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GALLAGHER ESTATES LTD

ENVIRONMENT ASSESSMENT - WYKHAM PARK

Flood Risk Assessment

February 2013

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GALLAGHER ESTATES LTD

Environment Assessment - Wykham Park

Flood Risk Assessment

February 2013

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DRAWINGS

1 INTRODUCTION

1.1 General

1.1.1 Wardell Armstrong LLP has been commissioned to prepare a Flood Risk Assessment (FRA) and Outline Drainage Strategy on behalf of Gallagher Estates Ltd to support an outline planning application for a mixed use development on land at Wykham Park Farm located to the south of Banbury, Oxfordshire.

1.1.2 This report sets out the findings of the FRA required by the Local Planning Authority, and the Environment Agency, in support of the planning application. The assessment has been carried out in accordance with the guidance set out in the National Planning Policy Framework (NPPF).

1.2 Methodology

1.2.1 The methodology for this FRA has comprised a desktop study, supplemented by site inspections and liaison with the Environment Agency and Thames Water.

1.2.2 Reference has been made to relevant plans and documents, including the Cherwell and West Oxfordshire Strategic Flood Risk Assessment, the Oxfordshire County Council Preliminary Flood Risk Assessment, and Thames Water's public sewer records.

1.3 Background Information

1.3.1 The Department for Communities and Local Government (DCLG) published the NPPF and the Technical Guidance to the National Planning Policy Framework (Technical Guidance) in March 2012. The NPPF replaces the guidance previously contained within Planning Policy Statement 25 (PPS25) – Development and Flood Risk.

1.3.2 The NPPF and the accompanying Technical Guidance aim to ensure that flood risk is taken into consideration at all stages of the planning process in order to avoid inappropriate development in areas at medium-high risk of flooding.

1.3.3 The NPPF and the Technical Guidance advocate the use of a risk-based 'Sequential Test' to direct development away from areas at the highest risk of flooding. Where development is necessary in high risk areas, the NPPF aims to ensure that the development is safe without increasing flood risk and where possible, reducing flood

risk overall. Table 1 below, extracted from Table 1 of the Technical Guidance, defines the levels of flood risk within England.

Table 1: Flood Zones		
Flood Zone	**Flood zone Classification**	**Description**
Flood Zone 1	Low Probability	This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year (<0.1%).
Flood Zone 2	Medium Probability	This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
Flood Zone 3a	High Probability	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 3b	Functional Floodplain	The zone comprises land where water has to flow or be stored in times of flood.

1.3.4 As part of its general obligations under the Water Resources Act 1991, the Environment Agency has carried out surveys of its existing flood defences and published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In 2004 the EA published an online 'Flood Map' which shows areas across England and Wales that could be affected by flooding from rivers or the sea. The Flood Map is updated at quarterly intervals as more detailed data becomes available.

1.3.5 The Flood Map shows areas which may be affected by a 1 in 100 year fluvial flood or a 1 in 200 year tidal/coastal flood (ie Zone 3 as defined in the NPPF). It also shows which areas may be affected by an extreme 1 in 1000 year flood (ie Zone 2 as defined in the NPPF). The Flood Map also provides information on the location of raised flood defences such as embankments and walls, built in the last five years to protect against a 1 in 100 year fluvial flood, or flooding from the sea with an annual probability of 1 in 200 years, together with some, but not all, older defences and defences which protect against smaller floods. Areas that would benefit from flood

defences in the event of a 1 in 100 year fluvial flood, or flooding from the sea with an annual probability of 1 in 200 years, are also shown.

