# Flood Risk Assessment and Drainage Strategy

**Project:** Land South of Green Lane, Chesterton

**Client:** Wates Developments

**Reference:** C86354-JNP-92-XX-RP-C-1002

**Date:** November 2022

# DOCUMENT CONTROL SHEET

Prepared By.....
**Anthony Scoones**
MEng (Hons)
Civil Engineer

Approved By.....
**Martin Hitchcock**
Director
**FOR AND ON BEHALF OF JNP GROUP**

**Document Issue Control**

| Rev | Date | Description | Prepared | Checked | Approved |
|---|---|---|---|---|---|
| P01 | 31/08/2022 | First Issue | AMS | SH | MAH |
| P02 | 11/11/2022 | Issued for Planning | AMS | SH | MAH |
| | | | | | |
| | | | | | |

## TABLE OF CONTENTS



## LIST OF FIGURES

## LIST OF TABLES



## APPENDICES

# 1 INTRODUCTION

## 1.1 Terms of Reference

1.1.1 JNP Group has been commissioned by Wates Developments to prepare a flood risk assessment for the proposed Green Lane residential development in Chesterton, Oxfordshire.

1.1.2 This report assesses flood risk at the development site from all potential sources and describes the measures adopted in the master planning process to manage such risks. It has been prepared in compliance with current policies and best practices.

## 1.2 Policy Framework and Key Stakeholders

1.2.1 The *National Planning Policy Framework* (NPPF) (July 2021) sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed.

1.2.2 In areas at risk of flooding or for sites of one hectare (ha) or more, developers must undertake a site-specific flood risk assessment to accompany applications for planning permission (or prior approval for certain types of permitted development).

1.2.3 In decision-taking, local planning authorities must ensure a sequential approach to site selection and master planning is followed so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk.

1.2.4 Where development needs to be in locations where there is a risk of flooding, local planning authorities and developers must ensure development is appropriately flood resilient and resistant, safe for its users for the development's lifetime, and will not increase flood risk elsewhere.

1.2.5 The Environment Agency (EA) is a statutory consultee on applications where there is a risk of flooding from the sea or main rivers.

1.2.6 Lead local flood authorities (unitary authorities or county councils) are responsible for managing local flood risk from ordinary watercourses, surface water or groundwater, and for preparing local flood risk management strategies. Local planning authorities work with lead local flood authorities to ensure local planning policies are compatible with the local flood risk management strategy.

1.2.7 Oxfordshire County Council (OCC) is the lead local flood authority (LLFA) and its strategy for managing local flood risk is set out in the Local Flood Risk Management Strategy (April 2015) and in the Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire (November 2018).

1.2.8 Cherwell District Council (CDC) is the local planning authority (LPA) and its policies on flood risk management are set out in the Cherwell Local Plan (2011-2031) (adopted December 2016) and in the Cherwell Level 1 Strategic Flood Risk Assessment (May 2017).

1.2.9 Where relevant, local planning authorities and developers must also take advice from:

- Internal drainage boards; to identify the scope of their interests.
- Sewerage undertakers; to ensure they can assess the impact of new development on their assets and plan any required improvements. Thames Water (TW) is the local sewerage undertaker.

- Reservoir undertakers; to avoid an intensification of development within areas at risk from reservoir failure and ensure they can assess the cost implications of any reservoir safety improvements required due to change in land use downstream of their assets.
- Navigation authorities; in relation to developments adjacent to, or which discharge into, canals (especially where these are impounded above natural ground level).

## 1.3 Sources of Information

1.3.1 This flood risk assessment has been based on the following sources of information:

- Bespoke topographic survey undertaken by CD Surveys Ltd in October 2019;
- British Geological Survey's *Geoindex Tool*; *(http://mapapps2.bgs.ac.uk/geoindex/home.html)*
- Cranfield University's soils data; *(http://www.landis.org.uk/soilscapes/)*
- DEFRA / EA's aquifer and source protection data *(https://magic.defra.gov.uk/MagicMap.aspx)*
- British Geological Survey's borehole scans; *(http://mapapps.bgs.ac.uk/geologyofbritain/home.html)*
- Bespoke Phase I Geo-Environmental Report (including a Groundsure Report) undertaken by JNP Group in December 2021 C86354-JNP-XX-XX-RP-G-1001;
- FEH's catchment data *(https://fehweb.ceh.ac.uk/)*
- EA's *Flood Map for Planning*; *(https://flood-map-for-planning.service.gov.uk/)*
- EA's *Long Term Flood Risk Information*; *(https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)*
- OCC's Local Flood Risk Management Strategy (April 2015);
- CDC's Strategic Flood Risk Assessment (May 2017);
- TW's Asset Location Plans.

# 2 DEVELOPMENT SITE

## 2.1 Location

2.1.1 The development site is located at Land South of Green Lane in Chesterton, Oxfordshire (Figure 2.1 and Table 2.1).

2.1.2 The development site comprises of two fields, with a total area of approximately 14.8 ha. The large field to the west has an area of approximately 10.8 ha and is separated from the eastern field by a drainage ditch. The greenfield site is bounded by Green Lane to the north, a residential development and Vespasian Way to the east, and agricultural land to the south and the west.

Table 2.1: Site Location

| OS X | OS Y | National Grid Reference | Nearest Postcode |
|---|---|---|---|
| 455689 | 221044 | SP 55689 21044 | OX26 1DF |

Figure 2.1: Site Location


## 2.2 Topography

2.2.1 The available topographic information (Appendix A) shows that ground levels within the development site range between 74.4 m AOD and 71.3 m AOD, falling with an average slope of 1:150 from the north to the south.

## 2.3 Hydrology

2.3.1 The nearest permanent surface water feature is a stream / drain tributary of the Langford Brook. This drain is on the western site boundary. It should be noted that the ditches observed during the site inspection also feed into this stream.

## 2.4 Geology and Hydrogeology

2.4.1 In accordance with BGS' *Geoindex*, the following bedrock geological units are present at the site, the Kellaways Clay Member, the Cornbrash Formation and the Forest Marble Formation. The stratigraphic sequence of these units comprises the Forest Marble as the lowest unit, overlain by the Cornbrash, which in turn is overlain by the Kellaways Clay. The Kellaways Clay is present at the surface within the southern half of the site, with the underlying Cornbrash outcropping within the north and west of the site. Superficial deposits are absent at the site.

2.4.2 A Phase 2 ground investigation was carried out by JNP Group in June 2022 (ref. C86354-JNP-XX-XX-RP-G-1004).

2.4.3 This found a variable thickness (up to 0.7m) of made ground in the north-east of the site. 0.2 to 0.45m topsoil was underlain by 0.5 to 1.75m of both granular and cohesive superficial deposits in the west of the site.

2.4.4 Superficial deposits were not encountered in the remainder of the site, where the Cornbrash Formation was encountered, consisting of sandy silts and clays in addition to silty clayey gravel, overlying limestone. Kellaways Clay Member was encountered in the south east of the site.

2.4.5 Thicknesses of Kellaways Clay Member and Cornbrash Formation was not proven.

2.4.6 DEFRA / EA's *MAGiC* map classifies the site's bedrock as a Secondary A Aquifer.

2.4.7 The EA defines Secondary A Aquifers as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, in some cases forming an important source of base flow to rivers*".

2.4.8 In accordance with DEFRA / EA's *MAGiC*, map the site is not in a groundwater source protection zone.

2.4.9 Records of three boreholes within 250 m of the site were obtained from BGS' *Geology of Britain Viewer*. They relate to historical wells, and the geological strata was not recorded. The records of three boreholes located approximately 500 m west of the site, relating to construction of the M40 have been consulted (references SP52SW20 CHESTERTON CUTTING C7 AKEMAN ST BHY7, SP52SE15 CHESTERTON CUTTING C7 BH059 and SP52SE50 M40 BANBURY BYPASS BH234G)

2.4.10 The above boreholes indicate a southwards dipping sequence of 3.90 m of the Kellaways Clay Member (present only in the south), underlain by up to 3 m of Cornbrash Formation, in turn underlain by between 3 m and 5 m of clay and limestone of the Forest Marble Formation, underlain in turn by the White Limestone Formation, comprising between 3 m and 5 m of limestone with interbedded mudstone, overlying limestone.

2.4.11 Groundwater monitoring was carried out as part of the JNP Group phase 2 ground investigation. Groundwater was encountered in the overlying superficial deposits (including Weathered Cornbrash Formation) between 0.60 – 2.05 m below ground level. During the subsequent monitoring period, groundwater was recorded between 0.58 – 1.80 m below ground level, and was generally shallowest in the south of the site.

2.4.12 In the south east of the site, groundwater was encountered at 0.47 – 2.05 m below ground level in the underlying Kellaways Clay Member. Groundwater levels peaked in early March 2022 and declined thereafter.

2.4.13 Based on the available geologic and hydrogeologic information – namely lithology and groundwater levels– infiltration drainage is deemed unfeasible at the development site.

2.4.14 Due to the shallow groundwater identified on site, the contractor will need to follow appropriate construction methodology for shallow groundwater during the construction phase. Appropriate construction types for buried structures should also be used.

# 3 PROPOSED DEVELOPMENT

3.1.1 The proposed development (Figure 3.1 and Appendix A) comprises up to 147 homes, public open space, flexible recreational playing field area and sports pitches with associated car parking, alongside landscaping, ecological enhancements, SuDs, green / blue and hard infrastructure, with vehicular and pedestrian/cycle accesses, and all associated works (all matters reserved except for means of access)

3.1.2 The development comprises approximately 14.8 Ha total area, with an estimated 3 Ha of impermeable surfaces.

3.1.3 Under *Table 2* of the *Flood Risk and Coastal Change Guidance* (August 2022), the proposed residential development is classified as more vulnerable.

**Figure 3.1: Proposed Development**

# 4 FLOOD RISK ASSESSMENT

## 4.1 Overview

4.1.1 All potential sources of flood risk at the development site have been assessed based on the information listed in Section 1.3 and are summarised in Table 4.1. The key sources of flood risk to the proposed development are further described in the ensuing sections.

Table 4.1: Potential Sources of Flood Risk

| Source | Flood Risk |
|---|---|
| Coastal | Very low risk as site levels > 70 m AOD |
| Fluvial | Very low risk as site wholly located in Flood Zone 1. |
| Surface Water | Very low risk in general, but low to high towards the south-west and south-east boundaries of the western parcel. |
| Groundwater | Low risk in Groundsure Report but shallow groundwater levels noted during ground investigation. |
| Sewers | Very low to low risk as there are no sewers located on site, but there are sewers located by the development, east of site. |
| Infrastructure Failure | Very low risk in general as no reservoirs located in the vicinity of site. |

## 4.2 Climate Change

4.2.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

4.2.2 In accordance with the EA's guidance *Flood Risk Assessment: Climate Change Allowances* (May 2022), the proposed development with anticipated life span into the 2080s (2070 to 2115) must take account of the following allowances:

- Peak River Flows (Cherwell and Ray Management Catchment)
  - Central ..... 15%
  - Higher Central ..... 25%
  - Upper End ..... 49%
- Peak Rainfall Intensity (Cherwell and Ray Management Catchment)
  - Central ..... 25%
  - Upper End ..... 40%

## 4.3 Fluvial Flood Risk

4.3.1 Fluvial flooding occurs when a catchment area receives greater than usual amounts of water (e.g. rainfall or snow melt). When the converging runoff exceeds the conveyance capacity of the receiving channel, water spills onto the surrounding floodplains and fluvial flooding occurs.

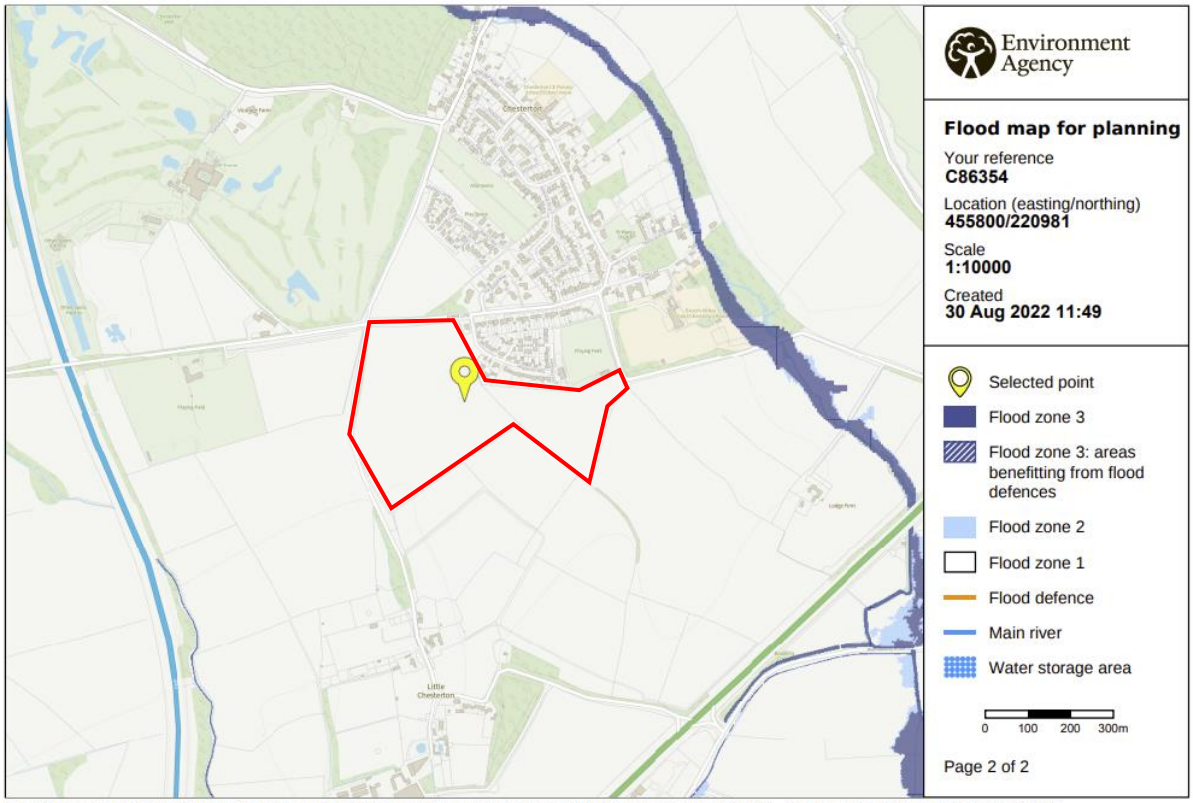
4.3.2 Fluvial flooding usually occurs hours or days after heavy and / or prolonged rainfall and its effects often last several hours or days.

4.3.3 Besides posing a direct flood risk to floodplain areas, high water levels in watercourses can exacerbate other sources of flood risk by surcharging / locking outfalls, thus preventing the normal discharge of flows or even back flowing into tributary drainage systems.

