

HK Hydrology Ltd.

24 Turnbridge Close

Sustainable Drainage Strategy



On behalf of **Ms N. Purssell**

Project Ref: 2466 | Report 1 | Date: August 2026

Registered Office: 10 St Hubert Road, Waterlooville

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1. Introduction

1.1 Instruction

HK Hydrology Ltd. has been instructed by Ms N. Purssell (the Client) to provide a Sustainable Drainage Strategy (SuDS) for the proposed development in Reading (the Site). Instruction to proceed was provided by email on the 24th of July 2026.

1.2 Background

The Client is seeking planning permission for the construction of a new two-storey dwelling with associated garage, parking and permeable paving. A full description of the proposed development is provided in Section 3. This report presents the Sustainable Drainage Strategy prepared in support of the planning application.

1.3 Scope of the report

The scope of this assessment is to develop an Outline SuDS Strategy (Section 4) that mitigates any increase in runoff quantity or deterioration in water quality, while also providing amenity and biodiversity benefits. The strategy has been prepared in accordance with the DEFRA 2025 National Standards for SuDS and with due regard to relevant national and local drainage policy and guidance.

1.4 Data sources

The main sources of data utilised in this assessment are summarised below:

- Site development plans provided by the Client (Appendix 1);
- Photographs and measurements collected at the Site and surrounding area provided by the Client;
- Environment Agency (EA) flood risk data;
- Wokingham Borough Strategic Flood Risk Assessment (SFRA) (JBA, 2023);
- Wokingham Guidance on the use of sustainable drainage systems (WBC, 2017);
- Wokingham Borough Local Flood Risk Management Strategy (LFRMS) (WBC, 2015);
- Thames Water Asset Location Plans (Appendix 2);
- The CIRIA SuDS manual (CIRIA, 2015);
- Ordnance Survey mapping;
- Rainfall and catchment characteristics data from the Centre for Ecology and Hydrology (UK Centre for Ecology & Hydrology, 2026);
- Soilscape soil mapping (Cranfield Soil and AgriFood Institute, 2026);
- LiDAR Digital Terrain Model (DTM) data; and
- British Geological Survey (BGS) mapping data and borehole logs.

1.5 Qualifications

This report has been drafted by Mr. Henry Kelly of HK Hydrology Ltd. Henry has an MSc in Hydrology and Water Resources Management from Imperial College London and is a chartered member of CIWEM. He also has over 14 years' experience in environmental consultancy, specialising in flood risk and drainage work.

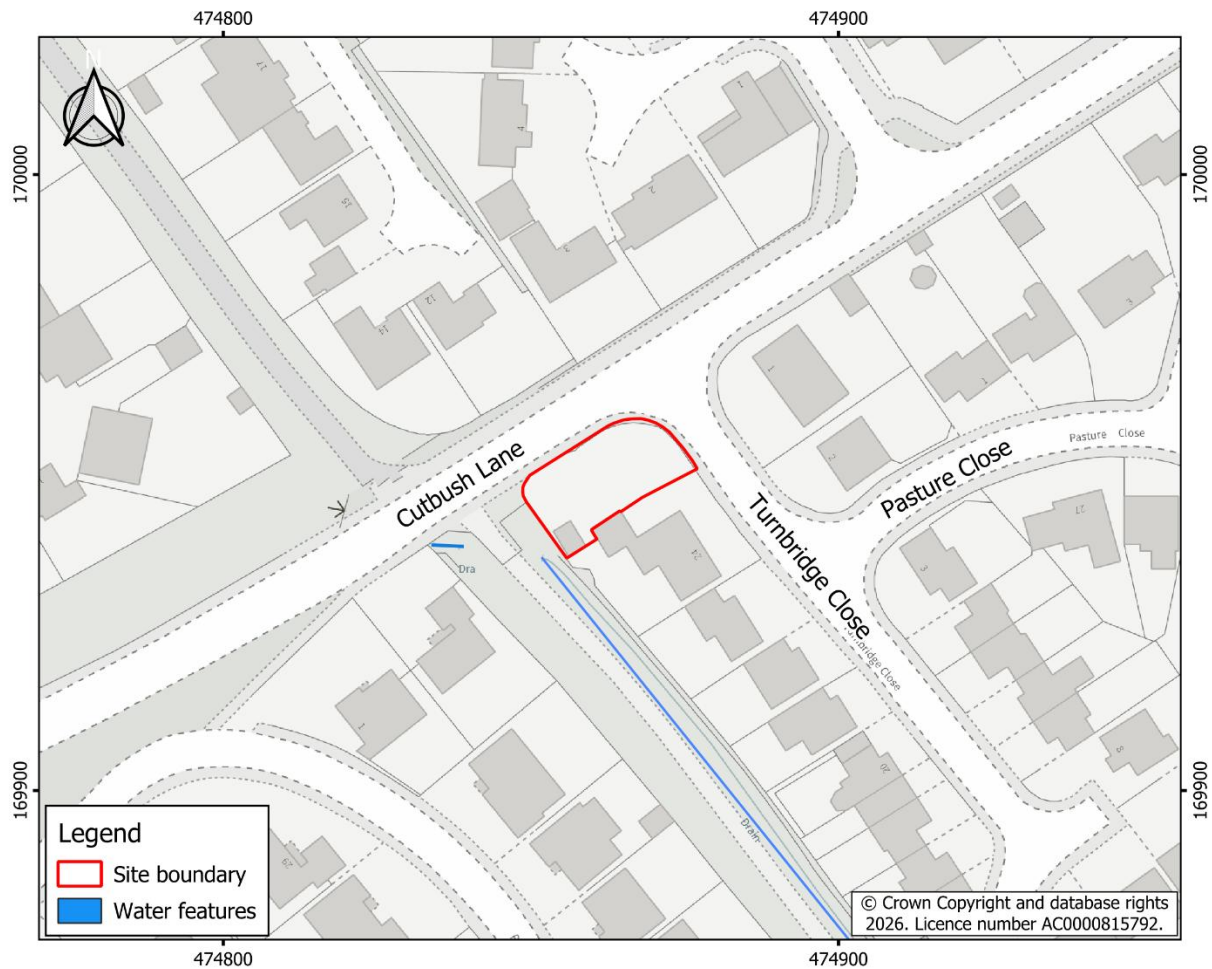


Figure 1.1 Site location and water features

2. Site description

2.1 Site setting and surrounding area

The Site is located 24 Turnbridge Close, Reading, RG6 4UZ (see Figure 1.1), on the corner of Cutbush Lane to the north and Turnbridge Close to the east. The approximate centre of the Site is located at NGR SU 74864 69951.

Figure 2.1 provides aerial imagery illustrating the current layout and condition of the Site. The Site extends to approximately 328 m² and currently comprises predominantly undeveloped greenfield land, with a small outbuilding located in the southern corner. The Site is surrounded by residential development.



Figure 2.1 Existing Site layout

LiDAR topographical data for the area is included in Figure 2.2, along with runoff flow directions derived from the local topographical contours.

The surrounding area generally slopes towards the south-east. Ground levels at the Site range from approximately 44.3 mAOD in the north-east to 43.7 mAOD in the south.