2 SITE AND CATCHMENT CHARACTERISTICS

2.1 Description and Location

2.1.1 A summary of the site and its characteristics is provided in Table 2 below.

Table 2: Site Location Summary	
Site Name	Wykham Park Farm
Site Address	Wykham Lane, Banbury, Oxfordshire OX16 9ER
Site Area (ha)	50ha (approx.)
National Grid Reference	444818,238673 (approx. centre of site)
Existing Land Use	Agricultural
Proposed Land Use	Mixed Use
Local Planning Authority	Cherwell District Council
Environment Agency Area	West Thames
Sewer Undertaker	Thames Water

2.1.2 The site is a roughly rectangular area of land, approximately 50 hectares in size located to the south of the centre of Banbury as shown on Drawing No. WM10671-001 'Site Location'.

2.1.3 The surrounding area is characterised by agricultural land to the east, south and west, and residential areas to the north including a secondary school.

2.1.4 The site is bounded by Bloxham Road (A361) to the west, agricultural fields to the south and east and the Salt Way track (public footpath and bridleway) to the north. Wykham Park Farm is located on Wykham Lane approximately 400m to the south of the site.

2.1.5 A number of residential and agricultural properties are located within the vicinity of the site including Wykham Farm, Wykham Farm Cottage, Wykham Park Farm Cottage, Wykham Park Lodge, The Great Barn, and Georges Barn. These are all identified on Figure 1 below.

2.1.6 The site is characterised by approximately 8 large agricultural fields separated by hedegrows. The site topographical survey (Drawing No. 17711 OGL) shows the majority of the site to fall from north-west to south-east at an average gradient of

approximately 1 in 80. The highest elevation within this part of the site is approximately 132.00mAOD in the north-western corner adjacent to the Salt Way track. The lowest elevation is approximately 122.50mAOD in the south-eastern corner of the large field immediately north of Wykham Farm Cottage.

2.1.7 A single field in south-western corner of the site falls in a south-westerly direction away from the access track oriented north-south through the western part of the site. This field falls at an average gradient of approximately 1 in 45 from the northern corner where the highest elevation is approximately 132.80mAOD, towards the south-western corner where the lowest elevation is approximately 121.40mAOD. The fall of the land steepens in the western half of field as shown on the topographical survey (Drawing No. 17711 OGL), where the average gradient is approximately 1 in 12.

2.1.8 The natural drainage of the site is, therefore, split into two catchment areas. Drawing No. WM10671-FRA002 shows the approximate extents of these catchment areas, and the locations of the field ditches and local watercourses identified from the site walkover inspection and OS maps.

2.1.9 The site can be accessed off Bloxham Road in the north-western corner via a farm track which runs in a north-south orientation through the western part of the site. The farm track continues to the south of the site and ultimately joins Wykham Lane via the farm yard to Wykham Park Farm.

2.2 Local Watercourses

2.2.1 The nearest named watercourse is the Sor Brook which is located approximately 1.5km to the south of the site at its nearest point as shown on Figure 1 below.

2.2.2 There are no other main rivers within the vicinity of the site. A field drainage ditch is located along the southern boundary of the site running in an easterly direction. Site inspections located this ditch which was found to be heavily overgrown and dry. A headwall was located at the downstream end of the ditch within the site. The ditch appears to continue in culvert in an easterly direction for approximately 5 metres. The topographical survey shows a second headwall within the site approximately 5 metres east of the one located during the site walkover inspection. An open ditch is shown by the contours on the topographical survey downstream of this second headwall. It appears that the culvert is, therefore relatively short in length. The

approximate diameter of the single culvert pipe is 375mm but was found to be almost 100% blocked as shown in Photo 1 below.

2.2.3 Ordnance Survey (OS) maps have been inspected to determine the route of the drainage ditch downstream of the site. The OS maps show an open watercourse continuing in an easterly direction from the site boundary for approximately 160m before connecting to a small pond. The OS maps show an open watercourse running in a southerly direction from the pond towards Wykham Lane. Due to access restrictions and dense vegetation it was not possible to confirm the drainage arrangements in this area during the site walkover inspection.

Photo 1. Brick headwall at culvert inlet on southern site boundary (field drainage ditch).

