHT CONTROL POST	CPTL	BENCH MARK	BM
VENT PIPE	VP	SURVEY STATION	
WATER METER	WM	ROOF	
WASH OUT	FB	BUILDING	
WATER CONTROL PILLAR	WCP	WALL BRICK (WB)	
WATER TAP	TAP		
WATER TROUGH	WT		

LEVELS — Indicates not surveyed

SPOT LEVEL	BM		
BASEMENT LEVEL	BTL		
COVER LEVEL		CL	
EAVES LEVEL		EL	
FLOOR LEVEL		FL	
INVERT LEVEL		IL	
ROOF LEVEL		RFL	
RIDGE LEVEL		RL	
SOFFIT LEVEL		SFL	
SPRING LEVEL		SPL	
THRESHOLD LEVEL		THL	
TOP OF WALL LEVEL		TWL	
WATER LEVEL		WL	
CILING LEVEL		CL	
MULTI TRUNK		MT	

0.2 / 6 / 3
Dia of Tree / Spread
Bale Height

NOTES

1. The accuracy of this survey corresponds to Band D (for Measured Building Surveys) or Band E (for Topographical Surveys) of the RICS Guidance, Global: Measured Surveys of Land, Buildings and Utilities 3rd Edition.
2. Surveyed boundary features are not necessarily legal boundaries.
3. Dimensions should not be scaled. All dimensions should be checked on site before any fabrication / construction.
4. Information provided should not be altered in any way. It should not be used for any purpose other than for which it was intended and should not be issued to other parties without prior agreement.
5. If the AutoCAD DWG drawing is being read by any system other than Autodesk AutoCAD it should be checked against a hard copy or plotted PDF file. We cannot accept liability for omissions.
6. Eaves level indicates lowest point of roof pitch.
7. All building lines have been shown at approximate 1.5m from respective floor levels. Details above are shown in overhead detail layers.
8. Overhead services such as pipes and ducts smaller than 100mm in diameter have not been individually shown. Where multiple services are located, an outline of the full extent will be drawn; this will be accompanied with a level indicating the lowest underside point.
9. All trees sizes and heights are approximate and species have been identified to the best of the surveyor's knowledge. Where guaranteed tree species becomes important, the services of an Arborist should be employed.
10. Trees that have multiple boles will be annotated MB. Individual tree canopies are shown in a separate layer named CANOPIES, which for presentation purposes has been turned off.
11. Where drainage covers have been lifted, data has been recorded for each individual manhole from the surface and connections to other manholes, pipes or gullys are assumed. Where information is required by accessing the manhole or tracing to other manholes then a services trace will be needed.

Geo-1 Survey LTD
E. info@geo1.co.uk
T. (+44) 7838005008
ISLEWORTH
TW7 5AS

COORDINATE TABLE

NAME	E	N	Z
CP1	5111.248	4967.628	47.569
CP2	5132.568	4977.261	46.857	

GRID SURVEY
THE SURVEY GRID IS BASED ON LOCAL COORDINATES
ALL LEVELS ARE BASED ON A LOCAL DATUM

SCAN	SURVEYOR	DATE
01	AI	18/02/2023

Client: Michael Hegarty

Drawing Title: Topographical Survey

Project: 224 St Leonards Rd, London SW14 7BN

Surveyed: AI | Checked: IL | Status: FINAL | Size: A3 | Scale: 1:250

Date: 18/02/23 | Ref No: 162-TS-LR-01 | Sheet: 01 of 01

Appendix C – Drainage

- Microdrainage Calculations:
  - 1% AEP + 40% CC (including urban creep)
  - 1% AEP (including urban creep)
  - 3.33% AEP (including urban creep)
  - 50% AEP (including urban creep)
  - QBAR
- RAB Drawings
- Asset location search

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

Half Drain Time : 57 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	46.361	0.361	0.0	1.5	1.5	6.8	Flood Risk
30 min Summer	46.439	0.439	0.0	1.5	1.5	8.3	Flood Risk
60 min Summer	46.473	0.473	0.0	1.5	1.5	8.9	Flood Risk
120 min Summer	46.500	0.500	0.0	1.5	1.5	9.4	Flood Risk
180 min Summer	46.488	0.488	0.0	1.5	1.5	9.2	Flood Risk
240 min Summer	46.463	0.463	0.0	1.5	1.5	8.7	Flood Risk
360 min Summer	46.398	0.398	0.0	1.5	1.5	7.5	Flood Risk
480 min Summer	46.307	0.307	0.0	1.5	1.5	5.7	O K
600 min Summer	46.234	0.234	0.0	1.5	1.5	4.3	O K
720 min Summer	46.186	0.186	0.0	1.5	1.5	3.4	O K
960 min Summer	46.127	0.127	0.0	1.4	1.4	2.3	O K
1440 min Summer	46.075	0.075	0.0	1.1	1.1	1.3	O K
2160 min Summer	46.041	0.041	0.0	0.8	0.8	0.6	O K
2880 min Summer	46.025	0.025	0.0	0.6	0.6	0.3	O K
4320 min Summer	46.013	0.013	0.0	0.4	0.4	0.1	O K
5760 min Summer	46.008	0.008	0.0	0.3	0.3	0.0	O K
7200 min Summer	46.006	0.006	0.0	0.3	0.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	158.373	0.0	7.8	18
30 min Summer	102.578	0.0	10.1	31
60 min Summer	63.455	0.0	12.6	58
120 min Summer	40.537	0.0	16.2	90
180 min Summer	30.560	0.0	18.4	124
240 min Summer	24.739	0.0	19.8	160
360 min Summer	18.048	0.0	21.7	228
480 min Summer	14.263	0.0	22.9	290
600 min Summer	11.810	0.0	23.7	344
720 min Summer	10.088	0.0	24.3	398
960 min Summer	7.819	0.0	25.1	510
1440 min Summer	5.414	0.0	26.0	750
2160 min Summer	3.734	0.0	26.7	1104
2880 min Summer	2.874	0.0	27.3	1468
4320 min Summer	2.006	0.0	28.4	2160
5760 min Summer	1.566	0.0	29.5	2896
7200 min Summer	1.305	0.0	30.7	3568

