

Land opposite Charlton Lane,
Trowe's Lane, Swallowfield, RG7 1RN

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

For 5 no. Gypsy and Traveller pitches

Swallowfield FRA DS 01
November 2025

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1 INTRODUCTION

- 1.1.1 This Flood Risk Assessment (FRA) and Drainage strategy has been prepared to support the Full Planning Application to Wokingham Borough Council for the development of 5 no. Gypsy and Traveller pitches.
- 1.1.2 In accordance with Chapter 14 of the National Planning Policy Framework (NPPF), this site specific Flood Risk Assessment (FRA) considers the potential flood risk to the proposed development over its lifetime from all sources, including tidal and fluvial (rivers), pluvial (surface water and overland flow), sewer, groundwater, reservoirs, canals, and other artificial sources. It also assesses the potential impact of the development on flood risk within the wider catchment and identifies suitable mitigation measures to ensure the scheme is designed to be safe, sustainable, and resilient to flooding without increasing risk elsewhere.
- 1.1.3 This FRA has been prepared in line with relevant local, regional, and national planning policy and guidance, including the NPPF, the Planning Practice Guidance (PPG), the Wokingham Borough Council's Strategic Flood Risk Assessment (SFRA), and the requirements of the Lead Local Flood Authority (LLFA).
- 1.1.4 A supporting surface water drainage strategy has been prepared to accompany this FRA. The strategy has been developed in accordance with the Wokingham Borough Council's requirements, and best practice SuDS principles. It demonstrates how the proposed development can achieve an appropriate level of runoff attenuation and water quality treatment, while supporting the wider objectives of sustainable drainage.

2 DEVELOPMENT PROPOSAL

2.1 Existing Site Location and Description

- 2.1.1 The application site is approximately 0.31 hectares in size and is primarily comprised of undeveloped grassland and a scattering of hedgerows. The site is well enclosed by dense vegetation, but there is an existing access gate to the west that faces onto Trowe's Lane.
- 2.1.2 The site lies within the designated Countryside and located adjacent to a narrow fork in the road that divides Charlton Lane and Trowe's Lane, both single track roads that have 60mph speed limits.



Figure 1 – Indicative Site Location on satellite view

2.2 Proposed Development

- 2.2.1 The proposal is the proposed change of use of the land for the siting of 5 no. Gypsy and Traveller pitches, with access from Trowes Lane.
- 2.2.2 The development is classed as a Minor Development under the Town and Country Planning (Development Management Procedure) (England) order 2015.
- 2.2.3 Refer to APPENDIX 1 of this report for proposed site layout plan.



Figure 2 - Extract of Proposed Site Plan

2.3 Statutory Authorities and Consultation

2.3.1 The following statutory authorities and stakeholders are applicable to this site as shown in Table 1:

Table 1 - Statutory Authorities and Stakeholders

Function	Stakeholder	Abbreviation
Executive Public Body	Environment Agency	EA
Lead Local Flood Authority (LLFA)	Wokingham Borough Council	WBC
Statutory Undertaker for sewers	Thames Water	TW
Planning Authority	Wokingham Borough Council	WBC

2.3.2 Consultation with statutory authorities has not been undertaken in the production of this Flood Risk Assessment.

3 PLANNING POLICY

3.1.1 The proposed development will be designed in accordance with the requirements as set out in the National Planning Policy Framework, Flood risk and coastal change planning practice guidance (PPG)¹, and local plans and policies as follows:

3.2 National Planning Policy Framework (NPPF)

3.2.1 The National Planning Policy Framework (NPPF) (updated 12 December 2024)² sets out the government's planning policies for England. Section 14 covers the topic of meeting the challenge of climate change, flooding and coastal change³. New development should take a proactive approach to mitigating and adapting to the impacts arising from climate change, including avoiding increased vulnerability to flood risk.

3.2.2 With regards to planning and flood risk, the NPPF sets out the following key policies:

- 170. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- 172. All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by applying the sequential test and then, if necessary, the exception test.
- 181. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.
- 182. Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity.
- rainwater discharge direct to a watercourse (unless not appropriate)

3.3 The Managing Development Delivery Local Plan Policy CC01 (2024)

3.3.1 Pre-application advice was sought, the following advice regarding the local plan was received

3.3.2 Flooding and Drainage:

- Policy CC09 of the MDD Local Plan requires consideration of flood risk from historic flooding.
- Policy CC10 of the MDD Local Plan requires sustainable drainage methods and the minimisation of surface water flow.

¹ <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

² <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

³ <https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change>

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- Foul drainage will discharge into an existing foul network while surface water runoff will be managed via SuDS.

3.4 The CIRIA C753 – The SuDs Manual 2015

3.4.1 The SuDs Manual incorporates the very latest research, industry practice and guidance. In delivering SuDs there is a requirement to meet the framework set out by the Government's 'Non-Statutory Technical Standards' and the revised SuDs Manual complements these but goes further to support the cost-effective delivery of multiple benefits including technical design and maintenance of SuDs systems.

3.5 Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)

3.5.1 This document sets out non-statutory standards for sustainable drainage systems. They should be used in conjunction with the National Planning Policy, Framework and Planning Proactive Guidance.

3.6 Site Specific Flood Risk Assessment Methodology

3.6.1 Information used in preparing this Flood Risk Assessment was obtained from the following sources:

- (i) Environment Agency Flood Map for Planning
- (ii) Environment Agency Main River Map
- (iii) Environment Agency Long Term Flooding Map
- (iv) EA Climate Change Guidance
- (v) Wokingham Borough Strategic Flood Risk Assessment

4 PLANNING POLICY CONTEXT

- 4.1.1 A site-specific Flood Risk Assessment (FRA) is required to demonstrate how flood risk will be effectively managed both now and throughout the lifetime of the proposed development. This assessment takes into account the potential impact of climate change, the intended use of the site, and the vulnerability of its future users, in line with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) on Flood Risk and Coastal Change, and local policy frameworks.
- 4.1.2 In order to adequately consider and demonstrate how the flood risk will be managed, we need to identify what the probability is of the site flooding, what the site is going to be used for, the associated flood risk vulnerability, and the compatibility between the flood risk vulnerability and the flood zones.
- 4.1.3 This section details how the planning policy is applied to this site specific FRA. Items highlighted in 'green' in the following tables are applicable to this site.
- 4.2 Flood Zones
- 4.2.1 Flood zones are classifications defined by the Environment Agency (EA) to indicate the probability of flooding from rivers (fluvial) and the sea (tidal), excluding the presence of flood defences. These zones provide a strategic framework for planning decisions, helping to guide development towards areas of lower flood risk and ensuring that appropriate mitigation measures are implemented where necessary.
- 4.2.2 Based on the EA's Flood Map for Planning⁵, the site is located entirely within Flood Zone 1, which represents areas with a low probability of flooding, defined as having an annual probability of river or sea flooding of less than 0.1% (1 in 1,000 years).

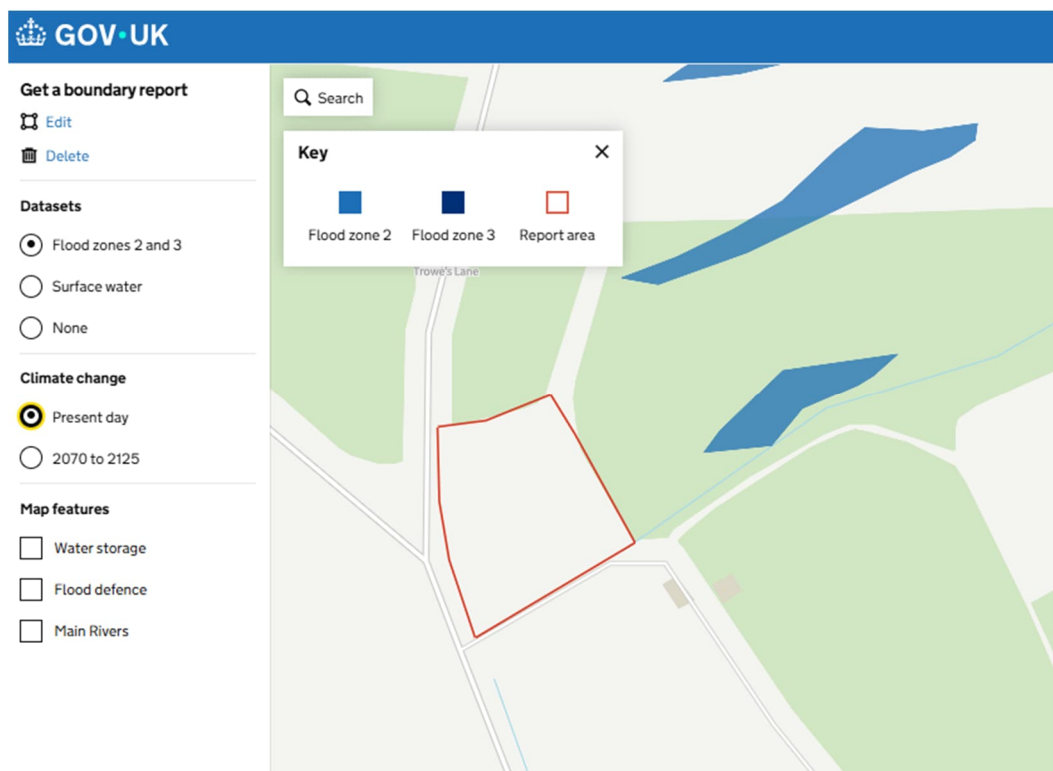


Figure 3 - Flood Map for Planning

Table 2 - Flood Zones

Flood Zone	Probability	Definition
Flood Zone 1	Low	Land which has a less than 0.1% (1 in 1,000 year) chance of flooding from rivers or the sea.
Flood Zone 2	Medium	Land which has between a 1% (1 in 100 year) and 0.1% (1 in 1,000 year) chance of flooding from rivers and between a 0.5% (1 in 200 year) and 0.1% (1 in 1,000 year) chance of flooding from the sea.
Flood Zone 3a	High	Land which has a 1% (1 in 100 year) or more chance of flooding from rivers, or a 0.5% (1 in 200 year) or more chance of flooding from the sea.
Flood Zone 3b	Functional Flood Plain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

4.3 Flood Risk Vulnerability Classification

4.3.1 The flood risk vulnerability classifications are detailed in Table 3 below as per Annex 3 of the NPPF.

Table 3 - Flood Risk Vulnerability Classification

Classification	Description
Essential Infrastructure	- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. - Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. - Wind turbines.
Highly Vulnerable	- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. - Emergency dispersal points. - Basement dwellings. - Caravans, mobile homes and park homes intended for permanent residential use. - Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

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Classification	Description
More Vulnerable	- Hospitals - Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. - Buildings used for residential houses, student halls of residence, drinking establishments, nightclubs and hotels. - Non-residential uses for health services, nurseries and educational establishments. - Landfill* and sites used for waste management facilities for hazardous waste. - Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	- Police, ambulance and fire stations which are not required to be operational during flooding. - Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. - Land and buildings used for agriculture and forestry. - Waste treatment (except landfill* and hazardous waste facilities). - Minerals working and processing (except for sand and gravel working). - Water treatment works which do not need to remain operational during times of flood. - Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water Compatible	- Flood control infrastructure. - Water transmission infrastructure and pumping stations. - Sewage transmission infrastructure and pumping stations. - Sand and gravel working. - Docks, marinas and wharves. - Navigation facilities. - Ministry of Defence installations. - Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. - Water-based recreation (excluding sleeping accommodation). - Lifeguard and coastguard stations. - Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. - Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

4.4 Flood Risk Vulnerability and Flood Zone Compatibility

4.4.1 The compatibility of the development flood zone and flood risk vulnerability classification, as identified above, has been assessed in accordance with the Flood Risk and Coastal Change PPG as shown in Table 4.

Table 4 - Flood Risk Vulnerability and Flood Zone Compatibility

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

✓ Development Appropriate

✗ Development Should not be Permitted

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

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

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

4.5 Sequential Test & Exception Test

4.5.1 The Environment Agency's Flood Map for Planning confirms that the application site is located wholly within Flood Zone 1, defined as land at the lowest probability of river or sea flooding (less than 0.1% annual probability). Development of all vulnerability classifications is appropriate within Flood Zone 1.

4.5.2 On this basis:

- The Sequential Test is satisfied, as the proposed development is already located in the lowest risk flood zone.
- The Exception Test is not required, as the site does not fall within Flood Zone 2 or 3, nor is it subject to other significant sources of flood risk that would necessitate its application.

4.5.3 Accordingly, the development is considered fully compliant with the requirements of the NPPF in relation to the Sequential and Exception Tests.

5 EXISTING SITE INFORMATION

5.1 Topography and Watercourses

- 5.1.1 The site is relatively flat with a slight fall towards the east.
- 5.1.2 The flood map for planning show an ordinary watercourse running along the Trowes Lane boundary, which then continues to the south east, and another ordinary watercourse is shown to the eastern corner of the land parcel.
- 5.1.3 The ordinary watercourse to the eastern corner has been identified on site as a ditch which is 1.5-2m deep.
- 5.1.4 The site is located approximately 600 metres to the west of the Blackwater, a designated watercourse in the local area, as confirmed by the Environment Agency Main River Map and shown within Figure 4.