2.2.4 To the south of Wykham Lane, the drainage ditch is shown as a watercourse on the available OS maps, and this was confirmed during the site walkover inspection. The watercourse continues in southerly direction to a small reservoir. The outfall from the reservoir continues in a southerly direction and forms a tributary to the Sor Brook.

2.2.5 The drainage ditch/watercourse was located during the site walkover inspection at Wykham Lane but was found to have no flowing water. A further 100m downstream of Wykham Lane running water could be heard but was not visible due to dense vegetation. The watercourse was not accessible or visible for the remainder of its reach downstream to the reservoir. The subsequent topographical survey shows a water level of 113.60mAOD immediately to the south of Wykham Lane.

2.3 Existing Drainage

2.3.1 Thames Water's public sewer record plans (see Appendix 1) show two public surface water sewers within the site boundary. The first is a 375mm diameter sewer running in an easterly direction within the far north-eastern field and parallel to the northern site boundary. This sewer appears to receive flows from the residential areas immediately to the north of the site.

2.3.2 The second public surface water sewer within the site is a 150mm diameter sewer running in a southerly direction adjacent to the western site boundary. The sewer is shown on the record plans to enter the site from Bloxham Road and continue in a southerly direction towards Wykham Lane.

2.3.3 It is considered unlikely that there are any formal private drainage systems within the site due to it being agricultural land.

2.3.4 The site walkover inspections identified a further 2No. small ditches along the hedgerows within the site which are assumed to be field drainage ditches. The ditches were, however, found to be shallow, overgrown and extremely dry inferring that they rarely convey or store water.

2.4 Flood Risk Setting

2.4.1 The flood map for the site shows that the development is located in an area defined as having a low risk of flooding from rivers (ie Flood Zone 1). An extract of the Environment Agency's Flood Map is shown in Figure 1 below. The annual probability of flooding is, therefore, less than 1 in 1000 years.

2.4.2 The proposed mixed use development of the site falls into a number of vulnerability classifications as defined in Table 2 of the NPPF Technical Guidance. The highest vulnerability use proposed is residential development which is classified as 'More Vulnerable' development. Table 3 of the NPPF Technical Guidance shows that 'More Vulnerable' development is appropriate in Flood Zones 1 and 2.

2.4.3 There is no requirement to apply the Sequential Test since the site is located within Flood Zone 1.

2.4.4 The Exception Test, as detailed in paragraph 102 of the NPPF, should be applied only after the Sequential Test has been applied and in the circumstances when 'More Vulnerable' development and 'Essential Infrastructure' cannot be located within

Flood Zones 1 or 2, or 'Highly Vulnerable' development cannot be located within Flood Zone 1.

2.4.5 Since the site is located within Flood Zone 1 and is classified as 'More Vulnerable', it is not necessary to apply the Exception Test.