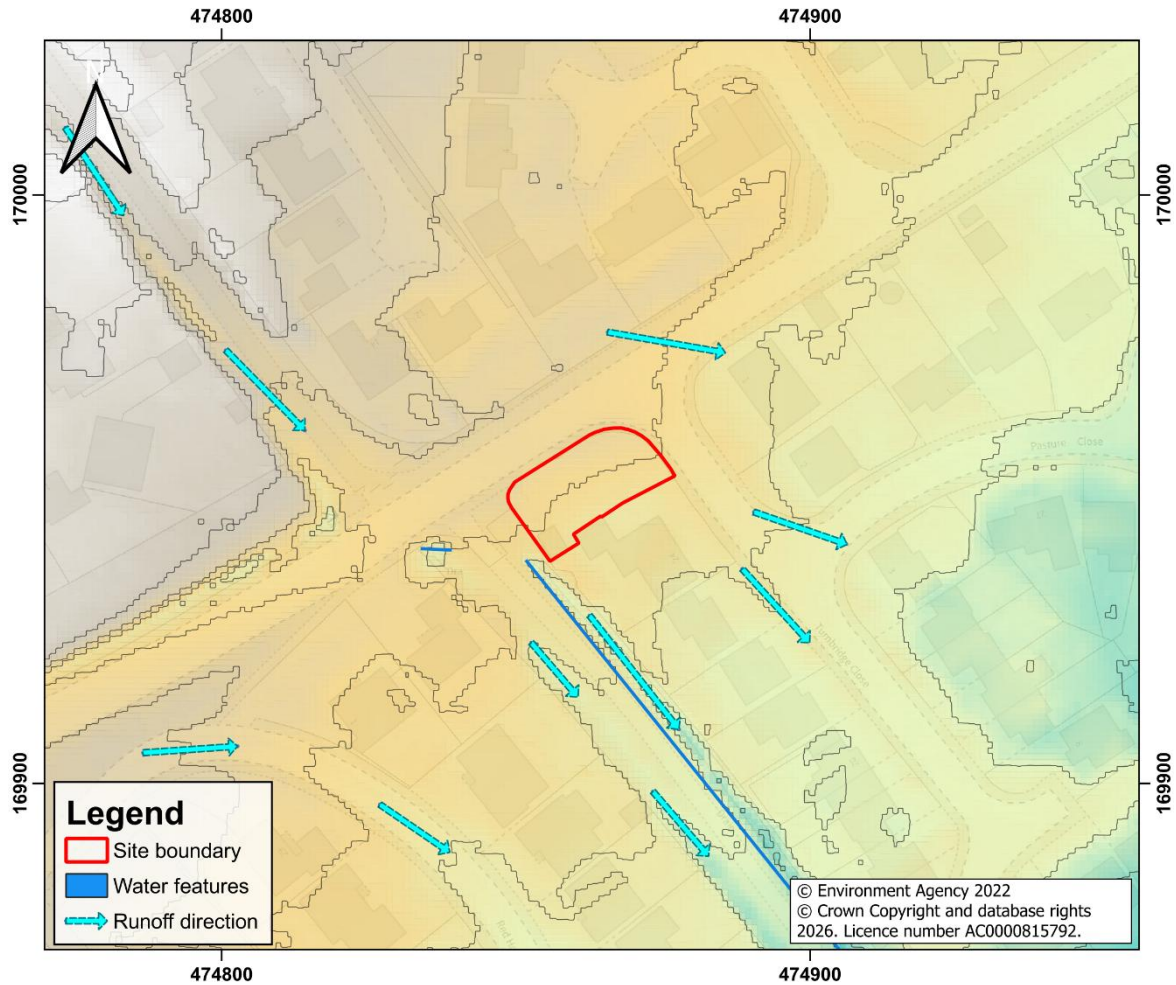


Figure 2.2 LiDAR ground elevation data, watercourses and inferred flow directions

2.2 Soils, geology and hydrogeology

The following information has been compiled from British Geological Survey (BGS) 1:50,000 scale mapping, freely available borehole logs, as well as the Soilscape soils mapping database for the UK (Cranfield Soil and AgriFood Institute, 2026).

The geological sequence underlying the Site is as follows:

- Soils: "Loamy soils with naturally high groundwater".
- Superficial deposits: Fluvio-aeolian deposits (clay, silt and sand).
- Solid geology: London Clay Formation (clay, silt and sand).

The underlying London Clay Formation bedrock is classified as an Unproductive stratum. These are described by the EA as deposits with low permeability that have negligible significance for water supply or river base flow.

The overlying Fluvio-aeolian deposits are designated as a Secondary B aquifer. These are described as "mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers."

The Site is not within a Source Protection Zone.

According to the Wokingham Borough SuDS guidance (WBC, 2017), the Site is in an area with an unknown potential for groundwater infiltration potential.

According to BGS records, trial pit SU77SW753 (located c. 90 m north-west of the Site), recorded silty sandy gravel to a depth of 0.8 m, underlain by silt. The trial pit was recorded as dry to its full investigated depth of 2.5 m in 1992.

2.3 Climate

The Standard Annual Average Rainfall (SAAR) for the area is 645 mm (CEH, 2025).

2.4 Hydrology

Ordnance Survey water feature vector data is shown in Figure 1.1. The nearest water feature is a small drain immediately southwest of the Site. The drain is classified by the Environment Agency as an Ordinary Watercourse and flows in a south-easterly direction. Upstream of the Site, the watercourse is culverted beneath the surrounding area.

Hydrological point descriptors for the Site are presented in Table 2.1.

Table 2.1 Hydrological point descriptors (CEH, 2025)

Descriptor	Value
NGR	SU 74864 69951
BFIHOST19	0.485
PROPWET	0.29
SAAR 61-90	642 mm
SAAR 91-20	645 mm

2.5 Current drainage arrangements

The Site is currently predominantly greenfield land and is not considered to be served by a formal surface water drainage system. Surface water runoff is expected to infiltrate into the ground and runoff naturally in accordance with the local topography, which generally falls towards the southeast.

Thames Water assets plans are provided in Appendix 2, with an excerpt for the Site shown in Figure 2.3. Both a foul sewer and a surface water sewer pass beneath the Site, running from north to south before continuing east towards Turnbridge Close.