4.3.4 In accordance with the EA's *Flood Map for Planning* (Figure 4.1), in the site is entirely within Flood Zone 1 (< 0.1 % AEP).

4.3.5 The site does not benefit from formal flood defences.

**Figure 4.1: Flood *Map for Planning***






4.3.6 The OCC and CDC's strategic flood risk assessments do not provide any additional information on the history of flooding at the development site.

4.3.7 The overall fluvial flood risk is very low at the development site as the entire site is in Flood Zone 1.

## 4.4 Surface Water Flood Risk

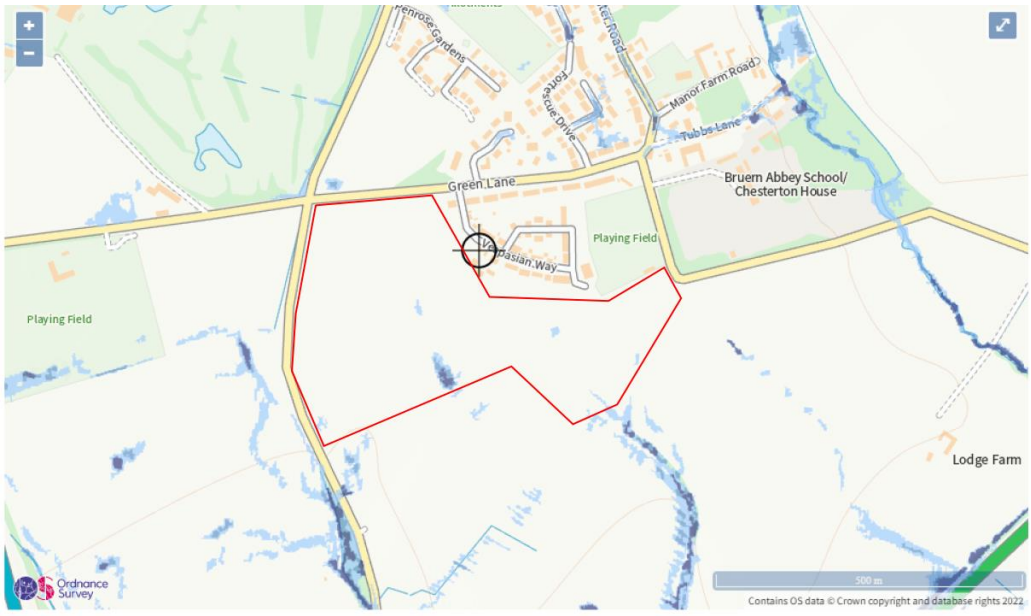
4.4.1 Surface water flooding is a description for excessive overland flows that have yet to enter a natural or manmade receptor (e.g. aquifer, watercourse or sewer). Surface water flooding also occurs when the amount of runoff exceeds the capacity of the collecting system and spills onto overland flow routes.

4.4.2 Surface water flooding is usually the result of very intense, short lived rainfall events, but can also occur during milder, longer lived rainfall events, when collecting systems are at capacity or the ground is saturated. It often results in the inundation of low points in the terrain.

4.4.3 In accordance with the EA's *Long Term Flood Risk Information* (Figure 4.2), the development site is mostly at very low (< 0.1% AEP) risk of surface water flooding. There are also some isolated areas of low risk. Within the western field there is an area of low to medium risk at the south-west corner and an area of low to high risk towards the south-east corner which upon review of the topographical survey is caused by a localised low spot.

4.4.4 All areas of surface water flooding are indicated to have a flood depth of below 300mm.

**Figure 4.2: Flood Risk from Surface Water**




4.4.5 OCC and CDC's strategic flood risk assessments are based on the EA's *Long Term Flood Risk Information* and do not provide any additional information regarding surface water flood risk.

4.4.6 The overall surface water flood risk is considered to be low. No development is proposed in the south-west area of low to medium risk. The area of low to high risk towards the south-east corner of the western field is due to a topographical low spot which will not be reflected in the post-development ground levels. Any residual risk can be managed by the measures outlined in Section 5.2.

## 4.5 Groundwater Flood Risk

4.5.1 Groundwater flooding occurs when the level of water filling the pores and / or cracks in the underlying soil and / or rock (i.e. water table) rises and emerges on the surface. The level of the water table varies seasonally and depends upon long term rainfall, thickness and porosity of the underlying strata and groundwater abstraction.

4.5.2 Groundwater flooding is most common in areas where the underlying bedrock and superficial deposits are very porous, but it can also happen at locations where superficial layers of sand or gravel overlay impermeable bedrock.

4.5.3 Groundwater flooding usually occurs after days or weeks of prolonged rainfall and often lasts for days or weeks, as subsiding of the water table can be a very slow process.

4.5.4 Besides posing a direct flood risk to developments (particularly basements), high water table levels can exacerbate other sources of flood risk by preventing infiltration and / or leaking into drainage systems.

4.5.5 The overall groundwater flood risk is deemed as low, as per the GroundSure report included in Appendix C.

4.5.6 The Phase 2 Ground Investigation encountered shallow groundwater across the site, with monitored water levels varying from 0.47 – 2.05 m below ground level. It is proposed to lift site levels as part of the works, which will lower the risk of groundwater flooding.

4.5.7 Considering the above, the risk of groundwater flooding is considered to be low. However, during the construction phase, the contractor will need to follow appropriate construction methodology for shallow groundwater. Appropriate construction types for buried structures should also be used.

### 4.6 Sewer Flood Risk

4.6.1 Sewer flooding occurs when a manmade drainage system receives greater than usual amounts of water and the overwhelmed system starts overflowing at gullies and manholes, thus generating overland flows.

4.6.2 Sewer flooding is usually the result of very intense, short lived rainfall events, but can also occur during milder, longer lived rainfall events, when outfalls become surcharged / locked by high water levels in the receiving feature.

4.6.3 In addition to a flood risk, overflowing combined sewers also pose a significant public health and environmental risk.

4.6.4 SDC's strategic flood risk assessment shows records of sewer flooding in Kidlington, but no records of flooding at the development site. Kidlington is not located in the vicinity of site, with its centre being approximately 9.5 km away, in the south west direction.

4.6.5 TW's asset location plans (Appendix A) show several public sewers near the development site, particularly near the residential development to the east of site. TW's asset location plans do not provide any additional information on the public sewers.

4.6.6 TW have confirmed that the additional foul flows resulting from the development would not lead to an increased risk of foul sewer flooding downstream of the development, as the outfall via the pumping station in Vespasian Way bypasses the village. Correspondence with TW is included in Appendix D.

4.6.7 The overall sewer flood risk is deemed as very low as there are no sewers on site.

# 5 FLOOD RISK MANAGEMENT

## 5.1 Sequential and Exception Tests

5.1.1 The sequential, risk-based approach to the location of development is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim is to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible.

5.1.2 Application of the sequential approach in the master planning process, in particular application of the *Sequential Test*, helps ensure that development can be safely and sustainably delivered, and developers do not waste resources promoting proposals which are inappropriate on flood risk grounds.

5.1.3 The *Sequential Test* ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The aim is to steer new development to Flood Zone 1 (areas with a low probability of sea or river flooding).

5.1.4 The proposed development is located entirely in Flood Zone 1, so the requirements of the sequential test have been met and the exception test is not required.

## 5.2 Flood Risk Management Measures

5.2.1 Flood risk at the development is deemed very low to low.

5.2.2 The following flood risk management measures have been incorporated in the proposed development's master plan:

- Any overland flows will be safely routed towards existing boundary ditches or the proposed swale on site;
- Proposed levels will be raised across the site.

## 5.3 Flood Risk Management during Construction

5.3.1 The groundwater monitoring carried out as part of the phase 2 ground investigation found groundwater between 0.47 m to 2.05 m below existing ground level.

5.3.2 Proposed site levels are to be increased, which prevents groundwater flooding from posing more than a low risk to occupants of the site over its design life.

5.3.3 However, during the construction phase, the contractor will need to follow appropriate construction methodology for shallow groundwater. Appropriate construction types for buried structures should also be used.

# 6 SURFACE WATER DRAINAGE STRATEGY

## 6.1 Existing Drainage (Greenfield Runoff)

6.1.1 The undeveloped (greenfield) development site does not benefit from a formal surface water drainage system. Runoff generated within the site is expected to infiltrate into the ground or flow overland towards Langford Brook.

6.1.2 The greenfield runoff rate was calculated using the IoH124 methodology with the ICP SuDS correction for small catchments. The HR Wallingford maps indicate the site has a WRAP class of 1, representing a well drainage permeable soil. The resulting greenfield $Q_{Bar}$ discharge rate is 0.4 l/s/ha. The calculations are included in Appendix E.

6.1.3 The intrusive ground investigation found that shallow groundwater is present across the site. Therefore, a WRAP class of 3 is more appropriate for the site, representing permeable soils with shallow groundwater in low lying areas.

6.1.4 The simple approach in Oxfordshire County Council's 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' document states that discharge rates should be limited to QBar for rainfall events up to and including the 1 in 100 year event (including 40% climate change allowance) or 2 l/s/ha, whichever is the greater.

6.1.5 An increased discharge rate of 2.0 l/s/ha has been selected and agreed with the LLFA and LPA. Correspondence with the LLFA and LPA is included in Appendix D.

6.1.6 The proposed development has been split into two parcels. The western parcel includes the 147 dwellings, and associated vehicular, pedestrian and cycle accesses. The eastern catchment includes public open space and the flexible recreational playing field area.

6.1.7 The total area of the western parcel made impermeable by the proposed development is estimated at 2.994 Ha, including 1.596 Ha of adopted and private roads, and 1.398 ha of roofs and private driveways.

6.1.8 As per the OCC local standards document, a 10% allowance should be made for urban creep to take into account potential increases in impermeable area that do not require consent, such as paving of gardens or small extensions.

6.1.9 The 10% allowance has been applied to the area of the roofs and private driveways. Therefore, the total area made impermeable by the development is estimated at 3.134 ha.

6.1.10 Therefore, the total discharge rate from western parcel, based on assumed developable areas and a discharge rate of 2 l/s/ha will be 6.3 l/s.

6.1.11 In the eastern parcel, only the hard surfaced sports pitches will be positively drained. The other sports pitches and areas of public open space will drain via infiltration as per the existing ground.

6.1.12 The total area made impermeable by the hard surfaced sports pitches is 0.355 Ha. Therefore, the total discharge rate from eastern catchment, based on a discharge rate of 2 l/s/ha will be 0.7 l/s.

## 6.2 Proposed Drainage Strategy

6.2.1 The proposed surface water drainage strategy has been designed in accordance with the Sewerage Sector Guidance *Design and Construction Guidance* and *Building Regulations Part H* and in compliance with the *NPPF*, local requirements and current best practices[†], to collect, convey and attenuate runoff from all impermeable areas before discharging into nearby surface water features.

6.2.2 The strategy is shown in Appendix E.

6.2.3 Given the unfeasibility of infiltration drainage (Section 2.4), following the drainage hierarchy, the next preferred option is discharging to a surface water body.

6.2.4 The western parcel has been split into six catchments. Surface water runoff from roofs in each catchment will be collected via rainwater pipes and conveyed via gravity to a detention basin. Private roads and drives will feature tanked pervious paving, which will also be conveyed to these detention basins via gravity.

6.2.5 Surface water runoff from adopted roads will be collected by a network of swales and filter drains, and conveyed to the two southernmost detention basins.

6.2.6 Discharge from the basins will be restricted, and the maximum overall discharge rate from the western parcel will be 6.3 L/s, for a storm with 1% AEP with a 40% allowance for climate change.

6.2.7 The restricted runoff from the basins will be conveyed by a new swale to the existing watercourse that runs parallel to the south eastern boundary of the site.

6.2.8 It is proposed to lift site levels to ensure sufficient unsaturated zone to accommodate the detention basins. The base of these will be set 300mm above the peak wet season monitored groundwater levels. Proposed levels are shown on the drainage layout in Appendix E.

6.2.9 In the eastern parcel, the hard-surfaced sports pitches will be of pervious construction. Rainwater will infiltrate into the sub-base and then be conveyed via gravity to a detention basin. Discharge from the basin will be restricted and the maximum overall discharge rate from the eastern parcel will be 0.7L/s, for a storm with 1% AEP with a 40% allowance for climate change. The restricted runoff from the basin will be conveyed via gravity to the existing ditch that bisects the site.

6.2.10 The proposed drainage strategy (Appendix E) has been designed so that:

- flooding does not occur on any part of the site for all events up to 3.3% AEP (1 in 30 years);
- flooding does not occur in any part of a building or utility plant susceptible to water for all events up to 1.0% AEP (1 in 100 years) + 40% climate change allowance. Flood volumes and exceedance flow routes for the 1.0% AEP + 40% climate change allowance are shown on the exceedance flow plan in Appendix E.

6.2.11 The performance of the proposed surface water drainage strategy has been tested for storm events with 100.0% AEP, 3.3% AEP and 1.0% AEP + 40% climate change and durations of 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640 and 10080 minutes.

[†] e.g. *Non-Statutory Technical Standards for Sustainable Drainage Systems* (March 2015) and *The SuDS Manual* (2015).

## 6.3 Sustainable Drainage Systems (SuDS)

6.3.1 In accordance with the *NPPF*, (major) developments should incorporate sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate. In addition to water quantity control, SuDS should consider opportunities to provide water quality and amenity / biodiversity benefits (i.e. multifunctionality approach).

6.3.2 The proposed drainage strategy features seven detention basins. These have been designed to reduce risks to end users to acceptable levels, whilst providing water quality, biodiversity and amenity benefits.

6.3.3 The basins have been sited to be visible to the public. This reduces the risk of a member of the public entering the basins and becoming trapped, and also increases the amenity benefit to users of the development.

6.3.4 Basin banks are no steeper than 1 in 3 within this strategy, to ensure that any member of the public that enters the basin can safely exit.

6.3.5 Continued consideration of risk is required at later design stages.

6.3.6 Fencing is to be considered only where the basins are considered to be high risk or where visibility is poor. Any proposed planting should be limited to reeds that will not obstruct visibility.

6.3.7 Table 6.1 summarises the SuDS components deemed compatible with the site's characteristics and which are included in the proposed drainage strategy.

6.3.8 It is important to note the need to remove silt from runoff prior to discharge into SuDS features. SuDS such as filter drains, swales, bioretention systems and pervious pavements are sustainable alternatives to proprietary treatment systems otherwise required to manage silt.