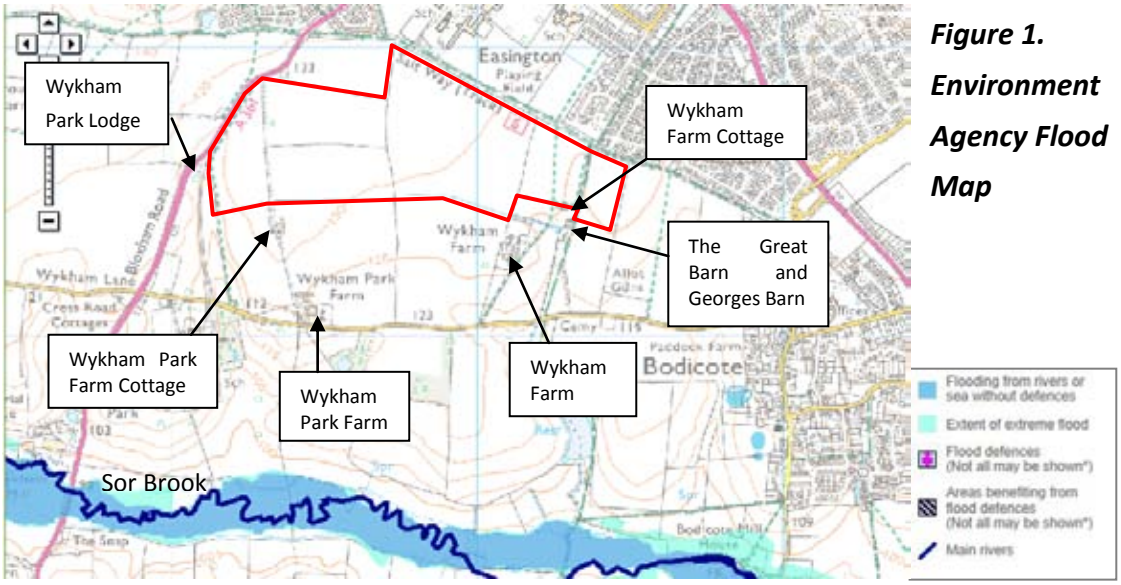

Figure 1. Environment Agency Flood Map

3 DEVELOPMENT PROPOSALS

3.1 Description of Site Proposals

3.1.1 The proposals are for a mixed use development incorporating residential units, employment land, a primary school, a local centre (commercial uses) and formal and informal public open space. The Indicative Development Framework Plan is included as Drawing No. JJG043-006 E.

3.1.2 The development will require new infrastructure and services including foul and surface water drainage, gas, electricity, water and telecommunications across the whole site.

3.1.3 Under the proposals a new roundabout off Bloxham Road will be constructed to serve as the primary site access point. It is understood that new distributor roads within the development site will link to existing road networks including Wykham Lane to south.

3.1.4 A large area of public open space incorporating allotments and sports pitches will be provided at the eastern end of the site. Under the proposals the elevation of this area of land will be raised to provide protection to archaeological features.

3.2 Drainage Proposals

3.2.1 Surface water drainage will be designed to mimic the existing drainage characteristics at the site. Surface water runoff rates will be restricted to greenfield (QBAR) runoff rates.

3.2.2 It is proposed that surface water runoff will be managed in a sustainable manner through the use of Sustainable Drainage Systems (SuDS). The SuDS techniques utilised within the site will be dependent on ground conditions in the first instance. If possible, surface water runoff will be designed to infiltrate to ground. Should the ground conditions prove to be unsuitable for infiltration methods, surface water runoff will be discharged to nearby local watercourses at pre-development greenfield runoff rates. Surface water management proposals are discussed further in Section 4.3 of this report.

3.2.3 Foul water flows from the development will ultimately be discharged to public sewer. Thames Water Ltd has provided a scope for a formal impact study to assess the impact of the development on the local drainage network. The impact study will

also highlight any necessary upgrading works and will confirm points of connection and permitted discharge rates for foul and surface water flows.

4 FLOOD RISK

4.1 Flood Risk to the Site

4.1.1 The main sources of flooding identified within the NPPF are rivers, tidal waters and the sea, overland runoff, groundwater, sewers and drains, and artificial sources such as canals and reservoirs.

4.1.2 The presence of a potential flooding source does not necessarily translate into a high risk of flooding. Table 3 below summarises the potential flood sources and the related flood risk posed to the site.

Table 3: Sources of Flood Risk

Flood Source	Presence at Site	Potential Risk at Site	Description
Rivers *(fluvial flooding)*	N		
Tidal	N		
Groundwater	Y	Low	High water tables in local area
Surface Water *(pluvial flooding)*	Y	Low	Developed areas to north at higher elevation
Sewers	N		
Artificial	N		

4.1.3 The risk of tidal flooding to the site is discounted due to distance from the sea.

Fluvial Flooding

4.1.4 The site is located in Flood Zone 1 (low risk) as shown on the Environment Agency's Flood Map in Appendix 2. The annual probability of flooding to the site from fluvial source is, therefore, less than 1 in 1000 years (ie < 0.01%).