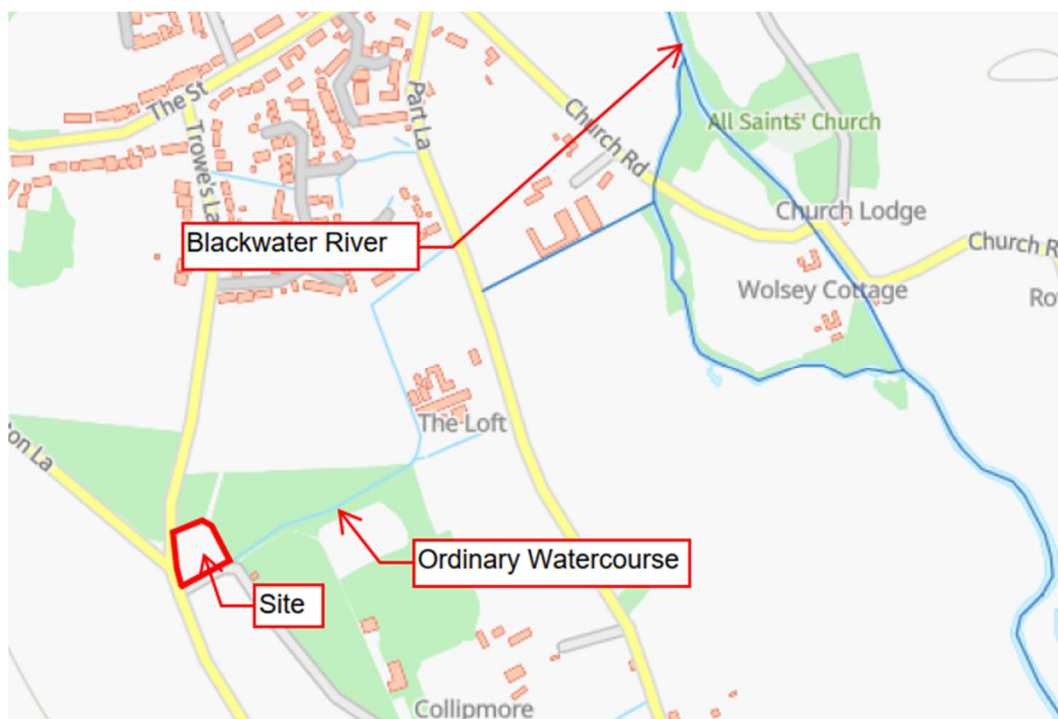


Figure 4 – EA Main River Map

5.2 Geology and Hydrogeology

- 5.2.1 Landis Soilscape Viewer⁴ states the site predominantly comprises of 'Soilscape 22: Loamy Soils with naturally high groundwater'. These soils typically exhibit moderate permeability and a naturally high water table.
- 5.2.2 British Geological Society (BGS) Geology Viewer⁵ indicates the site is underlain by the following strata:
- Superficial deposits – River Terrace Deposits, 3 - Sand and gravel.

⁴ <https://www.landis.org.uk/soilscales/>

⁵ <https://geologyviewer.bgs.ac.uk/>

- Bedrock geology – London Clay – Clay and Silt, with low permeability and limited infiltration capacity.

5.2.3 BGS has two borehole records immediately adjacent to the site, which were undertaken on 25th October 1965, these were part of a larger study, the two relevant trial holes were SU76SW58 and SU76SW65, the summary of the ground material and ground water recorded are shown in table 5 below. The full record is included in Appendix 2.

Table 5 - BGS Records

Hole Number 6	SU76SW58		Hole Number 13	SU76SW65	
	Feet	Metres		Feet	Metres
Top Soil	1'0"	0.305m	Top Soil	1'0"	0.305m
Clay	2'6"	0.793m	Sandy Clay	2'6"	0.793m
Ballast	6'6"	2.012m	Ballast	5'6"	1.707m
Blue Clay			Blue Clay		
Water	6'0"	1.829m	Water	4'0"	1.219m

5.2.4 EA Magic Map shows the site is not underlain by aquifers:

5.2.5 The site is located within a Drinking Water Safeguard Zones (Surface Water)

5.3 Infiltration

5.3.1 Infiltration testing was undertaken on site. Test one was undertaken on 03rd October 2025, Table 5 below illustrates the results.

Table 6 - Infiltration testing

Hole No.	Hole Depth	Test No.	Drop in water level	Hole Area	Volume of water lost	Duration	Duration	Infiltration Rate
	m		m	m ²	m ³	min	sec	m/s
TP1	0.75	1	0.332	0.780	0.25896	1200	72000	4.61E-06

5.3.2 Because the geology is known for the potential of high ground water, further testing was paused to wait for the winter ground water monitoring period.

5.3.3 On the 2nd November 2025 an additional trial hole was excavated to a depth of 2.6m, Figure 5 illustrates the trial hole, the soil log and the depth of ground water.

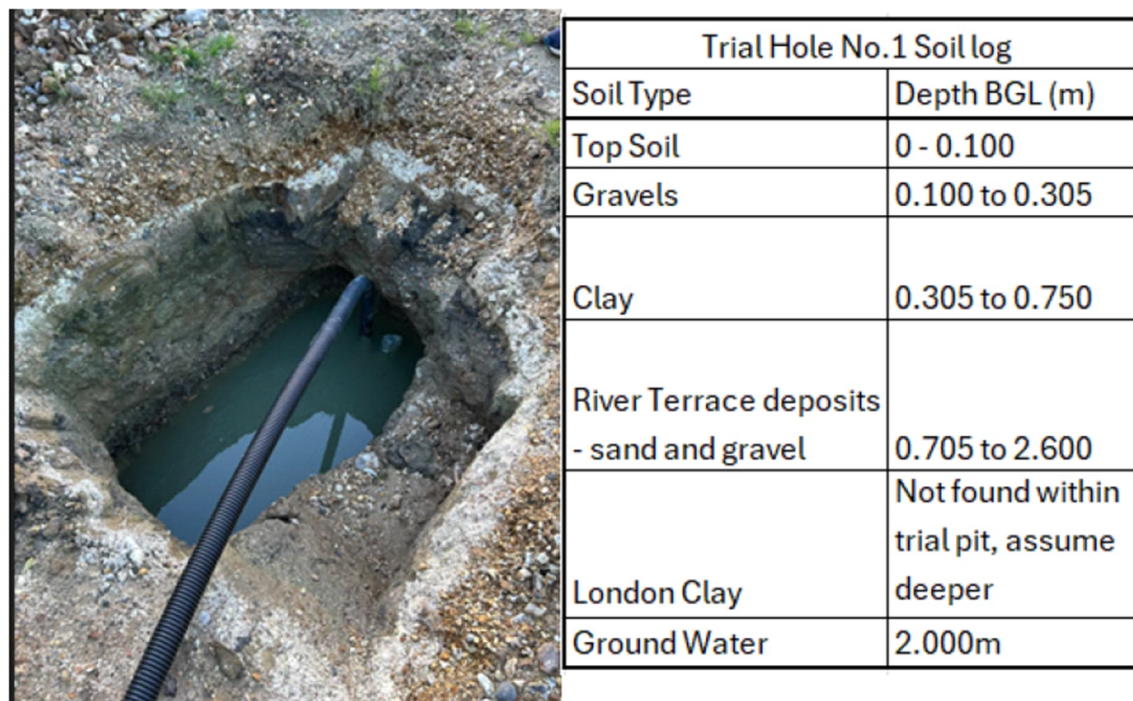


Figure 5 – Trial Hole & soil log

- 5.3.4 Another site visit was undertaken on the 09th November 2025, where the groundwater was recorded at the same depth.
- 5.3.5 The highest ground water level recorded is from the BGS record for Trial Hole 13 with a depth of 1.219m bgl.
- 5.3.6 A shallow infiltration system would need to be within the river terrace deposits, which starts at a depth of 0.705m, which only gives approximately 0.5m depth to the highest recorded ground water level.
- 5.3.7 As a result of high ground water being present, no further infiltration testing has been carried out and infiltration has been ruled out, as there will not be a clear zone of 1m or more between the bottom of any soakaway and the ground water.
- 5.4 Existing Drainage Infrastructure
- 5.4.1 There is no formal drainage networks on site, there is an ordinary watercourse / ditch in the south east corner.
- 5.4.2 In addition, a review of the Thames Water asset plans, which can be found in Appendix 6 indicates that the nearest public sewer is approximately 300m away (MH4606). Figure 6 below illustrates the foul sewers (in red) in the proximity of the site.



Figure 6 - Thames Water Asset Map

6 FLOOD RISK

6.1 Climate Change Allowance

6.1.1 The EA guidance of climate change allowances for Flood Risk Assessment⁶, states that a residential development should have a minimum design lifetime of 100 years. This means the 2070s / 2080s epoch is applicable.

6.1.2 The EA recommended values for climate change allowances are stated in Table 7. The site is located within the Wandle Catchment.

Table 7 - EA Climate Change Allowances

Allowance	Epoch	Central	Higher	Upper
Peak River Flow	2080s	14%	23%	46%
Peak Rainfall – 3.3% AEP	2050s	20%	-	35%
Peak Rainfall – 3.3% AEP	2070s	20%	-	35%
Peak Rainfall – 1% AEP	2050s	20%	-	40%
Peak Rainfall – 1% AEP	2070s	25%	-	40%

6.2 Flooding from Rivers and the Sea

6.2.1 The EA Flood Map for Planning states the development site is located within Flood Zone 1, as shown in Figure 7. Flood Zone 1 areas have a low probability of flooding, defined as having less than 0.1% chance of flooding from rivers and the sea, in any given year.

6.2.2 The WBC SFRA interactive maps shows the development to not be at risk from fluvial flooding as below.

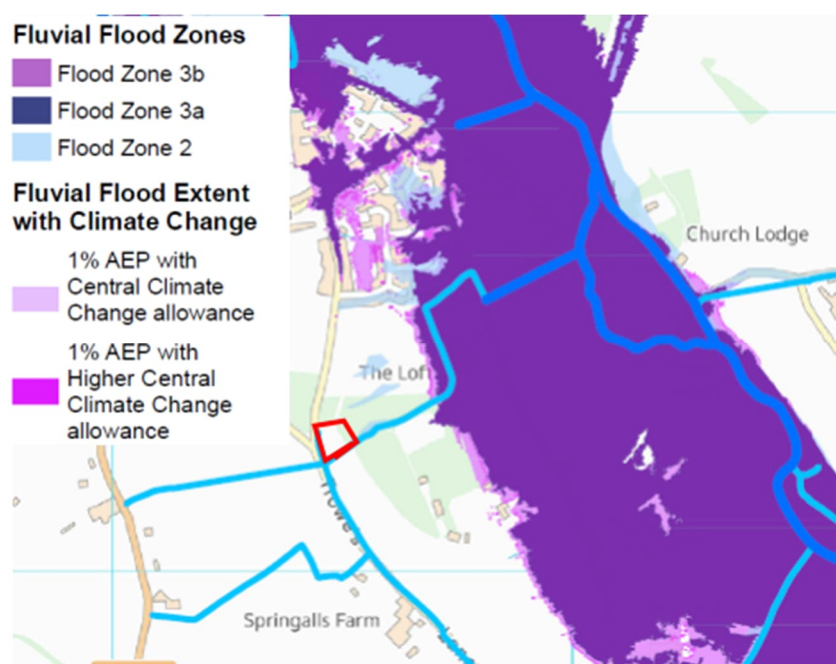


Figure 7 – WBC SFRA Mapping (Fluvial Flood Zones)

⁶ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

6.2.3 The lifetime risk to the development of flooding from rivers has been assessed as very *low*.

6.3 Flooding from Surface Water

6.3.1 The EA long terms flood map shows the site has a high risk of surface water flooding, as shown in Figure 7 & 8 below.

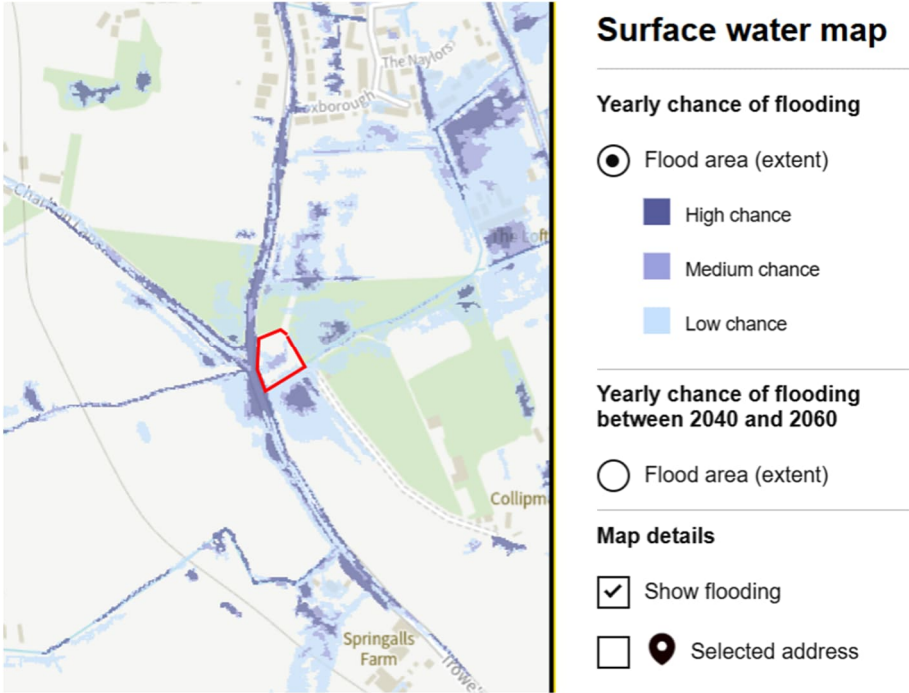


Figure 8 – EA Long Term Flood Risk Map (1 in 30 year Return Period)

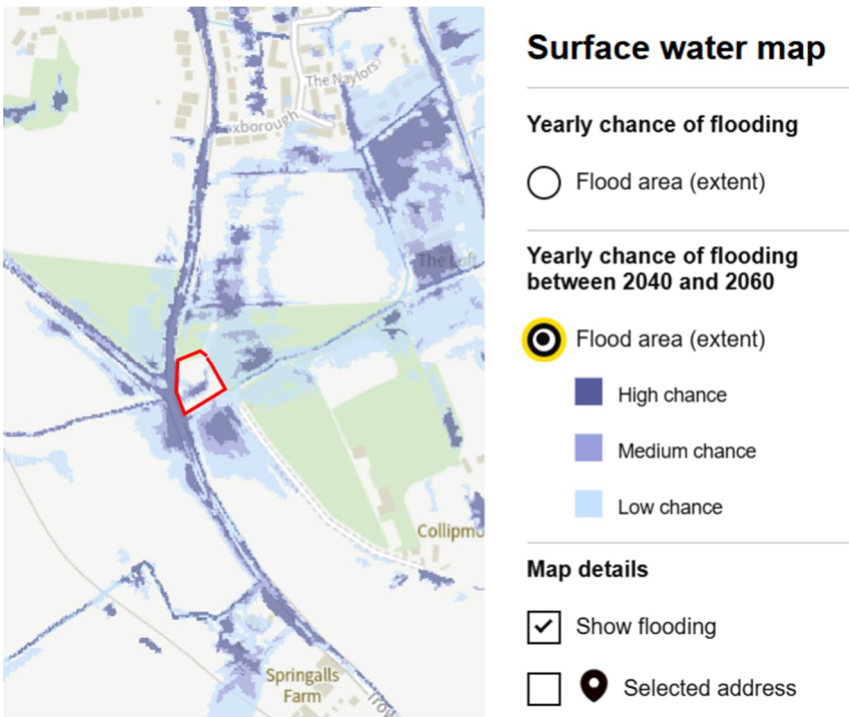


Figure 9 - EA Long Term Flood Risk Map (1 in 100 year Return Period)

6.3.2 The Environment Agency's Risk of Flooding from Surface Water mapping confirms that

there are no recorded areas of surface water flooding within the site boundary under any of the modelled flood scenarios. Predicted surface water ponding and overland flow paths during extreme rainfall events, including the 1 in 100 year (1% AEP) storm event, are shown to be contained within the adjacent highway network rather than extending onto the development site.