**Table 6.1: Sustainable Drainage Systems (SuDS)**

| SuDS Component | Description and Opportunities |
|---|---|
| Swales | Swales are shallow, flat bottomed, vegetated open channels designed to treat, convey and often attenuate surface water runoff. Swales can also provide aesthetic and biodiversity benefits.<br>Swales can help reduce flow rates by facilitating infiltration and / or providing attenuation storage when flow at the outlet is controlled. Coarse to medium sediments and associated pollutants can be removed by filtration through surface vegetation and ground cover.<br>Swales are well suited for managing runoff from linear features such as main roads / highways. Swales are generally difficult to incorporate into dense urban developments, where space is limited.<br>Sales are proposed. around the boundary of the development to convey surface water runoff from roads to the detention basins. A swale is also proposed to convey attenuated runoff to the watercourse parallel to the south eastern boundary of the site. |

| SuDS Component | Description and Opportunities |
|---|---|
| Filter Drains / Filter Strips | Filter drains are trenches filled with stone/gravel that create temporary subsurface storage for the filtration, attenuation, and conveyance of surface water runoff. Ideally, filter drains receive lateral inflow from adjacent impermeable surfaces pre-treated over a filter strip.<br>Filter drains can help manage peak flows by naturally limiting rates of conveyance through the filter medium and by providing attenuation storage when the rate of flow at the outlet is controlled.<br>Filter drains can be effectively incorporated into the landscape and public open spaces and can have minimal land take requirements. The use of filter drains is typically restricted to flat sites (unless placed parallel to contours).<br>Filter drains are best located adjacent to (small) impermeable surfaces such as car parks and roads / highways, and are proposed to collect runoff from internal adopted roads where swales or pervious construction are not appropriate. |
| Bioretention Systems | Bioretention systems (including rain gardens) are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution. They also provide attractive landscape features and biodiversity.<br>Bioretention systems can help reduce flow rates from a site by promoting infiltration / evapotranspiration and providing some attenuation storage. Bioretention systems can also provide very effective treatment functionality.<br>Bioretention systems are a very flexible surface water management component that can be integrated into a wide variety of developments / densities using different shapes, materials, planting and dimensions. These could be used in the landscaped areas on the development site. Potential locations for bioretention systems are indicated on the drainage strategy in Appendix E. |
| Detention Basins | Detention basins are landscaped depressions that are normally dry expect during and immediately following storm events. They can be on-line components where surface runoff from regular events is routed through the basin or off-line components into which runoff is diverted once flows reach a specific threshold.<br>Detention basins can be vegetated depressions (providing treatment in on-line components) or hard landscaped storage areas. Off-line basins will normally have an alternative principal use (e.g. amenity or recreational facility or urban (hard) landscaping).<br>Seven detention ponds are proposed, located throughout the site. |
| Pervious Pavement | Pervious pavements provide a pavement suitable for pedestrian and / or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before discharge downstream.<br>Pervious pavement drainage has been shown to have decreased concentrations of a range of surface water pollutants, including heavy metals, oil and grease, sediment and some nutrients.<br>Pervious pavements are typically built as an alternative to impermeable surfaces and therefore require no extra development space for their construction. Private roads and drives are proposed to be of pervious construction. |

## 6.4 Exceedance Events

6.4.1 Plot levels are generally set 150 mm above external ground levels and external ground levels shall be designed to safely route overland flows away from buildings and towards existing boundary ditches or the proposed swales, using the less vulnerable parts of the proposed development such as public open spaces, parking areas and roads to convey and store overland flows.

6.4.2 Overland flows resulting from exceedance events are expected to leave the developed site via the proposed swales and existing boundary ditches as currently occurs (i.e. pre-development conditions), without posing any increased flood risk on site or elsewhere.

6.4.3 Exceedance flow routes are shown in Appendix E.

## 6.5 Water Quality Management

6.5.1 The suitability of the proposed drainage strategy to manage the development's pollution risk has been assessed using the simple index approach in *The SuDS Manual* (2015), as summarized in Table 6.2.

**Table 6.2: Surface Water Quality Management (Simple Index Approach)**

| Runoff Route / Treatment Train 1 | | | | |
|---|---|---|---|---|
| **Land Use / SuDS** | **Hazard Level** | **TSS** | **Metals** | **Hydro-Carbons** |
| *Pollution Hazard Indices* | | | | |
| Residential Roofs | Very Low | 0.20 | 0.20 | 0.05 |
| Driveways, residential car parks and low traffic roads | Low | 0.50 | 0.40 | 0.40 |
| *SuDS Mitigation Indices* | | | | |
| Detention Basin | - | 0.50 | 0.50 | 0.60 |
| Swale | - | 0.50 | 0.60 | 0.60 |
| *Total SuDS Mitigation Index = Detention basin index + 0.5(swale index)* | | | | |
| Total SuDS Mitigation Index | - | 0.75 | 0.80 | 0.90 |
| **Total SuDS Mitigation Index ≥ Pollution Hazard Index (for each contaminant type)** | | | | |

*Note: additional treatment will be provided by pervious paving, filter strips / drains and bioretention systems where runoff is conveyed through these features. These features have not been included in this calculation, because all of the site runoff will be conveyed through the detention basins and swale, which provide adequate treatment.*

## 6.6 Operation and Maintenance

6.6.1 The function of the surface water drainage system must be understood by those responsible for maintenance, regardless of whether individual components are below ground or on the surface. In any system properly designed, monitored and maintained, performance deterioration can usually be minimised.

6.6.2 The long-term operation and maintenance of the proposed surface water drainage strategy will be the responsibility of the entities, as detailed in Table 6.3. Appropriate legal agreements defining maintenance responsibilities and access rights over the lifetime of the proposed development must be established prior to construction.

**Table 6.3: Entities Responsible for SuDS Maintenance**

| SuDS Component | Location | Function | Responsible Entity |
|---|---|---|---|
| Swale | Public open space | Convey and treat runoff | Local highways authority (if receiving runoff from an adopted road only) or private management company |
| Detention Basin | Public open spaces | Store & treat runoff | Private management company |
| Filter Strip / Drain | Adjacent to roads (public open space) | Convey and treat runoff | Local highways authority |
| Pervious pavement | Private roads and drives | Convey and treat runoff | Householder (if within private curtilage) or private management company. |
| Bioretention Systems | Public open space | Convey and treat runoff | Private management company |

6.6.3 Where the user / benefiter of a system is not responsible for maintenance, then it is important to ensure that they know when the SuDS is not functioning correctly and who to contact if any issue arises.

6.6.4 Maintenance plans are often required to clearly identify who is responsible for maintaining proposed SuDS as well as the maintenance regime to be applied. Maintenance plans can also form a useful tool for public engagement with SuDS and understanding their wider benefits. The maintenance requirements of the proposed surface water drainage strategy are summarised in Table 6.4.

**Table 6.4: Typical Operation and Maintenance Requirements**

| Operation and Maintenance Activity | SuDS Component | | | | |
|---|---|---|---|---|---|
| | Filter Drain | Swale | Bioretention System | Pervious Pavement | Detention Basin |
| Inspection | ■ | ■ | ■ | ■ | ■ |
| Litter and debris removal | ■ | ■ | ■ | ■ | ■ |
| Grass cutting | ■ | ■ | ■ | □ | ■ |
| Weed and invasive plant control | □ | | | □ | □ |
| Shrub management (including pruning) | | □ | □ | □ | □ |
| Shoreline vegetation management | | | | | □ |
| Aquatic vegetation management | | | | | □ |
| Sediment management | ■ | ■ | ■ | ■ | ■ |
| Vegetation replacement | | □ | □ | | □ |
| Vacuum sweeping and brushing | | | | ■ | |
| Structure rehabilitation/repair | □ | □ | □ | □ | □ |
| Infiltration surface reconditioning | □ | □ | □ | □ | |

## 6.7 Drainage During Construction

6.7.1 Drainage is typically an early activity in the construction of a development, taking form during the earthworks phase. However, the connection of piped drainage system to SuDS components should not take place until the end of construction works, unless a robust strategy for silt removal prior to occupation of the site is implemented.

6.7.2 Silt-laden runoff from construction sites represents a common form of waterborne pollution and cannot enter SuDS components not specifically designed to manage this, as it can overwhelm the system and pollute receiving water features. Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to SuDS components.

6.7.3 The three principal aspects of drainage during construction are conveying runoff, controlling runoff and trapping sediments:

- Conveyance of runoff can be achieved through small ditches / swales, channels and drains. Runoff control measures should be implemented to ensure that runoff does not overwhelm the temporary drainage system causing flooding on site or elsewhere.
- Control of runoff can be achieved through perimeter ditches or appropriate grading to ensure that any runoff from the construction site stays on site. Runoff rates leaving the site should be managed so they do not exceed pre-development conditions.
- Construction runoff should be directed to dedicated infiltration basins with adequate upstream sediment and pollution control such as sediment basins, silt fences and straw bales prior to infiltration or off-site discharge.

6.7.4 Additional conveyance, control and treatment measures should be installed as needed during grading. Slope stability needs to be considered when using open water features to convey, control and treat runoff across the site. Any necessary surface stabilisation measures should be applied immediately on all disturbed areas where construction work is either delayed or incomplete.

6.7.5 Maintenance inspections should be performed weekly, and maintenance repairs should be made immediately after periods of rainfall.

6.7.6 All drainage infrastructure (namely underground features) must be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers and storing construction materials away from the drainage infrastructure.

# 7 FOUL WATER DRAINAGE STRATEGY

7.1.1 Sewerage undertakers have a legal obligation under the Water Industries Act 1991 to provide developers with the right to connect to public (foul) networks. The Water Industries Act 1991 also contains safeguards to ensure that flows resulting from new developments do not cause detriment to the existing public sewerage networks by imposing a duty on sewerage undertakers to carry out works required to accommodate additional flows into their networks.

7.1.2 The undeveloped (greenfield) development site does not benefit from a formal foul water drainage system, but in accordance with records obtained from TW (Appendix A), the residential development east of the site is served by a public network of foul sewers. The nearest public foul sewer is the 150 mm pipe along Vespasian Way, approximately 38.5 m west of site.

7.1.3 In response to a Developer Enquiry, TW confirmed acceptance of the proposed connection to the public foul sewer at the junction of Green Lane and Vespasian Way, MH SP5521811D (Appendix A). Foul flows will then flow via gravity to an existing pumping station in Vespasian Way, which will be upgraded to accommodate these additional flows.

7.1.4 TW confirmed that the additional foul flows would not lead to an increased risk of foul sewer flooding, as the outfall via the pumping station in Vespasian Way bypasses the village. Correspondence with TW is included in Appendix D.

7.1.5 As invert levels of the existing public foul drainage network are not deep enough to allow gravity drainage from the site, on site pumping of foul flows will be required. The proposed drainage strategy (Appendix E) proposes a pumping station (designed to adoptable standards, with a cordon sanitaire of 20 m to all dwellings) in the south western part of the site.

# 8 CONCLUSIONS AND RECOMMENDATIONS

8.1.1 All potential sources of flood risk at the development site have been assessed based on the information listed in Section 1.3 of this report.

8.1.2 Coastal, fluvial, sewers and infrastructure flood risks are considered to be very low. Groundwater flood risk is deemed as low, while surface water flood risk is considered very low, with isolated areas of low to high risk. The surface water flood risk areas are not due to any offsite overland flow routes and can be managed by the proposed development levels directing any exceedance flows away from properties and towards the proposed on-site swale and existing boundary ditches.

8.1.3 The proposed surface water drainage strategy has been designed in accordance with the LLFA documents, and SuDS features (including seven detention basins and swales) will be used on site. Further SuDS features incorporated into the drainage strategy include pervious pavements, filter strips / drains and bioretention systems.

8.1.4 Surface water discharge from the western parcel of the site will be restricted to 6.3 L/s, and 0.7L/s from the eastern parcel, equivalent to 2 L/s/Ha. This has been agreed with the LLFA. The proposed drainage strategy has been modelled, and no flooding occurs for all events up to the 3.3% AEP, and no buildings or utility plant are flooded for all events up to the 1.0% AEP with a 40% allowance for climate change.

8.1.5 The proposed development will not increase offsite flood risk. Any exceedance flows generated within the site will be managed by designing external ground levels to safely route overland flows away from buildings and towards boundary ditches or proposed swales, using less vulnerable parts of the development.

8.1.6 The proposed foul water strategy includes a foul pumping station built to adoptable standards. Thames Water have confirmed capacity for the foul water flows.

# 9 LIMITATIONS

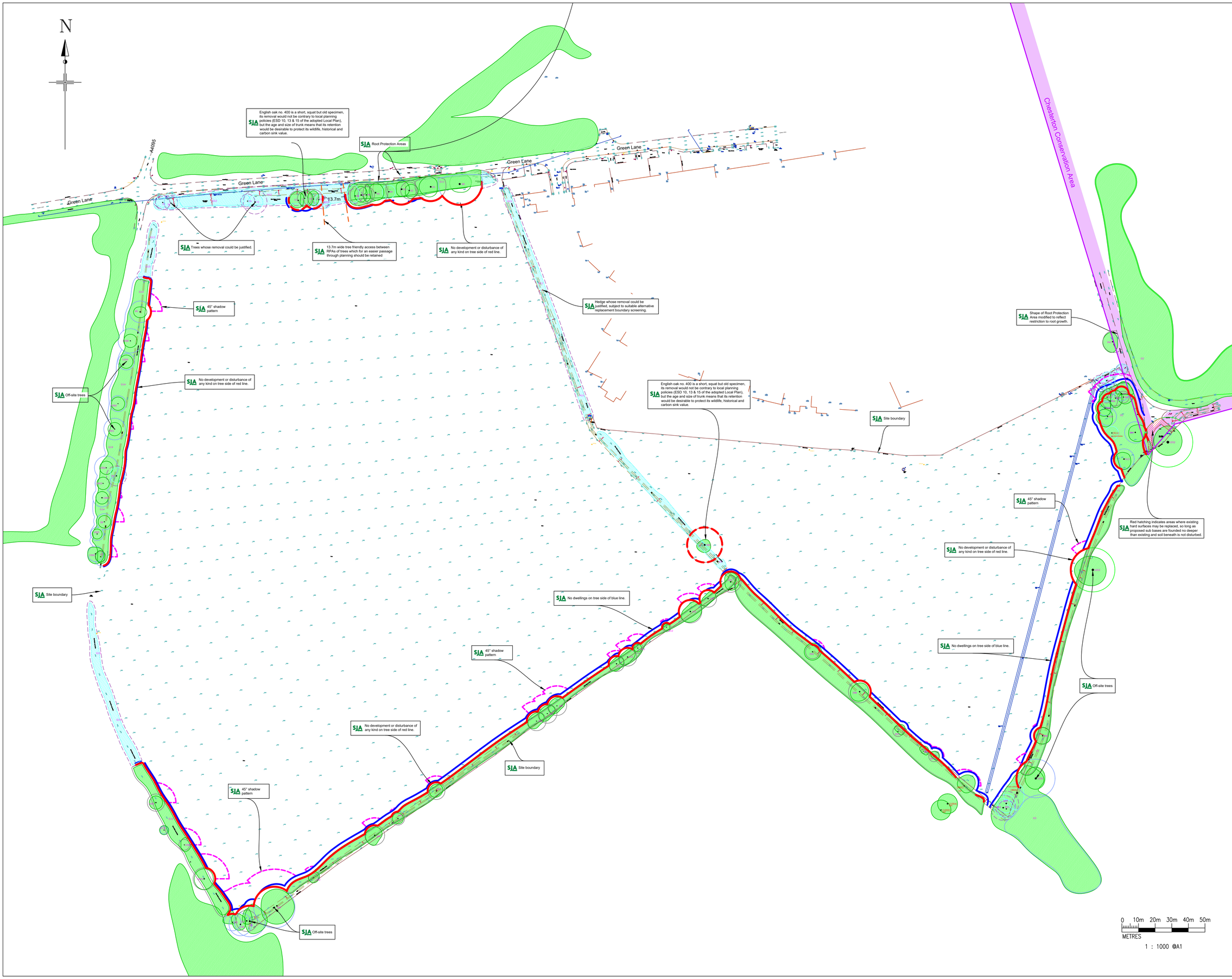
9.1.1 The information, conclusions and recommendations presented within this report are deemed to be current at the time of issue. No guarantee can be given to the status of this information other than at the time of issuing. Where necessary, the user shall confirm the status of any applicable assessments and consents.