4.1.5 The nearest named watercourse is the Sor Brook which is located approximately 1.5km to the south of the site. Ordnance Survey mapping shows that the approximate difference in elevation between the Sor Brook and the development site is over 30m. It is considered, therefore, that the risk of flooding to the site from this source is negligible.

4.1.6 A small, unnamed watercourse along the southern boundary of the site is shown on the OS maps. Further details regarding the characteristics of this water feature and its connectivity are provided in Section 2.2 of this report.

4.1.7 Under the development proposals, surface water runoff could be discharged into this water feature should ground conditions prove to be unsuitable for infiltration methods. Consequently, remediation and restoration, and ongoing maintenance of the watercourse will be required to provide a suitable discharge location and ensure that flood risk is not increased.

4.1.8 It is considered, that in its current situation, the unnamed watercourse poses a low risk of flooding to the site due to it having a relatively small rural catchment area producing little, if any, surface water runoff.

4.1.9 The risk of flooding to the site from fluvial sources is, therefore, considered to be negligible.

Groundwater Flooding

4.1.10 Flooding can occur when prolonged rainfall causes the groundwater table to rise to the point where it affects development on a site. This is particularly a problem where buildings have basements.

4.1.11 The Strategic Flood Risk Assessment (SFRA) for Cherwell DC and the Oxfordshire CC Preliminary Flood Risk Assessment (PFRA) state that the superficial geology across the Councils area is predominantly clay which results in flashy runoff characteristics. In addition, the two assessments state that these are locations within the local area that are affected by high water tables and are susceptible to seasonal, spring-fed activity. The settlements most at risk are those that lie at the base of steep sided valleys, such as Bodicote which is located to the south-east of the site.

4.1.12 The site is not located at the base of a steep sided valley and, therefore, is unlikely to be at a high risk of groundwater flooding. The 'Areas Susceptible to Groundwater Flooding' map contained within the Oxfordshire PFRA, shows the percentage risk of groundwater emergence at the site as being 0 – 25%.

4.1.13 The risk of groundwater flooding to the site is, therefore, considered to be low.

Surface Water Flooding (Pluvial Flooding)

4.1.14 Pluvial flooding often occurs during intense rainfall, when water is unable to soak into the ground or enter drainage systems, and runs quickly overland resulting in local flooding.

4.1.15 The main source that could pose a risk of surface water flooding to the site is the residential area to the north which sites at a higher elevation than the site. It is understood that the developed areas to the north of the site are served by a formal, piped, drainage system which would convey surface water runoff away from the site in the first instance.

4.1.16 In the event that the formal drainage system fails or becomes overwhelmed, it is considered likely that surface water runoff would be intercepted by existing open space including the large playing fields associated with the secondary school located to the north of the Salt Way track.

4.1.17 Two drainage ditches run alongside the Salt Way track, which forms the northern boundary of the site. It is considered that any surface water runoff that does not enter the formal drainage systems and is not intercepted by the playing fields, would be intercepted by these two drainage ditches and not reach the site.

4.1.18 The Cherwell DC Strategic Flood Risk Assessment lists a number of sites and settlements that may be at risk of surface water flooding due to their location on low-lying, impervious ground. The proposed development site is not included on the list.

4.1.19 The risk of pluvial flooding to the site is, therefore, considered to be low.

Flooding from Sewers and Drains

4.1.20 Flooding could theoretically occur from localised, high intensity storms of relatively short duration that might exceed the capacity of the local drainage network. The only potential source of flooding of this type is the 375mm public surface water sewer located in the north-western corner of the site (see Section 2.3 for further details).

4.1.21 It is assumed that the public sewer will be incorporated into the development with an appropriate easement and may or may not be diverted. It is considered that

should the capacity of the sewer be exceeded, flood water will be routed away from any proposed buildings by careful design of road layouts and site levels.

