whitby wood

Hampton Wick Royal Cricket Ground

New Pavilion

Drainage Strategy Report

Client: Hampton Wick Royal Cricket Club

Date: May 2024

P451640-WW-XX-XX-RP-C-0003

whitby wood

91-94 LOWER MARSH
LONDON SE1 7AB
UNITED KINGDOM

+44 (0)20 7442 2216

www.whitbywood.com

Whitby Wood Limited
reg in England and Wales
reg no 07786822

91-94 Lower Marsh
London SE1 7AB

REVISION RECORD

Rev	Date	Description	Prepared	Reviewed	Approved
P1	24/05/2024	Stage Issue	AR	RS	RW

Prepared by:

Aaron Rogers

Design Engineer – Civils

Reviewed by:

Ryan Saunders

Senior Engineer - Civils

Approved by:

Ryan Williams

Associate– Civils

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

1 INTRODUCTION

This Design Strategy Report (DSR) has been prepared in accordance with National Planning Policy Framework (NPPF) in support of the detailed planning and listed building consent application being submitted by Hampton Wick Royal Cricket Club ('the Applicant'). The application will be submitted to London Borough of Richmond ('the Council') for the proposed development at Hampton Wick Royal Cricket Ground, Surrey, KT1 4AZ ('the Site'). This is a supporting document to The Flood Risk Assessment (FRA). This report has been undertaken to ascertain the constraint of flooding in order to redevelop the site and allow to the introduction of Sustainable Urban Drainage Systems (SuDs) to act as the key aspect of flood mitigation.

1.1 Sources of Information

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

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

- London Regional Flood Risk Appraisal (Greater London Authority, 2018)
- Level 1 Strategic Flood Risk Assessment (London Borough of Richmond, 2021)
- Surface Water Management Plan (London Borough of Richmond, 2021)
- British National Geology Viewer [Accessed March 2024]
- Soilscapes Viewer [Accessed March 2024]
- London Borough of Richmond Local Plan (London Borough of Richmond, 2021)
- National Planning Policy Framework (2023)
- Whitby Wood, Flood Risk Assessment (2024)
- BS EN12056-2:2000, Gravity drainage systems inside buildings (2010);
- CIRIA, The SuDs Manual (2016)
- Building Regulations Part H;
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections).

1.2 Site Location and Description

The Site sits within the Hampton Wick Royal Cricket Ground in Bushy Park, Surrey. The Site currently comprises of a pavilion, which has been destroyed by a fire, and a storage shed. The approximate centre of the Site is located at an easting and northing of 517127 and 169451, respectively.

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

FIGURE 1 - SITE LOCATION PLAN

1.3 Existing Drainage

A Thames Water asset search has been carried out. The full report can be found in **Appendix B** but is summarised below:

Surface Water

- The closest surface water asset to be a Thames water trunk main, of unknown diameter, which runs below Hampton Court Road, A308. This main is approximately 250m south of the proposed pavilion.
- 250m north of Site, there is a 300mm DI surface water sewer which lies beneath Sandy Lane. This sewer is under private ownership.
- It is believed that the existing Site currently discharges into a soakaway.

Foul Water

- 250m north of Site, there is a 150mm foul rising main which begins beneath Sandy Lane and continues northward though the Bushy Park.
- Thames water manhole MH1602 lies close to the entrance to HWRCC on Sandy Lane.
- There is a 175mm foul sewer 250m south of Site, below Hampton Court Road, A308.

- Currently, all Site foul drainage discharges into a cesspit below the carpark, adjacent to the Site of the new pavilion. There have been previous concerns that, due to the increased membership and therefore usage of the facilities, the storage volume of the cesspit is inadequate.

1.4 Geology

The British Geological Survey's Geology of Britain map has been reviewed as shown in **Appendix C** and it indicates a bedrock geology of Lambeth Group (Clay, Silt and Sand), overlain with Kempton Park Gravel Member (Sand and gravel). The Site belongs to soilscape 6 – freely draining slightly acid loamy soils.

1.5 Proposed Development

The proposed development will include the construction of a new pavilion on the Site of the old pavilion, which was destroyed in a catastrophic fire.

The new pavilion will be divided across two levels. On the ground floor will be changing rooms and office space for the club's administrative staff. The first floor will provide a function area with kitchen and bar facilities and a large balcony overlooking the square.

2 DRAINAGE DESIGN POLICIES

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

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

2.1 Overall Site Drainage Requirements

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

TABLE 1 - REQUIREMENTS FOR THE PROPOSED DRAINAGE SYSTEM

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

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

2.2 Planning Policy Requirements

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

2.3 Local Plan – Policy 8

Within the LB of Richmond Local Plan (2021) is policy 8 which is governing the Flooding, flood risk and sustainable drainage zones requirements for developments. The policy can be stated below:

A. All developments should avoid, or minimise, contributing to all sources of flooding, including fluvial, tidal, surface water, groundwater and flooding from sewers, taking account of climate change and without increasing flood risk elsewhere. Development will be guided to areas of lower risk by applying the 'Sequential Test' as set out in national policy guidance, and where necessary, the 'Exception Test' will be applied. Unacceptable developments and land uses will be refused in line with national policy and guidance, the Council's Strategic Flood Risk Assessment (SFRA) and as outlined in the table below.
B. To enable development, proposals must provide mitigation and resilience against flood risk, taking advice from the Lead Local Flood Authority (LLFA) as appropriate, and provide appropriate compensation to existing flood risk levels and volumes, addressing the predicted 1 in 100-year Risk of Flooding from Surface Water (RoFSW) mapped depths as a minimum.
C. In Flood Zones 2 and 3, all proposals on sites of 10 dwellings or more or 1000sqm of non-residential development or more, or on any other proposal where safe access/egress cannot be achieved, a Flood Emergency Plan must be submitted.
D. Where a Flood Risk Assessment is required, on-site attenuation to alleviate fluvial and/or surface water flooding over and above the Environment Agency's floodplain compensation is required where feasible.
E. Where possible, land within major development sites should be safeguarded for potential flood mitigation use through the active consideration of predicted flood mapping from all sources.
F. In line with the Council's SFRA, the following catchment areas have been designated as throughflow and groundwater policy zones:
    1. Richmond Hill (Richmond)
    2. Strawberry Hill (Twickenham)
    3. Marble Hill (Twickenham)
    4. St. Margarets West
G. Subsurface structure development proposals within these zones need to fulfil site-specific requirements to demonstrate that basements, cellars, and other subsurface structures can be safely developed without increasing throughflow and groundwater related flood risk.
H. The Council requires the use of Sustainable Drainage Systems (SuDS) in all development proposals to manage surface water runoff as close to its source as possible, using the most sustainable solutions to reduce runoff volumes and rates. Ideally, all surface water should be managed on site. The development must not increase flood risk elsewhere and where possible reduce flood risk overall. Applicants will have to demonstrate that their proposal complies with the following:
    1. A reduction in surface water discharge to greenfield run-off rates wherever feasible.
    2. Where greenfield run-off rates are not feasible, this will need to be demonstrated by the applicant, and in such instances, the minimum requirement is to achieve at least:
        a. a runoff rate of 2 l/s or below, or

b. a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development.

I. Applicants will have to demonstrate that their proposal complies with the following:

1. Retain the effectiveness, stability and integrity of flood defences, riverbanks and other formal and informal flood defence infrastructure.
2. Ensure the proposal does not prevent essential maintenance and upgrading from being carried out in the future.
3. Unless exceptional circumstances are demonstrated for not doing so, development should be set back from riverbanks and existing flood defence infrastructure to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way (16 metres for the tidal Thames and 8 metres for other rivers where possible).
4. Take into account the requirements of the Thames Estuary 2100 Plan and the River Thames Scheme and demonstrate how the current and future requirements for flood defences have been incorporated into the development.
5. The removal of formal or informal flood defences is not acceptable unless this is part of an agreed flood risk management strategy by the Environment Agency.