9.1.2 This report has been commissioned by Wates Developments. No third party may receive a copy of this report without first obtaining our permission in writing.

9.1.3 This report is confidential and has been prepared solely for the benefit of Wates Developments and those parties with whom a warranty agreement has been executed or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of this report, written approval must be sought from JNP Group and a charge may be levied against such approval. JNP Group accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, or this document being used by any third party with whom an agreement has not been executed.

9.1.4 The copyright of this report remains with JNP Group at all times.

# APPENDIX A
## SITE INFORMATION




## G1 Trees whose removal could be justified

Trees whose canopies are shown in light blue are those whose removal would not appear to conflict with national, regional or local planning policies and therefore can be justified in arboricultural terms. These comprise specimens that are either surrounded by other, better quality trees, or those which are situated internally within the site and are not contributing significantly to the local landscape, boundary screening, or public views. Some larger or more visible trees may also be included where it can be demonstrated that removal would neither impair the local landscape significantly, nor open up views into or out of the site.

A tree shown as one whose removal could be justified does not mean that it has to be removed, nor that its removal is necessarily desirable in arboricultural or landscape terms; it means simply that in our judgement it should not be considered to be a material constraint on a proposed development layout.

If specimens whose removal could be justified are to be retained, they must be protected from construction damage in the same way as those trees identified as being retained: i.e. there must be no development or disturbance of any kind within their root protection areas, the extents of which are depicted in green, blue or grey. See "Arboricultural Constraints" below.

Consequently, if a proposed layout can be designed to be entirely outside the constraint lines shown on this plan, it is unlikely that the LPA will raise any objections to the scheme on the grounds of loss of or damage to existing trees. If this cannot be achieved, then objections may be expected: these could necessitate direct liaison with council officers, further design work or a recommendation for refusal of a planning application.

## Arboricultural Constraints

The bold red line represents the closest to trees to be retained that proposed development can be located without encroaching into root protection areas ('RPAs').

The bold blue line represents the closest to the canopies of trees to be retained that dwellings may be located without necessitating excessive or unacceptable pruning. Subject to tree species, habit, size and orientation, proposed dwellings can be located as close to 3m from the canopies of trees of large ultimate size and no closer than 2m from the canopies of small or ornamental species, as long as blind or partially blind flank walls face the trees. Non residential structures such as garages, sheds or bin stores may be located up to and even beneath tree canopies, but must not encroach into RPAs.

Where proposed dwellings are located within an arc between the north-west and east of retained trees (their shadow pattern through the main part of the day), elevations containing windows of living rooms or kitchens (habitable rooms, used for long periods during the day - BS 8206 Part 2), should not be sited so they directly face the trees within a distance equivalent to their present heights. These areas are indicated by the dashed pink segments on the plan.

## Root Protection Areas (RPAs)

To assist in the prediction of the likely impact of development on retained trees, a model is used. This model, based on the size of individual specimens, is the central feature of the British Standard 'Trees in relation to design, demolition and construction - Recommendations', BS 5837: 2012. This document provides a useful and consistent starting point for the assessment of likely impacts on trees.

The Standard recommends that an area around each retained tree should be protected from disturbance in order to maintain the tree's viability; within which the protection of the roots and soil structure is treated as a priority.

These root protection areas ('RPAs') have been calculated for all live trees with at least ten years' potential in accordance with Section 4.6 of the Standard; and are shown as areas bordered in green, blue or grey according to tree category. Normally portrayed as a circle of a fixed radius from the centre of the trunk; but where there appear to be barriers to root growth they have been reshaped to more accurately reflect the likely distribution of roots.

SJA trees ARBORICULTURAL PLANNING CONSULTANTS

| | | | | | |
|---|---|---|---|---|---|
| Project: | Land South of Green Lane, Chesterton | | | | |
| Client: | Wates | | | | |
| Drawing: | TREE CONSTRAINTS PLAN | | | | |
| Drawing no: | SJA TCP 20010-011 | | | Revision no: | |
| Based on: | Topographical survey | | | | |
| Drawn by: NHK/FJC | | Date of issue: Dec 2021 | | Scale: 1:1000 @ A1 | |
| Checked by: | | Tel:(01737) 813058 | | sja@sjatrees.co.uk | |
| Tree nos.: | ● 1053 | Category 'U' trees: | ● [862] | Canopies of trees to be retained: | |
| Category 'A' RPA: | | Category 'B' RPA: | | Category 'C' RPA: | |
| Devt. area: | | Trees that could be removed: | 74 | Shadow pattern: | |
| Cnsv area boundary: | | | | | |

FOR DESIGN GUIDANCE ONLY – NOT FOR SUBMISSION TO THE LPA!

For further information refer to the SJA Tree Survey Schedule

Do not scale from this drawing: please check all dimensions on site, and notify us of any discrepancies. SJAtrees (the trading name of Simon Jones Associates Ltd ) cannot be held responsible for inaccuracies in the topographical plan on which this drawing is based.

# Asset location search

Property Searches

JNP Group Consulting Engineers
CHESHAM
HP5 1HR

**Search address supplied** Land South of Green Lane
Green Lane
Chesterton
Bicester
Oxfordshire
OX26 1UU

**Your reference** C86354

**Our reference** ALS/ALS Standard/2021_4548927

**Search date** 29 November 2021

**Knowledge of features below the surface is essential for every development**

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

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

Contact us to find out more.

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

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

0800 009 4540

**Search address supplied:** Land South of Green Lane, Green Lane, Chesterton, Bicester, Oxfordshire, OX26 1UU

Dear Sir / Madam

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

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

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

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

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

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

**Contact Us**

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

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

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

## Waste Water Services

**Please provide a copy extract from the public sewer map.**

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

SP5621SW
SP5620NW
SP5521SE

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

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

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

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

The following quartiles have not been printed as they contain no assets:

SP5520NE

For your guidance:

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

## Clean Water Services

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

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

SP5621SW
SP5620NW
SP5520NE
SP5521SE

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

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

For your guidance:

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

**Payment for this Search**

A charge will be added to your suppliers account.

## Further contacts:

### Waste Water queries

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

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

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

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

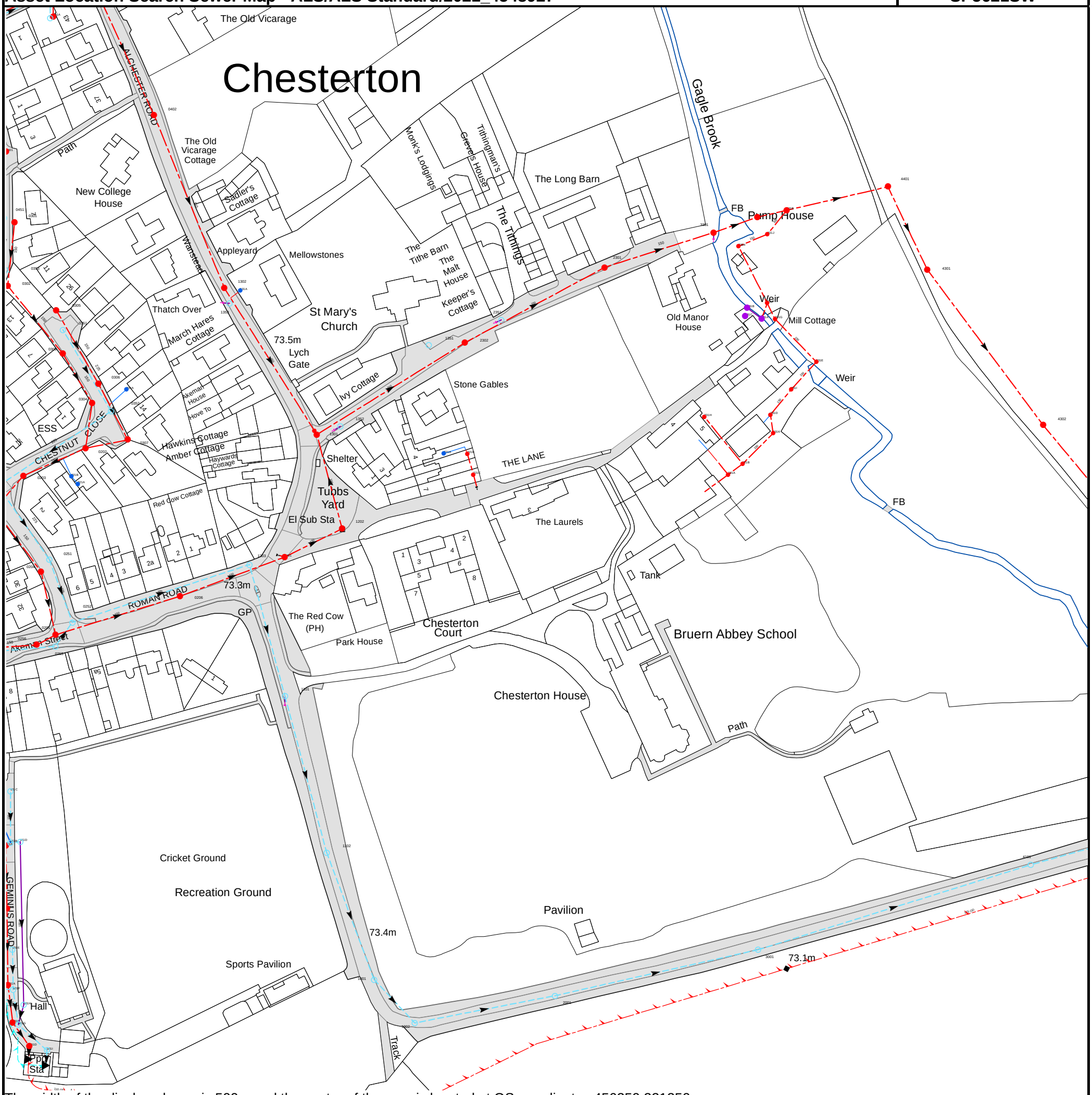
### Clean Water queries

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

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

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

**Asset Location Search Sewer Map - ALS/ALS Standard/2021_4548927** | **SP5621SW**




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 456250,221250

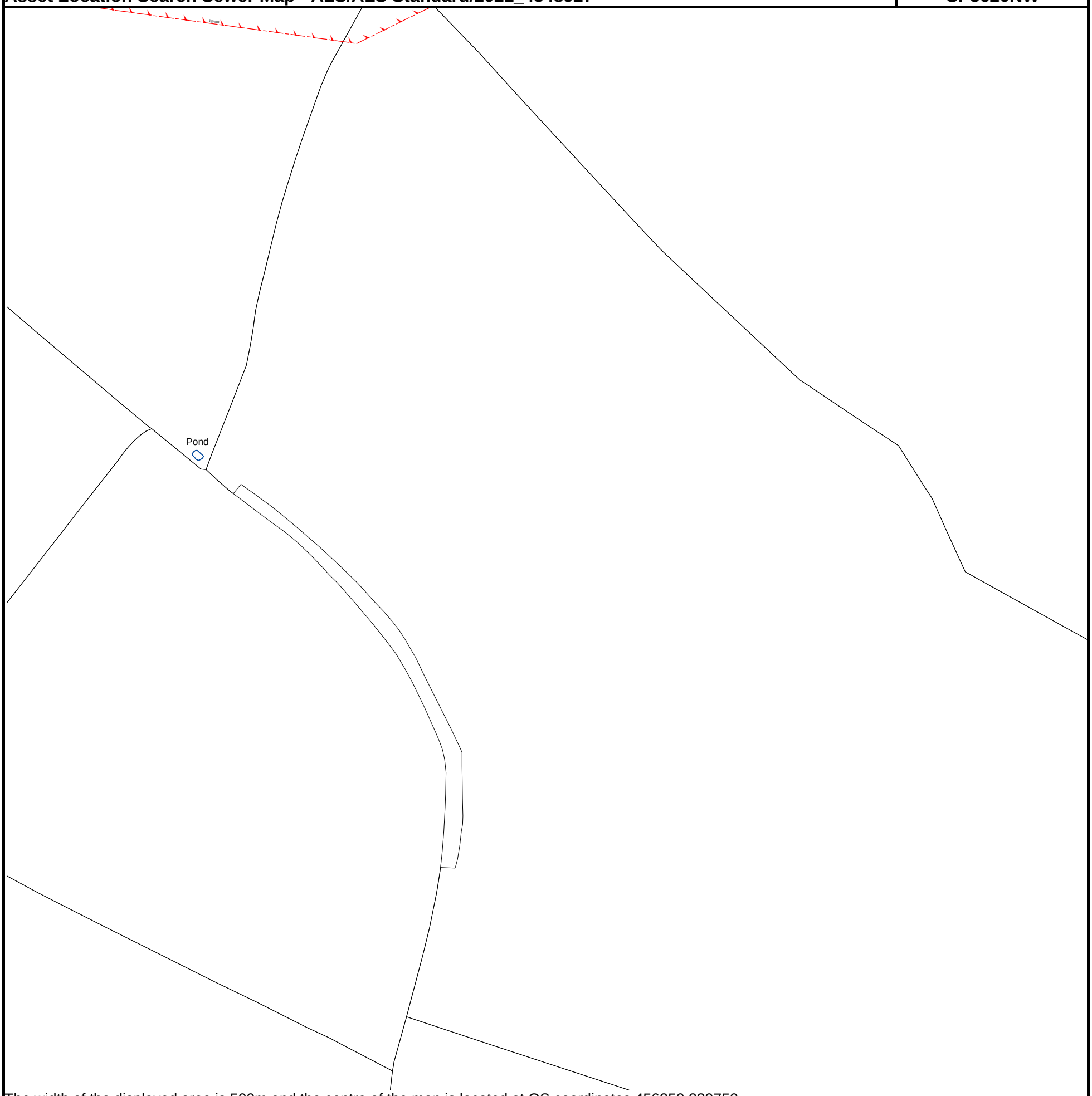
**The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual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