4.1.22 The Cherwell DC Strategic Flood Risk Assessment makes reference to the Thames Water DG5 Flooding Register which is a database of flooding incidents from sewers, by postcode area (5-digit). The register does not indicate the level of risk of flooding from sewers but does highlight those areas which are more prone to such incidents. The dataset for the postcode area (OX16 9--) covering the proposed development site shows that there has been a low incidence of reported flooding from sewers in the last 10 years (ie 1 – 2 reported incidents).

4.1.23 The risk of flooding to the site from this source is, therefore, considered to be low.

Flooding from Artificial Sources

4.1.24 There are no artificial sources such as canals or reservoirs, within the vicinity of the site that could pose a risk of flooding to the proposed development. The risk of flooding from artificial sources is, therefore, considered to be negligible.

Historical Flooding

4.1.25 The Strategic Flood Risk Assessment (SFRA) for Cherwell DC makes reference to a number of historical flooding incidents. There have been numerous flood events in Banbury but these have been primarily along the River Cherwell corridor. There is no reference in the SFRA to any historical flooding incidents along the Sor Brook.

4.1.26 It is considered, therefore, that the proposed development site has not been affected by any historical flood events.

4.2 Flood Risk posed by the Development

4.2.1 New development often poses a risk of flooding to neighbouring properties and areas downstream of the site, often as a result of an increase in impermeable area which has the effect of increasing the rate and volume of surface water runoff.

4.2.2 Flood risk can also be increased as a result of new development if the development reduces the floodplain storage area or alters flood flow paths, ultimately displacing flood water and resulting in an increased risk to the surrounding area.

Floodplain Storage and Flood Flow Paths

4.2.3 Since the site is located within Flood Zone 1 there will be no effect on flood flow routes or floodplain storage (ie floodwater will not be displaced from the site).

Surface Water Runoff

4.2.4 The development site is currently a greenfield site with no hard surfacing. The development will result in an increase in the impermeable area of the site which could result in increased surface water runoff rates and volumes. The risk of flooding to areas downstream of the development site could, therefore, increase as a result of the development.

4.2.5 Mitigation measures to ensure that flood risk is not increased will be required. This will include surface water management to restrict runoff rates from the development to pre-development rates. Any flows in excess of this will be attenuated on site for events up to and including the 1 in 100 year event, including an allowance for climate change.

4.2.6 In addition, the proposed land raising in the eastern part of the site (public open space) could have an impact on surface water pathways. It is considered, however, that flow rates are unlikely to increase as a result of the land raising. To mitigate the risk of off-site flooding resulting from the altered surface water pathways, mitigation measures will be required.

4.2.7 Surface water management measures for flood risk mitigation are included in Section 4.3 of this report.

4.3 Flood Risk Mitigation Measures

4.3.1 The level of flood risk posed to the site from rivers, the sea, groundwater, sewers, surface water runoff and artificial sources has been assessed as low. Flood risk mitigation measures for these sources of flooding are, therefore, not necessary.

4.3.2 The risk of flooding to areas downstream of the site, as a result of the development, has been assessed as high and, therefore, mitigation measures are required. The main source of flooding is increased surface water runoff resulting from an increase in the impermeable area of the site. In addition, surface water pathways may be

altered as a result of the proposals to raise the level of the land in the eastern part of the site, albeit flow rates are unlikely to be affected.

Surface Water Management

4.3.3 It is proposed that surface water runoff from the development is discharged to ground using infiltration based Sustainable Drainage (SuDS) methods. This is subject to suitable ground conditions, which will be confirmed at the detailed design stage. Should the ground conditions prove to be unsuitable for infiltrating surface water to ground, surface water will be discharged to nearby local watercourses at a rate equivalent to pre-development runoff rates and public sewers at a rate to be agreed with Thames Water Ltd. A combination of infiltration SuDS and attenuation may prove to be feasible.