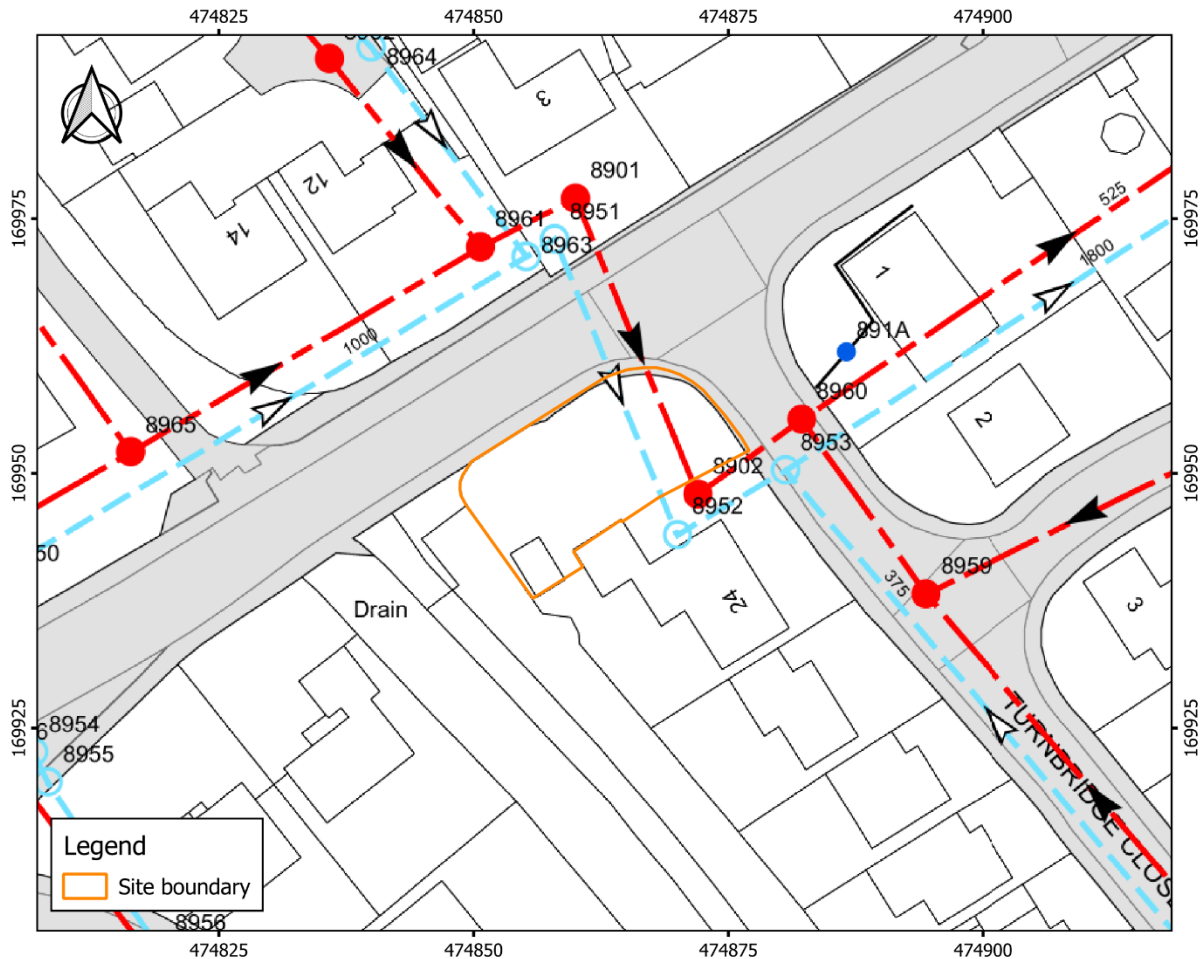


Figure 2.3 Thames Water assets near the Site (surface water sewer in blue; foul sewer in red)

2.6 Flood risks

According to EA data, the Site and its surrounding area are entirely located within Flood Zone 1, which is defined as having a less than 0.1% (1 in 1,000) annual probability of flooding from rivers and tidal sources.

A map of EA's Risk of Flooding from Surface Water (RoFSW) data is shown in Figure 2.4. This data includes the 'Central' climate change allowance for the 2050s epoch (2040-2060). This data indicates that the majority of the Site is at negligible risk of surface water flooding, with only a small area of Low risk identified at the southern corner, coinciding with the location of the existing outbuilding.

The SFRA (JBA, 2023) identifies the Site as being within an area of Low susceptibility to groundwater flooding (<25%). According to SFRA data, there have been 68 recorded sewer flooding incidents within the RG6 4 postcode area between 2000 and 2022. Therefore, the risk of sewer flooding at the Site is considered to be Medium. According to Environment Agency data, the Site is not located within an area at risk of flooding in the event of reservoir failure.

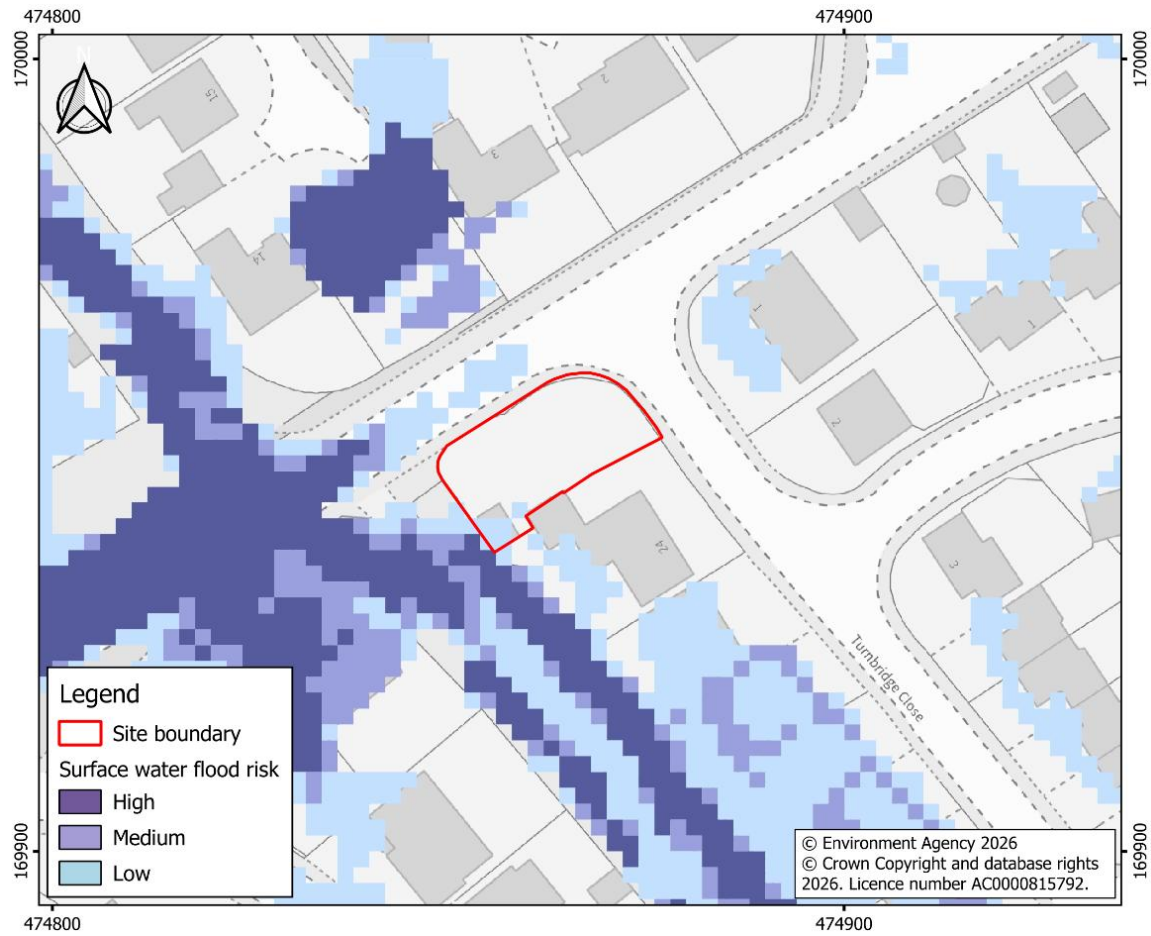


Figure 2.4 Flood Risk from Surface Water (with climate change allowance)

3. Proposed development

The Client is seeking planning permission for the construction of a new two-storey dwelling with an associated garage, parking area, cycle store, walkways, and landscaped garden. Access will be from Turnbridge Close to the east. The development will also include paved areas connecting the dwelling to the existing outbuilding, with areas of grassed garden retained to the west and north-east of the Site.