J. In addition, in line with the requirements of the Thames Estuary 2100 Plan, developments adjoining the River Thames must maintain and where necessary enhance or raise flood defences (or show how they could be raised in the future), demonstrating that they will continue to provide adequate flood protection for the lifetime of the development. In alignment with the Council's SFRA, developments on the river should make the most of the opportunities presented by regeneration and redevelopment on river corridors to reduce fluvial flood risk through location, layout and design of development. Opportunities should also look at flood compatibility, flood resilience and maximising open space for flood water.

K. Basements – Omitted

L. In line with the recommendations set out in the Council's Strategic Flood Risk Assessment, submitted FRAs have to utilise the 'upper end' climate change scenarios when implementing the climate change allowances for surface water and fluvial flood risk. Assessments of tidal flood risk should use the current TE2100 crest levels guidance and breach modelling to account for worst-case scenarios.

2.4 LLFA Plan

LB of Richmond is the Lead Local Flood Authority (LLFA) for Hampton Wick. A LLFA is a Statutory Consultee on planning applications for surface water drainage. This role applies to major development only. LB of Richmond will provide technical advice and response surface water drainage proposal for the development. LB of Richmond has the 'lead' role in managing flood risk from surface water, groundwater and ordinary watercourses across the borough. Partnership working underpins the delivery of effective local flood risk management. LB of Richmond will need to ensure that:

- Proposals are not increasing flood risk on and off the site:

- There is a review of the maintenance schedule to ensure that the drainage system will operate effectively as designed. This involves close working with partners involved in flood and water management, known as Risk Management Authorities. Applying and monitoring the Local Flood Risk Management Strategy. This will be guided by the Environment Agency's National Flood and Coastal Risk Management Strategy;
- Cooperating with other Risk Management Authorities, including neighbouring boroughs, water utility companies, the EA and others;
- Maintain a register of local structures and features that are likely to have a significant effect on flood risk;
- In the event of a significant flood, investigate to an appropriate level whether the relevant flood risk management functions were exercised correctly;
- Contribute towards sustainable development when exercising a flood risk management function; and
- Statutory consultee on planning applications from 15th April 2015 for 10 houses or more (or equivalent other type of development) with regard to surface water management.

2.5 London Plan

The site is subject to policies as described in the London Plan (2021):

SI 12 Flood Risk Management

A. Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.
B. Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.
C. Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.
D. Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.
E. Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.
F. Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back

from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.

G. Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

SI 13 Sustainable Drainage

A. Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water run-off outside these areas also need to be identified and addressed.

B. B 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.

C. Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.

D. Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

3 SURFACE WATER MANAGEMENT

3.1 Greenfield Runoff Rates and Volumes

Greenfield runoff rates have been calculated using IH124 methodology which can be found in **Appendix D**. The table below shows the greenfield runoff rates for the development and factored to provide a runoff rate per hectare. The area considered in the calculations has been limited to the existing pavilion and car parking area as no changes to other areas of the Site are included in the planning submission. The table also shows the current brownfield discharge rates, calculated using the modified rational method. A percentage of impermeable area (PIMP) of 100% and a time of concentration of 5 minutes were assumed at this stage. A runoff coefficient (Cv) of 1 has been used in the calculations.

TABLE 2 - GREENFIELD RUNOFF AND EXISTING DISCHARGE RATES

Return Period	Greenfield runoff rates		Existing Discharge Rates (l/s)
	Site Area [1.60ha] (l/s)	Per hectare (l/s/ha)	
QBAR	0.21	1.53	-
1-year	0.18	1.31	27.1
30-year	0.48	3.50	64.0
100-year	0.66	4.82	81.2

3.1.1 Storage Volumes

A quick storage estimate for the Site can be calculated using UK SuDS tool as shown in **Appendix D**. The output value shows that up to 98m3 of attenuation will be required. This is based on no flooding of the network or Site up to and including the 1 in 100year storm event plus a 40% allowance for climate change. A peak discharge of 2.0l/s has been assumed but a restriction on discharge rates is only required for a connection into a public sewer or minor watercourse. It is proposed that either the existing soakaway will be reused, or a new soakaway constructed to discharge surface water on Site. Limited attenuation will be provided by a green roof and a water butt.

3.2 Delivering a SuDS Scheme

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

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

SuDS deliver high quality drainage while supporting areas to cope better with severe rainfall both now and in the future. SuDS can improve the quality of life in developments by making them more vibrant, visually

attractive, sustainable and more resilient to change, by improving urban air quality, regulating building temperatures, reducing noise and delivering recreation and education opportunities.

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

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

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

3.2.1 SuDS Component Performance

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

TABLE 3 - SUDS TREATMENT TRAIN

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

Subsurface Storage	N	Y	Y	N	Y	N (~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N (~)	N	N	N	N

Notes:

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

3.2.2 Hydraulic Design Criteria

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

- Interception

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

- Flow and Volume Control

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

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

Rainwater harvesting, or the use of Long-Term Storage can be used to achieve Greenfield runoff volume control. Up to 98m^3 of attenuation for surface water flooding up to and including 1in100 + climate change allowances will be provided.

- Water Quality Design Criteria

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

- Hazard Classification

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

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

- Treatment requirements for disposal to surface water systems

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

4 DRAINAGE DESIGN PROPOSALS

4.1 Surface Water

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

The current proposal for the surface water drainage strategy for the development can be found in **Appendix E**. The proposed strategy utilises areas of green roof, and a water butt to provide attenuation. The system is to discharge via a soakaway located to the south of the pavilion. The system has been hydraulically modelled with an infiltration rate of $1x10^{-6}$ m/s and a crate style soakaway of 4.5m x 4.5m x 1.2m. The modelling results show no flooding up to and including the 30 year plus 35% climate change allowance event. See **Appendix G**. If possible, the existing soakaway will be reused however, this is subject to infiltration tests and surveys to assess the condition and size of the structure.

4.1.1 Drainage Hierarchy

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

- Rainwater used as a resource (for example rainwater harvesting, green roofs for irrigation);
    - A rainwater butt will be proposed to capture runoff from the pavilion roof.
    - Areas of green roof are also proposed.
- Rainwater infiltration to ground at or close to source.
    - Infiltration will be via a soakaway in the south of the site, subject to infiltration test results.
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);
    - Areas of green roof are being proposed.
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;
    - A water butt is being proposed to capture rainwater.
- Discharge rainwater direct to a watercourse;
    - This has not been considered due to the relatively small volumes of runoff.
- Discharge rainwater to a surface water sewer/drain;
    - Due to the large distance to the nearest surface water sewer this approach has not been deemed appropriate.
- Discharge rainwater to the combined sewer;
    - Due to the large distance to the nearest combined water sewer this approach has not been deemed appropriate.

4.1.2 Water Cycle

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

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

Rainwater will be heavily 'treated' through its discharge process by passing through numerous stages through its cycle. Water quality will be improved with the use of a green roof and soakaway, to control the pollution hazard index of the surface water.

Water Consumption will be considered by others. Water will be reused and recycled through the green roof and water butt infrastructure proposed. This will provide amenity and usable, non-potable water for watering plants.

4.1.3 Water Quality Management

Wherever possible, when discharging runoff from the site to surface waters, SuDS should be designed to intercept runoff for most rainfall events up to approximately 5 mm in depth in allowance for treatment for pollutants.

This approach has been taken to minimise the impact of the development on the environment. Techniques that control pollution close to the source, such as permeable surfaces or infiltration trenches, offer a suitable means of treatment for run-off from low-risk areas such as roofs, car parks, and non-operational areas as currently proposed.