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	46.004	0.004	0.0	0.3	0.3	0.0	O K
10080 min Summer	46.004	0.004	0.0	0.2	0.2	0.0	O K
15 min Winter	46.361	0.361	0.0	1.5	1.5	6.8	Flood Risk
30 min Winter	46.440	0.440	0.0	1.5	1.5	8.3	Flood Risk
60 min Winter	46.475	0.475	0.0	1.5	1.5	9.0	Flood Risk
120 min Winter	46.492	0.492	0.0	1.5	1.5	9.3	Flood Risk
180 min Winter	46.467	0.467	0.0	1.5	1.5	8.8	Flood Risk
240 min Winter	46.426	0.426	0.0	1.5	1.5	8.0	Flood Risk
360 min Winter	46.296	0.296	0.0	1.5	1.5	5.5	O K
480 min Winter	46.198	0.198	0.0	1.5	1.5	3.7	O K
600 min Winter	46.141	0.141	0.0	1.4	1.4	2.6	O K
720 min Winter	46.110	0.110	0.0	1.3	1.3	2.0	O K
960 min Winter	46.072	0.072	0.0	1.1	1.1	1.2	O K
1440 min Winter	46.037	0.037	0.0	0.8	0.8	0.6	O K
2160 min Winter	46.018	0.018	0.0	0.5	0.5	0.2	O K
2880 min Winter	46.011	0.011	0.0	0.4	0.4	0.1	O K
4320 min Winter	46.005	0.005	0.0	0.3	0.3	0.0	O K
5760 min Winter	46.004	0.004	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.131	0.0	31.6	4312
10080 min Summer	1.008	0.0	32.6	4968
15 min Winter	158.373	0.0	7.8	17
30 min Winter	102.578	0.0	10.1	31
60 min Winter	63.455	0.0	12.6	58
120 min Winter	40.537	0.0	16.2	94
180 min Winter	30.560	0.0	18.4	132
240 min Winter	24.739	0.0	19.8	172
360 min Winter	18.048	0.0	21.7	236
480 min Winter	14.263	0.0	22.9	288
600 min Winter	11.810	0.0	23.7	342
720 min Winter	10.088	0.0	24.3	398
960 min Winter	7.819	0.0	25.1	512
1440 min Winter	5.414	0.0	26.0	748
2160 min Winter	3.734	0.0	26.8	1104
2880 min Winter	2.874	0.0	27.2	1468
4320 min Winter	2.006	0.0	28.5	2196
5760 min Winter	1.566	0.0	29.5	2840

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Winter	46.003	0.003	0.0	0.2	0.2	0.0	O K
8640 min Winter	46.002	0.002	0.0	0.2	0.2	0.0	O K
10080 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Winter	1.305	0.0	30.5	3808
8640 min Winter	1.131	0.0	31.5	2752
10080 min Winter	1.008	0.0	32.4	6264

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 519824 175560 TQ 19824 75560
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.850
Cv (Winter)	0.850
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.024

Time (mins) From:	To:	Area (ha)
0	4	0.024

Model Details

Storage is Online Cover Level (m) 46.629

Porous Car Park Structure

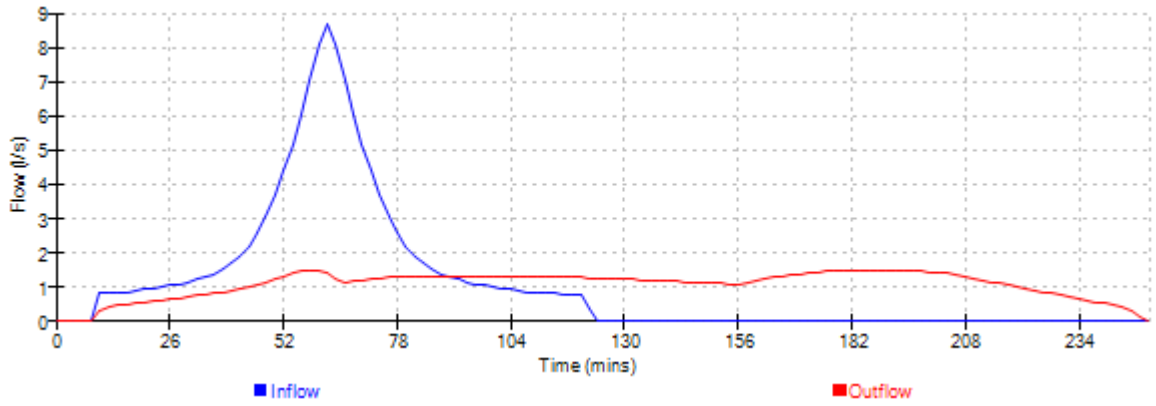
Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	8.0
Max Percolation (l/s)	17.8	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	46.000	Membrane Depth (m)	80