4.3.4 It may be necessary to discharge surface water runoff from the south-western corner of the site to public sewer due to the difference in ground levels between this area of the site and the proposed surface water outfall to the watercourse.

4.3.5 Initial consultation with Thames Water Ltd has suggested that a discharge rate of 5 litres/second may be acceptable (see Appendix 4), but this is subject to formal agreement and is also dependent on the outcome of the formal Impact Study by Thames Water Ltd.

4.3.6 With regards to the majority of the site area that will discharge to local watercourses (approximately 30 hectares), the pre-development Greenfield runoff rate (QBAR) has been assessed following the IH124 method. The estimated QBAR rate is 4.65 litres/second, which is equivalent to approximately 0.15 litres/second/hectare. This rate is considered to be low, due to the soil value (Wallingford WRAP maps) being approximately 0.15, indicating a relatively permeable site.

4.3.7 Following best practice guidance for 'permeable' sites, it is proposed to restrict surface water runoff rates to the minimum recommended rate of 2 litres/second/hectare, equivalent to a total runoff rate of 60 litres/second for the development site (see Appendix 5).

4.3.8 The Environment Agency was consulted with regards to the proposed discharge rate of 2 litres/second/hectare. A response from the Environment Agency was received on 30 October 2012 but it was not clear within their response whether the proposed discharge rate was acceptable. An email was sent on 2 November 2012 to the

Environment Agency to clarify their requirements; a response is still awaited (see Appendix 3).

4.3.9 Any flows in excess of 60 litres/second will be attenuated on site for events up to and including the 1 in 100 year event including an allowance for climate change. Preliminary calculations of the attenuation volume that would be required have been estimated at 13,610 m^3 (ie approximately 455m^3 per hectare of development (assuming 30ha of development)) for the 1 in 100 year event including a 20% allowance for climate change (see Appendix 5). The allowance for climate change will be variable across the site, dependent on land use. Climate change allowance for residential use will be 30%, and all other uses will have a 20% allowance for climate change included.

4.3.10 It is proposed that surface water runoff is managed in a sustainable manner through the use of Sustainable Drainage Systems (SuDS). SuDS provide a range of benefits, including flood risk management, in comparison to conventional piped drainage systems. In particular, SuDS can reduce the rate and volume of surface water runoff. There is a wide range of SuDS techniques available, some of which could be utilised within the development site to provide Source Control, attenuation, conveyance routes and water quality treatment. A suitable SuDS management train, with an appropriate number of treatment stages, will be incorporated into the development to achieve both water quantity (volume and rate) and water quality objectives. The choice of SuDS techniques will be determined at the detailed design stage but could potentially include permeable paving, swales, ponds, and detention basins as described in Section 4.4 below.

Surface Water Pathways

4.3.11 Under the development proposals the land designated for public open space in the eastern part of the site will be raised slightly. The primary reason for this is for the protection of archaeological features. It is understood that the land will be raised by up to 600mm (variable across the site) using soil from other areas of the site. There is a risk, therefore, that surface water pathways could be altered as a result of these proposals.

4.3.12 The soils will incorporate drainage where appropriate to ensure that an adequate playing surface on the sports pitches is provided. It is considered that surface water

runoff rates will be unaltered since there is unlikely to be any change in the permeability of the land.

4.3.13 To ensure that surface water does not run off site and cause flooding to neighbouring properties as a result of the land raising, mitigation measures such as cut-off ditches to intercept runoff will be incorporated within the POS. The characteristics of the mitigation measures will be considered further at the detailed design stage.

4.4 Outline Surface Water Drainage Strategy

General

4.4.1 An Indicative Surface Water Management Plan is included as Drawing No. WM10671-FRA001 to demonstrate potential SuDS options and the space required within the development to incorporate them (this is based on the assumption of no infiltration). The choice of SuDS techniques will be determined at the detailed design stage. Options for SuDS within the different areas of the proposed development are outlined below. It is proposed that all areas of the development are ultimately linked with a variety of conveyance features along the main spine roads, to a single SuDS feature prior to discharge to local watercourses.