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

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 331F | n/a | n/a |
| 331J | n/a | n/a |
| 331D | n/a | n/a |
| 331K | n/a | n/a |
| 331G | n/a | n/a |
| 341B | n/a | n/a |
| 331I | n/a | n/a |
| 331E | n/a | n/a |
| 4401 | n/a | n/a |
| 4301 | n/a | n/a |
| 4101 | n/a | n/a |
| 4302 | n/a | n/a |
| 0206 | 73.7 | 71.61 |
| 1203 | n/a | n/a |
| 1201 | 72.99 | 71.925 |
| 1301 | 73.12 | 70.81 |
| 1352 | 73.44 | 72.54 |
| 1202 | 72.75 | 71.07 |
| 1351 | 73.73 | 71.98 |
| 221A | n/a | n/a |
| 2302 | 73.51 | 70.41 |
| 221B | n/a | n/a |
| 221C | n/a | n/a |
| 2351 | 73.01 | 72.18 |
| 331H | n/a | n/a |
| 321A | n/a | n/a |
| 321B | n/a | n/a |
| 331C | n/a | n/a |
| 331A | n/a | n/a |
| 0203 | 74.21 | 72.57 |
| 0204 | 74.55 | 72.18 |
| 0251 | 74.43 | 72.48 |
| 0205 | 74.65 | 71.99 |
| 0305 | 74.29 | 73.47 |
| 0351 | 74.17 | 73.39 |
| 0303 | 74.2 | 73.04 |
| 021B | n/a | n/a |
| 0252 | 74.65 | 72.47 |
| 021A | n/a | n/a |
| 0202 | 74.06 | 72.78 |
| 0304 | 74.04 | 72.87 |
| 0306 | 74.13 | 73.15 |
| 0352 | 73.94 | 73.13 |
| 031A | n/a | n/a |
| 0307 | 74.1 | 72.89 |
| 331B | n/a | n/a |
| 1353 | 73.59 | 72.73 |
| 131A | n/a | n/a |
| 1302 | 73.7 | 72.31 |
| 2301 | 71.82 | 69.87 |
| 3304 | n/a | n/a |
| 3301 | 69.9 | 67.26 |
| 0301 | 75.2 | 73.95 |
| 3401 | n/a | n/a |
| 0402 | 74.61 | 73.3 |
| 041B | n/a | n/a |
| 041A | n/a | n/a |
| 001I | 73.01 | 69.67 |
| 001D | 73.08 | 70.61 |
| 001G | 73.27 | 69.82 |
| 1002 | n/a | n/a |
| 001C | 73.27 | 70.7 |
| 001H | n/a | n/a |
| 2001 | n/a | n/a |
| 001F | 73.4 | 69.97 |
| 001A | 73.36 | 70.82 |
| 1001 | n/a | n/a |
| 3001 | n/a | n/a |
| 001E | 73.23 | 71.74 |
| 1102 | n/a | n/a |
| 011B | n/a | n/a |
| 011D | n/a | n/a |
| 011C | n/a | n/a |
| 1101 | n/a | n/a |
| 0255 | n/a | n/a |
| 0256 | n/a | n/a |
| 0302 | 74.82 | 73.36 |
| 0353 | 74.83 | 73.48 |
| 0401 | 75.33 | 74.65 |
| 011A | 73.66 | 71.24 |
| 001B | 73.3 | 71.05 |

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

| Asset Location Search Sewer Map - ALS/ALS Standard/2021_4548927 | SP5620NW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 456250,220750

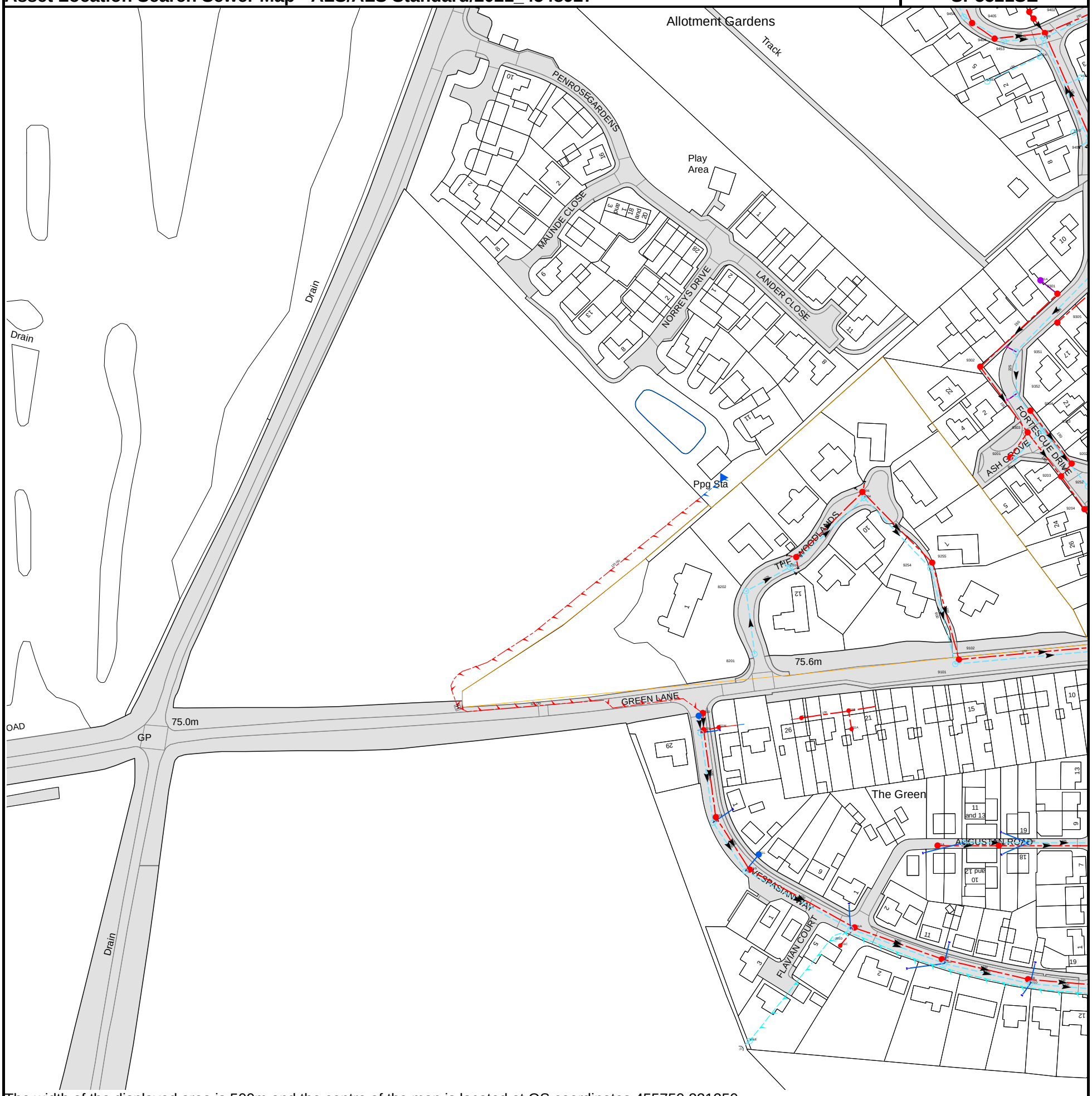
**The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual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

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

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| n/a | n/a | n/a |

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

**Asset Location Search Sewer Map - ALS/ALS Standard/2021_4548927** | **SP5521SE**




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,221250

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

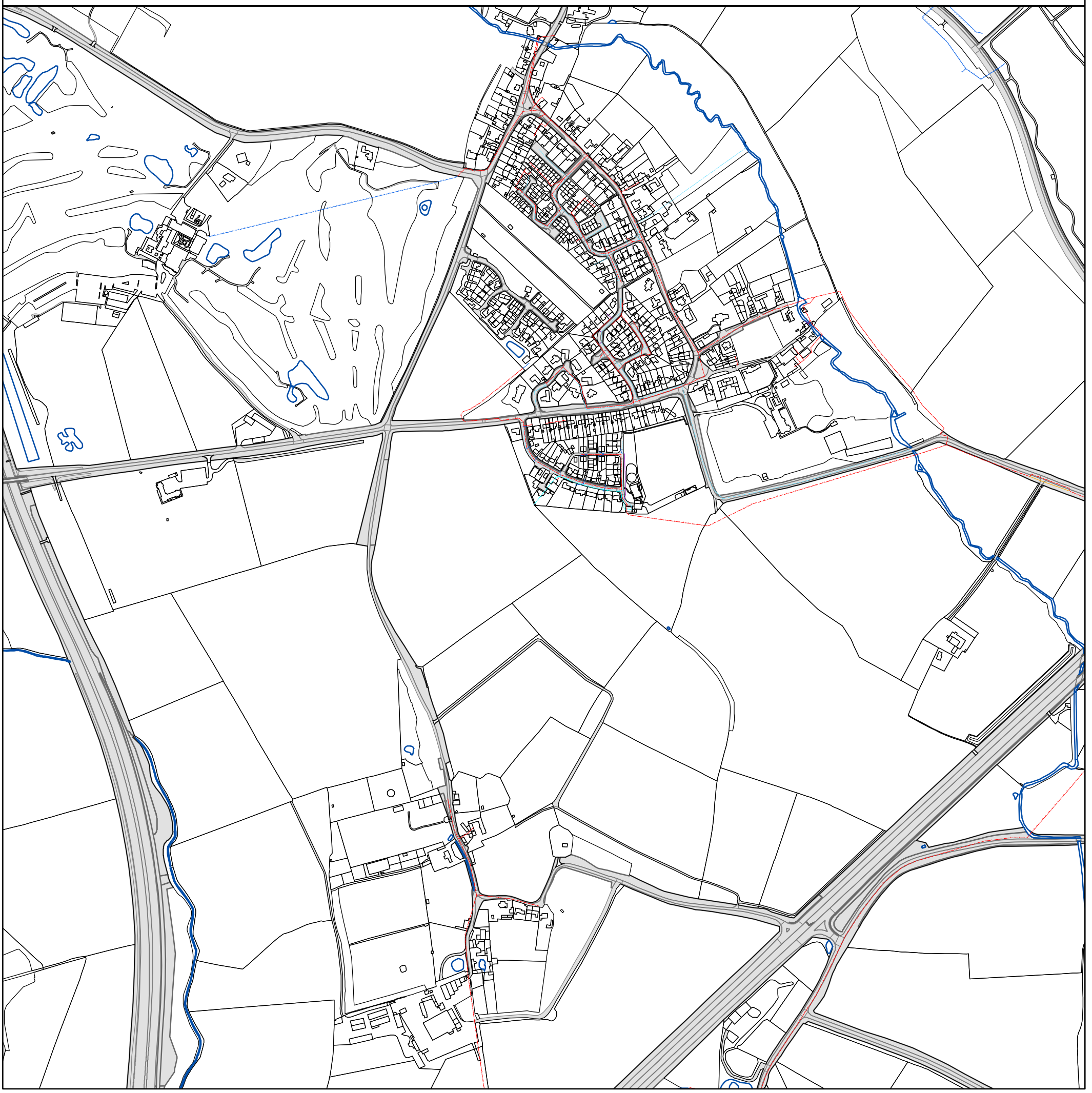
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 9203 | 74.28 | 72.54 |
| 9202 | 74.28 | 72.7 |
| 9251 | 74.49 | 73.18 |
| 9201 | 74.52 | 72.94 |
| 9303 | 74.43 | 72.76 |
| 9353 | 74.41 | 72.93 |
| 9304 | 74.5 | 73.05 |
| 9352 | 74.52 | 73.09 |
| 9302 | 74.68 | 72.96 |
| 9351 | 74.54 | 73.2 |
| 9305 | 74.69 | 73.52 |
| 9301 | 74.78 | 73.47 |
| 931A | n/a | n/a |
| 0451 | 75.15 | 73.59 |
| 9451 | 75.35 | 74.2 |
| 941G | n/a | n/a |
| 941E | n/a | n/a |
| 941F | n/a | n/a |
| 941A | n/a | n/a |
| 9453 | 76.1 | 74.54 |
| 9404 | 76.12 | 74.35 |
| 9452 | 75.85 | 73.67 |
| 9403 | 75.85 | 74.08 |
| 9405 | 76.27 | 74.55 |
| 9402 | 76.05 | 74.78 |
| 9454 | 76.33 | 75 |
| 9401 | 76.13 | 75.33 |
| 811K | 75.36 | 74.5 |
| 811H | 75.31 | 73.6 |
| 811D | 75.27 | 73.31 |
| 811E | 75.27 | 73.31 |
| 811I | 74.3 | 72.81 |
| 811F | 74.32 | 72.48 |
| 811M | n/a | n/a |
| 8202 | 75.24 | 73.81 |
| 8201 | n/a | n/a |
| 811L | n/a | n/a |
| 8203 | 75.07 | 73.7 |
| 8205 | 75.09 | 74.1 |
| 811C | n/a | n/a |
| 811B | n/a | n/a |
| 811A | n/a | n/a |
| 8206 | 74.79 | 73.63 |
| 8204 | 74.78 | 73.2 |
| 9254 | 74.78 | 73 |
| 9255 | 74.78 | 73.11 |
| 911A | 73.46 | 71.88 |
| 9101 | n/a | n/a |
| 9102 | n/a | n/a |
| 911C | n/a | n/a |
| 911B | 73.69 | 71.53 |
| 911D | n/a | n/a |
| 9204 | 74.35 | 72.47 |
| 9252 | 74.27 | 72.77 |
| 801E | 73.35 | 72.9 |
| 901D | 73.53 | 71.36 |
| 901B | 73.56 | 71.03 |
| 901C | 73.31 | 71.71 |
| 901A | 73.28 | 71.31 |
| 801C | 73.37 | 71.84 |
| 801D | 73.41 | 72.14 |
| 801B | 73.49 | 71.99 |
| 801A | 73.49 | 71.62 |
| 811J | 73.88 | 72.4 |
| 811G | 73.87 | 72.03 |

**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 with the sanction of the Controller of H.M Stationary Office License Number 10019345

# ALS/ALS Standard/2021_4548927



0 45 90 180 270 360
Meters



| | |
|---|---|
| **Scale:** | 1:7161 |
| **Width:** | 2000m |
| **Printed By:** | Rveldhur |
| **Print Date:** | 29/11/2021 |
| **Map Centre:** | 455858,220941 |
| **Grid Reference:** | SP5520NE |

**Comments:**

# ALS Sewer Map Key

## Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

## 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

Dam Chase

Fitting

Meter

Vent Column

## Operational Controls

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

Control Valve

Drop Pipe

Ancillary

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.