The tables below have been extracted from the CIRIA SuDS Manual 26.2 and 26.3 to be used to provide a basis and show adequate protection of the environment.

The land use within the development is predominantly categorised as medium or below for the pollution hazard levels.

Due to the confinements of the site restricting the use of SuDs that can help reduce the pollution hazard levels, further treatment processes will have to be selected and implemented to alleviate for the high pollution hazard level. This would include a full retention treatment interceptor that matches or surpasses the mitigation indices.

TABLE 4 - POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS

Land use	Pollution hazard level	Total suspended solids (TTS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways1	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

TABLE 5 - SUDS MIGITATION INDICES FOR DISCHARGES TO SURFACE WATERS

	Mitigation Indices		
Land use	Total suspended solids (TTS)	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Soakaways	0.3	0.6	0.5
Green Roof	0.8-0.9	0.9	0.5
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

4.2 Foul Water

Foul water will discharge from the pavilion into a cess pit, located below the car park. This follows the existing site strategy but with an increase in the size of the cess pit. Due to the large distance to the nearest foul water sewer, 250m, through multiple Root Protection Areas (RPAs), it was deemed unviable to establish a connection to the existing Thames Water network.

It is assumed that foul water will discharge at an unrestricted rate into 2no. 71,000 L cess pits, which have been specified by Kingspan based on the proposed occupancy and use of the new pavilion, both as a sports club and social venue. See **Appendix F** for cess pit details.

4.3 Internal Drainage

Rainwater pipes will discharge into the water butt within the fenced compound are to the north of the pavilion. Internal drainage is to be designed by others. The proposed strategy will be confirmed at the next design stage once a set of frozen MEP drawings are available.

5 ADOPTION AND MAINTENANCE

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

5.1 Typical SuDS Maintenance Schedule

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

5.1.1 Rainwater Harvesting

Rainwater harvesting (RWH) is the collection of rainwater runoff for use. Runoff can be collected from roofs and other impermeable areas, stored, treated (where required) and then used as a supply of water for domestic, commercial, industrial and/or institutional properties. The table below has been extracted from Table 11.6 of the SuDS Manual and details the maintenance requirements for RWH.

TABLE 6- MAINTENANCE REQUIREMENTS FOR RAINWATER HARVESTING TANKS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional Maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial Actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

5.1.2 Green Roof

A green roof is a roof design with a layer of living vegetation or planting to provide a range of benefits such as improving thermal performance, visual benefit, and ecological value. It is possible to combine a blue and green roof by having a layer of storage sat beneath the vegetation which maximises benefits. The table below has been extracted from table 12.5 - operation and maintenance requirements for green roofs from the SuDS Manual.

TABLE 7- MAINTENANCE REQUIREMENTS FOR GREEN ROOF

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or a required
	During establishment (i.e. year one), replace dead plant as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where>5% coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be established with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlets has settled, cracked, or moved, investigate and repair as appropriate	As required

5.1.3 Soakaway

Soakaways are excavations that are filled with a void-forming material that allows the temporary storage of water before it soaks into the ground. The table below has been extracted from Table 13.1 - operation and maintenance requirements for soakaways from the SuDS Manual.

TABLE 8- MAINTENANCE REQUIREMENTS FOR SOAKAWAYS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor inspection tube or chamber and inside concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

5.1.4 Pipework

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

5.1.5 Timetable

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

6 CONSTRUCTION PHASE

During the construction and post construction phase of implementation any below ground drainage networks, the following methods should be utilized to project the construction sequence and mitigate any pollution or flooding on site.

6.1 Protecting Drainage

Any existing drainage that needs to be retained must be protected from construction traffic. The location and level of existing drainage is available through existing GPR or CCTV surveys. If any existing drainage to be retained is located in designated construction traffic routes, then timber bog mats should be laid over the top of the of the drainage system to allow the load imposed heavy plant to be distributed around the infrastructure. The same methodology should be implemented when construction traffic is to pass over newly installed drainage. For axel loads over and above 10t, additional protection measures over and above the timber bog mat will be required.

CCTV survey of existing drainage should highlight where any diversions are required. In the case of diverting live drainage, over-pumping may be required which will need to be agreed with the asset owner. If any assets are adopted, then a diversion agreement with the water authority will be required.

The appointed contractor will implement a construction management plan which will identify in further detail how the existing drainage will be protected and maintained throughout the period of construction.

6.2 Pollution Prevention

Throughout the construction process it is important to manage surface water runoff from the site. The appointed contractor will formalise an environmental protection plan, but the below steps demonstrate how the risk will be mitigated.

- Initially it is important to identify the receptors at risk from potentially polluted runoff. Locating all nearby watercourse, drainage ditches and habitats on site or within its vicinity will help develop the environmental protection plan by establishing buffer strips and storage locations that minimise risk of runoff impacting the receptors.
- All personnel on site should be trained to be aware of the potential impact of their activities and be equipped with knowledge of how to eliminate that impact.
- An emergency response plan should be formulated during construction works and plan accordingly through risk assessments. The emergency response plan will think through the possible incidents and emergencies such as spillages, extreme weather events, temporary works etc, and how to react to them.
- During site clearance, unnecessary clearing of vegetation should be avoided to prevent sediment pollution from run-off. A phased approach should be carried out where the areas of the site are

only cleared when works are required, rather than leaving large areas of exposed ground for long periods of time. Any invasive or noxious plants should be removed before works commence.

- Stockpiles should be sited away from watercourses and any fuel, oil or chemicals should be storage on an impermeable base. Where possible bunds should be placed around any stored items to prevent water ingress/ egress.
- Diversion ditches can be introduced to prevent runoff leaving the site. The diversion ditches should be lined with non-erodible material and convey polluted runoff to silt traps to remove the silt from runoff.
- Should any contaminated water need to be discharged from the site during construction then a temporary trade effluent agreement is required.

6.3 Post Construction

An 'as built' drainage drawing supported by a CCTV survey carried out post construction will be made available to the site's management company. Sewers, manholes and drainage channels are unlikely to require maintenance other than periodic inspections, unless a blockage occurs. The following should be carried out on an annual basis:

- Covers of inspection chambers and manholes should be removed and the sides, benching and channels cleaned.
- Deposits in channels and gullies should be removed. The traps should be plunged and thoroughly flushed out with clean water.
- Main and branch drains should be rodded, jetted, and then flushed with clean water.
- Any obstructions should be removed.
- Note that correct ends of rods should be used to avoid damage to pipes and them becoming detached.

Reference should be made to the manufacturer's information and maintenance requirements for recommended intervals and safe methods of cleaning for the following proprietary systems detailed in this document.

A full CCTV survey will also be carried out at 10 yearly intervals to assess the condition of the drainage system. In all instances, inspection and cleaning is to be carried out only by a suitable Specialist Contractor, following the guidelines given in BE EN 752 Part 7 1998 "Maintenance and Operations" and "Safe Working in Sewers and at Sewage Works", published by the National Joint Health and Safety Committee for the Water Services.

All underground and under-floor drains and manholes represent confined spaces. Appropriate precautions will be taken before entering drains and manholes. Access will only be undertaken by appropriately trained personnel.

7 RISKS AND UNCERTAINTIES

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

- **Infiltration Test** – Infiltration tests need to be carried out on site to investigate whether the use of soakaways is a viable option. If not an alternative means of discharge for surface water from the rampways will need to be confirmed.
- **Existing Soakaway** – A survey of the existing soakaway is required to assess whether it can be repurposed in the proposed design or will require replacement.
- **Landscape Coordination** – The proposed cess pits and soakaway will be located within the RPAs of nearby trees.
- **MEP coordination** – The proposed drainage layout is subject to change upon receipt of a proposed above ground drainage plan from the appointed MEP engineer. Any amendments made to the above ground drainage design is likely to cause subsequent changes to the below ground drainage design.