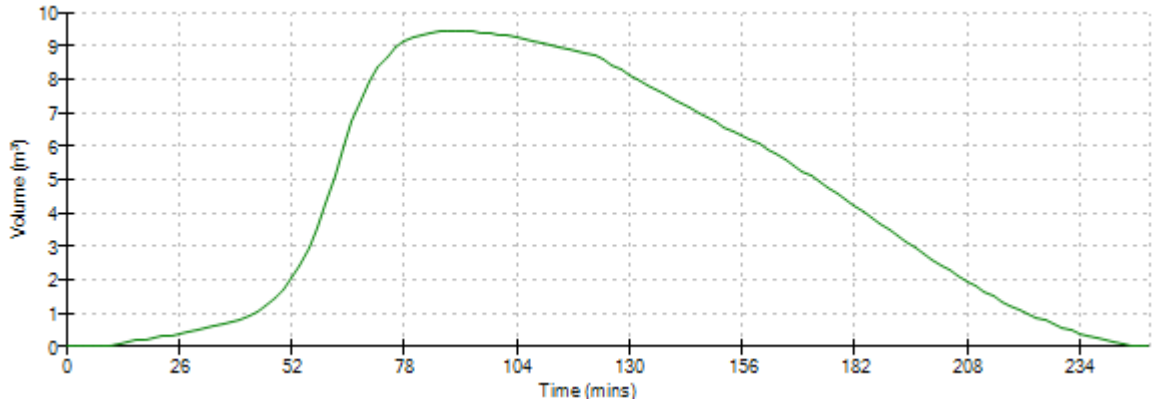
ACO Q-Brake Outflow Control

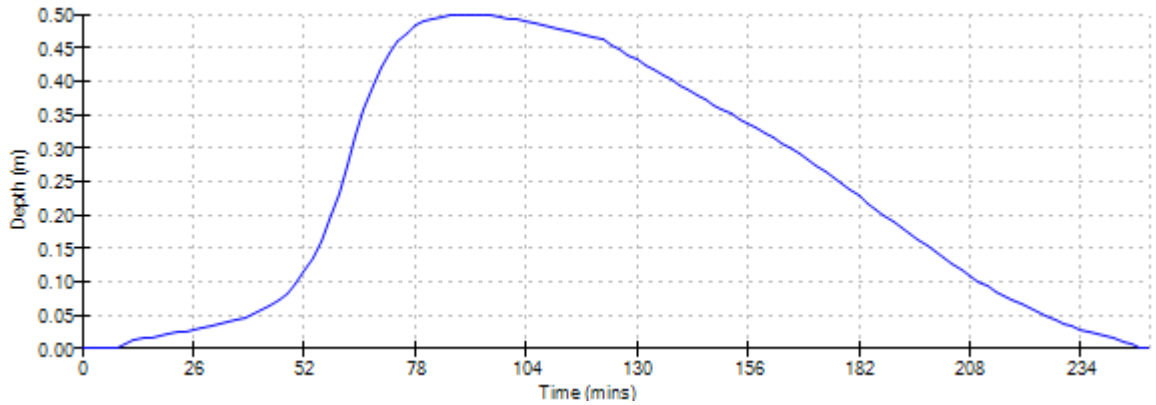
Design Head (m)	0.629	Diameter (mm)	60
Design Flow (l/s)	1.5	Invert Level (m)	46.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.2	1.200	2.1	3.000	3.2	7.000	5.0
0.200	1.5	1.400	2.2	3.500	3.5	7.500	5.1
0.300	1.3	1.600	2.4	4.000	3.8	8.000	5.3
0.400	1.2	1.800	2.5	4.500	4.0	8.500	5.5
0.500	1.3	2.000	2.7	5.000	4.2	9.000	5.6
0.600	1.5	2.200	2.8	5.500	4.4	9.500	5.8
0.800	1.7	2.400	2.9	6.000	4.6		
1.000	1.9	2.600	3.0	6.500	4.8		

Event: 120 min Summer







Summary of Results for 100 year Return Period

Half Drain Time : 33 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	46.240	0.240	0.0	1.5	1.5	4.4	O K
30 min Summer	46.284	0.284	0.0	1.5	1.5	5.3	O K
60 min Summer	46.298	0.298	0.0	1.5	1.5	5.6	O K
120 min Summer	46.304	0.304	0.0	1.5	1.5	5.7	O K
180 min Summer	46.281	0.281	0.0	1.5	1.5	5.2	O K
240 min Summer	46.251	0.251	0.0	1.5	1.5	4.7	O K
360 min Summer	46.194	0.194	0.0	1.5	1.5	3.6	O K
480 min Summer	46.151	0.151	0.0	1.5	1.5	2.7	O K
600 min Summer	46.121	0.121	0.0	1.4	1.4	2.2	O K
720 min Summer	46.100	0.100	0.0	1.2	1.2	1.8	O K
960 min Summer	46.071	0.071	0.0	1.1	1.1	1.2	O K
1440 min Summer	46.041	0.041	0.0	0.8	0.8	0.6	O K
2160 min Summer	46.021	0.021	0.0	0.6	0.6	0.3	O K
2880 min Summer	46.013	0.013	0.0	0.5	0.5	0.1	O K
4320 min Summer	46.007	0.007	0.0	0.3	0.3	0.0	O K
5760 min Summer	46.004	0.004	0.0	0.3	0.3	0.0	O K
7200 min Summer	46.003	0.003	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	113.123	0.0	5.4	16
30 min Summer	73.270	0.0	7.2	30
60 min Summer	45.325	0.0	8.9	48
120 min Summer	28.955	0.0	11.5	82
180 min Summer	21.829	0.0	13.0	116
240 min Summer	17.671	0.0	14.1	148
360 min Summer	12.892	0.0	15.4	210
480 min Summer	10.188	0.0	16.2	268
600 min Summer	8.436	0.0	16.8	326
720 min Summer	7.206	0.0	17.2	384
960 min Summer	5.585	0.0	17.8	502
1440 min Summer	3.867	0.0	18.4	738
2160 min Summer	2.667	0.0	18.9	1100
2880 min Summer	2.053	0.0	19.3	1444
4320 min Summer	1.433	0.0	20.1	2192
5760 min Summer	1.119	0.0	20.7	2832
7200 min Summer	0.932	0.0	21.4	3576

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	46.002	0.002	0.0	0.2	0.2	0.0	O K
10080 min Summer	46.002	0.002	0.0	0.2	0.2	0.0	O K
15 min Winter	46.240	0.240	0.0	1.5	1.5	4.5	O K
30 min Winter	46.284	0.284	0.0	1.5	1.5	5.3	O K
60 min Winter	46.292	0.292	0.0	1.5	1.5	5.5	O K
120 min Winter	46.283	0.283	0.0	1.5	1.5	5.3	O K
180 min Winter	46.244	0.244	0.0	1.5	1.5	4.5	O K
240 min Winter	46.203	0.203	0.0	1.5	1.5	3.7	O K
360 min Winter	46.138	0.138	0.0	1.4	1.4	2.5	O K
480 min Winter	46.101	0.101	0.0	1.3	1.3	1.8	O K
600 min Winter	46.077	0.077	0.0	1.1	1.1	1.3	O K
720 min Winter	46.060	0.060	0.0	1.0	1.0	1.0	O K
960 min Winter	46.038	0.038	0.0	0.8	0.8	0.6	O K
1440 min Winter	46.019	0.019	0.0	0.5	0.5	0.2	O K
2160 min Winter	46.009	0.009	0.0	0.4	0.4	0.0	O K
2880 min Winter	46.006	0.006	0.0	0.3	0.3	0.0	O K
4320 min Winter	46.003	0.003	0.0	0.2	0.2	0.0	O K
5760 min Winter	46.003	0.003	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.808	0.0	22.1	5016
10080 min Summer	0.720	0.0	22.9	5976
15 min Winter	113.123	0.0	5.5	16
30 min Winter	73.270	0.0	7.2	30
60 min Winter	45.325	0.0	8.9	50
120 min Winter	28.955	0.0	11.5	88
180 min Winter	21.829	0.0	13.0	122
240 min Winter	17.671	0.0	14.1	154
360 min Winter	12.892	0.0	15.4	214
480 min Winter	10.188	0.0	16.2	272
600 min Winter	8.436	0.0	16.8	332
720 min Winter	7.206	0.0	17.2	390
960 min Winter	5.585	0.0	17.8	508
1440 min Winter	3.867	0.0	18.4	736
2160 min Winter	2.667	0.0	18.9	1100
2880 min Winter	2.053	0.0	19.4	1436
4320 min Winter	1.433	0.0	20.1	2128
5760 min Winter	1.119	0.0	20.8	1856