SuDS features will be installed around the Site to sustainably manage site runoff as discussed in Section 4.

4. Sustainable Drainage Strategy

4.1 Introduction

The following sections describe the Outline SuDS Strategy for the Proposed Development with due regard to DEFRA's Non-Statutory Technical Standards for SuDS (DEFRA, 2025), the PPG for Flood Risk and Coastal Change, the CIRIA SuDS manual (CIRIA, 2015) and the guidance and requirements contained within the Wokingham Borough Council guidance on drainage design has also been considered (WBC, 2017).

The 2025 National Standards establish requirements for runoff destinations, management of everyday rainfall, management of extreme rainfall and flooding, water quality, amenity, biodiversity, and the design, construction, operation and maintenance of drainage systems. These elements have all been considered and assessed in the following sections.

SuDS aim to mimic the natural drainage characteristics of a site prior to its development by controlling surface water runoff as close to where the rain falls as possible e.g. through interception and re-use, evaporation and infiltration into the ground. Furthermore, SuDS provide opportunities to remove pollutants from runoff and also provide amenity and biodiversity benefits.

4.2 Greenfield runoff and permissible discharge rates

The development areas within the Site were assessed using GIS software to quantify the areas of proposed hardstanding, including roof areas and paved areas.

The total area draining to the proposed drainage infrastructure (the "positively drained area" in this instance) has been quantified as being 0.021 ha.

The Institute of Hydrology Report 124 (IH124) method has been used to estimate the greenfield runoff rate for the positively drained area. The QBAR (i.e. 1 in 2.3 year return period) greenfield runoff rates are presented in Table 4.1.

Table 4.1 Permissible discharge rates for the Site

Total area (ha)	Positively drained area (ha)	QBAR rate (l/s)	3 l/s/ha rate (l/s)
0.033	0.021	0.1	0.063

The 2025 National Standards for SuDS design stipulate that the permissible discharge rate for a site should be set at either the peak QBAR greenfield runoff rate or 3 l/s/ha, whichever is greater. The calculated QBAR rate equates to a larger flow rate in this instance, so its rate shown in Table 4.1 has been used to set the permissible discharge rates for the Site.

Total greenfield runoff volumes are included in Table 4.2.

Table 4.2 Greenfield runoff volumes for the Site

Return period (yrs.)	Total runoff volume (m ³)
1	2
2	2
10	3
30	5
100	7

4.3 Climate change

The potential increase in rainfall intensity associated with climate change needs to be considered when designing drainage strategies. The recommended allowances for rainfall intensity in the Loddon and tributaries Management Catchment are included in Table 4.3.

Table 4.3 Climate change allowances for rainfall in the Loddon and tributaries Management Catchment

Epoch	Central allowance	Upper end allowance
1 in 30 year (3.3%)		
2050s	20%	35%
2070s	25%	35%
1 in 100 (1%)		
2050s	20%	40%
2070s	25%	40%

The EA guidance for climate change allowances in flood risk assessments (Environment Agency, 2022) recommends the use of the upper end allowances for developments with a lifetime beyond 2100. Climate change allowances of 35% and 40% were applied to rainfall intensities for the 1 in 30-year and 1 in 100-year drainage simulations, respectively.

4.4 Runoff destination

As per DEFRA (2025) SuDS Standards (Standard 1), the following runoff destination hierarchy is followed for the disposal of surface water from new developments, in order of priority:

1. Collection for non-potable use;
2. Infiltration to ground;
3. Discharge to a surface water body;
4. Discharge to a surface water sewer, or another piped surface drainage system;
5. Discharge to a combined sewer.

The following sections comment on the suitability of each of these measures in turn.

4.4.1 Collection for non-potable use

Some capture and reuse of rainfall at the Site is achievable for the proposed development.

Rainwater harvesting butts may be used to capture and re-use roof runoff for non-potable purposes (e.g. for toilet flushing). This has the benefit of reducing both the demand for non-potable water and the volume of surface water runoff requiring disposal.

It is difficult to accurately determine the volume of roof runoff that would be intercepted and re-used on-site and the influence of butts has not been included within the calculations below.

4.4.2 Infiltration to ground

Given the limited available space, opportunities for dedicated infiltration features are limited (given the required standoff distance). However, permeable paving remains a suitable component of the drainage strategy, providing distributed attenuation storage while allowing infiltration to the underlying ground.

Permeable paving is suitable for use on private driveways and parking areas. In addition to attenuating runoff, permeable paving blocks have the capacity to infiltrate (to the sub-base) very high intensity rainfall events and are expected to manage the peak intensity associated with a short-duration (15-minute), summer profile, 1 in 100-year (+40% climate change) rainfall event at the Site.

4.4.3 Discharge to a surface water body

The Site can discharge via gravity to the unnamed drainage ditch to the west, which is classified as an Ordinary Watercourse. Any new outfall is therefore likely to require Ordinary Watercourse Consent from the Lead Local Flood Authority (Wokingham Borough Council). Surface water will be discharged at a controlled rate below the equivalent greenfield runoff rate, representing a continuation of the existing drainage regime while providing betterment in terms of peak discharge rates during storm events. LiDAR DTM data have been used to estimate the invert level of the watercourse at approximately 43.0 mAOD.

4.4.4 Discharge to a surface water sewer

A surface water sewer passes underneath the Site (see Appendix 2). However, given the availability of suitable discharge routes to a nearby watercourse, discharge to the sewer network is not considered necessary in this instance.

This option is proposed as a back-up option if a discharge to the adjacent ditch is not achievable for any reason.

4.4.5 Discharge to a combined water sewer

There are no known public combined water sewer assets in the vicinity of the Site.

4.5 Attenuation storage requirements

In order for the site to meet the permissible discharge rates, the provision of attenuation storage will be required.

The required attenuation storage volume was calculated using Flow+ industry standard drainage design software, for a 1-in-100 year, 6 hour event, assuming a permissible discharge rate of 0.1 l/s and an input area of 0.021 ha. A 40% climate change uplift was also included (see Section 4.3).

The calculated attenuation storage requirement ranges between **15-18 m³**, which can be fully accommodated within the attenuation storage provided by the proposed permeable paving.

4.6 Drainage strategy description

The Proposed SuDS layout is included in Figure 4.1. The strategy comprises attenuation within the lined permeable paving features, and a controlled discharge to the adjacent brook, along with some rainwater harvesting within water butts. All surface water drainage features would be shallow in depth (below 1.00 m depth) to avoid clashes with the culvert running beneath the Site, as well as allowing for a gravity driven drainage system discharging to the adjacent ditch.

The paving blocks would be constructed over gravel sub-grade layers, which provide attenuation storage capacity and deliver water quality benefits, as microbial communities that develop within the sub-grade material are effective at breaking down hydrocarbons.

The total proposed permeable paving area is 88 m². Proposed permeable paving locations are shown in Figure 4.1. Assuming a gravel sub-grade depth of 0.75 m and a void space ratio of 0.35, it is estimated the permeable paving will provide attenuation storage volume of 23.1 m³. The feature would be lined to prevent infiltration in proximity to the surrounding foundations.

Surface runoff at the Site will be conveyed via an underground gravity-driven drainage system. Underdrains within the permeable paving will transfer water to the conveyance system. The Site is not expected to require land raising/lowering to accommodate a gravity-driven drainage system.