Outfall

Undefined End

Inlet

## Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

**Areas**

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

## Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

**Notes:**

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

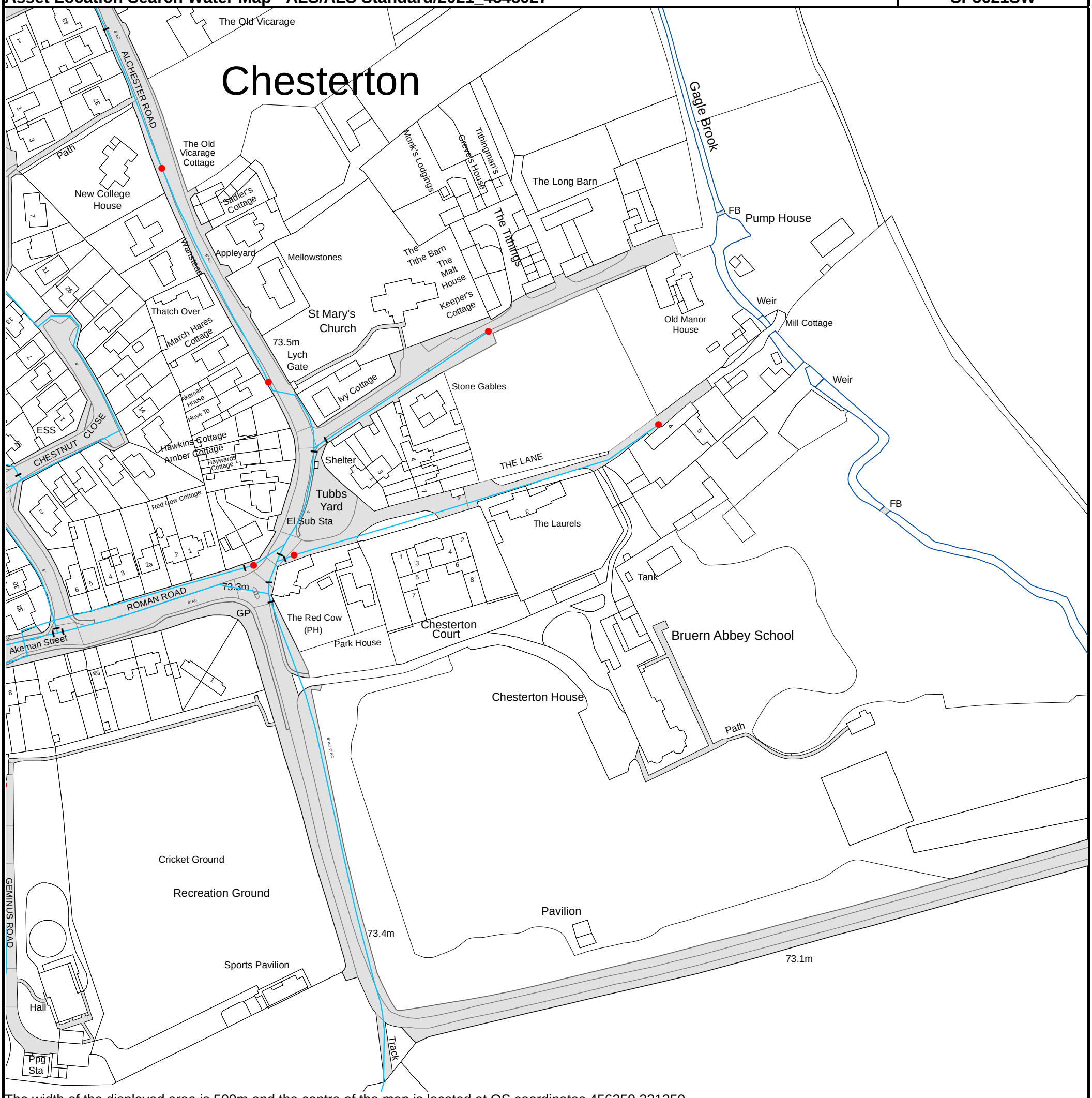
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. 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 present on the plan, please contact a member of Property Searches on 0800 009 4540.

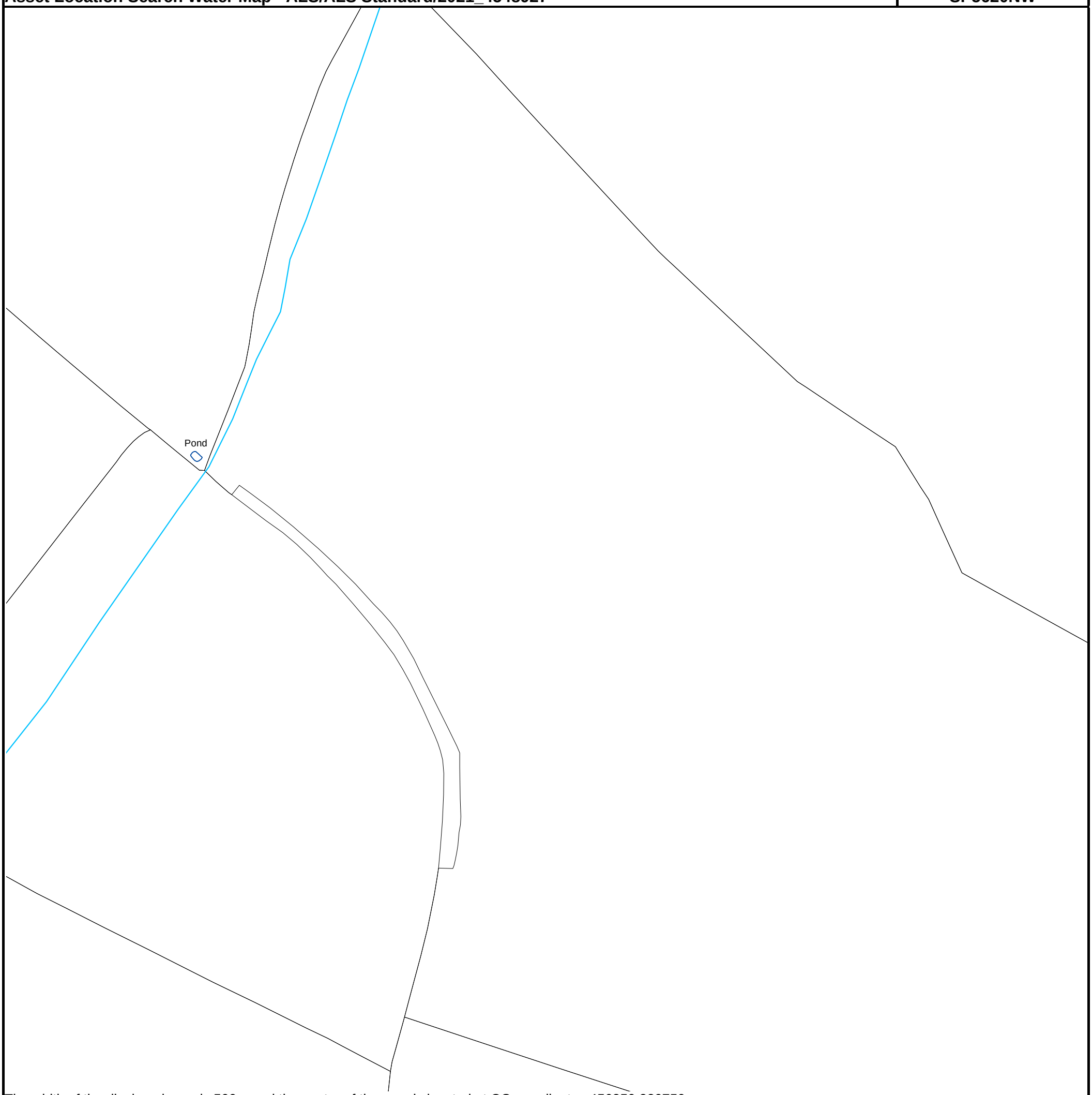
| Asset Location Search Water Map - ALS/ALS Standard/2021_4548927 | SP5621SW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 456250,221250

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

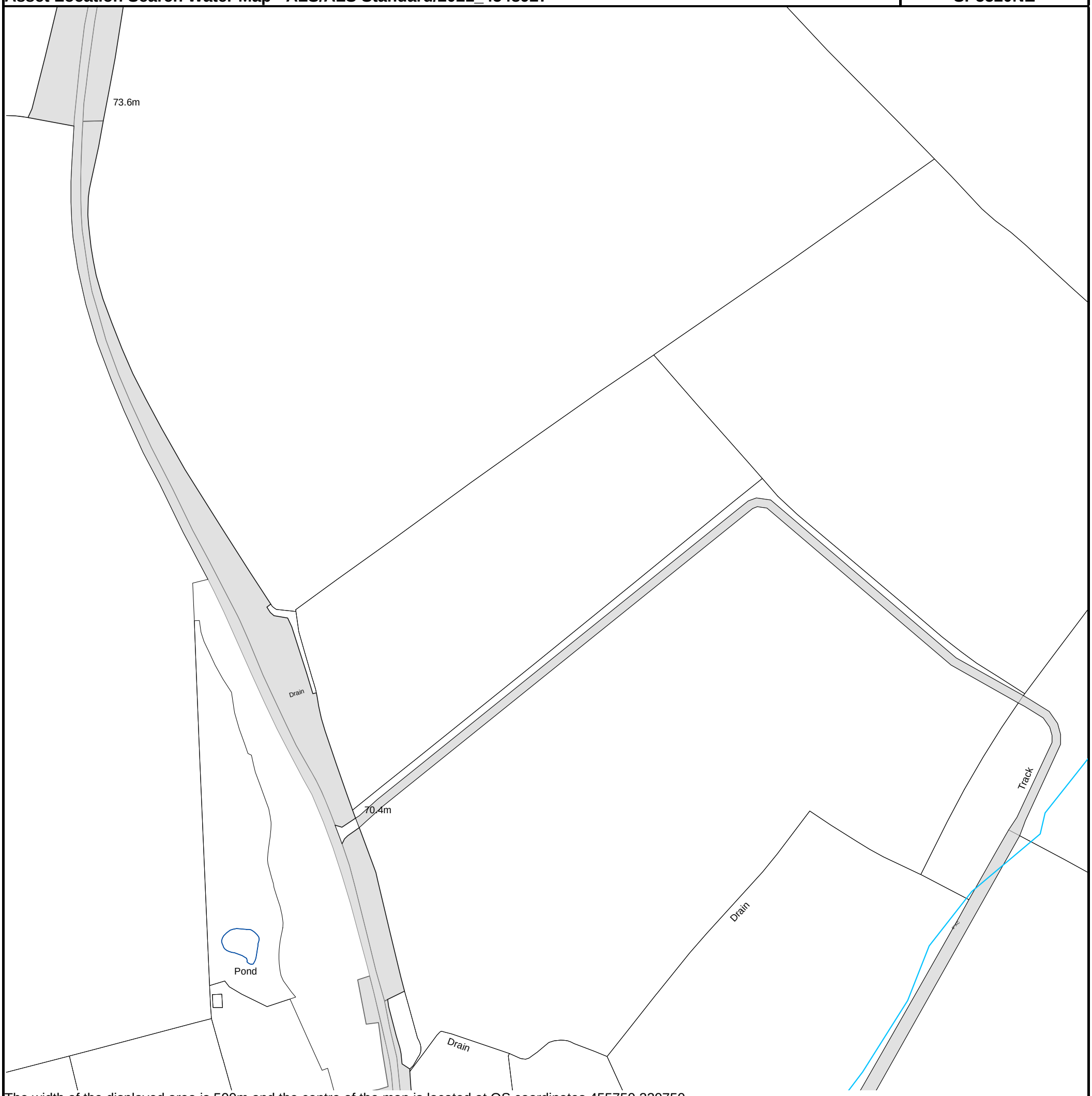
| Asset Location Search Water Map - ALS/ALS Standard/2021_4548927 | SP5620NW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 456250,220750

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

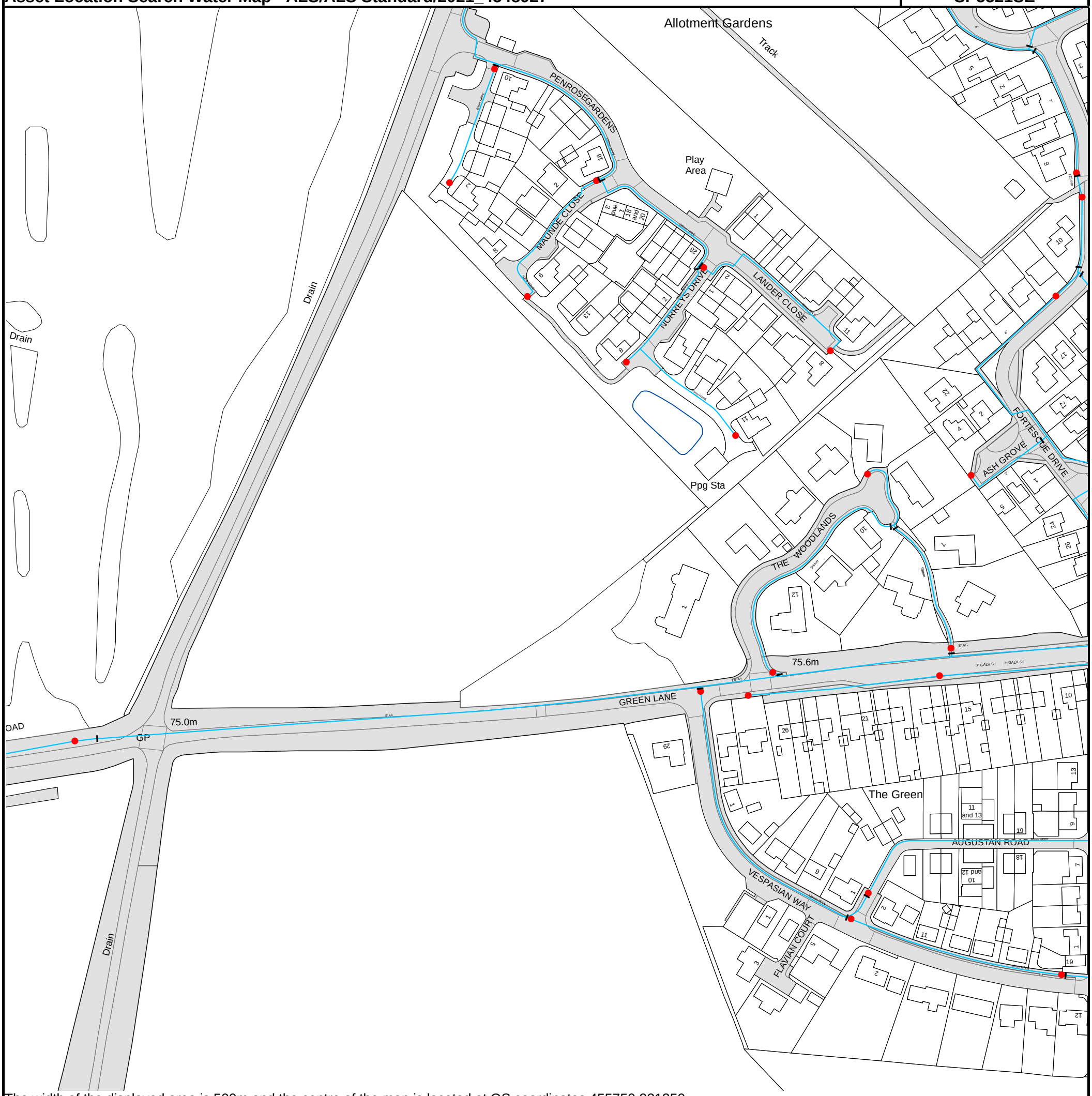
| Asset Location Search Water Map - ALS/ALS Standard/2021_4548927 | SP5520NE |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,220750

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

| Asset Location Search Water Map - ALS/ALS Standard/2021_4548927 | SP5521SE |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,221250

**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.**

# ALS Water Map 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.

## 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

| 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') |

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

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

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

## Terms and Conditions

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

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

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

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

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

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

### Ways to pay your bill

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

# APPENDIX B
## PROPOSED DEVELOPMENT




A1

0 10 20 30 M

1:1000

353_Site Plan 230727.vwx

## NOTES:

**DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.**

All dimensions to be checked on site.