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Winter	46.002	0.002	0.0	0.2	0.2	0.0	O K
8640 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K
10080 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Winter	0.932	0.0	21.4	4680
8640 min Winter	0.808	0.0	22.2	5536
10080 min Winter	0.720	0.0	22.8	5648

Summary of Results for 30 year Return Period

Half Drain Time : 26 minutes.

	Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15	min Summer	46.175	0.175	0.0	1.5	1.5	3.2	O K
30	min Summer	46.200	0.200	0.0	1.5	1.5	3.7	O K
60	min Summer	46.203	0.203	0.0	1.5	1.5	3.7	O K
120	min Summer	46.200	0.200	0.0	1.5	1.5	3.7	O K
180	min Summer	46.179	0.179	0.0	1.5	1.5	3.3	O K
240	min Summer	46.156	0.156	0.0	1.5	1.5	2.8	O K
360	min Summer	46.119	0.119	0.0	1.4	1.4	2.1	O K
480	min Summer	46.094	0.094	0.0	1.2	1.2	1.7	O K
600	min Summer	46.075	0.075	0.0	1.1	1.1	1.3	O K
720	min Summer	46.062	0.062	0.0	1.0	1.0	1.0	O K
960	min Summer	46.043	0.043	0.0	0.8	0.8	0.7	O K
1440	min Summer	46.024	0.024	0.0	0.6	0.6	0.3	O K
2160	min Summer	46.013	0.013	0.0	0.4	0.4	0.1	O K
2880	min Summer	46.008	0.008	0.0	0.4	0.4	0.0	O K
4320	min Summer	46.004	0.004	0.0	0.3	0.3	0.0	O K
5760	min Summer	46.003	0.003	0.0	0.2	0.2	0.0	O K
7200	min Summer	46.002	0.002	0.0	0.2	0.2	0.0	O K

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15	min Summer	86.905	0.0	4.1	16
30	min Summer	55.945	0.0	5.4	26
60	min Summer	34.274	0.0	6.7	42
120	min Summer	22.016	0.0	8.6	78
180	min Summer	16.524	0.0	9.8	110
240	min Summer	13.320	0.0	10.5	142
360	min Summer	9.666	0.0	11.5	202
480	min Summer	7.614	0.0	12.0	262
600	min Summer	6.298	0.0	12.5	322
720	min Summer	5.380	0.0	12.8	382
960	min Summer	4.178	0.0	13.2	500
1440	min Summer	2.914	0.0	13.7	736
2160	min Summer	2.039	0.0	14.3	1100
2880	min Summer	1.591	0.0	14.8	1468
4320	min Summer	1.137	0.0	15.8	2144
5760	min Summer	0.907	0.0	16.5	2856
7200	min Summer	0.769	0.0	17.5	4112

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K
10080 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K
15 min Winter	46.176	0.176	0.0	1.5	1.5	3.2	O K
30 min Winter	46.199	0.199	0.0	1.5	1.5	3.7	O K
60 min Winter	46.196	0.196	0.0	1.5	1.5	3.6	O K
120 min Winter	46.180	0.180	0.0	1.5	1.5	3.3	O K
180 min Winter	46.149	0.149	0.0	1.4	1.4	2.7	O K
240 min Winter	46.122	0.122	0.0	1.4	1.4	2.2	O K
360 min Winter	46.085	0.085	0.0	1.1	1.1	1.5	O K
480 min Winter	46.061	0.061	0.0	1.0	1.0	1.0	O K
600 min Winter	46.045	0.045	0.0	0.8	0.8	0.7	O K
720 min Winter	46.035	0.035	0.0	0.7	0.7	0.5	O K
960 min Winter	46.022	0.022	0.0	0.6	0.6	0.3	O K
1440 min Winter	46.011	0.011	0.0	0.4	0.4	0.1	O K
2160 min Winter	46.006	0.006	0.0	0.3	0.3	0.0	O K
2880 min Winter	46.003	0.003	0.0	0.2	0.2	0.0	O K
4320 min Winter	46.002	0.002	0.0	0.2	0.2	0.0	O K
5760 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.676	0.0	18.1	4912
10080 min Summer	0.609	0.0	18.9	4248
15 min Winter	86.905	0.0	4.1	16
30 min Winter	55.945	0.0	5.4	27
60 min Winter	34.274	0.0	6.7	46
120 min Winter	22.016	0.0	8.7	82
180 min Winter	16.524	0.0	9.8	116
240 min Winter	13.320	0.0	10.5	146
360 min Winter	9.666	0.0	11.5	208
480 min Winter	7.614	0.0	12.0	268
600 min Winter	6.298	0.0	12.5	326
720 min Winter	5.380	0.0	12.8	384
960 min Winter	4.178	0.0	13.2	502
1440 min Winter	2.914	0.0	13.7	748
2160 min Winter	2.039	0.0	14.3	1076
2880 min Winter	1.591	0.0	14.8	1392
4320 min Winter	1.137	0.0	15.7	2280
5760 min Winter	0.907	0.0	16.5	3776

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K
8640 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K
10080 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Winter	0.769	0.0	17.4	4432
8640 min Winter	0.676	0.0	18.1	3440
10080 min Winter	0.609	0.0	19.0	4160