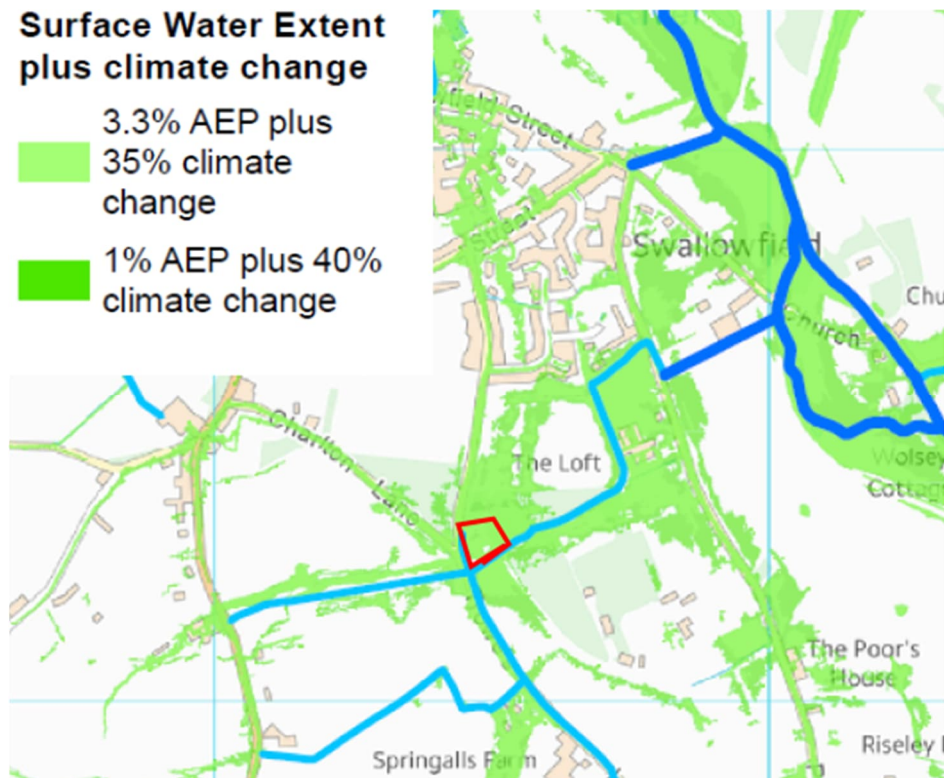


Figure 10 - WBC SFRA Interactive Mapping Surface Water Flood Risk

- 6.3.3 The risk to the development of flooding from surface water has been assessed as *High*.
- 6.4 Flooding from Groundwater
 - 6.4.1 Groundwater flooding typically occurs as a result of water rising from the underlying aquifer or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall, and the areas at most risk are often low lying where the water table is likely to be at shallow depth.
 - 6.4.2 The WBC Strategic Flood Risk Assessment (SFRA) Digital Map identifies the site as being within an area that is susceptible to groundwater flooding as shown in Figure X below.

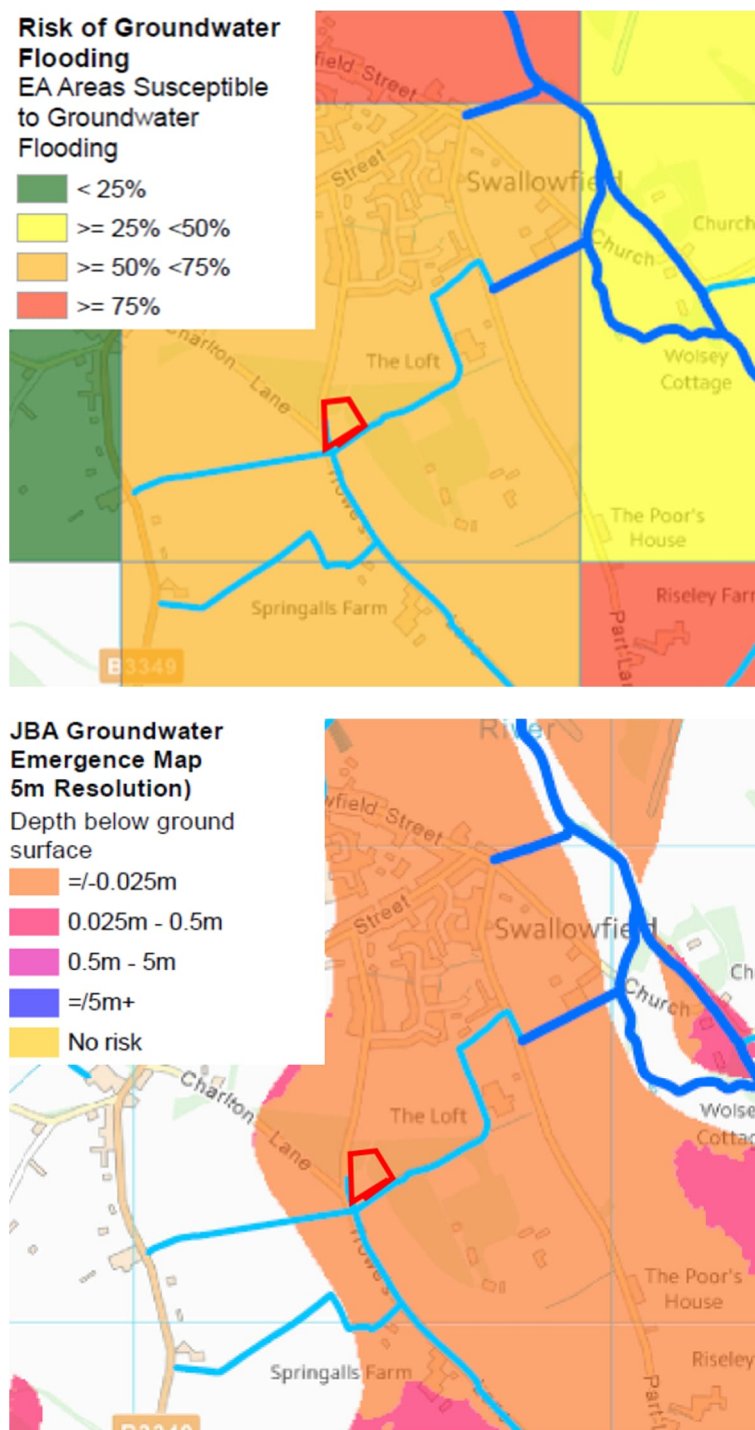


Figure 11 EA & JBA Ground Water Flood mapping from the WBC SFRA

6.4.3 The risk to the development of flooding from groundwater has been assessed as *Medium*

6.5 Flooding from Sewers

6.5.1 Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and/or when sewers cannot discharge properly to watercourse due to high water levels. Sewer Flooding can also be caused when problems such as blockages, collapses or equipment failure occur in the sewerage systems.

6.5.2 The WBC SFRA states that there has been 181 total sewer flooding incidents from January 2000 to May 2022 in the postcode region of RG7 1. The nearest sewer is in excess of 300m

away from the site, so sewer flooding would be unlikely in this location.

6.5.3 The risk to the development of flooding from sewers has been assessed as *very low*.

6.6 Flooding from Artificial Sources

6.6.1 Artificial Flooding occurs when the failure of infrastructure or human intervention results in flooding, artificial flood sources include reservoirs, canals, water retention ponds, docks and other structures.

6.6.2 The EA Long term Flood Risk service suggests flooding from reservoirs is unlikely in this area.

6.6.3 The WBC SFRA mapping shows that the site is not within an area at risk from reservoir flooding as shown in Figure X below

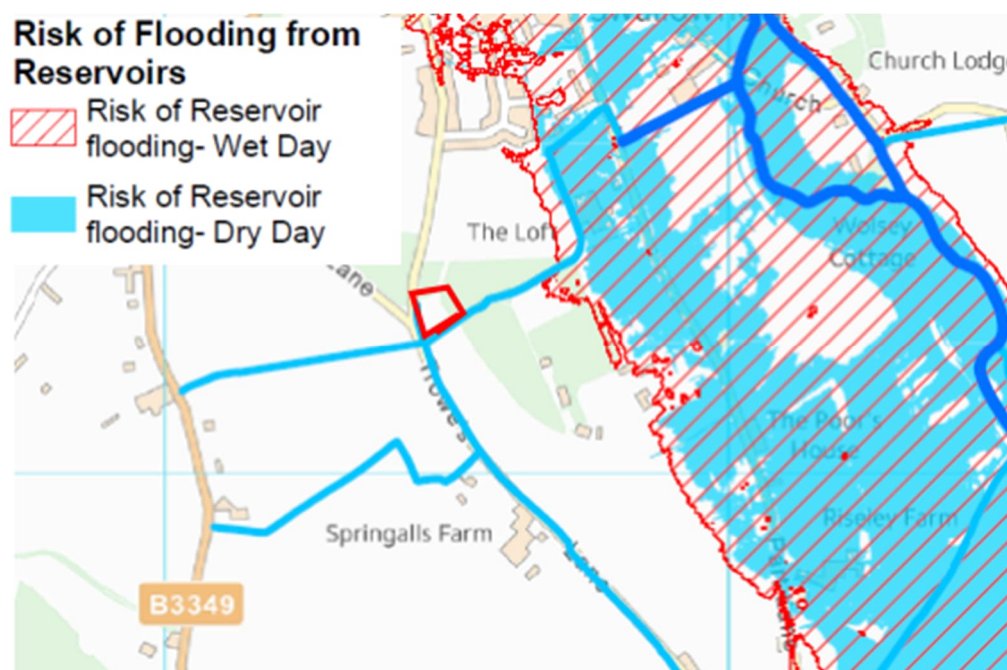


Figure 12 - WBC SFRA Interactive Mapping Flooding from Artificial Reservoirs

6.6.4 The risk to the development of flooding from artificial sources has been assessed as *very low*.

7 FLOOD RISK MITIGATION

7.1 Flood Risk Assessment Summary

- 7.1.1 The site specific flood risk assessment has considered the risk of flooding to the development for all sources of flooding, over the lifetime of the development. The results are summarised in Table 8 below.

Table 8 - Flood Risk Assessment Summary

Flood Risk Source	Assessed Risk Level
Rivers and Sea	Very Low
Surface Water	High
Groundwater	Medium
Sewers	Very Low
Artificial Sources	Very Low

- 7.1.2 To address the identified sources of flood risk, the following flood mitigation measures are recommended for this development.

7.2 Site Layout and Design

- 7.2.1 Flood risk from all sources should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development.

- 7.2.2 As the source of flood risk is from below ground and surface water flooding.

- 7.2.3 The integrated design of SUDS will ensure that the proposed development complies with the requirements of Chapter 14 of the NPPF, as well as Policy DM8: flood risk and water resources.

- 7.2.4 It is confirmed that no basement is proposed, which removes a key vulnerability to groundwater ingress.

- 7.2.5 The surface water flood risk is related to the overtopping of the ordinary watercourses previously identified in this report.

- 7.2.6 To prevent surface water from running into the site from the adjacent highway the entrance will be ramped up into the site, this will ensure that no highway drainage enters the site, this broadly matches the current arrangement.

- 7.2.7 The site gently falls to the south east corner, where there is a wooded area, this wooded area is lower than the proposed development site, so any exceedance flows would flow this way, rather than flood the development.

7.3 Finished Floor Levels

- 7.3.1 EA FRA guidance (updated 10/04/25) recommends that finished floor levels should be a minimum 600mm above the ground level / road level / river flood level for the site. If flood level estimates are supported by a high level of certainty, this allowance may be reduced to 300mm. EA's Flood Maps provides this increased certainty and can be used to justify a reduced freeboard where appropriate.

- 7.3.2 The dwellings (Static caravans) that are proposed will be raised approximately 1m above ground level.

- 7.3.3 To mitigate flood risk for ‘more vulnerable’ use classes, such as residential areas, the proposal places the static caravans at 1m above ground level, this approach exceeds the recommended minimum.
- 7.3.4 This allowance ensures adequate provision for emergency response and safe refuge.
- 7.4 Runoff Rate Restriction and Sustainable Drainage
- 7.4.1 Surface water flood risk will be managed by designing the developments surface water system to restrict runoff rate. The design will ensure no offsite flooding occurs during storms up to and including the 1% AEP Storm with a 40% allowance for climate change by implementing sustainable urban drainage systems (SuDs).
- 7.5 Flood Resistance and Resilience
- 7.5.1 Property Flood Resilience (PFR) is a building design approach aimed at reducing flood damage and accelerating recovery and reoccupation following a flood event. PFR combines both flood resistance and flood resilience measures. Flood resistance measures are intended to prevent the entry of water or minimise the volume of water entering a building up to a structurally safe limit. Flood resilience measures ensure that, in the event water does enter the building, damage is minimised, and rapid recovery is possible.
- 7.5.2 In accordance with government guidance, including the CIRIA Property Flood Resilience Code of Practice, these measures should be applied in areas at risk of flooding where it is not feasible to raise finished floor levels to the recommended height. For flood depths up to 0.6 m, efforts should be made to keep water out either fully or partially, with mitigation measures implemented to reduce potential damage and support building recovery.