8 CONCLUSIONS AND RECOMMENDATIONS

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

- A green roof will provide ecological and amenity benefits to the new pavilion.
- A water butt will be installed to collect rainwater and make it available for re-use.
- It is expected that surface water will discharge via a soakaway located to the south of the new pavilion. If possible, the existing soakaway structure will be reused. However, this is subject to surveys and infiltration tests to confirm that the design requirements can be made.
- The proposed surface water drainage strategy has been modelled on Causeway Flow+ and the results indicate no flooding of the soakaway up to the 30 year plus climate change event. This is based on an infiltration rate of 1 x10^{-6} m/s.
- Foul water is proposed to discharge into 2no. cess pits below the car park in the north of the site. The nearest foul water sewer is located too far away to make a permanent connection viable.
- Typical maintenance for the drainage network has been identified in Section 5.

Appendix A – Site Location

whitby wood

91-94 Lower Marsh, London, SE1 7AB

HAMPTON WICK CRICKET CLUB
P451640
13/03/24

SITE LOCATION PLAN

Legend

Site Boundary

1:5,000
1:10,000

Appendix B – Thames Water Asset Location Map

Asset Location Search

Property Searches

Whitby Wood
91-94 Lower Marsh
LONDON
SE1 7AB

Search address supplied	Hampton Wick Royal Cricket Ground Hampton Wick Royal Cricket Ground Pavilion Park Road Hampton Wick Kingston Upon Thames KT1 4AZ
Your reference	P451640 Hampton Wick CC
Our reference	ALS/ALS Standard/2024_4963659
Search date	4 April 2024

Notification of Price Changes

From 1st April 2024 Thames Water Property Searches will be increasing the prices of its CON29DW Residential and Commercial searches along with the Asset Location Search. Costs will rise in line with RPI as per previous years, which is sat at 6%.

Customers will be emailed with the new prices by February 28th 2024.

Any orders received with a higher payment prior to the 1st April 2024 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: Hampton Wick Royal Cricket Ground, Hampton Wick Royal Cricket Ground Pavilion, Park Road, Hampton Wick, Kingston Upon Thames, KT1 4AZ

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

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

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

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

Contact Us

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

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

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

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TQ1769SW
TQ1769NW
TQ1769SE

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.

The following quartiles have been printed as they fall within Thames' water area:

TQ1769SW

Asset Location Search

Thames Water Property Searches

TQ1769NW
TQ1769SE

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

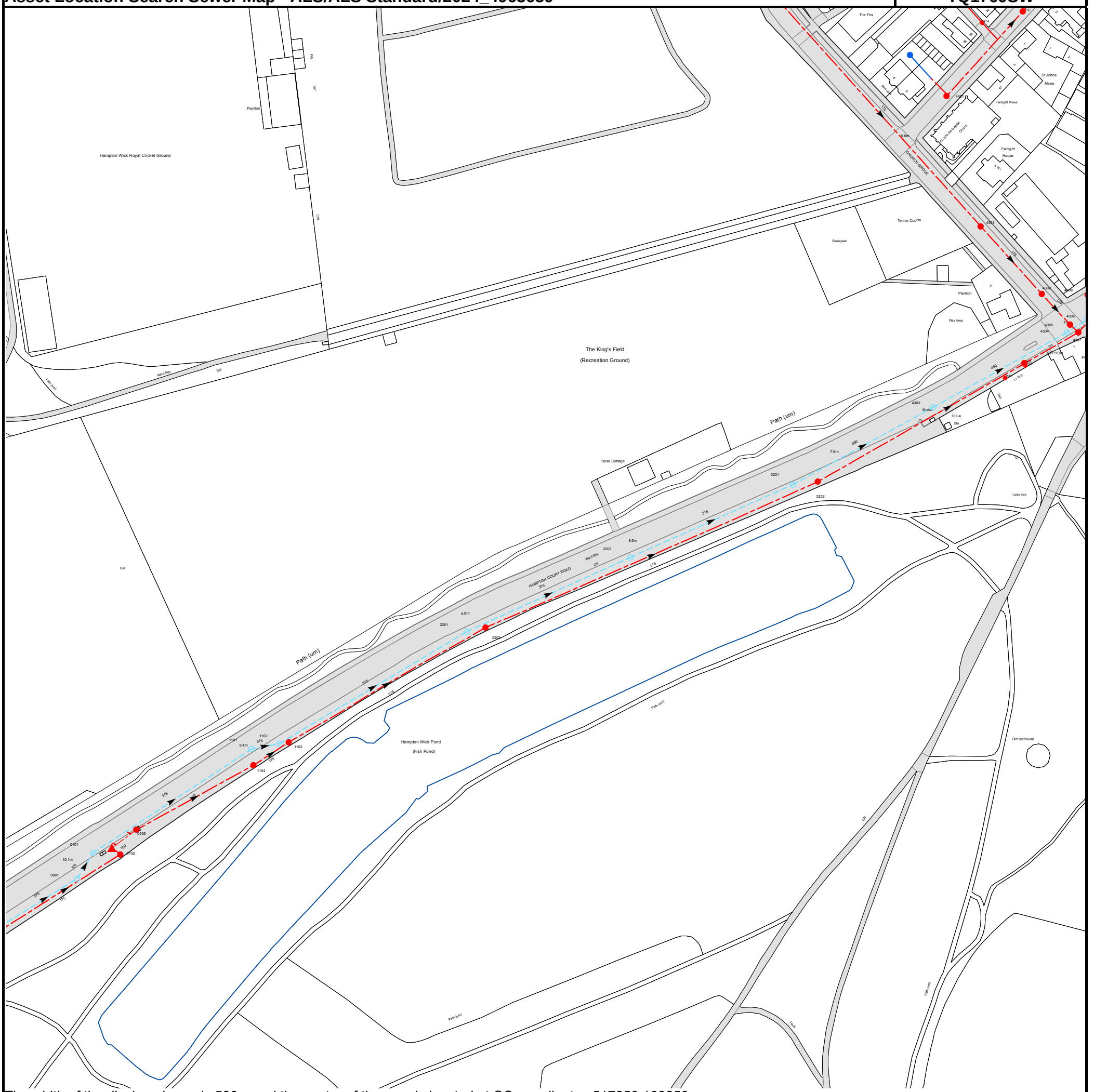
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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/2024_4963659

TQ1769SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517250,169250

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.