Summary of Results for 2 year Return Period

Half Drain Time : 13 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	46.062	0.062	0.0	1.0	1.0	1.0	O K
30 min Summer	46.068	0.068	0.0	1.0	1.0	1.2	O K
60 min Summer	46.066	0.066	0.0	1.0	1.0	1.1	O K
120 min Summer	46.070	0.070	0.0	1.0	1.0	1.2	O K
180 min Summer	46.063	0.063	0.0	1.0	1.0	1.1	O K
240 min Summer	46.056	0.056	0.0	0.9	0.9	0.9	O K
360 min Summer	46.043	0.043	0.0	0.8	0.8	0.7	O K
480 min Summer	46.033	0.033	0.0	0.7	0.7	0.5	O K
600 min Summer	46.026	0.026	0.0	0.6	0.6	0.3	O K
720 min Summer	46.021	0.021	0.0	0.6	0.6	0.2	O K
960 min Summer	46.015	0.015	0.0	0.5	0.5	0.1	O K
1440 min Summer	46.008	0.008	0.0	0.4	0.4	0.0	O K
2160 min Summer	46.004	0.004	0.0	0.3	0.3	0.0	O K
2880 min Summer	46.003	0.003	0.0	0.2	0.2	0.0	O K
4320 min Summer	46.002	0.002	0.0	0.2	0.2	0.0	O K
5760 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K
7200 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	36.027	0.0	1.5	14
30 min Summer	22.898	0.0	2.0	23
60 min Summer	14.003	0.0	2.5	40
120 min Summer	10.157	0.0	3.8	72
180 min Summer	8.007	0.0	4.6	104
240 min Summer	6.635	0.0	5.1	136
360 min Summer	4.959	0.0	5.7	196
480 min Summer	3.976	0.0	6.1	256
600 min Summer	3.329	0.0	6.4	314
720 min Summer	2.871	0.0	6.6	376
960 min Summer	2.261	0.0	6.9	492
1440 min Summer	1.609	0.0	7.3	732
2160 min Summer	1.152	0.0	7.8	1076
2880 min Summer	0.916	0.0	8.2	1428
4320 min Summer	0.676	0.0	8.9	2456
5760 min Summer	0.553	0.0	9.6	3336
7200 min Summer	0.479	0.0	10.3	3424

Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K
10080 min Summer	46.001	0.001	0.0	0.1	0.1	0.0	O K
15 min Winter	46.062	0.062	0.0	1.0	1.0	1.0	O K
30 min Winter	46.067	0.067	0.0	1.0	1.0	1.1	O K
60 min Winter	46.061	0.061	0.0	1.0	1.0	1.0	O K
120 min Winter	46.058	0.058	0.0	1.0	1.0	1.0	O K
180 min Winter	46.049	0.049	0.0	0.9	0.9	0.8	O K
240 min Winter	46.040	0.040	0.0	0.8	0.8	0.6	O K
360 min Winter	46.027	0.027	0.0	0.6	0.6	0.4	O K
480 min Winter	46.019	0.019	0.0	0.5	0.5	0.2	O K
600 min Winter	46.014	0.014	0.0	0.5	0.5	0.1	O K
720 min Winter	46.011	0.011	0.0	0.4	0.4	0.1	O K
960 min Winter	46.007	0.007	0.0	0.3	0.3	0.0	O K
1440 min Winter	46.004	0.004	0.0	0.2	0.2	0.0	O K
2160 min Winter	46.002	0.002	0.0	0.2	0.2	0.0	O K
2880 min Winter	46.002	0.002	0.0	0.2	0.2	0.0	O K
4320 min Winter	46.001	0.001	0.0	0.1	0.1	0.0	O K
5760 min Winter	46.000	0.000	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.430	0.0	11.1	4680
10080 min Summer	0.394	0.0	11.7	4688
15 min Winter	36.027	0.0	1.5	15
30 min Winter	22.898	0.0	2.0	24
60 min Winter	14.003	0.0	2.5	42
120 min Winter	10.157	0.0	3.8	76
180 min Winter	8.007	0.0	4.6	108
240 min Winter	6.635	0.0	5.1	140
360 min Winter	4.959	0.0	5.7	198
480 min Winter	3.976	0.0	6.1	258
600 min Winter	3.329	0.0	6.4	314
720 min Winter	2.871	0.0	6.6	372
960 min Winter	2.261	0.0	6.9	486
1440 min Winter	1.609	0.0	7.4	736
2160 min Winter	1.152	0.0	7.8	1108
2880 min Winter	0.916	0.0	8.2	1504
4320 min Winter	0.676	0.0	8.9	2320
5760 min Winter	0.553	0.0	9.5	3232

Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Winter	46.000	0.000	0.0	0.1	0.1	0.0	O K
8640 min Winter	46.000	0.000	0.0	0.1	0.1	0.0	O K
10080 min Winter	46.000	0.000	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Winter	0.479	0.0	10.4	3688
8640 min Winter	0.430	0.0	11.2	0
10080 min Winter	0.394	0.0	11.9	0