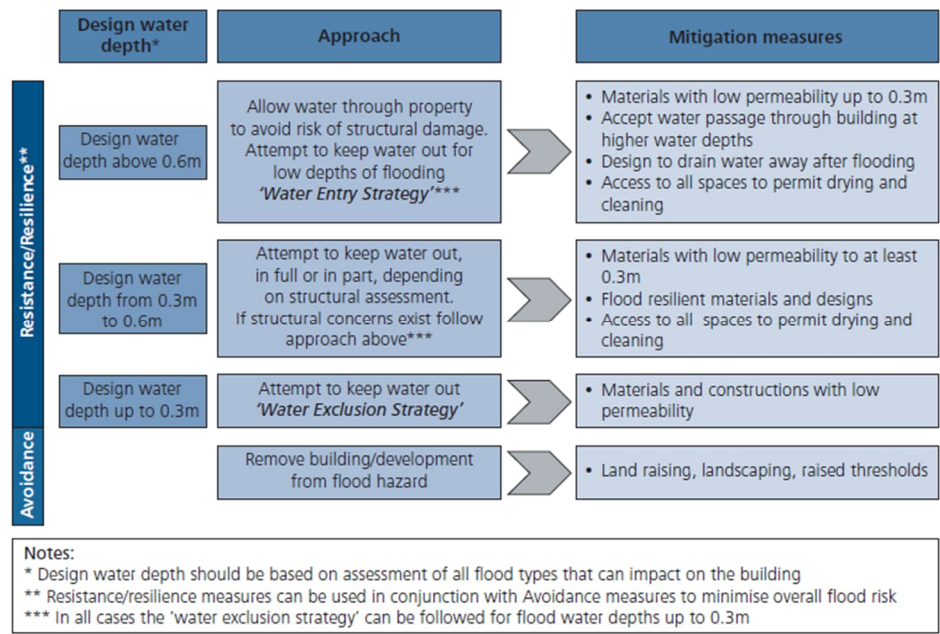


Figure 13 - Rationale for design strategies

- 7.5.3 In accordance with the CIRIA Property Flood Resilience Code of Practice, the design for this site should be appropriately flood resistant and resilient by:
- Use of materials with low permeability to at least 0.3 m above floor level to limit water ingress.

Flood Risk Assessment & Drainage Strategy

- Incorporation of flood-resilient construction materials and designs for walls, floors, and fixtures.
 - Ensuring access to all internal spaces to facilitate effective drying and cleaning after a flood event.
 - Installation of raised thresholds, door barriers, and impermeable barriers around vulnerable areas.
 - Use of water-resistant finishes and construction materials at ground floor levels, including plaster, flooring, and joinery.
 - Flood-proofing of electrical, mechanical, and service installations to prevent damage and maintain safety.
 - Provision of safe evacuation routes and adherence to emergency planning guidance as outlined by the Environment Agency.
 - Consideration of site layout and landscaping to manage overland flows and minimise the impact of external flooding on the building.
 - Implementation of operational procedures, including maintenance of flood barriers, monitoring systems, and staff or resident training to respond effectively during a flood event.
- 7.5.4 The static caravans will be in excess of the minimum 600mm above ground level, any access ramps and steps will be made of flood resistant materials.
- 7.5.5 Any drainage manholes will have sealing plates fitted to prevent any flood water overwhelming the sites drainage network for both foul and surface water drainage.
- 7.5.6 This design strategy ensures that the development complies with both the Environment Agency (EA) guidance and Wokingham Borough Council's requirements, while maximising safety for occupants and minimising flood risk across all areas of the site.
- 7.6 Access and Escape
- 7.6.1 The static caravans' finished floor levels (FFL) are set above the predicted flood level, safe refuge within the static caravans will be available.
- 7.6.2 Evacuation pathways should be clearly defined, maintained, and free from obstructions, directing occupants to designated areas of safe refuge, within the building at elevated levels. Safe assembly points should be identified, with signage and emergency lighting to provide effective navigation under low visibility conditions.
- 7.6.3 The occupants will have access to 4 wheel drive vehicles that have sufficient ground clearance, so if evacuation is required, the residents will be able to safely evacuate themselves.
- 7.6.4 Emergency planning procedures will be implemented in accordance with Environment Agency guidance, including:
- Clearly communicated evacuation protocols.
 - Designated responsibilities for monitoring and managing evacuation routes
 - Provision for occupants with mobility impairments or other vulnerabilities.

Flood Risk Assessment & Drainage Strategy

- 7.6.5 All evacuation routes and safe refuge areas will be regularly inspected and maintained to ensure they remain operational, reliable, and accessible throughout the life of the development.
- 7.6.6 The safe access / egress route would be to the south along Trowes Lane, then turning east along Part Lane and then heading south onto Odiham Lane, before turning west onto the B3349, which then joins the A33. The A33 is direct access to major urban areas with all emergency services. This route avoids the fluvial flooding that is related to the Blackwater River.
- 7.7 Residual Risks
- 7.7.1 The residual risk is thought to be low providing that the above mitigation measures are implemented as part of the development and the proposed drainage system for the site is adequately maintained.
- 7.8 Off Site Impacts
- 7.8.1 With the incorporation of the flood risk mitigation measures described in this report, including raised finished floor levels, flood resistance and resilience measures, and clearly defined evacuation routes, the proposed development is not expected to adversely affect existing flood flow paths or groundwater movement in the surrounding area.
- 7.8.2 The surface water drainage strategy has been designed to attenuate runoff and discharge at controlled rates. As a result, the development is likely to have a neutral to slightly positive impact on flood risk elsewhere, reducing the potential for downstream flooding.
- 7.8.3 The site currently has some piles of spoil, which is assumed to be inert (gravel / soils), the development of the site may result in this being removed from site. This will allow for additional flood storage within the site extents.
- 7.8.4 The identified ordinary watercourses are currently unmaintained and overgrown, these should be cleared to allow free flow of water.

8 SURFACE WATER DRAINAGE STRATEGY

8.1 Existing Surface Water Drainage

8.1.1 Site visits has been undertaken on the 28th September, 2nd November and the 09th November 2025 to observe the lie of the land and ground investigation.

8.1.2 There is a gentle fall across the site to the south east corner of the site.

8.1.3 There is an ordinary watercourse in the verge of Trowe's Lane at the frontage of the site, it is assumed that there is a culvert under the access track. This heads south along Trowe's Lane.

8.1.4 There is another ordinary watercourse within the south east corner of the site, this heads to the east along the boundary of an informal track.

8.1.5 Mapping indicates that both these ordinary watercourses drain to the Blackwater River.

8.1.6 Infiltration testing indicates that when the groundwater levels are sufficiently low, natural infiltration will occur.

8.1.7 When the ground water levels are high / the ground is saturated, the surface water runoff will drain to the ordinary water course in the south east corner.

8.2 Surface Water Discharge Hierarchy

8.2.1 The Wokingham SuDS Strategy 2017 sets out the requirements for the use of SuDS in Wokingham. It states that SuDS should be used unless there are practical reasons for not doing so, and should aim to achieve greenfield runoff rates and ensure that surface water runoff is managed as close to its source as possible in line with the following hierarchy:

- Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- Rainwater infiltration to ground at or close to source
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- Rainwater discharge direct to a watercourse (unless not appropriate)
- Controlled rainwater discharge to a surface water sewer or drain
- Controlled rainwater discharge to a combined sewer

8.2.2 The SuDs Manual (CIRIA C753) identified that 'Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscape and it can help make them more resilient to the changing climate'.

8.2.3 Also, "The philosophy of sustainable drainage systems is about maximizing the benefits and minimising the negative impact of surface water runoff from developed areas. The Suds approach involves slowing down and reducing the quality of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltration, slowing, storing, conveying and treating runoff onsite and, where possible, on the surface rather than

underground".

8.2.4 SuDs provide a flexible approach to drainage, with a wide range of components from soakaways to large scale basins or ponds. The individual techniques should be used in a management train that reinforces and, where possible, follows a natural pattern of drainage. The management train incorporates a hierarchy of techniques. These are:

- Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (examples include minimising paved areas and the use of sweeping to remove surface dust from car parks).
- Source control – control of runoff at or very near its source (such as the use of rainwater harvesting, previous pavements, green roofs or soakaways for individual housing).
- Site control – management of water from several sub-catchments (including routing water from roofs and car parks to one large soakaway or infiltration basin for the whole site).
- Regional control – management of runoff from several sites, typically in a detention pod or wetland.

8.2.5 Adopting a holistic approach towards surface water drainage provides the benefits of combined water quality and quality control, as well as increased amenity value. This is accomplished by managing the increased flows and pollution from surface water runoff that can arise from the development. Ideally, the system should utilise a management train and should achieve equal standing in all of these areas. However, specific site considerations may mean that a balance of benefits is not always achieved.

8.2.6 In order to manage surface water sustainably, the use of SuDs is recommended. There are a number of different options available, and these are detailed and assessed below. The various SuDs systems have been assessed to determine their sustainability for the proposed development site:

- Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
 - o Rainwater harvesting, One water butt is proposed for each dwelling, this will be used for irrigation of gardens and external water use.
- Rainwater infiltration to ground at or close to source
 - o As noted earlier within the report the site has high ground water levels, so infiltration cannot be used.
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- Rainwater discharge direct to a watercourse (unless not appropriate)
 - o It is proposed to connect to the ordinary watercourse within the south east corner of the site.
- Controlled rainwater discharge to a surface water sewer or drain
 - o There are no surface water drains or sewers within the vicinity of the site, so this is not proposed.

- Controlled rainwater discharge to a combined sewer
 - o There are no combined sewers within the vicinity of the site.

8.3 Design Criteria

8.3.1 When designing the surface water drainage network, it should be assessed against the following criteria to comply with British Standards BS EN 16933-2:2017:

- No significant surcharging (gravity flow only) for storm flow with a 50% AEP
- No flooding for storm flows with a 3.3% AEP
- No flooding or flooding that would present a risk to person or property for storms with a 1% AEP.
- An additional 40% allowance for climate change will be applied for all calculations
- A 10% Urban creep allowance has been allowed for

8.3.2 Based on the above assessment, the volume of water to be stored will be determined using UKSuDs tool:

- Surface Water Return period – 1in 100 year + 40%
- Site location – to determine the rainfall hyetograph characteristics
- Outfall discharge Rate

8.4 Greenfield Runoff Rate

8.4.1 The greenfield runoff rate was estimated using the UKSuDS.com tool. Using the FEH Statistical runoff estimation approach, the 1 in 1 year greenfield rate for the proposed development area is 0.3 l/s. Summary of the results are shown in Table 8. Calculations are included in APPENDIX 3.

Table 9 - Greenfield Runoff Rates

Return Period	Flow Rate (l/s)
1 year	0.3
2 Year	0.3
30 Year	0.9
100 Year	1.3
Qbar	0.4

8.5 Contributing Areas

8.5.1 Table 10 below illustrates the permeable and impermeable areas for the development.

Table 10 - Contributing Areas

	Impermeable Areas (m ²)				
Description	Static	Parking	Storage	Private parking	Total
Refuse					36
Internal Road					290
Plot 1	55	23	16.7	70	164.7
Plot 2	55	23	16.7	55	149.7
Plot 3	55	23	16.7	63	157.7
Plot 4	55	23	16.7	78	172.7
Plot 5	55	23	16.7	66	160.7
Totals					
Total Impermeable area (m ²)					1131.5
Total Site Area (m ²)					3545
Total Permeable area (m ²)					2413.5

8.6 Surface Water Drainage Philosophy

- 8.6.1 The proposed surface water drainage strategy is illustrated on the drawing included in APPENDIX 4 The design provides for all surface water run-off generated from hardstanding areas and roof surfaces to be collected within a piped network. Runoff will be conveyed to onsite attenuation storage before being discharged, to the ordinary water course just inside the site boundary.
- 8.6.2 The drainage network will be designed to accommodate flows up to the 1 in 100 year storm event plus a 40% allowance for climate change, in line with national and local drainage design standards.
- 8.6.3 As indicated within the drainage strategy, a single outfall is proposed for the surface water network, providing a controlled point of discharge to the ordinary water course.
- 8.6.4 The access road and private parking will be permeable granular paving, there will be a lined filter drain located to the lower side of the access road, this will provide drainage for when the ground cannot support infiltration. The drainage network is sized to assume no infiltration.
- 8.6.5 The roofs of the static caravans and other significant buildings will have downpipes connected to the drainage network.
- 8.6.6 The drainage will then be directed in to the attenuation tank, before discharging into the ordinary watercourse.
- 8.6.7 It is important to highlight that, given the potential for a high groundwater table in this location, all proposed below ground drainage structures (including attenuation tanks and manholes) should be subject to flotation risk assessments during the detailed design stage. These calculations will ensure that each structure is designed with sufficient anti-buoyancy measures, such as increased self-weight, concrete surround, or ground

anchors, to resist uplift forces under worst-case groundwater conditions.

- 8.6.8 Undertaking these assessments is critical to ensure the long-term structural stability and integrity of the drainage system and to prevent damage or displacement during periods of elevated groundwater. This approach aligns with industry best practice and will be incorporated into the final detailed design to satisfy both Building Regulations and adopting authority requirements.

8.7 Proposed Discharge Rate

- 8.7.1 In accordance with WBC Local Flood Authority (LLFA) guidance, where infiltration is demonstrated to be unviable, surface water discharge from the site must be restricted to the equivalent 1 in 1 year greenfield runoff rate. The calculated greenfield runoff rate for this site is 0.3 l/s.

- 8.7.2 However, such a low discharge rate is not considered practical.