Drawing to be read with all relevant Architectural, Interiors, Structural, M&E, Drainage/Public Health, Landscape, Civils and Interiors drawings and specifications. Any discrepancies between consultant's drawings to be reported to the Architect before any work commences.

The Contractor's attention is drawn to the Health & Safety matters identified in the Health & Safety plan as being potentially hazardous.

These items should not be considered as a full and final list.

The Work Package Contractor's normal Health & Safety obligations still apply when undertaking constructional operations both on and off site.

Ayre Chamberlain Gaunt take no responsibility for the location of legal boundaries indicated on this drawing and advise a separate drawing be completed by a specialist surveyor in order to establish exact boundaries.

DWG files provided for information only. Refer to PDF record.



Application Site

ACGARCHITECTS.CO.UK

Ayre Chamberlain Gaunt
Belvedere House
Basing View
Basingstoke
Hampshire, RG21 4HG

+44 (0)1256 363 987
mail@acgarchitects.co.uk

AYRE CHAMBERLAIN GAUNT

**PROJECT**
Chesterton
Land South of Green Lane

**DRAWING TITLE**
ILLUSTRATIVE MASTERPLAN

| REV | DATE | DESCRIPTION |
|---|---|---|
| 1 | 31/08/2022 | Issue for Planning |
| 2 | 03/11/2022 | Issue for Planning |

| REV. | VER. | APPROVED BY |
|---|---|---|
| P2 | .00 | DA |

**DRAWING NO.**
project code - originator - volume - level - type - role - number
353-ACG-XX-00-DR-A-1050

**SUITABILITY**
code description
A2 APPROVED FOR PLANNING STAGE

# APPENDIX C
## FLOOD RISK INFORMATION

# 7 River and coastal flooding

## 7.1 Risk of flooding from rivers and the sea

| Records within 50m | 0 |
|---|---|

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 7.2 Historical Flood Events

| Records within 250m | 0 |
|---|---|

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

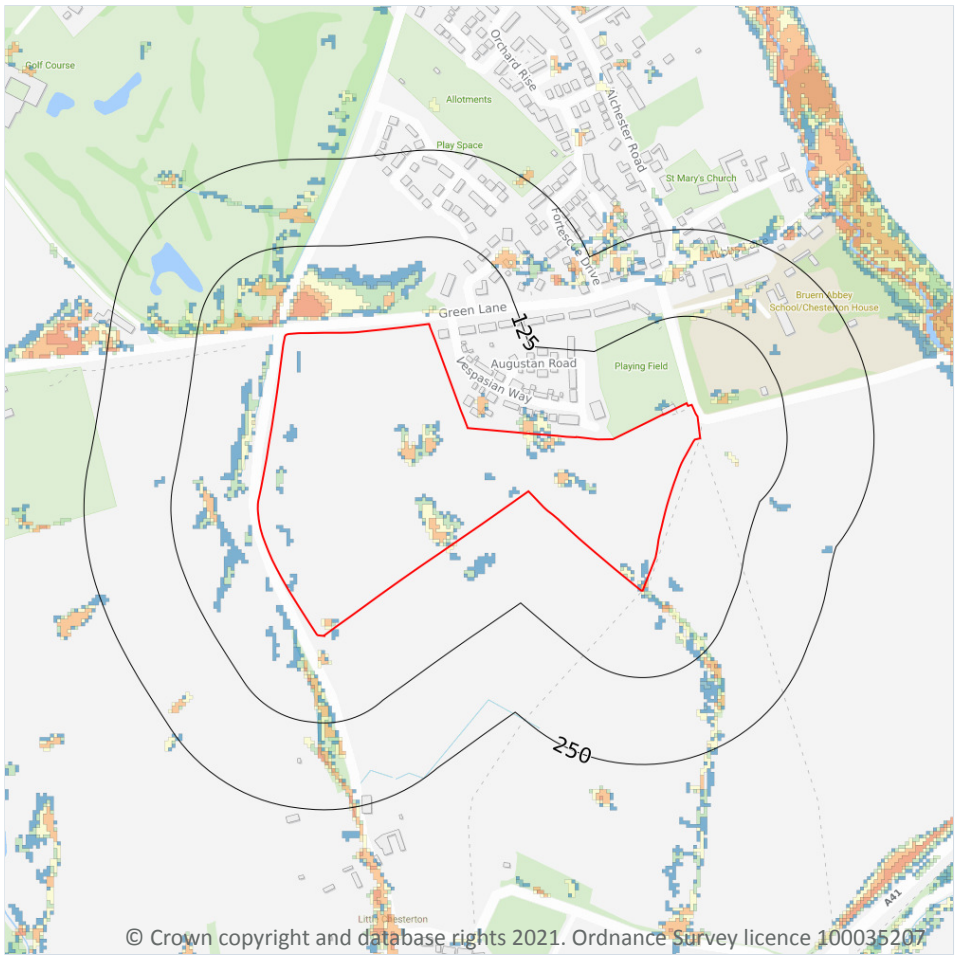
## 7.3 Flood Defences

| Records within 250m | 0 |
|---|---|

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

# 8 Surface water flooding




Site Outline
Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

## 8.1 Surface water flooding

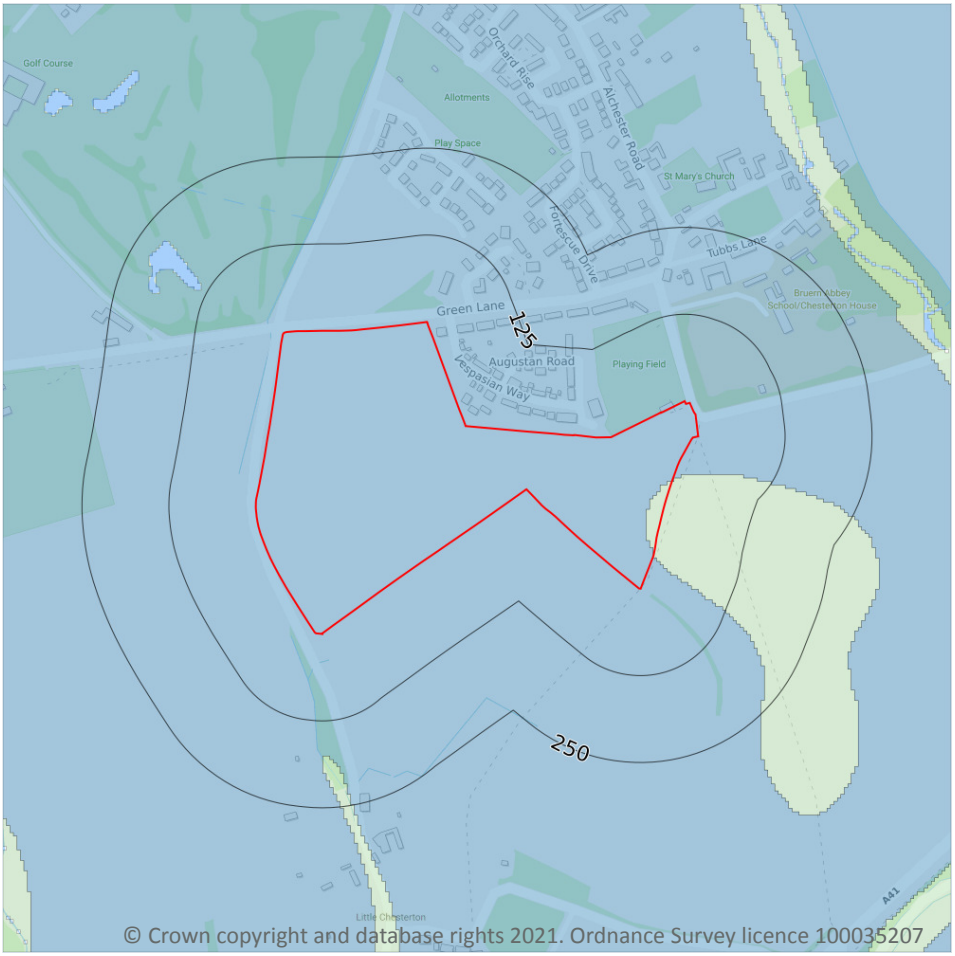
| | |
|---|---|
| **Highest risk on site** | **1 in 30 year, 0.1m - 0.3m** |
| **Highest risk within 50m** | **1 in 30 year, Greater than 1.0m** |

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 47**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

# 9 Groundwater flooding




Site Outline

Search buffers in metres (m)

- High
- Moderate - High
- Moderate
- Low
- Negligible

## 9.1 Groundwater flooding

| | |
|---|---|
| **Highest risk on site** | **Low** |
| **Highest risk within 50m** | **Low** |

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 49**

*This data is sourced from Ambiental Risk Analytics.*

# APPENDIX D
## CORRESPONDENCE

## Martin Hitchcock

| | |
|---|---|
| From: | James Hern <James.Hern@thameswater.co.uk> |
| Sent: | 06 August 2022 09:14 |
| To: | Martin Hitchcock |
| Cc: | Zaid Kazi; Rodrigo Magno |
| Subject: | Chesterton, Bicester - statement on accommodating new developments |
| Attachments: | 20220806 Chesterton, Bicester foul sewer network.JPG |

Morning Martin,

At our recent meeting to discuss your site known as Land South of Green Lane in Chesterton, near Bicester, we talked about the approach Thames Water has been taking in relation to accommodating growth in the village.

Foul water from the village of Chesterton drains to the south towards a pumping station known as Audley House Sewage Pumping Station (SPS). Flow entering this pump station is lifted a short distance across the road, connecting into the head of a foul sewer network that drains to another pumping station known as Oxford Road Caravan Site SPS. From here, flow is pumped directly to Bicester Sewage Treatment Works.

Sewer modelling impact studies undertaken to understand the impact of growth in the area have supported reported evidence of capacity constraints within the foul sewer network serving the village of Chesterton. As such, Thames Water has adopted an approach of looking to avoid connecting foul water flow from new developments into the village itself.

The drainage strategy for the recently build out Alchester Park development on Green Lane involves a new pump station. The rising main for this pumping station by-passes the village and connects to the same foul sewer that Audley House SPS. Since being built and adopted by Thames Water, the Alchester Park sewer network has been used to receive flow from another development at Penrose Gardens. The developer was required to connect into the sewer network in Alchester Park. Other developments in this area will be directed towards Alchester Park to avoid

As you confirmed, the preferred drainage strategy for your site at Land South of Green Lane will involve a connection into the Alchester Park development. This proposal fits in with Thames Water plans to accommodate growth and minimise the impact from a foul water perspective in the village outlined above.

For information, upsizing works on the sewer network upstream of Oxford Road Caravan Site SPS were completed in 2019 by Thames Water to accommodate an increase in the volume of flow coming through the Alchester Park pumping station.

Do let Zaid or I know if you have any further questions.

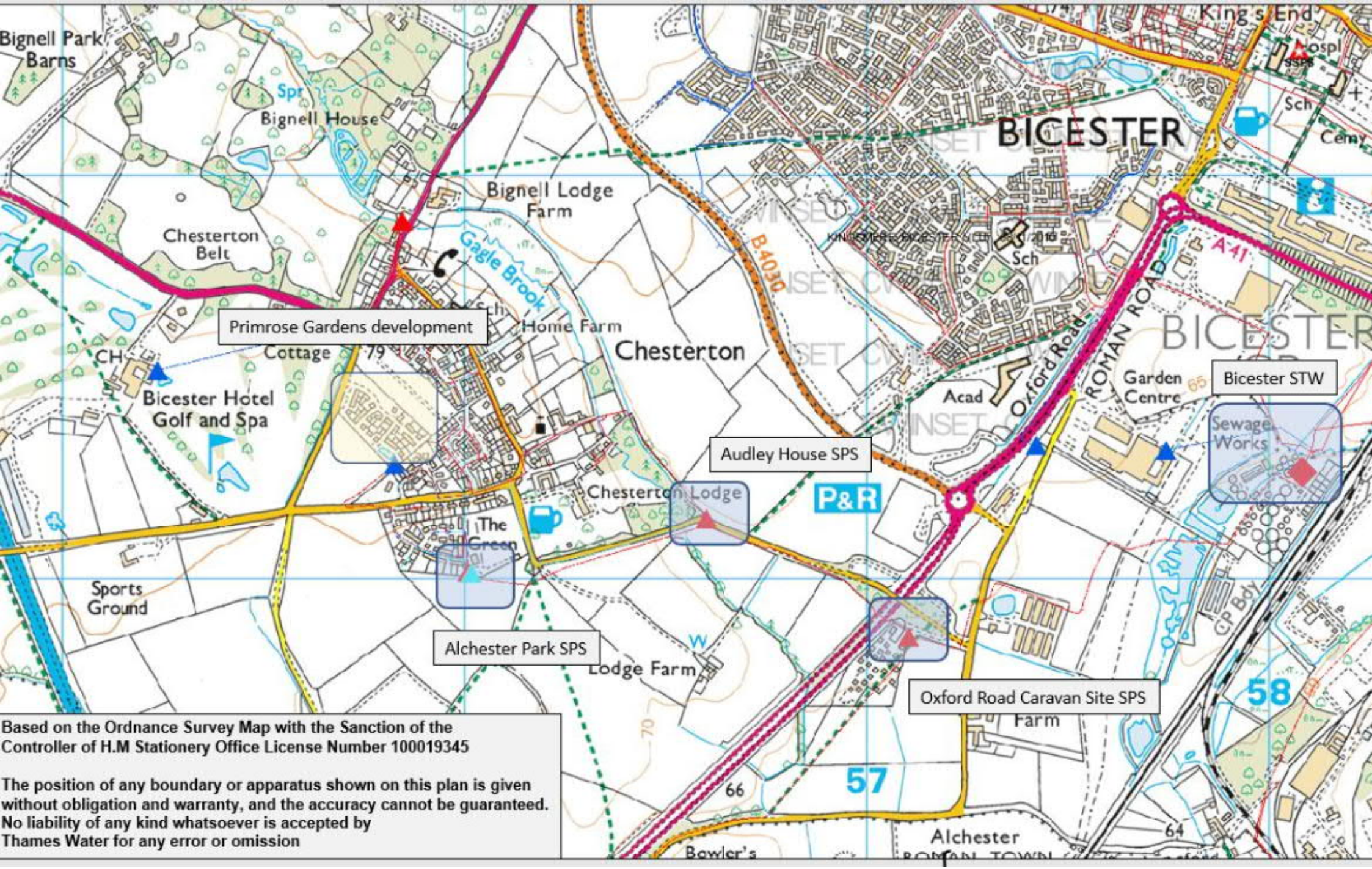
Regards

James

James Hern
Developer Services – Senior Project Engineer
Mobile 07747 645236
james.hern@thameswater.co.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Visit us online www.thameswater.co.uk , follow us on twitter www.twitter.com/thameswater or find us on www.facebook.com/thameswater. We're happy to help you 24/7.