ICP SUDS Mean Annual Flood

Input

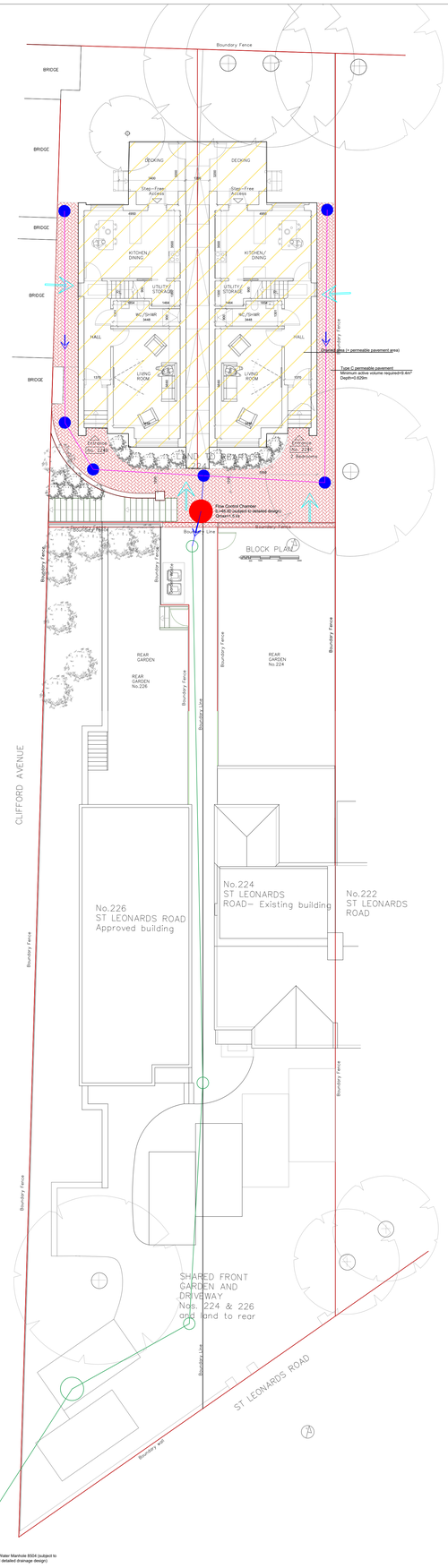
Return Period (years) 100 SAAR (mm) 600 Urban 0.000
Area (ha) 1.000 Soil 0.300 Region Number Region 6

Results l/s

QBAR Rural 1.5
QBAR Urban 1.5

Q100 years 4.9

Q1 year 1.3
Q30 years 3.4
Q100 years 4.9



LEGEND

- Type C Permeable Paving
- Perforated Pipe
- Surface Water pipes
- Exceedance flow routes
- Thames Water/existing infrastructure
- Inspection Chamber
- Flow control chamber

Notes:

1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
2. This drawing must be read in conjunction with all relevant drawings and with the drainage report (RAB3159).
3. A construction phase plan, in line with CDM 2015, must be prepared by the principal contractor prior to any work taking place. The Contractor must comply with all current legislation relating to health and safety.
4. Connections to Public sewers to be agreed and inspected by Water Authority.
5. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and not for construction. Should the contractor commence the work prior to such approval being given, it is entirely at his own risk.
6. Drainage to be in accordance with BS 7533-13:2009, Building Regulations Part H: Drainage and Waste Disposal, *Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England*, CIRIA Guidance on the Construction of (C768) SuDS and CIRIA SuDS Manual (C735).
7. The minimum depth of cover to the crown of gravity pipes without protection should be 0.35m for domestic gardens and pathways without any possibility of vehicular access; 0.5m in domestic driveways, parking areas and yards with height restrictions to prevent entry by vehicles weighing =7.5 tonnes; 0.9m in domestic driveways, parking areas and narrow streets without footways with limited access for vehicles with a gross vehicle weight in excess of 7.5 tonnes; 1.2m in highways and parking areas with unrestricted access to vehicles with a gross vehicle weight in excess of 7.5 tonnes.
8. All pipes not meeting the criteria 7 MUST include a minimum 150mm thick Class GEN3 Concrete surround in line with the 2000 Design And Construction Guidance document.
9. Where pipes are bedded and surrounded in concrete, flexible joints should be provided. Compressible boards (fibreboard or polystyrene) shall be provided at a maximum of 6m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 16mm for pipes up to 450mm nominal diameter and 36mm for pipes over 450mm nominal diameter.
10. The Contractor shall make allowance for raising / lowering all access covers & frames to suit finished levels.
11. Cover Class to manholes/inspection chambers are to suit anticipated vehicular loadings in accordance with BSEN 124:2015 (D400 where potential for HGV loading, C250/B125/A15 in footway trafficked areas not accessible by vehicles.
12. All soft / hard paved areas affected by the works shall be fully reinstated upon completion of the works. All surface markings damaged by the works shall be fully reinstated.
13. Before handover, all manholes shall be inspected, all rubble removed, and the whole system shall be thoroughly flushed and cleaned.
14. All pipe runs near buildings to comply with the Building Regulations 2002 Part H1. where a pipe is within 1m of a foundation the trench shall be filled with class GEN3 Concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN3 Concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases, the pipe shall be bedded and surrounded in 150mm thick class GEN3 Concrete.
15. All materials delivered to the site associated to the sub-base storage of the permeable pavement must be tested to obtain their porosity and permeability, in line with BS 1377-2:1990 and BS 1377-4:1990.
16. The drainage pipes are to be coordinated with the foundation levels from the structural engineer, subject to detailed design.
17. Structural integrity of pipes running internally through the proposed dwellings must be confirmed by the structural engineer.
18. All foul and RWP shall be 100mm diameter unless otherwise noted.
19. For setting out dimensions of SVPs, RWPs, etc., refer to the Architect's or Mechanical Engineer's drawing. Positions shown are indicative only.
20. Cover levels shown are approximate only and are to be adjusted to suit finished ground levels.
21. At least one soil pipe at the head of each foul run shall vent to the atmosphere.
22. All gradients on drainage runs are indicative. Runs to be laid soffit to soffit.
23. All drain runs from SVPs, stub-stacks, or FW gullies to be laid at 1:40 gradient. All RWPs to be laid at minimum 1:60 gradient.
24. Rodding eyes to be laid strictly to manufacturer's instructions.
25. Backfill material to drainage trenches under carriageways to be DOT Type 1 sub-base material, elsewhere backfill to be free draining readily compacted material, free from rubbish and organic matter, frozen soil clay lumps and large stones. To be compacted in layers of not exceeding 150mm thick.
26. Joints specification to be provided by manufacturers.
27. Typical pipe bedding to drainage for pipes up to D=525mm is to be Class S (i.e. 10-14mm).
28. Extra care must be taken once the permeable pavement(s) has been installed so that construction traffic does not impact the porosity due to compaction.
29. **Trench temporary formwork is required to all excavations exceeding 1.2m depth to provide adequate support and stability at all times.**
30. Sewers are to be constructed in single sections between manholes only. Trenches to be backfilled prior to excavating the succeeding sewer run.
31. All concrete products to be in accordance with BRE 363 for sulphates.
32. The requirement or not for a capping layer under the porous pavement(s) must be assessed by the highways engineer.
33. No SuDS features should receive construction-related runoff. Alternative methods of surface water disposal must be employed.
34. Where sewer or drains are to be abandoned they shall be removed or infilled by grouting in accordance with the Civil Engineer Specification for the Water Industry 7th edition. Clause S.23.
35. All manholes shall be watertight.
36. The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such utilities plant or apparatus may also be present but not shown. The Contractor must therefore undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect the design installation and/or their operations, prior to the commencement of any works and inform the designer should there be any clashes. Should the contractor commence the work prior to such an investigation, it is entirely at his own risk. RAB Consultants accepts no liability should existing utilities clash with the proposed design.
37. This drawing is for planning purposes only, not construction.
38. **Geotechnical engineer must confirm structural integrity of all foundations and road given the presence of permeable pavement on site. Suitable mitigation measures must be identified accordingly where necessary.**
39. RAB Consultants accepts no liability should the proposed drainage not be installed in line with these notes and report RAB3159, and structural/functional failure occurs.
40. Client must fulfill their relevant duties, under CDM (2015) and regulations 4, 5, 6, & 8.
41. We have not been made aware that the site utilises siphonic roof drainage. Should siphonic roof drainage be used without our prior knowledge, we accept no liability associated with a failure of the drainage system.
42. A detailed H&S Design Risk Assessment must be undertaken prior to the detailed design stage.