- Blockage risk – extremely low velocities would increase the potential for siltation and debris accumulation, compromising the long-term performance of the system.

- 8.7.3 To address these risks, it is proposed that the site discharge be restricted instead to 1.2 l/s for the 1 in 100 year storm event plus a 40% allowance for climate change. This approach represents a practical minimum flow rate that aligns with industry best practice for drainage systems.

- 8.7.4 This position is supported by guidance in the CIRIA SuDS Manual (C753), which recognises the importance of designing systems that are both hydraulically effective and maintainable, as well as the Non-Statutory Technical Standards for SuDS (Defra, 2015), which allow for consideration of practical constraints in achieving theoretical greenfield rates.

8.8 Storage Volume

- 8.8.1 The attenuation storage provides enough storage for all storms up to the 1 in 100 year plus climate change storm event.

- 8.8.2 The drainage design have been undertaken using UKSuDs tool, for a total site area of 3500m² with a contributing impermeable area of 1100m² and a 1% AEP Storm event with an allowance of 40% for climate change it is estimate that 86m³ of storage will be required in order to reduce the peak flow to 1.2 l/s. Refer to APPENDIX 3 for details of calculations undertaken.

- 8.8.3 Below ground attenuation tanks = 86m³

8.9 Surface Water Quality

- 8.9.1 The proposed SuDS features have been designed to intercept and manage runoff from the site. By incorporating measures such as green roofs and attenuation systems, the development will ensure that most small rainfall events are fully intercepted on-site, meaning there will be minimal to no runoff generated from the first 5 mm of rainfall. This aligns with best practice in SuDS design, supporting water quality improvements and reducing the risk of diffuse pollution being conveyed to the receiving sewer network.

- 8.9.2 The quality of surface water discharged to an ordinary watercourse must be appropriately managed to ensure that pollution levels are minimised. The minimum water quality management requirements for the site have therefore been determined in line with Table 4.3 and Table 26.2 of the CIRIA SuDS Manual (C753). These tables define the pollution hazard indices associated with different land uses and the level of treatment

required before discharge.

Table 11 - Pollution Hazard Indices

<i>Land use</i>	<i>Pollution hazard level</i>	<i>Requirements for discharge to surface water</i>	<i>Total suspended solids (TSS)</i>	<i>Metals</i>	<i>Hydro-carbons</i>
Individual property driveways	Low	Simple index approach	0.5	0.4	0.4
Residential roofs	Very low	Simple index approach	0.2	0.2	0.05

8.9.3 Given that the site primarily comprises residential roof areas, the pollution hazard level is considered very low. On this basis, the Simple Index Approach has been applied as a suitable methodology for assessing both the pollution risk and the effectiveness of the proposed SuDS measures in mitigating that risk.

8.9.4 The proposed SuDS features to be integrated within the development provide the following pollution mitigation indices, as referenced in Table 26.3 of the SuDS Manual (C753):

Table 12 - Proposed SuDS pollution Mitigation Indices

<i>SuDS component(s)</i>	<i>Total suspended solids (TSS)</i>	<i>Metals</i>	<i>Hydro-carbons</i>
Constructed permeable pavement	0.7	0.6	0.7
Filter Drain	0.7	0.6	0.7

8.9.5 The proposed SuDS measures have been carefully selected and applied so that the overall SuDS mitigation indices exceed the pollution hazard indices for each component. This ensures that water quality treatment is sufficient to reduce the pollution hazard to acceptable levels prior to discharge. In practice, the use of permeable paving provides a high level of pollutant removal efficiency (particularly for suspended solids and hydrocarbons), supplementing the engineered drainage network and ensuring compliance with CIRIA guidance.

8.9.6 Overall, the strategy demonstrates that the proposed development is capable of delivering robust water quality management through the use of SuDS, minimising pollutant loading to the public sewer network, and thereby protecting downstream water quality in accordance with the requirements of the Environment Agency, Thames Water, and WBC.

8.10 Exceedance Routes

8.10.1 For the internal drainage network the exceedance flows will follow the general topography of the site, which falls to the east boundary of the site

8.10.2 In the unlikely event that the external drainage system becomes overwhelmed, exceedance flows will be directed in line with the natural topography, falling towards the existing highway. This approach ensures that flows are routed away from sensitive areas, thereby reducing risks to people and property.

8.10.3 The exceedance routes are shown on the drainage layout drawing, the flow routes will not affect the static caravans, as they are elevated above the ground level.

8.10.4 Final site levels will be confirmed at detailed design stage to validate these exceedance pathways.

8.11 Pre-planning Enquiry (Surface Water)

8.11.1 A ordinary watercourse discharge consent has not been submitted

9 FOUL WATER DRAINAGE ASSESSMENT

9.1 Existing Foul Water Drainage

9.1.1 A review of the Thames Water asset records illustrates there are no foul drainage within the site, or within close proximity of site, Appendix 6 include the TW asset plans.

9.2 Design Criteria

9.2.1 When designing the foul water drainage network, it should be assessed against the following criteria to comply with British Standards BS EN 16933-2:2017.

9.2.2 Flow rates will be based on the following:

- Minimum gradients to achieve self-cleansing velocities will be in accordance with BS EN 16933-2:2017 CL 10.2. Where it is not possible to achieve self-cleansing velocities, the following table will be used:
- (BS EN 16933-2:2017) NA.5.2.3 Minimum gradients for small diameter drains and sewers.

9.2.3 Foul drains and sewers should be laid as steeply as is practicable. Where foul flow is intermittent (typically hydraulic design is carried out using probability methods (see 8.1.2 of BS EN 16933-2:2017)), drains and sewers are usually considered to be self-cleansing if they are laid no flatter than the gradients given in Table NA.7

Peak flow [l/s] ^a	Pipe size [mm]	Minimum gradient ^{b,c,d}
<1	75	1 in 40
	100	1 in 40
>1	75	1 in 80
	100	1 in 80 ^e
	150	1 in 150 ^{f,g}

^a Peak flows should be based on probability flow calculation methods.

^b These gradients have been empirically demonstrated on the basis of 6 l WC flush volumes. Further research is necessary to evaluate the recommended gradients for use in systems with very low WC flush volumes.

^c Exceptionally, where the length of drain or sewer serving a small number of properties is very long, steeper gradients may be required.

^d Where ground settlement is expected, steeper gradients are recommended.

^e Minimum of one WC connected.

^f Minimum of five WCs connected.

^g Exceptionally, where a 150 mm diameter pipe is used to carry flows from fewer than five WCs, the minimum gradient should be 1 in 60.

Figure 14 - Minimum gradients to achieve self-cleansing velocities

9.2.4 It may be possible to use flatter gradients if standards of design and workmanship are high, and where dwellings are close together so that the lengths of drain or sewer are short. Exceptionally, where the length of drain or sewer serving a small number of properties is very long, steeper gradients may be required.

9.3 Foul Water Drainage Philosophy

9.3.1 The nearest public sewer is 300m away, the binding rules state that it is reasonable to connect to a public sewer if it is within a certain distance.

- If the distance from the boundary (of the premises that your system serves) to the nearest public foul sewer is less than the number of houses multiplied by 30 metres.
- There are five properties proposed, so 5 x 30m is 150m, it is therefore not reasonable for a connection to be made to the public sewer.

Flood Risk Assessment & Drainage Strategy

- 9.3.2 The proposed foul water drainage strategy is shown on the plan provided in APPENDIX 4. It is proposed that all foul water generated from the development will be collected via a gravity fed drainage network and discharged into cesspool.
- 9.3.3 The gradients of the foul pipe network will be 1:40, with a pipe diameter of 100mm, levels will be provided as part of the detail design submission.
- 9.3.4 The foul drainage calculations have been based on each static caravan having 2 bedrooms with an equivalent population of 4 persons. Table 13 below calculates the flows in accordance with the British Water Flows and Loads – 4 sizing criteria, treatment capacity for sewerage treatment systems.

Table 13 - Foul drainage discharge Volume

Usage	People / Day	Design Flow (l/person/day)	Design Flow (l/day)	Design Flow (l/week)
Mobile Home type caravan with full services	20	150	3,000	21,000
Total			3,000	21,000

- 9.3.5 It is recommended that a cesspool of 50,000 litres will be required for the development site, this will be emptied on a frequency of not less than fortnightly.
- 9.3.6 The cesspool and associated foul drainage network will be cleaned an annual basis.
- 9.3.7 The design of the onsite foul network will be in accordance with current Design and Construction Guidance (DCG) standards, ensuring suitability for long term operation.

10 OPERATION AND MAINTENANCE REQUIREMENTS

10.1 Introduction

10.1.1 All below ground drainage and SuDs components on the development are to be inspected regularly and maintained to ensure design flow conditions are maintained.

10.2 Maintenance Plan

10.2.1 Refer to the Drainage Maintenance and Management plan included within Appendix 5.

11 CONCLUSION

- 11.1.1 This Flood Risk Assessment (FRA) has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF), the planning authority and Lead Local Flood Authority (LLFA), Wokingham Borough Council.
- 11.1.2 The proposed development is located entirely within Flood Zone 1, which represents the lowest risk of fluvial flooding. As such, the sequential and exception tests are not required for this site.
- 11.1.3 The FRA has considered all potential sources of flooding, including fluvial, surface water, groundwater, sewer, and reservoir flood risks, and has taken account of the potential impacts of climate change over the lifetime of the development. The assessment indicates that the site has a medium risk of groundwater flooding, a high risk of surface water flooding, while the risk from all other sources is considered low.
- 11.1.4 To mitigate potential flood risk, a range of flood resistance and resilience measures are proposed for all new elements of the building and vulnerable areas, including:
- The static caravans will be raised by a minimum of 600mm above the ground level.
 - The levels across the site will be maintained to ensure no water is trapped on site.
 - Drainage infrastructure will be fitted with sealing plates to ensure any flood water will not overwhelm the drainage networks.
 - Incorporation of flood-resilient construction techniques and materials for walls, floors, and fixtures.
 - The drainage for the site is designed to contain and manage the 1% AEP+CC event as detailed by the drainage strategy.
 - Installation of raised thresholds, door barriers, and impermeable barriers around vulnerable areas.
 - Use of water resistant finishes at ground levels, including plaster, flooring, and joinery.
 - Flood proofing of electrical, mechanical, and service installations to maintain safety and functionality.
 - Provision of safe evacuation routes.
 - Consideration of site layout and landscaping to manage overland flows and minimise the impact of external flooding.
- 11.1.5 Whilst there is no conclusive evidence that groundwater flooding will occur at the site, its location within an area of potential susceptibility warrants precaution. The design will therefore adopt mitigation at the detailed design stage, which may include:
- Waterproof foundation design
 - Raised finished floor levels above external ground level.
 - A sealed below-ground drainage network with flotation checks to prevent uplift or leakage.
 - Avoidance of basements and deep excavations susceptible to groundwater ingress.

Flood Risk Assessment & Drainage Strategy

- 11.1.6 With these measures, the risk from groundwater will be effectively managed, ensuring the development remains safe.
- 11.1.7 It is confirmed that no basement accommodation is proposed, which removes a key vulnerability to groundwater ingress.
- 11.1.8 Site specific investigation will be undertaken to confirm groundwater levels and assess any potential contamination issues, informing detailed design and safeguarding against residual risks.
- 11.1.9 The site is at risk from surface water flooding, the static caravans are raised by a minimum of 600mm off the ground, which will mitigate any flood risk to the dwellings.
- 11.1.10 The topography of the site will prevent water from entering off Trowe's lane, and any exceedance flows generated on site will flow as per the pre-development arrangement to the eastern boundary. It is not expected that surface water will pond on the site.
- 11.1.11 There is a safe access / egress route if required.
- 11.1.12 The proposed surface water drainage strategy is illustrated on the drawing included in APPENDIX 4. The strategy collects all runoff from roof areas and hardstanding via a piped network, conveys it to onsite attenuation storage, and discharges it to an ordinary watercourse.
- 11.1.13 The surface water drainage system is designed to:
- Control discharge rates through flow control devices
 - Accommodate flows up to a 1 in 100 year storm event plus 40% climate change allowance.
 - Incorporate attenuation crates and permeable paving as part of an integrated SuDS strategy, providing additional treatment and minor storage.
- 11.1.14 This approach aligns with national policy, CIRIA SuDS guidance, and best practice to manage surface water sustainably and reduce flood risk on and off-site.
- 11.1.15 The proposed foul water drainage strategy, shown in APPENDIX 4, provides for all foul flows to be collected via a gravity fed drainage network and discharged into a cesspool.
- 11.1.16 In summary, the FRA demonstrates that the proposed development:
- Is located in a low risk flood zone, with suitable mitigation measures for groundwater and surface water flooding risks.
 - Incorporates flood resistance and resilience measures to protect occupants and property.
 - Includes a robust surface water management strategy, integrating SuDS features, attenuation, and discharge.
 - Provides a gravity fed foul water network designed in accordance with DCG standards and the binding rules.
- 11.1.17 Overall, the development minimises flood risk to the site and surrounding area and is designed to meet the requirements of the NPPF, the Environment Agency, and Wokingham Borough Council.

APPENDIX 1 PROPOSED SITE LAYOUT PLAN



Proposed Site Plan

APPENDIX 2 BGS RECORDS



~~SU76SW53~~ - 65

Boxing for Mr. Smith, Fowling's Farm, Southwold, Suffolk.
25th October, 1965.