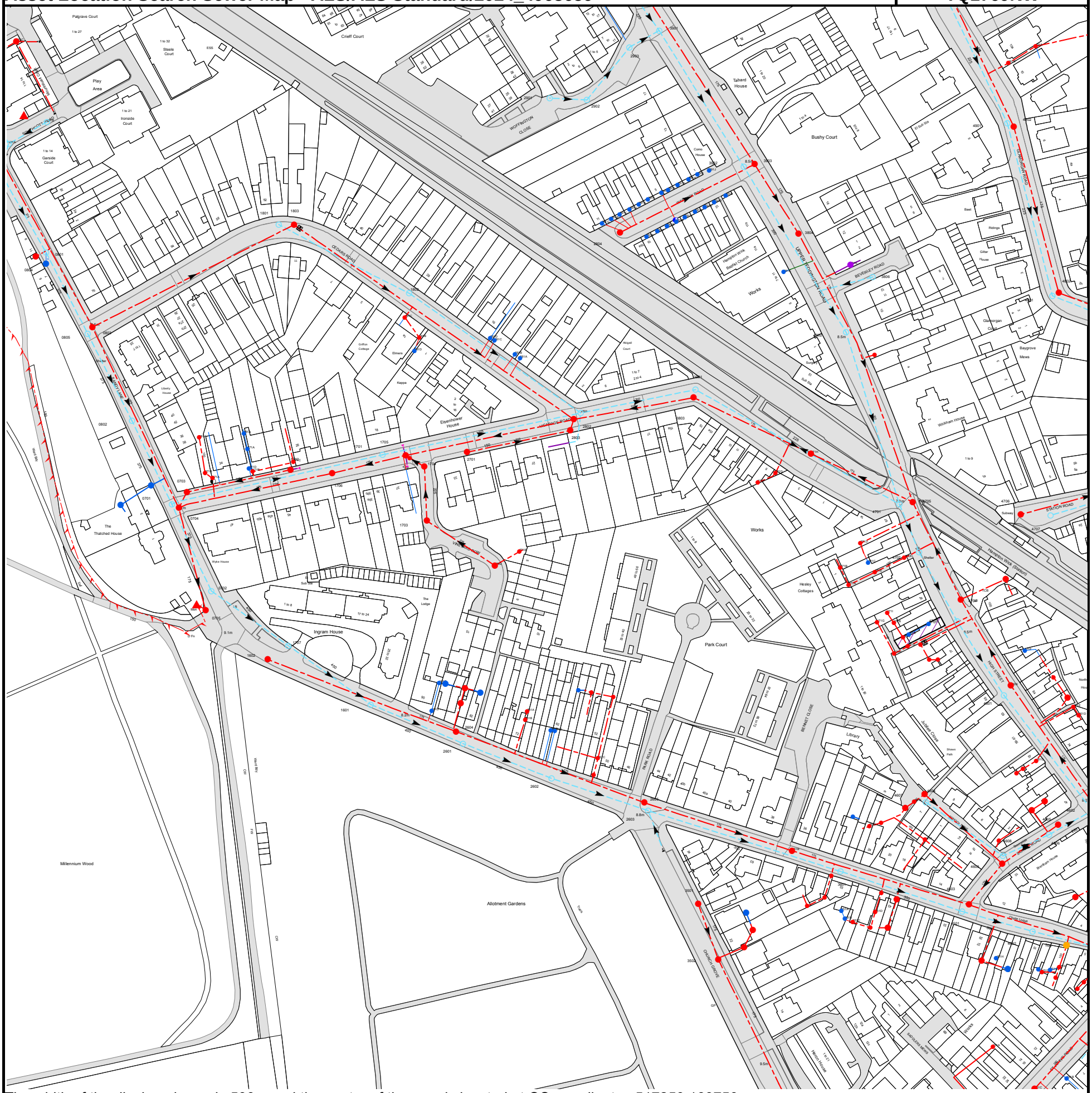
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
441C	n/a	n/a
4301	n/a	n/a
4401	n/a	n/a
44ZY	n/a	n/a
441A	n/a	n/a
441B	n/a	n/a
0001	n/a	n/a
0102	n/a	n/a
0101	n/a	n/a
0106	n/a	n/a
1104	n/a	n/a
1101	n/a	n/a
1102	n/a	n/a
1103	n/a	n/a
2201	n/a	5.98
2203	8.28	6.65
2202	n/a	5.76
3201	n/a	5.56
3202	7.35	6.03
4303	7.23	5.39
431C	n/a	n/a
431B	n/a	n/a
431A	n/a	n/a
4307	7.55	5.43
4304	7.46	5.19
4305	n/a	n/a
4306	7.49	5.18
4308	7.61	5.48
4302	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 Map - ALS/ALS Standard/2024_4963659

TQ1769NW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517250,169750

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
471C	n/a	n/a
471D	n/a	n/a
471E	n/a	n/a
471J	n/a	n/a
461E	n/a	n/a
461D	n/a	n/a
3902	n/a	n/a
3903	n/a	n/a
2902	n/a	n/a
2903	n/a	n/a
3901	n/a	n/a
1801	n/a	n/a
1803	n/a	n/a
181C	n/a	n/a
1802	n/a	n/a
2901	n/a	n/a
3802	n/a	n/a
3806	n/a	n/a
381C	n/a	n/a
381E	n/a	n/a
281E	n/a	n/a
3804	n/a	n/a
2804	n/a	n/a
281F	n/a	n/a
381B	n/a	n/a
281G	n/a	n/a
381A	n/a	n/a
291B	n/a	n/a
391A	n/a	n/a
291C	n/a	n/a
391B	n/a	n/a
291D	n/a	n/a
391C	n/a	n/a
291E	n/a	n/a
391D	n/a	n/a
291F	n/a	n/a
391E	n/a	n/a
291A	n/a	n/a
391F	n/a	n/a
391G	n/a	n/a
391H	n/a	n/a
391I	n/a	n/a
391J	n/a	n/a
4801	8.95	6.61
4802	9.01	6.07
4902	8.92	6.65
4901	8.91	6.87
491B	n/a	n/a
491A	n/a	n/a
0704	9	2.92
07ZX	n/a	n/a
0701	n/a	n/a
0703	8.96	6.24
07ZW	n/a	n/a
071B	n/a	n/a
081A	n/a	n/a
0802	n/a	n/a
0805	n/a	n/a
0803	8.53	4.31
0804	n/a	n/a
08ZY	n/a	n/a
0801	8.39	6.74
091A	8.36	7.165
091B	n/a	n/a
091C	8.95	7.41
0705	9.19	2.89
0702	n/a	n/a
071A	n/a	n/a
181A	n/a	n/a
171A	n/a	n/a
171D	n/a	n/a
171B	n/a	n/a
1602	n/a	n/a
1707	n/a	n/a
1702	8.64	6.89
171C	n/a	n/a
1706	8.44	3.2
1601	n/a	n/a
1701	n/a	n/a
1705	8.19	3.32
181D	n/a	n/a
181B	n/a	n/a
1704	n/a	n/a
1703	n/a	n/a
161D	n/a	n/a
161C	n/a	n/a
26YT	n/a	n/a
2604	n/a	n/a
26YY	n/a	n/a
2601	n/a	n/a