RESILIENCE & FLOOD RISK
Bedford Heights,
Brickhill Drive,
Bedford,
MK41 7PH

Client
UKR GROUP

Project
224 St Leonards

Drawing
SW Plan View Schematic

Checked by NP	Approved by AT	
Drawn by AT	Date: 03/05/2024	Scale: 1:100@ A0

Drawing No.	Revision
RAB3159_001	-

Asset location search

Thames Water Property Searches

RAB Consultants
Kingsbrook House
7Kingsway
KINGSWAY
MK42 9BA

Search address supplied 224
St. Leonards Road
London
SW14 7BN

Your reference 3159

Our reference ALS/ALS Standard/2023_4846419

Search date 21 June 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk

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

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

0800 009 4540

Asset location search

Property Searches

Search address supplied: 224, St. Leonards Road, London, SW14 7BN

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

Asset location search

Thames Water Property Searches

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/2023_4846419

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 519828,175578

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
031C	n/a	n/a
0310	n/a	n/a
0306	7.88	6.13
031D	n/a	n/a
0302	7.92	5.61
931G	n/a	n/a
041D	n/a	n/a
041E	n/a	n/a
041C	n/a	n/a
041B	n/a	n/a
041A	n/a	n/a
0401	6.74	5.16
05LD	n/a	n/a
05LE	n/a	n/a
9302	8.91	6.8
0303	9.01	7.07
0301	8.94	6.68
0304	9.02	7.03
9604	5.91	4
961A	n/a	n/a
961I	n/a	n/a
961H	n/a	n/a
9603	5.75	4
9501	6.5	4.94
961J	n/a	n/a
961K	n/a	n/a
9505	6.5	5.41
9601	5.92	3.79
9602	5.94	4.64
0608	6	4.7
0607	5.99	4.16
0507	6.41	5.15
0503	6.36	4.68
061A	n/a	n/a
0613	6.15	4.12
0606	n/a	n/a
071B	n/a	n/a
081A	n/a	n/a
0806	5.16	2.62
0807	5.16	2.54
0804	5.18	1.83
961C	n/a	n/a
961D	n/a	n/a
9703	5.6	3.82
9701	6.72	3.26
9704	5.55	4.18
97NE	n/a	n/a
971F	n/a	n/a
971G	n/a	n/a
971H	n/a	n/a
971D	n/a	n/a
9705	5.5	3.64
9702	5.49	3.1
07LM	n/a	n/a
07LD	n/a	n/a
07NM	n/a	n/a
071A	n/a	n/a
07LJ	n/a	n/a
07ME	n/a	n/a
07NK	n/a	n/a
0703	5.21	3.38
0701	5.18	2.31
0702	n/a	n/a
0605	6.1	2.99
5801	n/a	-4.78
6804	5.77	4.53
6802	5.82	2.16
6803	5.5	2.47
681D	n/a	n/a
781B	n/a	n/a
88LC	n/a	n/a
87KM	n/a	n/a
881B	n/a	n/a
87KH	n/a	n/a
87JN	n/a	n/a
87JJ	n/a	n/a
88MH	n/a	n/a
88ML	n/a	n/a
871A	n/a	n/a
98MD	5.27	4.08
98MF	n/a	n/a
971C	n/a	n/a
98ME	n/a	n/a
98MC	n/a	n/a
971B	n/a	n/a
98LD	n/a	n/a
98LN	n/a	n/a
98LE	n/a	n/a
98LM	n/a	n/a
98LL	n/a	n/a
97MH	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
07LK	n/a	n/a
07KN	n/a	n/a
08NE	n/a	n/a
08NC	n/a	n/a
861A	n/a	n/a
8601B	6.34	3.52
961B	n/a	n/a
961F	n/a	n/a
961G	n/a	n/a
8602	6.38	3.91
871C	n/a	n/a
971A	n/a	n/a
87MH	n/a	n/a
8702	n/a	n/a
8703	n/a	n/a
8706	n/a	n/a
871G	n/a	n/a
8705	n/a	n/a
8704	n/a	n/a
871H	n/a	n/a
971I	n/a	n/a
97ME	n/a	n/a
97MK	n/a	n/a
8701	5.83	3.6
871D	5.59	3.49
87JF	n/a	n/a
87JM	n/a	n/a
87KE	n/a	n/a
871E	n/a	n/a
87KL	n/a	n/a
871B	n/a	n/a
7703	7.64	1.78
77NF	n/a	n/a
77NM	n/a	n/a
77ML	n/a	n/a
7707	7.76	3.27
77NC	n/a	n/a
77NK	n/a	n/a
7705	5.98	2.65
7702	5.96	1.46
77HL	n/a	n/a
771D	n/a	n/a
77KC	n/a	n/a
7706	5.87	3.2
77JJ	n/a	n/a
77KH	n/a	n/a
771C	n/a	n/a
77LK	n/a	n/a
77LD	n/a	n/a
77HE	n/a	n/a
771B	n/a	n/a
771A	n/a	n/a
87MC	n/a	n/a
87LF	n/a	n/a
87HJ	n/a	n/a
86MM	n/a	n/a
87LN	n/a	n/a
87HF	n/a	n/a
561J	n/a	n/a
5714	5.4	4.28
5708	5.37	4.28
561G	n/a	n/a
661E	n/a	n/a
661C	n/a	n/a
661G	n/a	n/a
661F	n/a	n/a
661B	n/a	n/a
661A	n/a	n/a
661H	n/a	n/a
6701	5.9	4.12
671A	n/a	n/a
77MH	n/a	n/a
77MK	n/a	n/a
7704	5.79	4.31
7701	5.81	3.87
76NL	n/a	n/a
76NM	n/a	n/a
5602	5.62	3.31
571C	n/a	n/a
571A	n/a	n/a
8502	6.22	n/a
85LH	n/a	n/a