~~SU76SW53~~
7224 6463

Hole No. 1.	
Top Soil	1'0"
Clay - soft brown	11'0"
Ballast	3'0"
Blue Clay	
Water	8'0"

Hole No. 7. ~~SU76SW59~~
7222 6457

Top Soil	1'0"
Clay	2'0"
Ballast	7'0"
Blue Clay	
Water	7'0"

SU76SW54
7235 6471

Hole No. 2.	
Top Soil	1'0"
Clay	2'0"
Ballast	8'0"
Blue Clay	
Water	6'0"

Hole No. 8. SU76SW60
7221 6449

Top Soil	2'8"
Ballast	6'0"
Blue Clay	
Water	7'0"

SU76SW55
7243 6453

Hole No. 3.	
Top Soil	1'0"
Clay	2'0"
Ballast	8'0"
Blue Clay	
Water	6'0"

Hole No. 9. SU76SW61
7255 6456

Top Soil	1'0"
Clay	3'0"
Ballast	2'0"
Brown Clay	4'0"
Water	5'0"

COMMERCIAL
IN CONFIDENCE

NGDC
ACCESSION
NUMBER

28855

Hole No. 4. SU76SW56
7241 6441

Top Soil	1'0"
Clay and Marl	3'6"
Ballast	4'6"
Blue Clay	
Water	5'0"

Hole No. 10. SU76SW62
7266 6456

Top Soil	1'0"
Clay	2'0"
Sandy Clay	6'0"
Blue Clay	

Hole No. 5. SU76SW57
7229 6443

Top Soil	1'6"
Clay	3'0"
Sandy Clay	1'6"
Ballast	4'0"
Blue Clay	
Water	5'0"

Hole No. 11. SU76SW63.
7257 6445

Top Soil	1'0"
Sandy Clay	3'0"
Ballast	6'0"
Blue Clay	
Water	5'0"

Hole No. 6. SU76SW58
7247 6438

Top Soil	1'0"
Clay	2'6"
Ballast	6'6"
Blue Clay	
Water	6'0"

Hole No. 12. SU76SW64
7230 6442

Top Soil	1'0"
Clay	2'6"
Ballast	2'6"
Blue Clay	

Hole No. 13. SU76SW65
7252 6431

Top Soil	1'0"
Sandy Clay	2'6"
Ballast	5'6"
Blue Clay	
Water	4'0"

99

APPENDIX 3 DRAINAGE CALCULATIONS

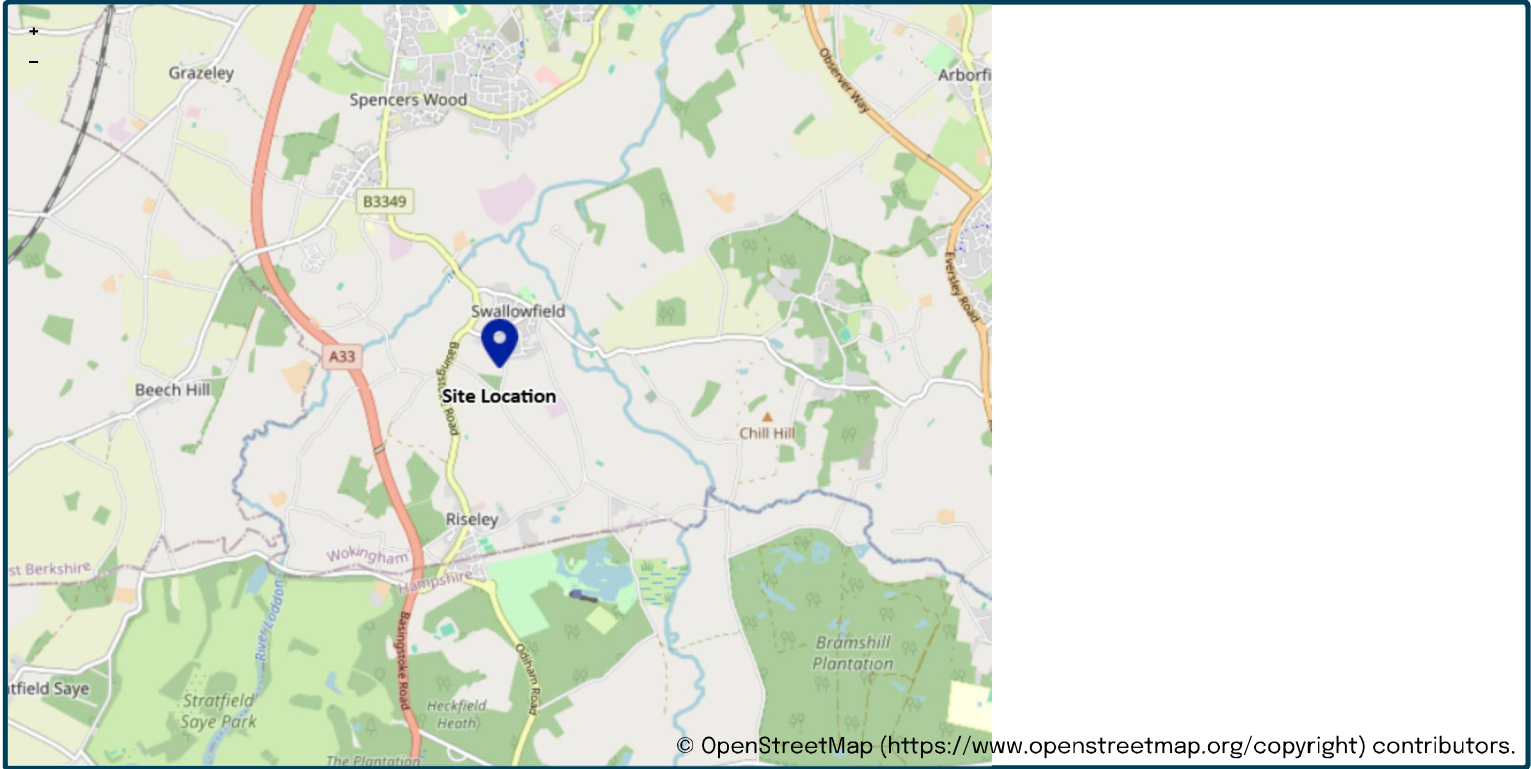
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	04/10/2025
Calculated by	Debby Booth
Reference	Swallowfield
Model version	2.1.2

Location

Site name	Swallofield
Site location	Trowes Lane



Site easting (British National Grid)	472421
Site northing (British National Grid)	164325

Site details

Total site area (ha)	0.113	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical
--------	-----------------

FEH statistical

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	660	mm	660
BFIHOST	0.426		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	0.35	l/s	
QBar (FEH statistical) (l/s)	0.4	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	6		6
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	0.3	l/s
Flow rate 2 year (l/s)	0.3	l/s
Flow rate 10 years (l/s)	0.6	l/s
Flow rate 30 years (l/s)	0.9	l/s
Flow rate 100 years (l/s)	1.3	l/s
Flow rate 200 years (l/s)	1.5	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.1.2) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

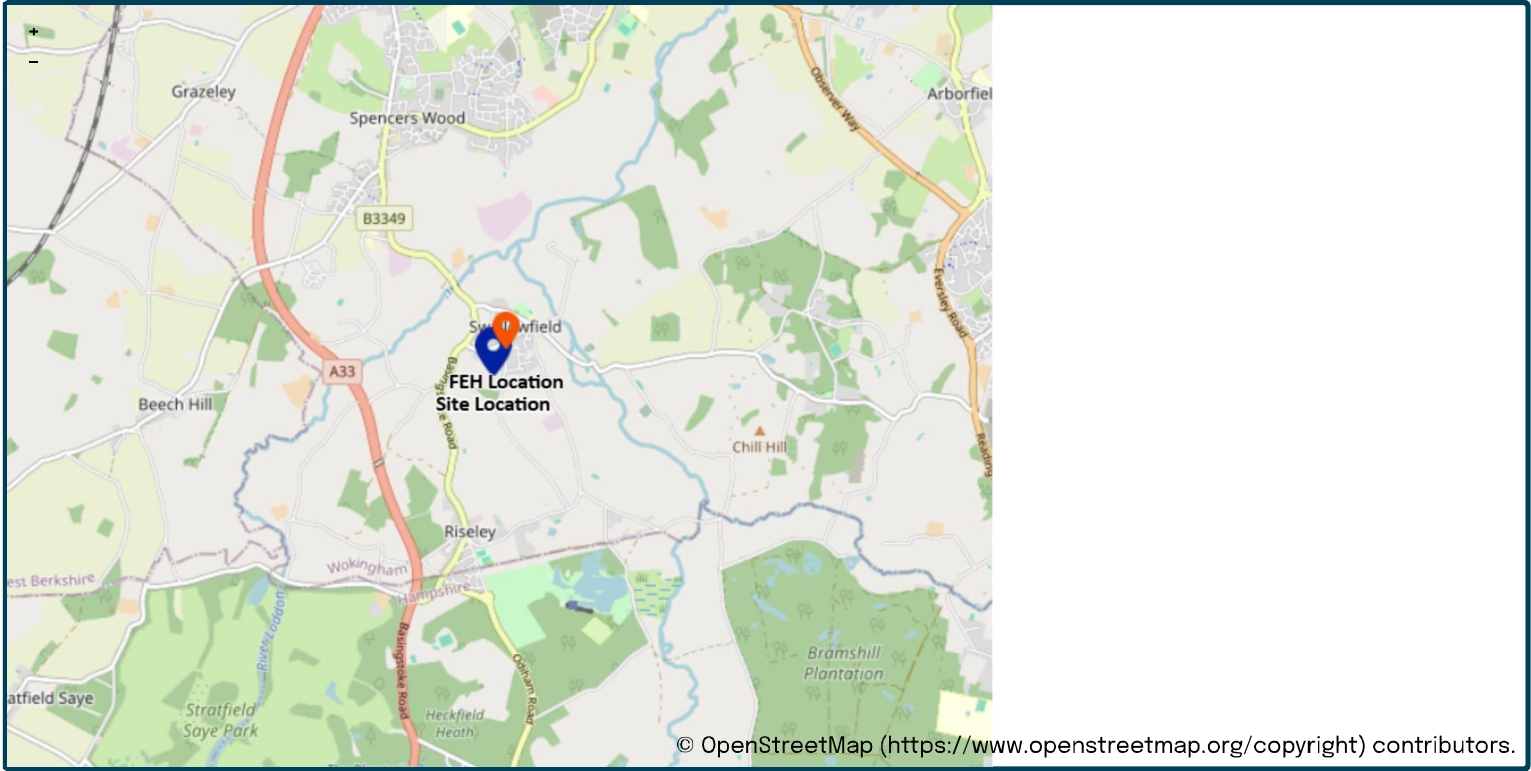
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	04/10/2025
Calculated by	D.Booth
Reference	Swallowfield
Model version	2.1.2

Location

Site name	
Site location	



Site easting (British National Grid)	472390
Site northing (British National Grid)	164378

Site areas

Total site area (ha)	0.35	ha
----------------------	-----------------	----

Roof area

Total roof area (ha)		
Contributing roof area (ha)		
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	0.11	
Contributing paved area (ha)	0.11	
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	0.24	
Contributing grass / vegetated area (ha)		
Non-contributing grass / vegetated area (ha)	0.24	ha

Total area

Total contributing area (ha)	0.11	ha
------------------------------	-----------------	----

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	0	ha
Contributing paved area (adjusted for urban creep) (ha)	0.11	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	1	m
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	FEH statistical

FEH statistical

	My value		Map/default value
SAAR (mm)	660	mm	660
BFIHOST	0.426		
QMed (l/s)	1.08	l/s	
QMed-QBar conversion	1.136		1.136
Total area for greenfield runoff calculation (ha)	0.35	ha	0.35
QBar (l/s)	1.23	l/s	
Hydrological region	6		6
Return period (years)	Qbar (1:2.3 years)		
Growth curve factor	1		
Flow rate (FEH statistical) (l/s)	1.23	l/s	

Final discharge rate

Runoff calculation method	FEH statistical
Design flow rate (l/s)	1.23

Blockage risk

Specify the method	Flow rate		
Minimum discharge flow rate to prevent blockage	1l/s		
	My value		Calculated value
Design orifice diameter (mm)	24	mm	24
Flow rate of orifice (l/s)	1.2	l/s	

Rainfall and runoff

Rainfall input type	FEH22 CSV file	
	FEH_Point_Rainfall_FEH22_AM_472500_164500.csv	
Distance from FEH location to site (km)	0.2	km
Climate change allowance factor	140%	
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR	
	My value	Map value
How should SPR be derived?	Estimate using BFI	
BFIHOST	0.426	

Model results

- Maximum discharge flow rate: 1.2 (l/s)
- Outflow orifice diameter: 24 (mm)
- Storage base length: 10 (m)
- Storage base width: 3.4 (m)
- Storage base area: 34 (m²)
- Storage total volume: 86 (m³)
- Storage total water volume: 86 (m³)
- Storm return periods run: 1, 2, 10, 30, 100, 200 (years)
- Storm durations run: 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	540	0.7	0.39	20	20
2	360	0.8	0.47	26	26
10	360	1.0	0.72	50	50
30	360	1.1	0.86	67	67
<u>100</u>	<u>360</u>	<u>1.2</u>	<u>1.00</u>	<u>86</u>	<u>86</u>
200	360	1.2	1.08	99	99

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

Disclaimer

This report was produced using the surface water storage volume design tool (2.1.2) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

HR Wallingford are not responsible for any rainfall data shared that is subject to licensing terms imposed by UK Centre for Ecology & Hydrology's Flood Estimation Handbook web service (<https://fehweb.ceh.ac.uk/Home/Terms> (<https://fehweb.ceh.ac.uk/Home/Terms>)).