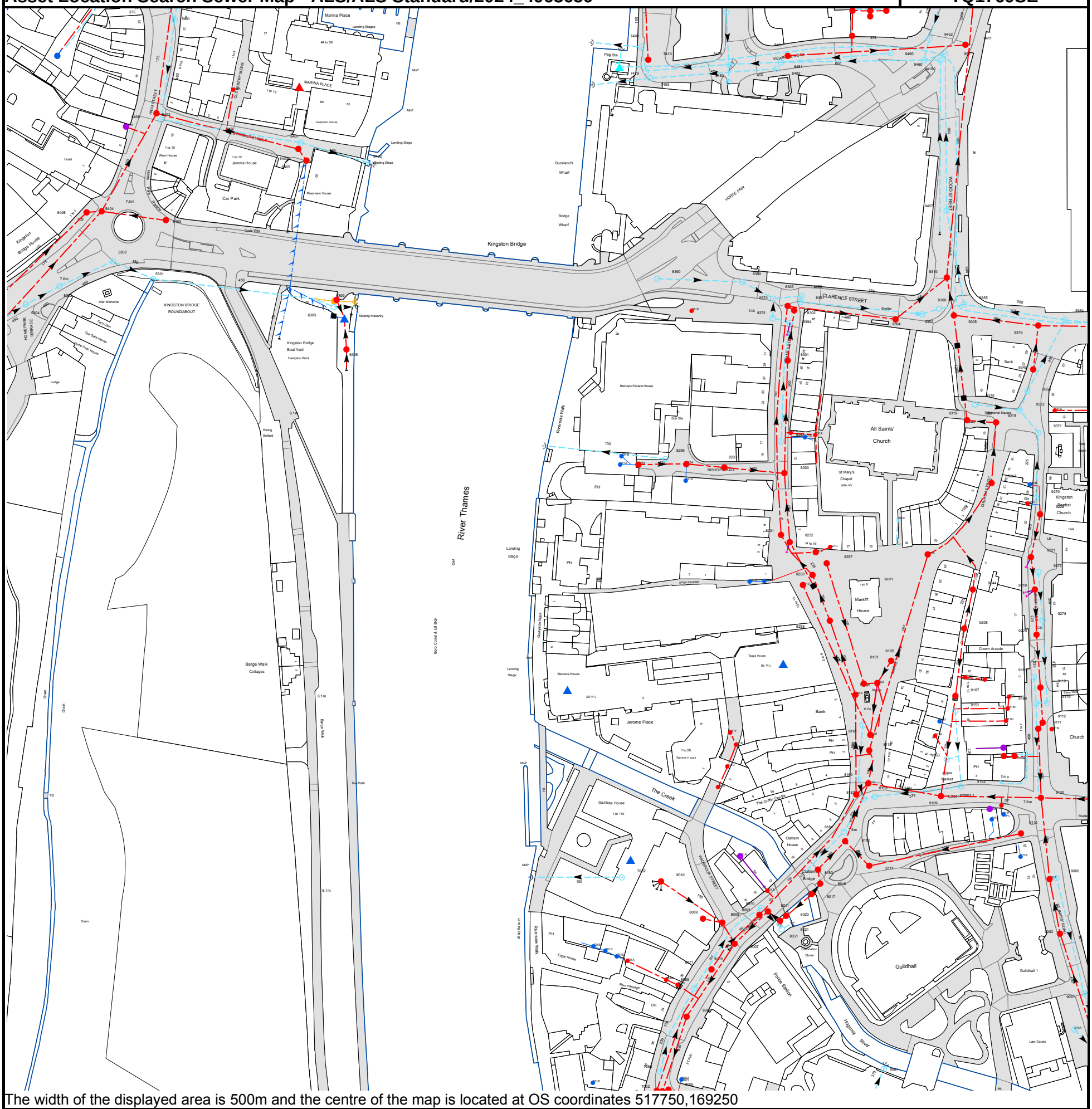
Manhole Reference	Manhole Cover Level	Manhole Invert Level
26YZ	n/a	n/a
2701	n/a	n/a
46XX	n/a	n/a
4607	n/a	n/a
461B	n/a	n/a
4604	7.24	5.82
4601	n/a	n/a
46XV	n/a	n/a
46XT	n/a	n/a
471H	n/a	n/a
47ZS	n/a	n/a
471B	n/a	n/a
471G	n/a	n/a
4703	n/a	n/a
471I	n/a	n/a
4704	8.34	5
371A	n/a	n/a
371E	n/a	n/a
371B	n/a	n/a
371C	n/a	n/a
471A	n/a	n/a
4702	n/a	n/a
371D	n/a	n/a
4701	n/a	n/a
4705	7.54	4.56
38ZY	n/a	n/a
4602	n/a	n/a
46YX	n/a	n/a
46YY	n/a	n/a
46YV	n/a	n/a
46YT	n/a	n/a
461C	n/a	n/a
46ZV	n/a	n/a
46YQ	n/a	n/a
46ZR	n/a	n/a
4609	n/a	n/a
46ZS	n/a	n/a
471F	n/a	n/a
47ZV	n/a	n/a
4707	n/a	n/a
4706	n/a	n/a
26YS	n/a	n/a
281D	n/a	n/a
281C	n/a	n/a
2702	n/a	n/a
281B	n/a	n/a
271B	n/a	n/a
281A	n/a	n/a
261B	n/a	n/a
261A	n/a	n/a
261D	n/a	n/a
2602	n/a	n/a
261E	n/a	n/a
2803	n/a	n/a
2802	7.74	3.62
26ZS	n/a	n/a
2801	n/a	n/a
26ZX	n/a	n/a
26ZV	n/a	n/a
261C	n/a	n/a
26ZW	n/a	n/a
2605	n/a	n/a
2603	n/a	n/a
3803	n/a	n/a
3801	n/a	n/a
371F	n/a	n/a
371G	n/a	n/a
371H	n/a	n/a
3501	n/a	n/a
3502	n/a	n/a
35ZT	n/a	n/a
35ZX	n/a	n/a
35ZV	n/a	n/a
361B	n/a	n/a
35YZ	n/a	n/a
35YY	n/a	n/a
35YX	n/a	n/a
3601	n/a	n/a
351A	n/a	n/a
351B	n/a	n/a
351C	n/a	n/a
36ZX	n/a	n/a
361A	9.57	8.81
35ZQ	n/a	n/a
351D	n/a	n/a
46XZ	n/a	n/a
45YW	n/a	n/a
45ZP	n/a	n/a
45YZ	n/a	n/a
461A	n/a	n/a
4501	n/a	n/a
4503	8.17	5.39
45ZS	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
451H	n/a	n/a
46ZX	n/a	n/a
4603	7.78	5.58
4608	n/a	n/a
45ZV	n/a	n/a
4502	n/a	n/a
45XW	n/a	n/a
451D	n/a	n/a
4606	n/a	n/a
451G	n/a	n/a
45XT	n/a	n/a
4605	n/a	n/a
451E	n/a	n/a
45YT	n/a	n/a
45XZ	n/a	n/a
45XY	n/a	n/a
451I	n/a	n/a
451C	n/a	n/a
451B	n/a	n/a
45ZY	n/a	n/a
451A	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 Map - ALS/ALS Standard/2024_4963659