751A	n/a	n/a
85MK	n/a	n/a
85NF	n/a	n/a
85LL	n/a	n/a
9503	6.04	4.34
8503	6.01	3.48
8506	6.01	3.92
7509	6.01	3.18
7603	n/a	n/a
761A	n/a	n/a
761B	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7602	n/a	n/a
7601	9.32	n/a
86NF	n/a	n/a
86LN	n/a	n/a
86MH	n/a	n/a
86NK	n/a	n/a
86LL	n/a	n/a
76NE	n/a	n/a
961E	n/a	n/a
86NM	n/a	n/a
86MN	n/a	n/a
76NK	n/a	n/a
86NJ	n/a	n/a
76NH	n/a	n/a
5502	6.39	4.96
5501	6.42	4.21
5603	5.94	4.04
551A	n/a	n/a
6602	5.8	n/a
651C	n/a	n/a
651A	n/a	n/a
6601	5.91	n/a
6502	6.23	4.63
6501	6.23	3.85
6404	6.38	5.11
6401	6.37	4.38
6603	5.99	n/a
7505	6.12	4.48
7501	6.05	3.59
75NE	n/a	n/a
75NL	n/a	n/a
74KL	n/a	n/a
74LL	n/a	n/a
7408	6.28	4.98
74LJ	n/a	n/a
74LC	n/a	n/a
8402	6.7	2.97
7403	6.29	4.08
8407	6.74	3.64
8408	6.76	3.62
74LE	n/a	n/a
84NF	n/a	n/a
85JN	n/a	n/a
75NJ	n/a	n/a
75NC	n/a	n/a
85KE	n/a	n/a
8505	7.8	3.61
8501	7.86	2.76
7504	6.19	3.3
85KJ	n/a	n/a
8504	8.12	3.52
7506	6.14	4.31
7508	6.08	3.5
85ND	n/a	n/a
7503	6.12	4.27
85NM	n/a	n/a
7502	6.16	4.38
7507	6.08	4.85
74ML	n/a	n/a
74ME	n/a	n/a
74NL	n/a	n/a
74NF	n/a	n/a
74NJ	n/a	n/a
74ND	n/a	n/a
73NE	n/a	n/a
74MC	n/a	n/a
74MJ	n/a	n/a
731L	n/a	n/a
73NC	n/a	n/a
7407	6.69	5.54
731K	n/a	n/a
73NJ	n/a	n/a
7404	6.65	4.67
741A	n/a	n/a
74KC	n/a	n/a
74KJ	n/a	n/a
74JJ	n/a	n/a
74JL	n/a	n/a
74KE	n/a	n/a
73MJ	n/a	n/a
73MC	n/a	n/a
73ML	n/a	n/a
8401	6.74	3.16
8301	24.11	11.36
8406	6.78	3.77
8306	24.2	16.62
841A	n/a	n/a
841B	n/a	n/a
84NK	n/a	n/a
93JJ	n/a	n/a
831A	n/a	n/a
9305	7.53	4.51
931E	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9306	7.24	6.35
931F	n/a	n/a
9310	7.35	6.58
941F	n/a	n/a
941A	n/a	n/a
941C	n/a	n/a
941E	n/a	n/a
941D	n/a	n/a
941B	n/a	n/a
9408	6.81	5.85
9406	6.82	5.57
0402	6.73	5.66
941G	n/a	n/a
9407	6.47	4.86
9401	6.45	3.96
951A	n/a	n/a
951B	n/a	n/a
85KM	n/a	n/a
851A	n/a	n/a
9504	6.45	5.12
85LD	n/a	n/a
9502	6.48	5.13
5306	22.8	18.18
5408	6.38	4.6
5303	22.73	15.65
6310	8.41	6.48
631A	n/a	n/a
6304	27.05	20.05
6315	6.64	5.54
6307	6.92	4.77
6314	8.17	6.56
6306	8.24	6.11
631C	n/a	n/a
6313	9.75	6.54
631B	n/a	n/a
731M	n/a	n/a
7312	n/a	n/a
7303	30.81	23.81
731A	n/a	n/a
731B	n/a	n/a
8302	28.83	23.08
8308	29.24	23.16
8307	28.97	23.97
831E	n/a	n/a
931L	n/a	n/a
9301	8.88	6.87
9309	7.5	5.58
93KH	n/a	n/a
931D	n/a	n/a
9308	9.05	7.3
93LD	n/a	n/a
93KE	n/a	n/a
931M	n/a	n/a
031B	n/a	n/a
731G	n/a	n/a
73NL	n/a	n/a
731F	n/a	n/a
731C	n/a	n/a
7311	25.06	20.15
7301	25	16.75
7309	29.85	21.68
7310	29.56	21.56
73ME	n/a	n/a
7306	9.16	8.47
7308	29.95	22.37
731J	n/a	n/a
7302	29.47	21.35
7305	29.27	23.36
7313	n/a	n/a
7316	0	0
8303	29.18	21.1
831D	n/a	n/a
8305	28.92	20.75
8304	29.34	21.59
831C	n/a	n/a
541A	n/a	n/a
541B	n/a	n/a
5412	6.39	5.22

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/2023_4846419

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 519828, 175578.

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

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Payment 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 within 14 days of the 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. 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'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. 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 still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

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 0300 034 2222 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**
Please Call **0800 009 4540** quoting your invoice number starting CBA or ADS	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