APPENDIX 4 DRAINAGE DRAWINGS

- DESIGN ASSUMPTIONS
- RED LINE BOUNDARY = APPROX. 3500M3 (0.35Ha)
 - IMPERMEABLE AREA = APPROX. 1130M3 (0.11Ha)
 - GREENFIELD RUNOFF RATE = 0.3 L/S (1 IN 1 YEAR)
 - RESTRICTED DISCHARGE RATE = 1.2 L/S

SURFACE WATER

SURFACE WATER TO BE COLLECTED BY GULLY/CHANNEL DRAINS AND DIRECTED TO BELOW GROUND ATTENUATION CRATES, BEFORE BEING DISCHARGED TO AN EXISTING DITCH. SUBJECT TO APPROVAL BY THE LLFA

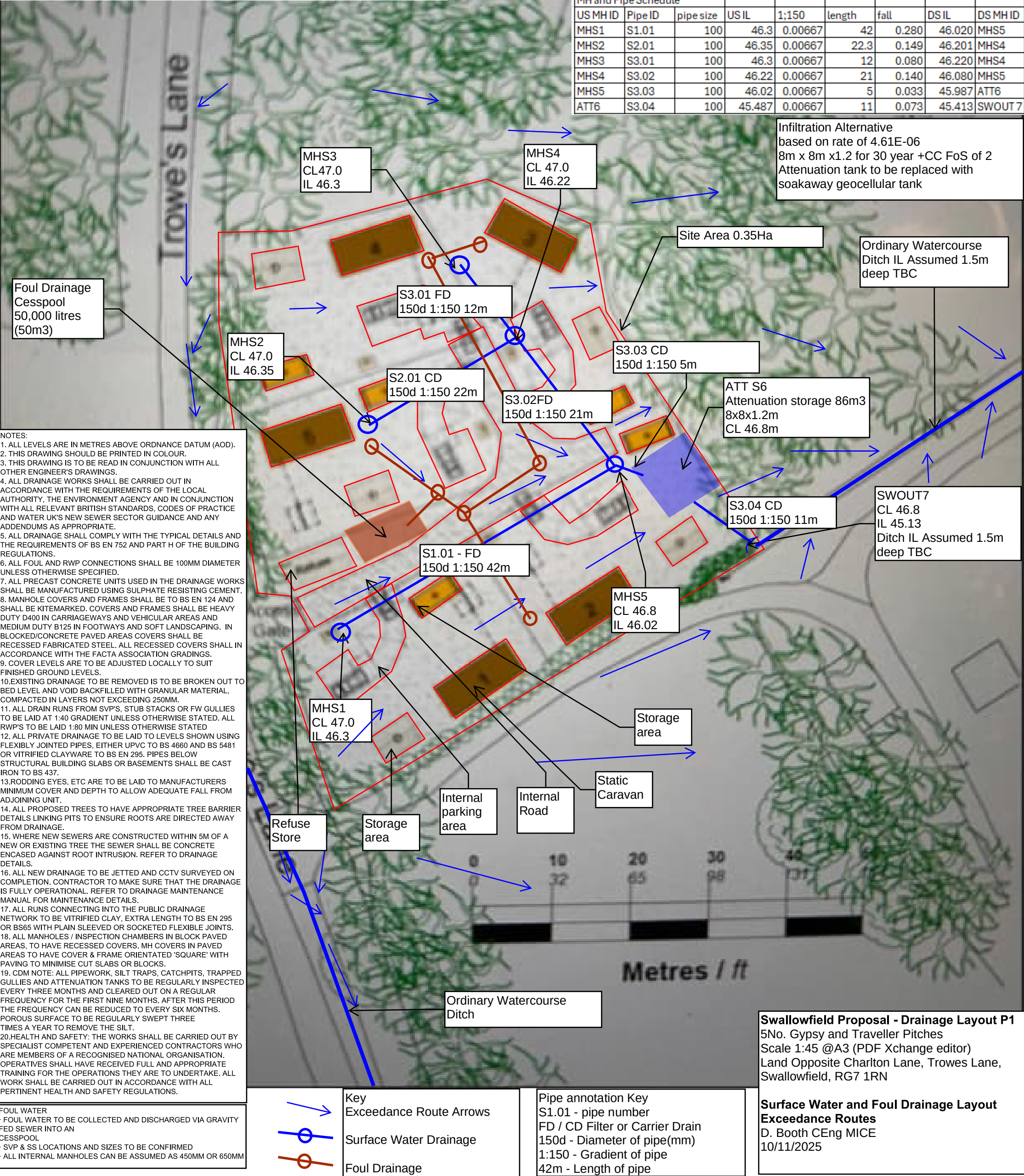
GULLY AND CHANNEL DRAIN REQUIREMENTS AND LOCATIONS TO BE CONFIRMED DURING DETAILED DESIGN

RWP LOCATED AND SIZES TO BE CONFIRMED BY ARCHITECT

86M3 STORAGE REQUIREMENT FOR 1IN 100YEAR + 40% CC. STORM EVENT, BASED ON QUICK STORAGE ESTIMATE.

Impermeable Areas					
Areas	Static	parking	orange	private parking	Total
Refuse					36
Internal Road					290
Plot 1	55	23	16.7	70	164.7
Plot 2	55	23	16.7	55	149.7
Plot 3	55	23	16.7	63	157.7
Plot 4	55	23	16.7	78	172.7
Plot 5	55	23	16.7	66	160.7
Totals					
Total Impermeable area					1131.5
Total Site Area					3545
Total Permeable area					2413.5

MH and Pipe Schedule								
US MH ID	Pipe ID	pipe size	US IL	1:150	length	fall	DS IL	DS MH ID
MHS1	S1.01	100	46.3	0.00667	42	0.280	46.020	MHS5
MHS2	S2.01	100	46.35	0.00667	22.3	0.149	46.201	MHS4
MHS3	S3.01	100	46.3	0.00667	12	0.080	46.220	MHS4
MHS4	S3.02	100	46.22	0.00667	21	0.140	46.080	MHS5
MHS5	S3.03	100	46.02	0.00667	5	0.033	45.987	ATT6
ATT6	S3.04	100	45.487	0.00667	11	0.073	45.413	SWOUT 7



APPENDIX 5 DRAINAGE MAINTENANCE AND MANAGEMENT PLAN

5 NO. GYPSY AND TRAVELLER PITCHES
AT TROWE'S LANE, SWALLOWFIELD, RG7
1RN

Surface Water Maintenance & Management
Strategy

November 2025

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3	RESIDUAL RISKS	3
4	RESPONSIBILITY FOR INSPECTIONS AND MAINTENANCE.....	3

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1 INTRODUCTION

- 1.1.1 Regular inspections and maintenance of the surface water drainage system is important to ensure the effective and efficient operation of the system and to reduce the likelihood of blockages and flooding on site.
- 1.1.2 The surface water drainage network comprises of permeable paving, geocellular attenuation and underground piped network.
- 1.1.3 The system has been designed to accommodate all surface water runoff for the design storm up to and including the 1% exceedance event + 40% for climate change, and should not need to be inspected or maintained for the first 12 months following construction during the defects liability period for the construction works.
- 1.1.4 A post-construction CCTV survey of the installed system should be undertaken to confirm the system has been installed in accordance with the drawings and specification and that there are no damages or obstructions within the system.
- 1.1.5 The information from the CCTV survey should be included in the Health & Safety File or O&M manual for the site, which should be passed to the management company and/or individual owner(s) for their information. Once the defects liability period has lapsed, the surface water drainage system should be inspected at regular intervals and any blockages cleared or remediation works undertaken at the earliest opportunity to ensure the effective operation of the drainage system.

2 INSPECTION REGIME

- 2.1.1 The surface water drainage system should be inspected and cleaned by a suitable Specialist Contractor, in accordance with the guidance provided in BS EN 752:2017 in the Maintenance and Operations section.
- 2.1.2 The system should be monitored monthly by lifting the covers to the manholes and chambers to monitor debris build-up. If required, these are to be cleaned at the earliest opportunity to prevent blockages.
- 2.1.3 Every six months, the drainage system should be inspected to identify areas that are not operating as required and any remedial works identified should be carried out at the earliest opportunity.
- 2.1.4 Refer to the Surface Water Management Schedule, detailed in Table 1, below, for the proposed maintenance schedule for the site.

Table 1 – Surface Water Maintenance Schedule

Feature	Schedule	Required Action	Frequency
Pervious Pavement	Regular	Stabilise and mow contributing and adjacent areas	As required
	Occasional	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less
		Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	Frequently used pavements - As required
	Remedial	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
		Initial inspection	Monthly for three months after installation
	Monitoring	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually
		Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
Drainage (Pipe Network)	Regular	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		Maintain vegetation to designed limits within the vicinity of below ground drainage pipes to avoid damage to system.	Monthly or as required
		Inspect rainwater down pipes, channel drains and road gullies, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
		Remove silt and leaf build up from manholes, gutters etc.	Annually (or as required)
	Occasional	Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually (or as required)
		Remove inspection covers and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually
		Removal of sediment, oil, grease and	Biannually (or as

Feature	Schedule	Required Action	Frequency
		floatables	required)
		Replacement of malfunctioning parts	As Required
	Remedial	Repair physical damage if necessary	As Required
		Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Biannually
	Monitoring	Undertake inspection after leaf fall in Autumn	Annually
		Inspect all inlets, outlets and vents to ensure that they are in good condition and operating as designed.	Annually
		Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required
		Check manholes, gutters etc. for silt and leaf build up.	Annually
Geocellular Storage	Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		Remove sediment from pre-treatment structures	Annually, or as required
	Remedial	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually

2.1.5 A full CCTV survey of the surface water drainage system should also be carried out at 10-yearly intervals to assess the condition of the drainage system.

2.1.6 Reference should also be made to the manufacturer's detailed information and maintenance requirements for their recommended intervals and safe methods of cleaning for the following proprietary systems:

- N/A

3 RESIDUAL RISKS

3.1.1 In all instances, all underground drains, access chambers and manholes represent working in confined spaces. Appropriate precautions should be taken before entering drains and manholes. Access should only be undertaken by appropriately trained personnel.

3.1.2 Reference should be made to the as-built drawings for the site, which will detail the layout and additional information for the drainage system. A copy of the drawings should be maintained in the Health & Safety file for the site and/or within the O&M manual.

4 RESPONSIBILITY FOR INSPECTIONS AND MAINTENANCE

4.1.1 The responsibility for the inspection and maintenance of the surface water drainage system lies with the owner(s) of the individual properties.

- 4.1.2 The responsibility for inspections and maintenance of the surface water drainage system lies wholly with the individual property owner(s).
- 4.1.3 The recommendations included in this Maintenance and Management Strategy are typical and may need to be amended to suit the site-specific requirements of the development, individual users and owner(s) requirements throughout the life span of the development.

APPENDIX 6 THAMES WATER ASSET PLANS

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

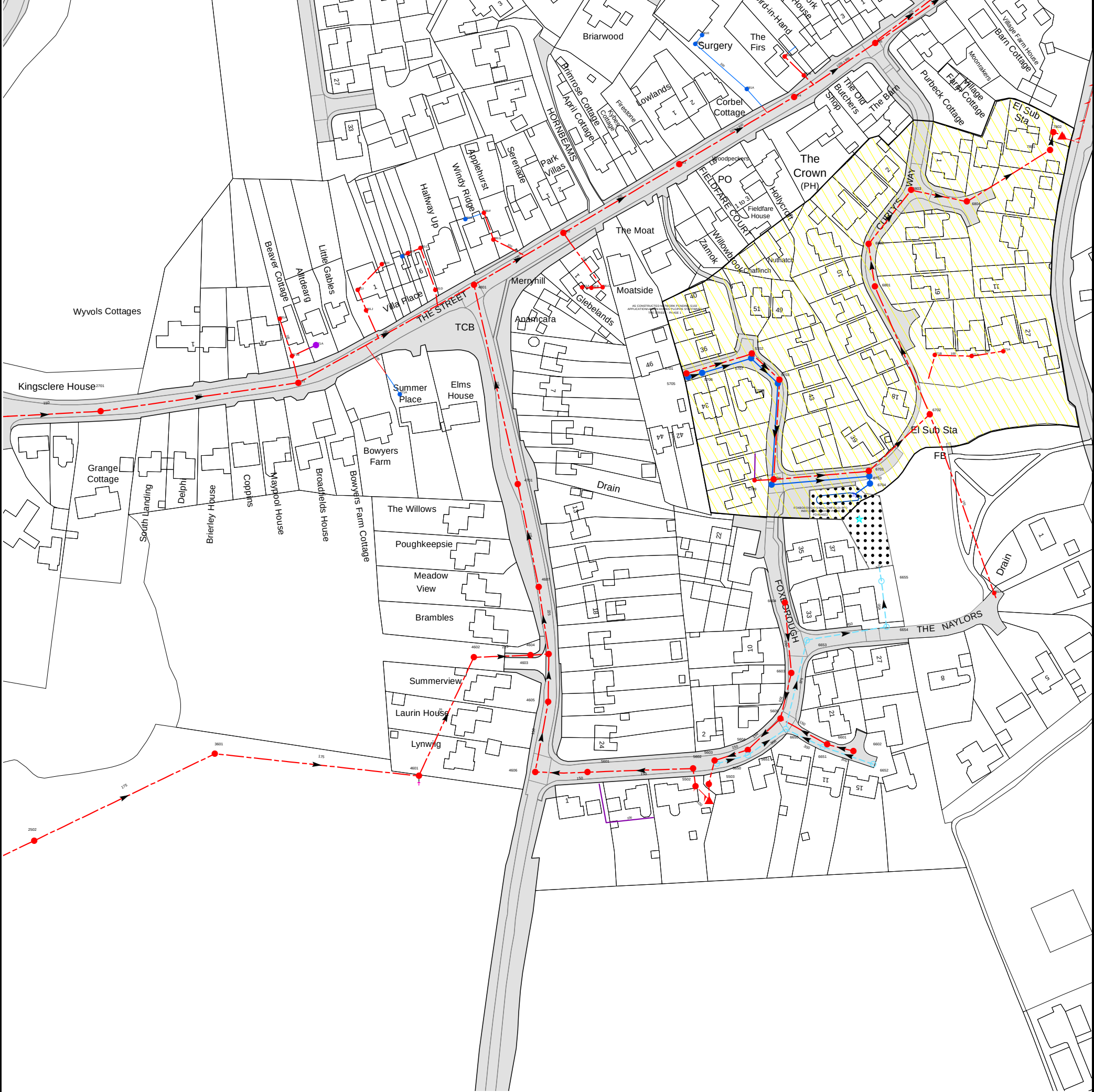
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

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



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 472494,164706
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
5709	n/a	n/a
571A	n/a	n/a
5704	n/a	n/a
6703	n/a	n/a
6701	n/a	n/a
6702	n/a	n/a
5708	n/a	n/a
5703	n/a	n/a
5705	n/a	n/a
5701	n/a	n/a
5706	n/a	n/a
5707	n/a	n/a
5702	n/a	n/a
581C	n/a	n/a
6802	n/a	n/a
5803	43.804	41.354
6904	43.885	40.955
591A	n/a	n/a
691B	n/a	n/a
691A	n/a	n/a
591D	n/a	n/a
591E	n/a	n/a
4701	43.894	42.514
2701	47.21	44.96
471A	n/a	n/a
3701	45	43.48
371B	n/a	n/a
371A	n/a	n/a
381A	n/a	n/a
481J	n/a	n/a
481D	n/a	n/a
481I	n/a	n/a
581B	n/a	n/a
581A	n/a	n/a
4801	43.812	42.002
481H	n/a	n/a
481A	n/a	n/a
481B	n/a	n/a
481C	n/a	n/a
481G	n/a	n/a
4802	43.75	41.7
481E	n/a	n/a
481F	n/a	n/a
6704	n/a	n/a
6801	n/a	n/a
6905	43.785	40.625
6803	n/a	n/a
671B	n/a	n/a
6804	n/a	n/a
671A	n/a	n/a
771A	n/a	n/a
7801	n/a	n/a
7802	n/a	n/a
3601	47.16	45.85
4601	46.29	44.72
4602	45.77	43.49
4603	45.51	43.18
4606	45.42	43.76
4607	44.18	42.77
4605	45	43.59
4604	44.32	43.07
5601	45.4	43.91
5602	45.28	44.24
5502	45.4	44.33
5503	45.45	42.81
5603	45.3	42.96
5650	45.37	44.13
5604	45.3	42.97
5651	45.3	44.09
5605	45.19	43.11
6604	45.18	43.47
6650	45.17	43.96
6603	45	44.24
6653	45.1	43.81
6651	45.2	44.08
6601	45.2	43.38
6602	45.2	43.54
6652	45.2	44.15
6655	44.85	43.68
6654	45	43.73
661A	n/a	n/a
2502	48.84	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

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.