A flow control device is proposed on the ultimate manhole before the off-site discharge to the ditch. A 10 mm orifice flow control has been proposed to limit the off-site discharge rate. This would require at least one level of blockage control around the feature, which should be easy to access and maintain.

Indicative key node (manholes or inspection chambers) locations are included in the drainage strategy figure below (Figure 4.1) along with current ground levels at each location (extracted from LiDAR data).

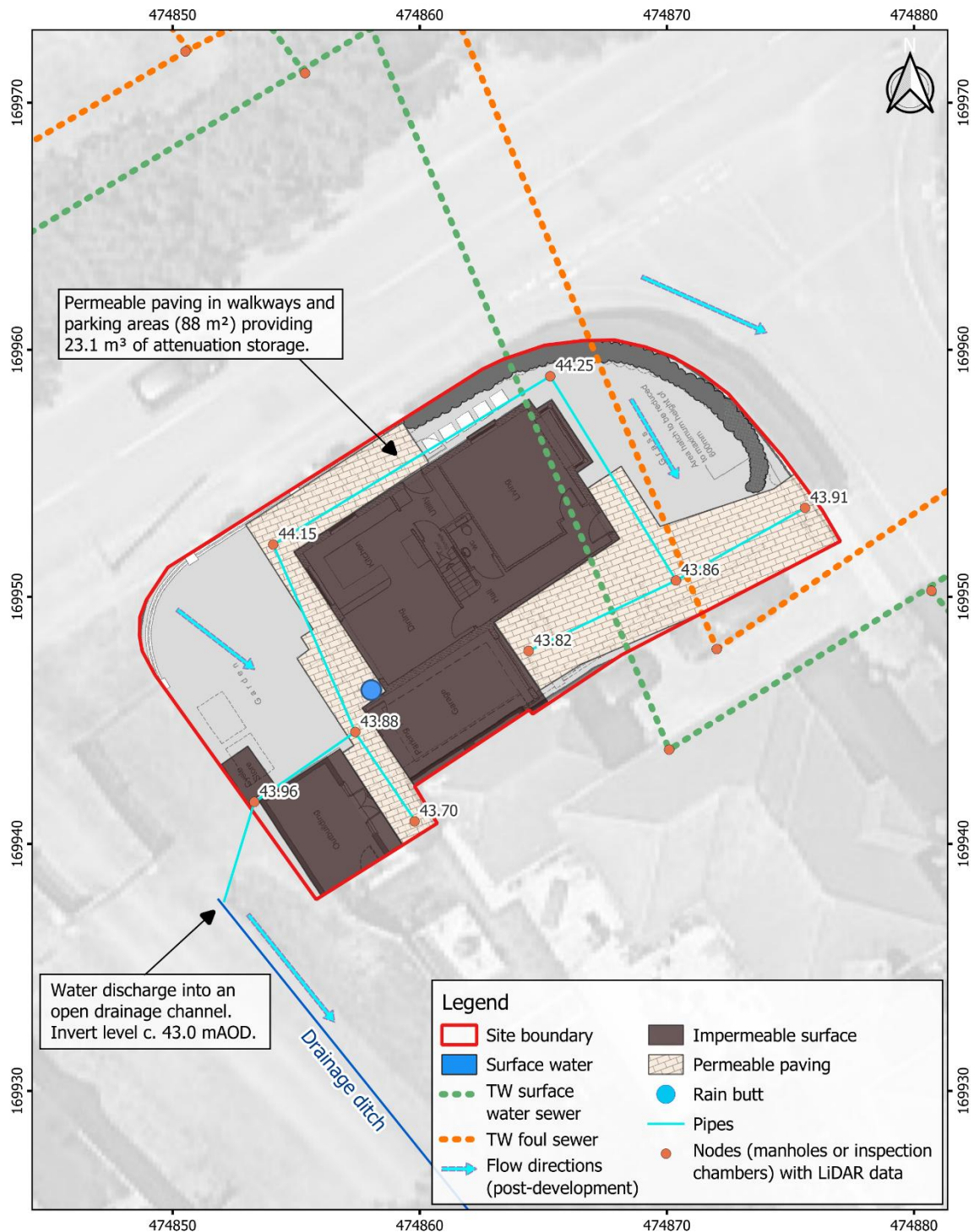


Figure 4.1 Outline drainage strategy

4.7 Performance calculations

The initial design of the SuDS features (just the permeable paving in this instance) has been undertaken using the Causeway "Flow+" v 17 industry standard software. Simulations were run for the 1 in 30-year+35% and the 1 in 100-year+40% event (allowance given for climate change as defined above). Urban creep was not included as the proposed layout leaves little scope for this.

The input hydrological descriptors for the Site were obtained from the Flood Estimation Handbook (FEH). These are shown in Table 2.1. The drainage model details are included in Appendix 3. The permeable paving was included as a single feature, and the rain butts were not included in the calculations. The infiltration rate for all SuDS features was conservatively set to zero.

Table 4.4 contains the output from the Flow drainage simulations. This confirms that, based on the parameters described above, the proposed drainage scheme will be able to attenuate and discharge all runoff generated during the 1 in 30-year storm + 35% event of the 1 in 100-year storm +40% event. Post development discharge rates and volumes are below the greenfield equivalents for all storm events. The peak off-site discharge rate is 0.1 l/s.

Table 4.4 Summary of drainage simulation results

Storm return period (yrs.)	Greenfield runoff rate (l/s)	Post-dev discharge rate (l/s)	Change (l/s)	Greenfield runoff volume (m ³ – 6 hr event)	Post-dev discharge vol (m ³ -6 hr event)	Change (m ³)
1	0.1	0.1	0.0	2	2	0
30	0.2	0.1	-0.1	5	5	0
100	0.3	0.1	-0.2	7	5	-2

Standard 2 of the National Standards for Sustainable Drainage Systems requires a SuDS approach to manage everyday rainfall, such that at least the first 5 mm of rainfall for the majority of events does not result in runoff from the site to surface waters or piped drainage systems.

A 5 mm rainfall event has been simulated within Causeway Flow+. The model results, included in Appendix 3, demonstrate that no discharge occurs from the Site during this event. This demonstrates that the proposed SuDS management train can satisfy the Standard 2 everyday rainfall / interception requirement at outline design stage.

Exceedance flows are discussed below.

4.8 Exceedance flows

In the event that the capacity of the proposed drainage system is exceeded, exceedance flows will follow the natural topographical gradient towards the southeast (as per the greenfield conditions). This reflects the existing overland flow pathway and is not expected to increase flood risk to neighbouring properties.

An emergency overflow from the discharge chamber is recommended to allow discharge to the receiving ditch in case of a blockage or a significant storm event (in exceedance of the design storm event).

4.9 Water quality

SuDS techniques can be used to effectively manage the quality of surface water flowing across a site. Different methods can be used to intercept pollutants and allow them to degrade or be stored in-situ without impacting the quality of water further downstream. Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants). Therefore, the first 5 mm to 10 mm of rainfall (i.e. the 'first flush') should be adequately treated using SuDS.

The development will comprise a residential rooftop and paved outdoor area. The CIRIA SuDS manual categorises runoff from different development types depending on the polluting potential, as defined in the table below.