TQ1769SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517750,169250

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
821D	n/a	n/a
911N	n/a	n/a
901A	n/a	n/a
901B	n/a	n/a
84IG	n/a	n/a
84IF	n/a	n/a
84JA	n/a	n/a
84IE	n/a	n/a
94JB	n/a	n/a
9490	n/a	n/a
9304	n/a	n/a
9352	n/a	n/a
9460	n/a	n/a
9452	n/a	n/a
9360	n/a	n/a
94100	n/a	n/a
956	n/a	n/a
9310	8.29	2.87
9457	7.97	4.98
9305	8.33	n/a
9355	8.23	n/a
9411	7.25	3.73
9319	n/a	3.63
9375	n/a	n/a
9217	n/a	3.74
9318	n/a	3.71
911L	n/a	n/a
9372	n/a	n/a
9356	7.86	5.76
921A	n/a	n/a
921B	n/a	n/a
9221	7.97	5.92
9340	7.69	4.01
9181	n/a	n/a
9219	7.8	5.43
9270	n/a	n/a
9180	7.78	5.86
9229	n/a	n/a
9376	7.69	3.99
9371	n/a	n/a
9277	n/a	n/a
9220	8.13	6.23
9119	7.78	4.72
9278	n/a	n/a
9179	n/a	5.85
931A	n/a	n/a
9354	7.43	5.08
911A	n/a	n/a
9106	7.787	4.697
811F	n/a	n/a
8161	7.68	5.64
911F	n/a	n/a
9151	7.67	6.06
9107	7.77	5.26
8104	7.78	3.16
8101	7.9	6.59
8102	7.9	6.33
911C	n/a	n/a
911D	n/a	n/a
9105	7.83	6.55
9208	8.24	6.45
8298	n/a	n/a
9244	8	6.72
8210	8.13	5.79
821A	73.7	67.7
821B	n/a	n/a
8203	8.19	3.09
8297	8.15	6.6
9216	8.53	3.82
8215	8.15	5.13
821C	n/a	n/a
8232	n/a	n/a
8231	8.07	2.96
921C	n/a	n/a
9007	7.42	3.9
9060	n/a	n/a
911B	n/a	n/a
9110	7.84	5.83
911E	n/a	n/a
911I	n/a	n/a
911J	n/a	n/a
911G	n/a	n/a
9130	7.46	3.83
91II	n/a	n/a
91IJ	n/a	n/a
91JD	n/a	n/a
911K	n/a	n/a
9111	n/a	n/a
9112	n/a	n/a
911H	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
911M	n/a	n/a
8001	7.27	3.84
8005	n/a	n/a
801D	n/a	n/a
7068	7.12	5.67
9067	n/a	n/a
8006	6.98	4.38
9061	7.57	5.29
8069	6.84	5.45
801C	n/a	n/a
801B	n/a	n/a
8071	n/a	n/a
8007	6.84	4.57
9002	7.52	4.19
8051	7.22	5.01
8008	6.77	5.12
8021	7.22	4.71
7410	n/a	n/a
7493	5.64	4.88
8477	n/a	n/a
8483	n/a	n/a
8478	n/a	n/a
8482	7.24	4.74
8481	7.21	4.8
8401	7.17	4.65
541A	n/a	n/a
641A	n/a	n/a
6403	n/a	n/a
6401	n/a	n/a
7490	n/a	n/a
7479	5.64	3.81
8009	6.94	6.23
8020	6.15	3.74
8003	7.11	3.34
8011	7.28	4.66
8070	7.22	5.08
8017	6.19	3.99
801A	n/a	n/a
8016	7.59	4.7
8010	6.96	6.1
7052	n/a	n/a
8183	7.61	4.7
8111	7.51	4.97
811A	n/a	n/a
8112	7.41	4.64
8181	7.39	5.3
8182	7.33	5.33
8153	7.37	5.32
9109	n/a	n/a
811B	n/a	n/a
811C	n/a	n/a
9152	7.31	5.64
8113	7.33	3.3
8160	7.28	5.4
811D	n/a	n/a
9153	n/a	n/a
8115	6.67	3.85
811E	n/a	n/a
8200	7.59	4.94
8233	6.75	4.99
721A	n/a	n/a
7235	6.59	5.21
8234	6.71	5.04
8295	6.66	5.24
721B	n/a	n/a
8293	n/a	n/a
831D	n/a	n/a
831A	n/a	n/a
831B	n/a	n/a
8301	7.83	4.44
6305	n/a	4.07
8394	n/a	n/a
8372	n/a	n/a
831E	n/a	n/a
8302	8.36	4.35
6303	n/a	n/a
8303	n/a	n/a
8351	8.37	4.65
6309	n/a	n/a
8370	n/a	n/a
8350	8.46	4.62
8380	n/a	n/a
8390	n/a	n/a
6402	n/a	n/a
6405	n/a	n/a
5403	n/a	n/a
5405	n/a	n/a
5404	n/a	n/a
5402	n/a	n/a
5406	n/a	n/a
54ZT	n/a	n/a
5401	n/a	n/a
54ZY	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
54ZR	n/a	n/a
5304	7.53	5.11
5303	n/a	n/a
5301	n/a	n/a
5302	n/a	n/a
7002	7.54	3.46
701E	n/a	n/a
701A	n/a	n/a
701D	n/a	n/a
701C	n/a	n/a
701B	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 (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

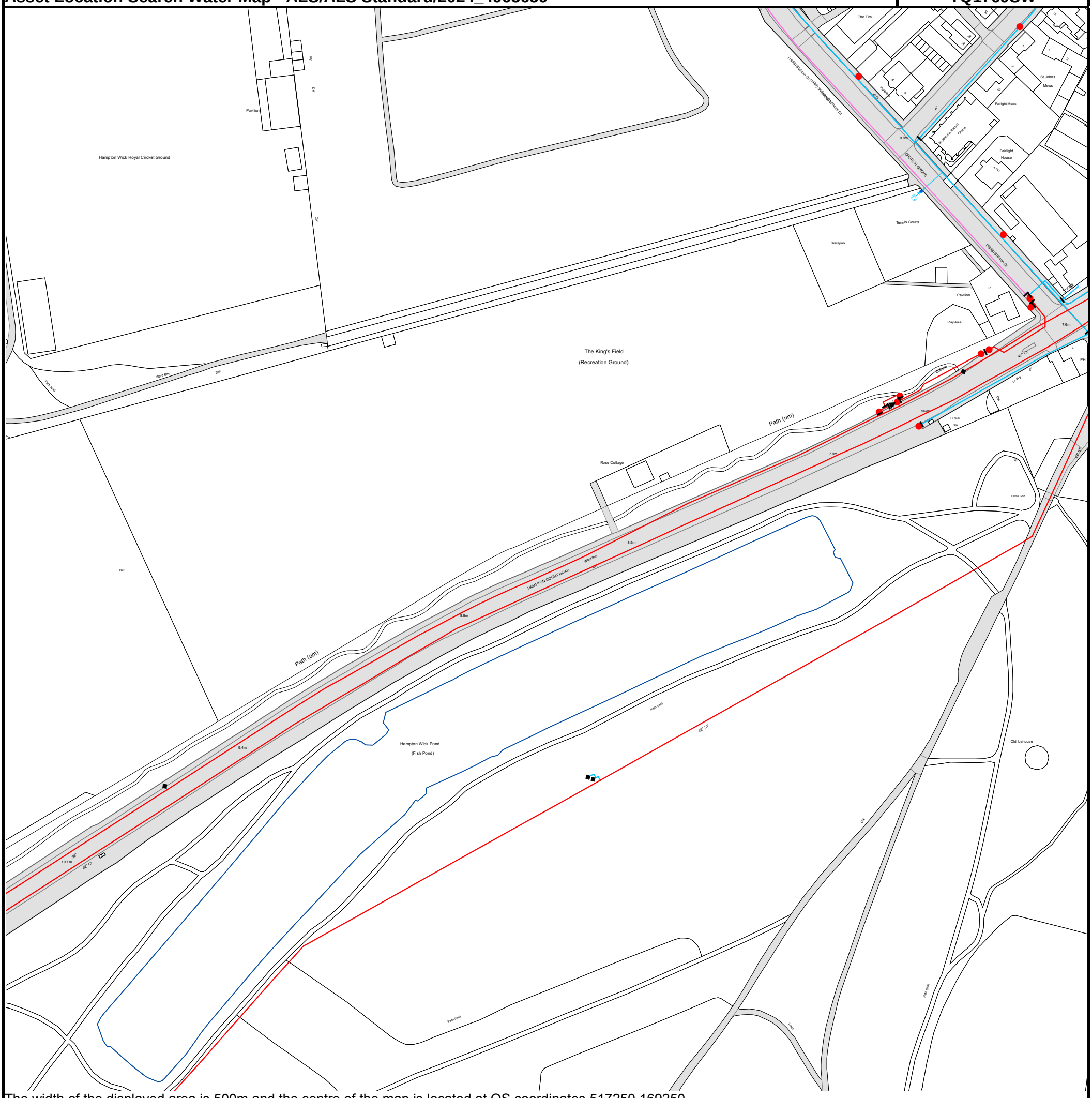
Notes:

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/2024_4963659

TQ1769SW

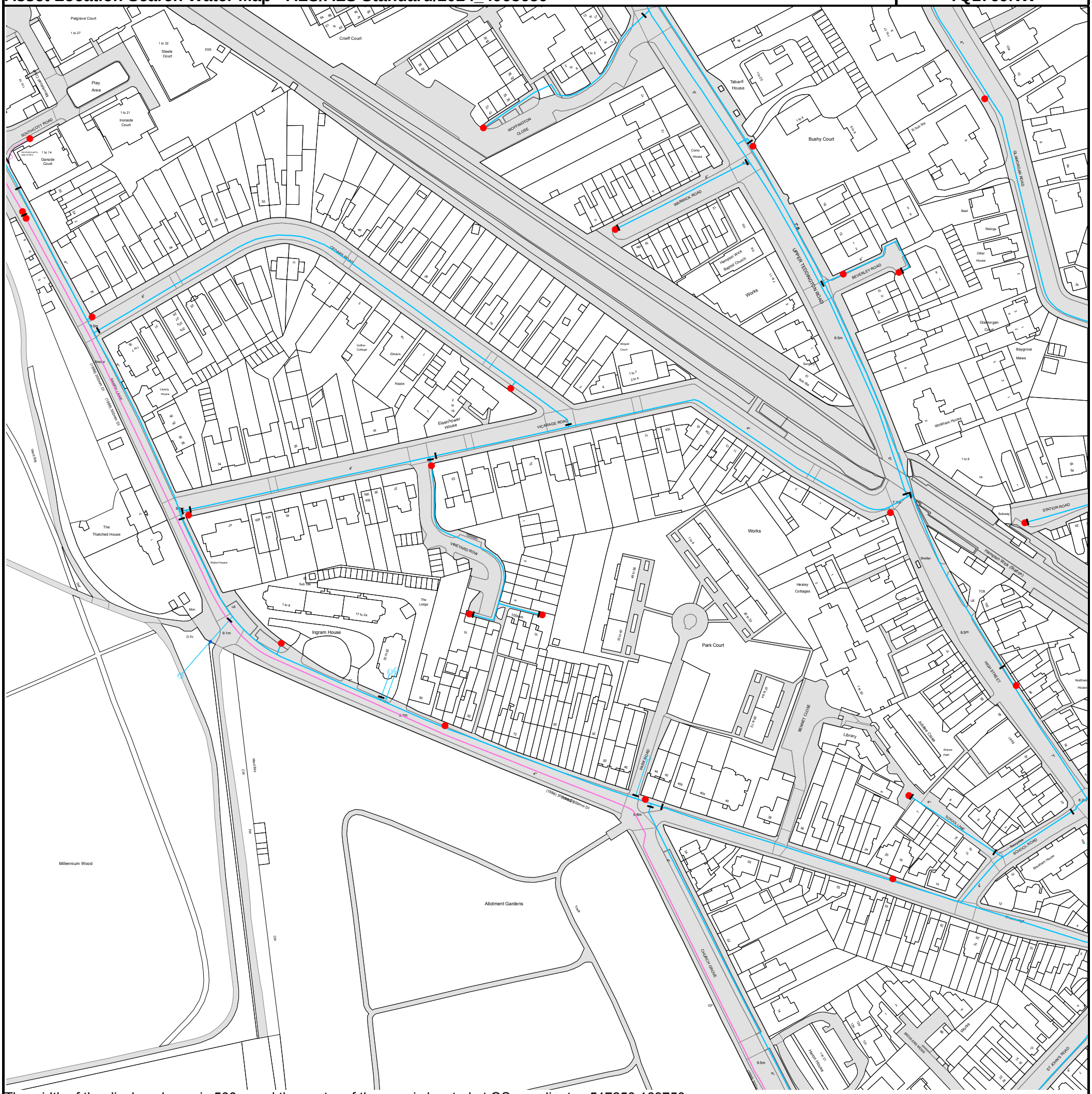


The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517250,169250

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

Asset Location Search Water Map - ALS/ALS Standard/2024_4963659

TQ1769NW

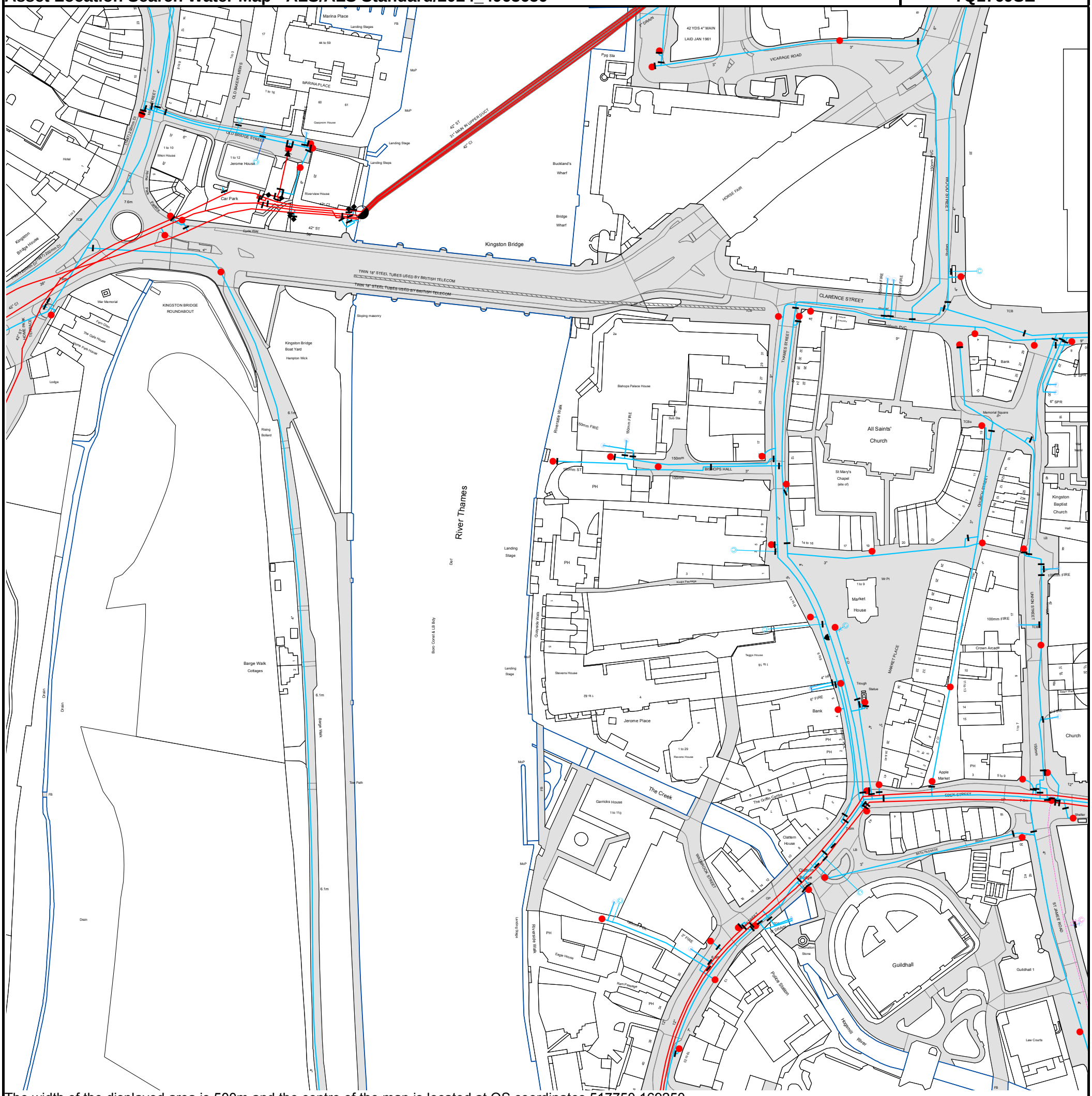


The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517250,169750

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

Asset Location Search Water Map - ALS/ALS Standard/2024_4963659

TQ1769SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517750,169250

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

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

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

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

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

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

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

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

Other Water Pipes (Not Operated or Maintained by Thames Water)

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

Private Main: 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