## Martin Hitchcock

**From:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Sent:** 27 April 2022 13:14
**To:** Sam Hinson
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice

Dear Sam,

Thank you for the explanation.

The LLFA would be happy to accept a WRAP of 3 and 2l/s/ha as per the below reasoning.

Best,

Adam.

---

**From:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Sent:** 27 April 2022 13:04
**To:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Cc:** Martin Hitchcock <Martin.Hitchcock@jnpgroup.co.uk>
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice



Hi Adam,

Thank you for your email

Qbar has been calculated based on the IH*124* methodology with *ICP SuDS* correction for small catchments. The Wallingford maps indicates the site as WRAP class 1 which is representative of well drained permeable soils, this results in a Qbar of 0.4 l/s/ha.

However, we know from ground investigations that shallow groundwater is present on the site. The site is underlain by the Cornbrash Formation, towards the south this is in turn overlain by Kellaways Clay. We would suggest therefore, that a WRAP class of 3 is more appropriate which, according to the WRAP soil definition, is representative of *"Permeable soils with shallow ground-water in low lying areas".* This results in a Qbar rate of 2.8 l/s/ha.

We have gone with 2 l/s/ha as the 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' document states that discharge rates should be limited to QBar for rainfall events up to and including the 1 in 100 year event (including 40% climate change allowance) or 2 l/s/ha whichever is the greatest.

I would be grateful if you could confirm if you are happy with this approach.

Regards,

**Sam Hinson**
Civil Engineer

JNP GROUP
CONSULTING ENGINEERS

**Brighouse · Bristol · Chesham · Glasgow · Hartlepool · Leamington Spa · Sheffield**

MBP2, Meadowhall Business Park, Carbrook Hall Road, Sheffield, S9 2EQ
**t:** 0114 244 3500 **w:** jnpgroup.co.uk



**From:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Sent:** 26 April 2022 16:48
**To:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice

Dear Sam,

Thank you for the below.

I would just add that the 2l/s/ha is a maximum. Discharge ,must be at Greenfield rates, where possible we would expect to see further reductions.

Cherwell contact is Tony Brummell: Tony.Brummell@Cherwell-DC.gov.uk

Please do let me know if you have any further queries.

Many thanks,

Adam.

**From:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Sent:** 26 April 2022 15:19
**To:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Cc:** Martin Hitchcock <Martin.Hitchcock@jnpgroup.co.uk>; Adina Tivichi <adina.tivichi@Jnpgroup.co.uk>
**Subject:** C86354 Green Lane, Chesterton - Pre-application Advice



Adam,

Thank you for your time last week.

As requested, please find attached our working drainage layout and a copy of the FRA.

The following is a summary of our discussion, please feel free to add to this:

- The strategy is based on a central wet swale or pipe which will convey flows to the existing ditch at the south-west corner of the site. The site is shallow so level raising will be required to drain via gravity.
- A number of detention basins will be spread through the site, each with a separate outfall into this central swale / pipe.
- The base of the basins will be set 300mm above groundwater levels.
- 6 months of groundwater monitoring will be required. Note: we commenced monitoring in February.
- Traditional headwalls should be avoided if possible and consideration given to a gabion basket filter system at the outfalls from the basins.
- Flow rates can be restricted to 2 l/s/ha
- Minimum Cv values of 0.95 and 0.9 should be used.
- FEH13 rainfall data should be used.
- Traditional gullies should not be used, at least on the main development roads. Roads should drain by filter strips or swales.
- Permeable paving should be used on paths and drives. Provided the base of the construction is 1m above groundwater level these will not need to be tanked.
- Tree pits / rain gardens should be considered wherever possible.
- Basins should be designed up to the 1 in 100yr +40% event with a 300mm freeboard above this.
- A good maintenance & management plan will need to be submitted.
- Down the line, as-built plans of all drainage infrastructure will be required.

I think we were discussing contacting South and Vale drainage team regarding the proposals and approvals for the connections to the ditches. The site is actually in Cherwell, can you confirm who would be best to contact?

Many thanks for your help.

Regards,

**Sam Hinson**
Civil Engineer

JNP GROUP
CONSULTING ENGINEERS

**Brighouse** · **Bristol** · **Chesham** · **Glasgow** · **Hartlepool** · **Leamington Spa** · **Sheffield**

MBP2, Meadowhall Business Park, Carbrook Hall Road, Sheffield, S9 2EQ
**t:** 0114 244 3500 **w:** jnpgroup.co.uk

## Martin Hitchcock

**From:** Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
**Sent:** 11 May 2022 16:47
**To:** Sam Hinson
**Cc:** adam.littler@oxfordshire.gov.uk
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice [Filed 27 Jul 2022 09:54]

Thank you for the clarification. Please continue to liaise closely with me as your site strategy develops. I can then assist in ensuring it meets our requirements.

**Tony Brummell CEng FICE FCIWEM MCIHT**
**Building Control and Flood Risk Manager**

**Cherwell Building Control Service**
Communities Directorate
**Cherwell District Council**

**Direct Dial: 01295 221909**
**tony.brummell@cherwell-dc.gov.uk**
**www.cherwell.gov.uk**

www.facebook.com/cherwelldistrictcouncil
**Twitter** @Cherwellcouncil

---

**From:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Sent:** 10 May 2022 07:46
**To:** Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
**Cc:** adam.littler@oxfordshire.gov.uk
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice



Hi Tony,

Thank you for visiting the site and for your comments.

Regarding the discharge rates I put the following to Adam who was in agreement. I would be grateful if you could confirm if you are also happy with this approach:

*Qbar has been calculated based on the IH124 methodology with ICP SuDS correction for small catchments. The Wallingford maps indicates the site as WRAP class 1 which is representative of well drained permeable soils, this results in a Qbar of 0.4 l/s/ha.*

*However, we know from ground investigations that shallow groundwater is present on the site. The site is underlain by the Cornbrash Formation, towards the south this is in turn overlain by Kellaways Clay. We would suggest therefore, that a WRAP class of 3 is more appropriate which, according to the WRAP soil definition, is representative of "Permeable soils with shallow ground-water in low lying areas". This results in a Qbar rate of 2.8 l/s/ha.*

*We have gone with 2 l/s/ha as the 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' document states that discharge rates should be limited to QBar for rainfall events up to and including the 1 in 100 year event (including 40% climate change allowance) or 2 l/s/ha whichever is the greatest.*

Regards,

**Sam Hinson**
Civil Engineer

JNP GROUP
CONSULTING ENGINEERS

**Brighouse · Bristol · Chesham · Glasgow · Hartlepool · Leamington Spa · Sheffield**

MBP2, Meadowhall Business Park, Carbrook Hall Road, Sheffield, S9 2EQ
**t:** 0114 244 3500 **w:** jnpgroup.co.uk



---

**From:** Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
**Sent:** 09 May 2022 09:53
**To:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice

Sam

I have now visited the site. Subject to any comments the LLFA might have I agree with the overall surface water drainage strategy you are developing. We require as much linear swale drainage as possible with a minimum of piped drainage and the avoidance of end-point SuDS features. Wherever practical, highways should be drained to roadside swales rather than underground systems.

The development layout should be designed such that all linear swale features and open drainage courses are located within the public realm. They should be located within adoptable public open space areas and be readily accessible for maintenance. Similarly, detention basins should be within adoptable open space areas and be readily accessed.

I see that the total discharge rates from the detention basins add to 9.80 l/s and that all site drainage will be directed to a minor watercourse at the south-western corner of the site. Downstream of your site this "Ordinary Watercourse" is very poorly formed and maintained and includes many undersized culverts whose inverts are not consistent with the hard bed levels. The watercourse runs through Little Chesterton and eventually joins the Wendlebury Brook. It already receives discharges from a large area of under-drained sports pitches and is proposed to serve a large development to the north-west. We will be seeking a drainage solution from your site that will limit the discharge to well under the QBAR rate. Can you tell me what the calculated QBAR is.

So in summary at this stage, I am comfortable with the principles you are developing but would like more clarity on the detail.

**Tony Brummell CEng FICE FCIWEM MCIHT**
**Building Control and Flood Risk Manager**

**Cherwell Building Control Service**
Communities Directorate
**Cherwell District Council**

**Direct Dial: 01295 221909**
**tony.brummell@cherwell-dc.gov.uk**
**www.cherwell.gov.uk**

www.facebook.com/cherwelldistrictcouncil
**Twitter** @Cherwellcouncil

---

**From:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Sent:** 27 April 2022 15:17
**To:** Tony Brummell <Tony.Brummell@Cherwell-DC.gov.uk>
**Cc:** adam.littler@oxfordshire.gov.uk
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice



Dear Tony,

We are the consulting engineers working on the drainage design for the above scheme.

We have started discussions with the LLFA regarding the proposed strategy (see a summary below).

The strategy includes the discharge to existing ditches bounding the site. We would be grateful for any comment on the proposals and confirmation of whether you will need to provide consent for any of the works, i.e. the construction of the outfalls.

I have attached a copy of the current version of the drainage layout.

Please do not hesitate to contact me if you require any further information.

Regards,

**Sam Hinson**
Civil Engineer

JNP GROUP
CONSULTING ENGINEERS

**Brighouse · Bristol · Chesham · Glasgow · Hartlepool · Leamington Spa · Sheffield**

MBP2, Meadowhall Business Park, Carbrook Hall Road, Sheffield, S9 2EQ
**t:** 0114 244 3500 **w:** jnpgroup.co.uk

**From:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Sent:** 26 April 2022 16:48
**To:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Subject:** RE: C86354 Green Lane, Chesterton - Pre-application Advice

Dear Sam,

Thank you for the below.

I would just add that the 2l/s/ha is a maximum. Discharge ,must be at Greenfield rates, where possible we would expect to see further reductions.

Cherwell contact is Tony Brummell: Tony.Brummell@Cherwell-DC.gov.uk

Please do let me know if you have any further queries.

Many thanks,

Adam.

**From:** Sam Hinson <Sam.Hinson@jnpgroup.co.uk>
**Sent:** 26 April 2022 15:19
**To:** Littler, Adam - Oxfordshire County Council <Adam.Littler@Oxfordshire.gov.uk>
**Cc:** Martin Hitchcock <Martin.Hitchcock@jnpgroup.co.uk>; Adina Tivichi <adina.tivichi@Jnpgroup.co.uk>
**Subject:** C86354 Green Lane, Chesterton - Pre-application Advice



Adam,

Thank you for your time last week.

As requested, please find attached our working drainage layout and a copy of the FRA.

The following is a summary of our discussion, please feel free to add to this:

- The strategy is based on a central wet swale or pipe which will convey flows to the existing ditch at the south-west corner of the site. The site is shallow so level raising will be required to drain via gravity.
- A number of detention basins will be spread through the site, each with a separate outfall into this central swale / pipe.
- The base of the basins will be set 300mm above groundwater levels.
- 6 months of groundwater monitoring will be required. Note: we commenced monitoring in February.
- Traditional headwalls should be avoided if possible and consideration given to a gabion basket filter system at the outfalls from the basins.

- Flow rates can be restricted to 2 l/s/ha
- Minimum Cv values of 0.95 and 0.9 should be used.
- FEH13 rainfall data should be used.
- Traditional gullies should not be used, at least on the main development roads. Roads should drain by filter strips or swales.
- Permeable paving should be used on paths and drives. Provided the base of the construction is 1m above groundwater level these will not need to be tanked.
- Tree pits / rain gardens should be considered wherever possible.
- Basins should be designed up to the 1 in 100yr +40% event with a 300mm freeboard above this.
- A good maintenance & management plan will need to be submitted.
- Down the line, as-built plans of all drainage infrastructure will be required.

I think we were discussing contacting South and Vale drainage team regarding the proposals and approvals for the connections to the ditches. The site is actually in Cherwell, can you confirm who would be best to contact?

Many thanks for your help.

Regards,

**Sam Hinson**
Civil Engineer

JNP GROUP
CONSULTING ENGINEERS

**Brighouse** · **Bristol** · **Chesham** · **Glasgow** · **Hartlepool** · **Leamington Spa** · **Sheffield**

MBP2, Meadowhall Business Park, Carbrook Hall Road, Sheffield, S9 2EQ
**t:** 0114 244 3500 **w:** jnpgroup.co.uk

Unless expressly stated otherwise, the contents of this e-mail represent only the views of the sender and does not impose any legal obligation upon the Council or commit the Council to any course of action..

This e-mail (including any attachments) may be confidential and may contain legally privileged information. You should not disclose its contents to any other person. If you are not the intended recipient, please notify the sender immediately.

Whilst the Council has taken every reasonable precaution to minimise the risk of computer software viruses, it cannot accept liability for any damage which you may sustain as a result of such viruses. You should carry out your own virus checks before opening the e-mail(and/or any attachments).

Unless expressly stated otherwise, the contents of this e-mail represent only the views of the sender and does not impose any legal obligation upon the Council or commit the Council to any course of action..