Table 4.5 Water quality hazard ratings (CIRIA, 2015)

Land use	Hazard level
Residential Roof drainage	Very Low
Residential, amenity uses including low usage car parking spaces and roads, other roof drainage.	Low
Commercial uses including car parking spaces and roads (excluding low usage roads, trunk roads and motorways).	Medium
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemical and fuels (other than domestic fuel oil) are delivered, handled, stored used or manufactured, industrial sites.	High
Trunk roads and motorways	High

The proposed development would present a "Very Low" to "Low" hazard level with regards to water quality. This category includes hazard indices of 0.5 for total suspended solids (TSS), 0.4 for metals and 0.4 for hydrocarbons.

The measures in Table 4.6 are examples which are suitable for inclusion in a drainage strategy for a proposed development of this nature, to mitigate a potential increase in pollutants within on-site and off-site runoff – note text in bold are measures included in this case. Removal indices are included for each feature type relative to the specific pollutant.

Table 4.6 Mitigation indices for SuDS components (discharges to surface water)

Component Type	TSS	Metals	Hydrocarbons
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system (raised rain garden)	0.8	0.8	0.8
Permeable paving	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6

Component Type	TSS	Metals	Hydrocarbons
Pond	0.7	0.7	0.5

The permeable paving included within the SuDS Strategy will provide adequate treatment to mitigate the Low hazard associated with runoff from the parking area.

The water from the rooftop will be clean and require no treatment.

4.10 Maintenance Plans

The implementation of an adequate maintenance strategy is important for the long-term functionality of a drainage scheme. This section gives an overview of the likely future maintenance requirements for the scheme. This is based on typical/standard details and may not be exhaustive. The schedule should be reviewed periodically and updated/adapted to suit the requirements of the constructed drainage system.

Maintenance requirements for the included features are set out in Table 4.7 below. In general, the features included in the scheme are fairly low maintenance.

Table 4.7 Maintenance requirements

Maintenance		
Activity	Required Action	Typical Frequency
Pipes, channels and manholes		
Monitoring	Initial inspection using post-construction CCTV survey	Once.
	Inspect for evidence of poor operation	Bi-monthly, or as required.
Regular maintenance	Remove silt and debris (particularly around the flow control feature).	Monthly or as required.
Remedial actions	Clear blockages, replace damaged or failed pipes or manholes.	As required.
Permeable paving		
Monitoring / inspections	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
Regular maintenance	Brushing and vacuuming -standard cosmetic sweep over whole surface	Once a year after autumn leaf fall

Maintenance		
Activity	Required Action	Typical Frequency
	Rubbish and litter removal	As required
Remedial actions	Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	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 paving material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required

The home owner would be responsible for maintaining the proposed SuDS.

5. Conclusions

The Site is entirely in Flood Zone 1, with limited extent of Low risk of surface water flooding and groundwater flooding, and Medium risk of sewer flooding.

An Outline SuDS Strategy was created for the Site.

SuDS features will be used to intercept, store and transfer surface water runoff across the Site to manage surface water runoff effectively from the Site for the lifetime of the development. Permeable paving will provide attenuation. Gravity drainage will convey the water to be discharged to the drainage ditch to the west of the Site at a controlled rate (below the QBAR greenfield runoff rate).

Drainage calculations included in Appendix 3 demonstrate the viability of the proposed scheme. The peak discharge rate to the adjacent ditch is limited to 0.1 l/s 1 in 100 year storm critical duration scenario (plus CCA), which represents a 67% reduction relative to the current peak flow rates for the same event (without any CCA). No flooding of the development area is expected under the 1 in 30 or 1 in 100 year (+CCA) storm events.

6. References

- CEH. (2025). *The Flood Estimation Handbook (FEH) Online Service*, Centre for Ecology & Hydrology, Wallingford, Oxon, UK.
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Appendices

Appendix 1 Site development plans

Appendix 2 Thames Water asset location plans

HK Hydrology Ltd.
10 ST HUBERT ROAD, HORNDEAN
WATERLOOVILLE
PO8 0EJ

Search address supplied 24
Turnbridge Close
Lower Earley
Reading
RG6 4UZ

Your reference 24 Turnbridge Close

Our reference ALS/ALS Standard/2026_5363966

Search date 28 July 2026

Keeping you up-to-date

Price Changes from 1 June 2026

With inflation continuing to influence costs, our prices for all searches will increase by around **4.3%** from **1 June 2026**. We've based this increase on **Retail Price Index (RPI)**.

You can view the new prices here: thameswater.co.uk/property-searches

If you have any questions, our customer experience team is here to help on **0800 009 4540**.



Thames Water Utilities Ltd
Property Searches,
Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

Search address supplied: 24, Turnbridge Close, Lower Earley, Reading, RG6 4UZ

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 search provides maps showing the position and 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 contact details below:

Thames Water Utilities Ltd
Property Searches
Clearwater Court
Vastern Road
Reading
RG1 8DB

Email: property.searches@thameswater.co.uk

Web: thameswater.co.uk/propertysearches

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. The public sewer map 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.

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. You can do this by emailing customer.feedback@thameswater.co.uk with the email subject header 'Enquiry – TWOSA', along with details of the request.

If you have any questions regarding sewer connections, budget estimates, diversions or building over 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