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.

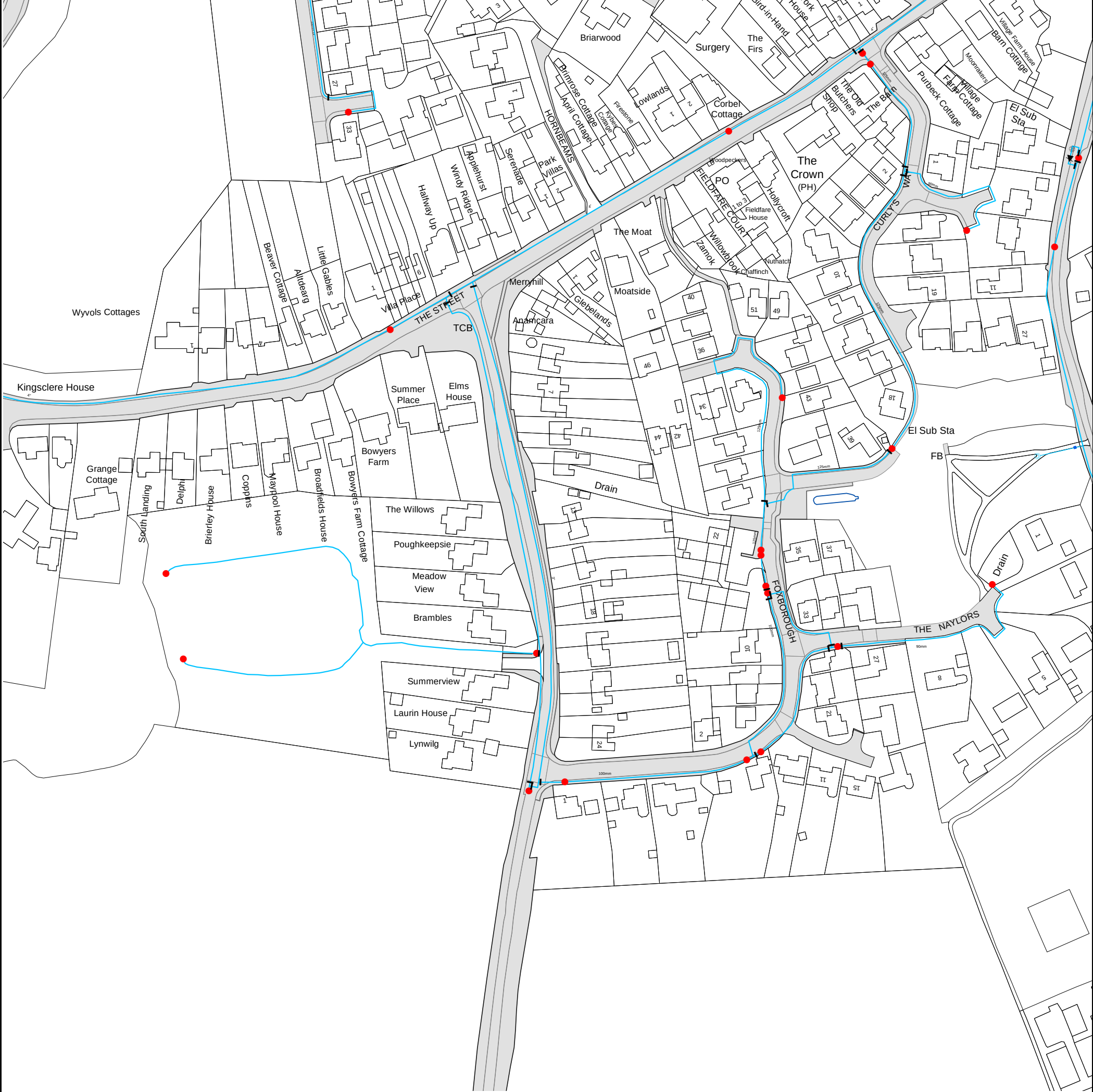
	Agreement
	Chamber
	Operational Site

Ducts or Crossings

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

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.



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 472494, 164706.

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Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

- 4"** **Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- 16"** **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" SUPPLY** **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- 3" FIRE** **Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- 3" METERED** **Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
- Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

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

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

- Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
- Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

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



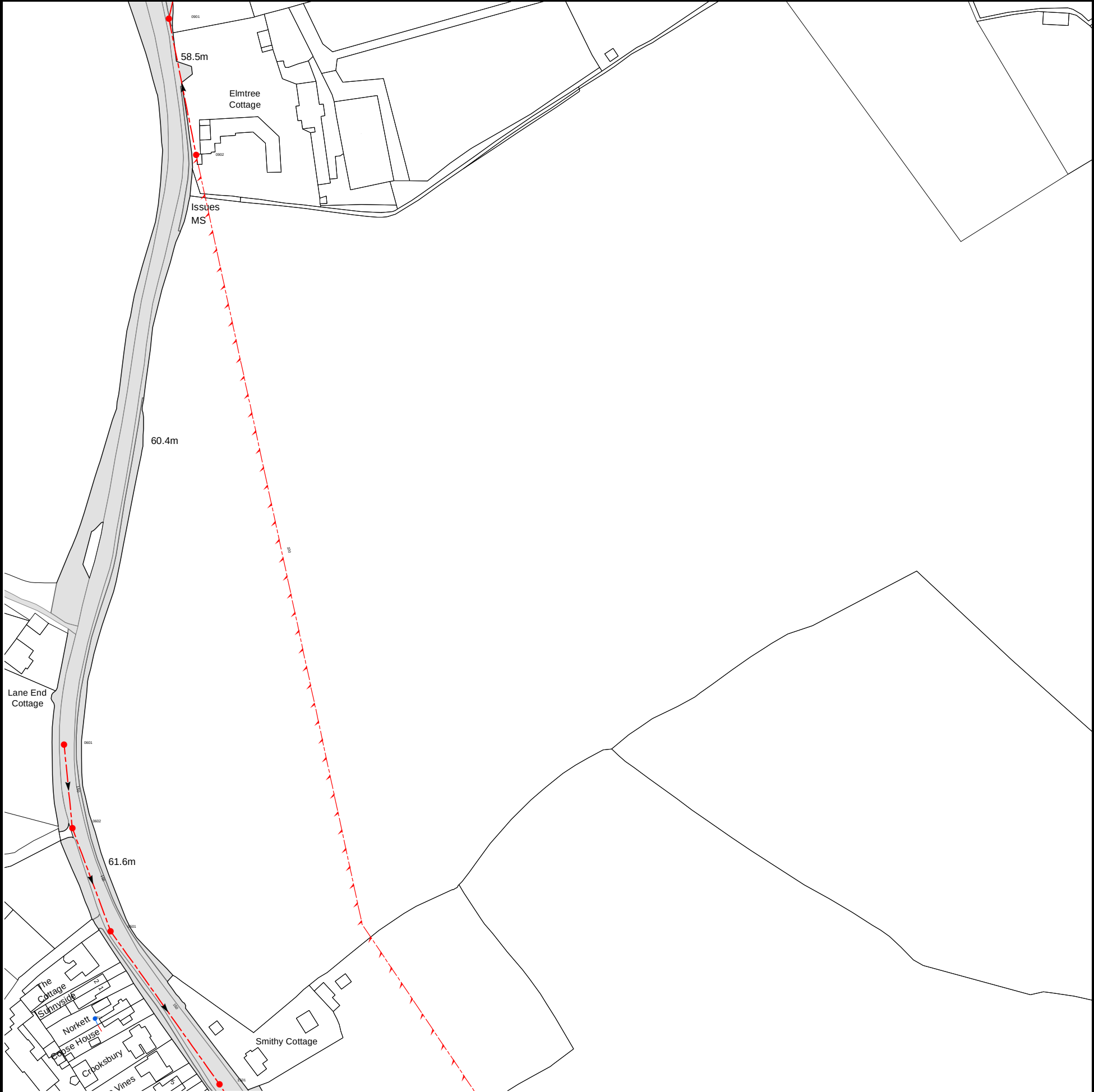
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 472250,164250

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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
0001	n/a	n/a
0002	n/a	n/a
0003	n/a	n/a
0102	n/a	n/a
0101	n/a	n/a
1401	48.74	47.4
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 472250,163750

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
1501	61.1	59.63
051A	n/a	n/a
0501	61.64	n/a
0602	61.87	n/a
0601	61.83	61.09
0902	n/a	n/a
0901	58.51	n/a
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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

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.

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

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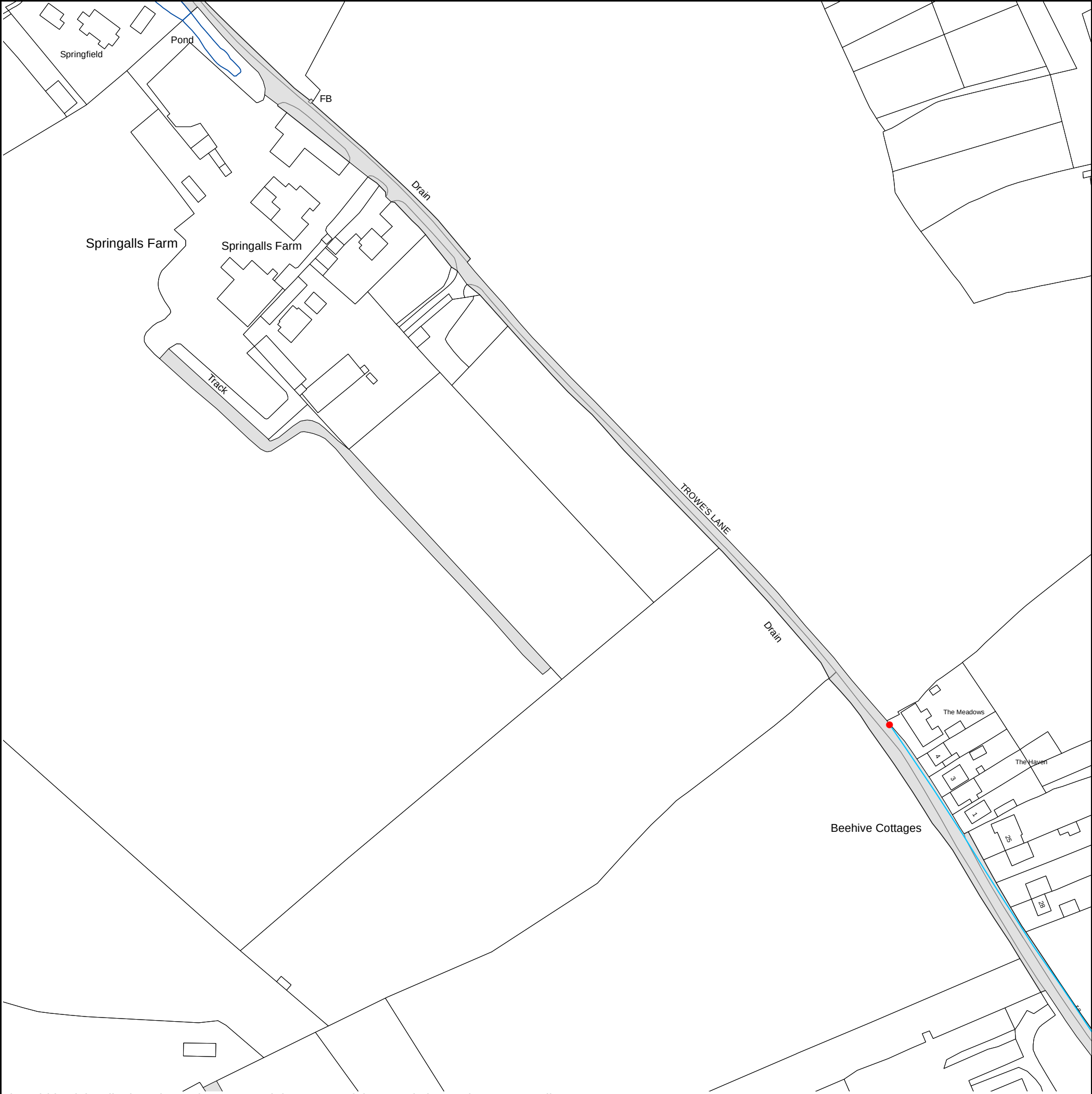
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