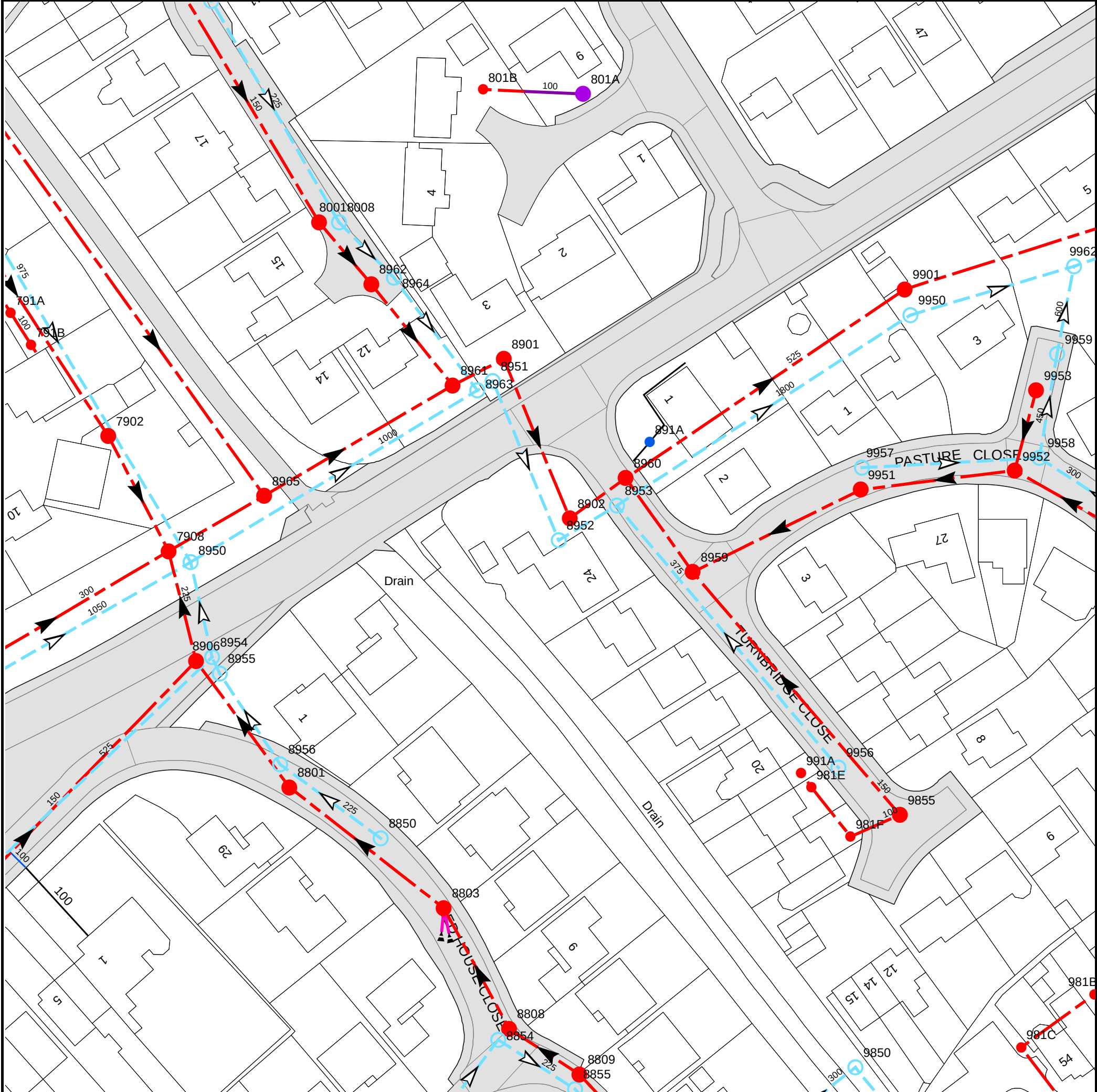
Clean Water queries

Should you require any advice concerning clean water 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/2026_5363966	
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The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 474869,169943

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 (2024) with the Sanction of the controller of H.M. Stationery Office, License no. AC0000849556 Crown Copyright Reserved.

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
981E	n/a	n/a
8955	44.28	42.19
9951	43.00	40.57
8809	42.77	41.52
9950	42.67	40.52
8951	44.21	41.25
9959	42.88	41.00
981B	n/a	n/a
8952	43.46	40.86
8950	44.58	41.58
8803	43.18	41.27
8956	43.88	42.30
891A	n/a	n/a
8854	42.89	41.03
801B	n/a	n/a
8906	44.75	41.07
9957	43.00	41.48
7908	44.82	40.18
8009	45.14	42.48
9952	42.76	40.76
8001	44.60	41.57
8901	44.21	40.02
7902	45.11	n/a
8850	43.39	42.43
9962	n/a	n/a
8008	44.48	42.19
9855	43.14	40.78
9958	42.75	41.17
9956	43.07	41.85
8964	44.05	42.10
8963	44.20	41.87
8808	42.83	41.38
8902	43.69	39.98
8855	42.78	40.89
8953	43.68	40.95
8960	43.71	40.15
8959	43.41	40.31
8954	44.75	42.40
8965	n/a	n/a
8801	43.85	40.84
8962	44.17	41.48
9953	43.20	40.85
8961	44.25	41.29
9850	42.28	40.54
801A	n/a	n/a
9901	n/a	n/a
981C	n/a	n/a
991A	n/a	n/a
981F	n/a	n/a
791A	n/a	n/a
791B	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



Asset Location Search Sewer Key

Public Sewer Types

(Operated and maintained by Thames Water)

- Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
- Surface Water Sewer:** A sewer designed to convey surface water (eg. rain water from roofs, driveways 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.
- Trunk Sewer:** A strategic sewer which collects either foul or surface water flow from a number of subsidiary catchments and transfers this flow to a pumping station, river outfall or 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**
- Vent Pipe**
- Thames Water Proposed**
- Gallery**

Other Sewer Types

(Not operated and maintained by Thames Water)

- Sewer**
- Proposed**
- Content of this drainage network is currently unknown**
- Gulley:** These sewers are generally maintained by the relevant highway authority.
- Culverted Watercourse**
- Decommissioned Sewer**
- Ownership of this drainage network is currently unknown**

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. eg. a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve**
- Dam Chase**
- Fitting**
- Meter**
- Vent**

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer.

- Ancillary**
- Control Valve**
- Drop Pipe**
- Weir**

End Items

End symbols appear at the start or end of the sewer pipe. eg. 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**
- Undefined End**
- Outfall**

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Other Symbols

Symbols used on maps that 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 and agreements etc.

- Agreement/Adoption**
- Operational Site**
- Chamber**
- Awaiting Ordnance Survey data**

Ducts or Crossings

Ducts may contain high voltage cables. Please check with Thames Water.

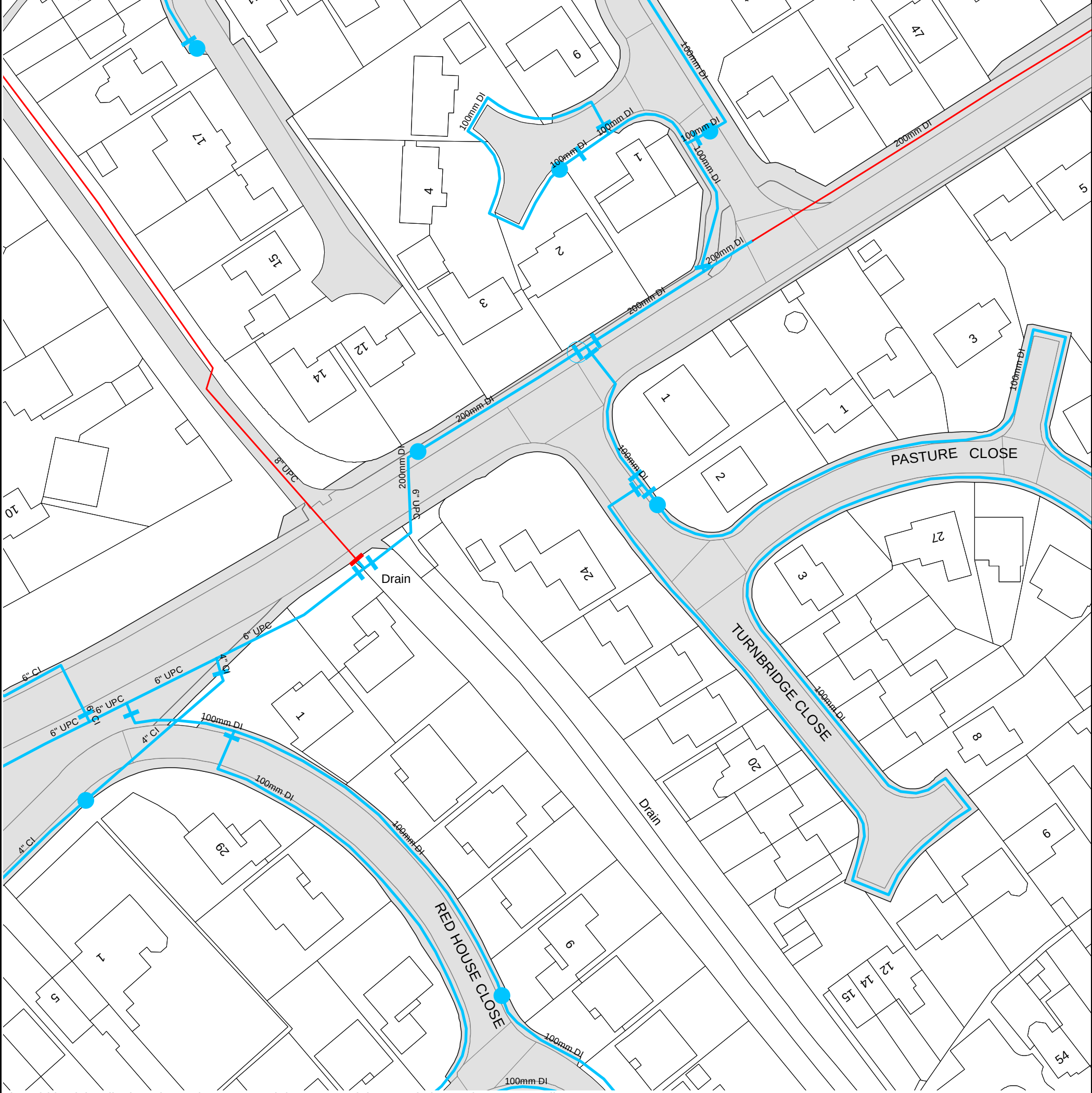
- Casement**
- Subway**
- Conduit Bridge**
- Tunnel**

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.

16129 - 12/25



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 474869, 169943.
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Asset Location Search Water Key



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Water Pipes

(Operated and maintained by Thames Water)

- 4" CI** **Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- 16" CI** **Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- 3" CI** **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- 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
- Network 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
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

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

Other Water Pipes

(Not operated and maintained by Thames Water)

- Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
- Private Main:** Indicates that the 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.

16129-02 - 01/26

Appendix 3 Drainage calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	15	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	3.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Permeable paving	0.021	5.00	44.000	-32.667	85.339	0.750

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240	10 year (l/s)	0.2
Rainfall Events	Singular	Additional Storage (m³/ha)	20.0	30 year (l/s)	0.2
Summer CV	0.750	Starting Level (m)		100 year (l/s)	0.3
Winter CV	0.840	Check Discharge Rate(s)	✓	Check Discharge Volume	✓
Analysis Speed	Normal	1 year (l/s)	0.1	30 year 360 minute (m³)	5
Skip Steady State	x	2 year (l/s)	0.1		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	35	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.022	Betterment (%)	0
SAAR (mm)	642	QBar	0.1
Soil Index	4	Q 1 year (l/s)	0.1
SPR	0.47	Q 2 year (l/s)	0.1
Region	6	Q 10 year (l/s)	0.2
Growth Factor 1 year	0.85	Q 30 year (l/s)	0.2
Growth Factor 2 year	0.88	Q 100 year (l/s)	0.3
Growth Factor 10 year	1.62		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	30
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.022	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.428
CWI	96.593	Runoff Volume (m³)	5

Node Permeable paving Offline Orifice Control

Flap Valve	x	Invert Level (m)	43.250	Discharge Coefficient	0.600
Loop to Node		Diameter (m)	0.010		

Node Permeable paving Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	43.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	88.0	88.0	0.750	88.0	112.9

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	59.371	16.800	30 year +35% CC 360 minute summer	47.503	12.224
1 year 15 minute winter	41.664	16.800	30 year +35% CC 360 minute winter	30.878	12.224
1 year 30 minute summer	38.167	10.800	30 year +35% CC 480 minute summer	36.417	9.624
1 year 30 minute winter	26.784	10.800	30 year +35% CC 480 minute winter	24.195	9.624
1 year 60 minute summer	25.353	6.700	30 year +35% CC 600 minute summer	29.144	7.972
1 year 60 minute winter	16.844	6.700	30 year +35% CC 600 minute winter	19.913	7.972
1 year 120 minute summer	20.397	5.390	30 year +35% CC 720 minute summer	25.461	6.824
1 year 120 minute winter	13.551	5.390	30 year +35% CC 720 minute winter	17.111	6.824
1 year 180 minute summer	17.228	4.433	30 year +35% CC 960 minute summer	20.226	5.326
1 year 180 minute winter	11.198	4.433	30 year +35% CC 960 minute winter	13.398	5.326
1 year 240 minute summer	14.266	3.770	30 year +35% CC 1440 minute summer	14.029	3.760
1 year 240 minute winter	9.478	3.770	30 year +35% CC 1440 minute winter	9.428	3.760
1 year 360 minute summer	11.315	2.912	100 year +40% CC 15 minute summer	550.768	155.848
1 year 360 minute winter	7.355	2.912	100 year +40% CC 15 minute winter	386.504	155.848
1 year 480 minute summer	9.034	2.388	100 year +40% CC 30 minute summer	361.550	102.306
1 year 480 minute winter	6.002	2.388	100 year +40% CC 30 minute winter	253.719	102.306
1 year 600 minute summer	7.439	2.035	100 year +40% CC 60 minute summer	243.361	64.313
1 year 600 minute winter	5.083	2.035	100 year +40% CC 60 minute winter	161.683	64.313
1 year 720 minute summer	6.643	1.780	100 year +40% CC 120 minute summer	144.475	38.180
1 year 720 minute winter	4.464	1.780	100 year +40% CC 120 minute winter	95.986	38.180
1 year 960 minute summer	5.452	1.436	100 year +40% CC 180 minute summer	108.293	27.867
1 year 960 minute winter	3.611	1.436	100 year +40% CC 180 minute winter	70.393	27.867
1 year 1440 minute summer	3.951	1.059	100 year +40% CC 240 minute summer	83.863	22.162
1 year 1440 minute winter	2.655	1.059	100 year +40% CC 240 minute winter	55.716	22.162
30 year +35% CC 15 minute summer	411.354	116.399	100 year +40% CC 360 minute summer	61.762	15.893
30 year +35% CC 15 minute winter	288.669	116.399	100 year +40% CC 360 minute winter	40.147	15.893
30 year +35% CC 30 minute summer	268.953	76.104	100 year +40% CC 480 minute summer	47.197	12.473
30 year +35% CC 30 minute winter	188.739	76.104	100 year +40% CC 480 minute winter	31.357	12.473
30 year +35% CC 60 minute summer	178.936	47.288	100 year +40% CC 600 minute summer	37.679	10.306
30 year +35% CC 60 minute winter	118.881	47.288	100 year +40% CC 600 minute winter	25.745	10.306
30 year +35% CC 120 minute summer	108.839	28.763	100 year +40% CC 720 minute summer	32.851	8.805
30 year +35% CC 120 minute winter	72.310	28.763	100 year +40% CC 720 minute winter	22.078	8.805
30 year +35% CC 180 minute summer	82.425	21.211	100 year +40% CC 960 minute summer	26.010	6.849
30 year +35% CC 180 minute winter	53.579	21.211	100 year +40% CC 960 minute winter	17.230	6.849
30 year +35% CC 240 minute summer	64.180	16.961	100 year +40% CC 1440 minute summer	17.938	4.808
30 year +35% CC 240 minute winter	42.640	16.961	100 year +40% CC 1440 minute winter	12.056	4.808

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	Permeable paving	440	43.336	0.086	0.3	2.7101	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)				
480 minute winter	Permeable paving	Orifice	0.1	1.8				

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
600 minute winter	Permeable paving	585	43.620	0.370	1.0	11.6134	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
600 minute winter	Permeable paving	Orifice	0.1	4.6

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	Permeable paving	472	43.737	0.487	1.5	15.2801	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)				
480 minute winter	Permeable paving	Orifice	0.1	4.6				