4.4.2 Source control and attenuation are key factors in managing surface water runoff sustainably. It is proposed, therefore, that as far as practicable, surface water runoff is managed following a sub-catchment approach ie individual land parcels incorporating the necessary attenuation volumes for that area, with a pro-rata discharge rate.

4.4.3 The additional benefits provided by SuDS features, other than surface water management and water quality, will be further considered at the detailed design stage to ensure that they are enhanced as much as possible. This will include, for example, consideration of the benefits to wildlife which may require the inclusion of buffer zones around ponds and wetlands, and consideration of the type of planting.

Residential Land

4.4.4 SuDS options for the residential areas include, but are not limited to the following:

- Rainwater Harvesting/Water butts
- Rain gardens
- Permeable Paving
- Pervious Surfaces
- Impervious Surfaces with stone-blankets
- Swales
- Filter Drains
- Ponds and Wetlands
- Detention basins

4.4.5 Any one, or combination of the above features could be incorporated into the residential development land. Use of permeable paving, pervious surfacing and/or stone blankets has the added benefit of not requiring any additional land take (ie attenuation can be provided beneath roads, driveways and parking areas).

4.4.6 Ponds, wetlands and detention basins require more land take and may only be feasible in those residential land parcels that incorporate Public Open Space (POS). Incorporating open SuDS features such as ponds into POS creates a multi-functional space, providing enhanced amenity and biodiversity benefit.

Employment Land

4.4.7 The SuDS options for employment land are largely similar to those for residential land. Certain SuDS features, for example rainwater harvesting, may prove to be more cost effective within the employment land due to the larger scale and nature of such developments. Other SuDS features, such as Green Roofs, could also be incorporated into the employment land. Larger SuDS features such as ponds, wetlands and detention basins are likely to be more easily incorporated into the landscaped buffer areas surrounding the employment land, than within residential areas.

Education Land

4.4.8 The proposed new school provides opportunities for incorporating similar SuDS features to the employment land. Any SuDS incorporated into the new school development could be designed with the additional educational benefit in mind, and therefore may include more visible features such as ponds, green roofs and swales.

4.4.9 The large playing fields associated with the proposed new school could be designed to act as a temporary attenuation area for extreme rainfall events, therefore acting as a multi-functional space.

Local Centre

4.4.10 The Local Centre will provide services to the local community such as convenience stores etc, and will, therefore, have a predominantly urban design. Space is, therefore, likely to be more limited within this area. There are, however, a number of urban SuDS features such as ponds, canals and rills which could be incorporated into the design and form part of the urban landscape, providing enhanced amenity benefit and increasing community engagement with the concept of sustainable drainage.

4.4.11 Other urban SuDS options include bio-retention areas, rain gardens, rainwater harvesting, green roofs and permeable/pervious surfacing, all of which do not require any significant additional land take.

Main Spine Roads

4.4.12 Drawing No. WM10671-FRA001 shows some of the proposed main spine roads within the development. It is proposed that SuDS features are provided along some of these roads to act primarily as conveyance features. These features will ultimately convey all surface water runoff from the development to the final discharge location and therefore, provide connectivity between the individual development parcels.

4.4.13 Surface water runoff from the spine roads could be attenuated within the roads by incorporating stone blankets in the road construction, and providing inlets in the form of beany block kerbs, for example.

4.4.14 Alternatively, the road surfacing could be designed as either permeable (eg block paving) or pervious (eg porous asphalt) with attenuation provided beneath.

4.4.15 Depending on the required volume, some surface water attenuation could be provided in the adjacent SuDS features running alongside the roads. These SuDS features could be in the form of wet, dry and/or enhanced swales, filter strips and filter drains.

4.4.16 Attenuation could also be provided in a pond, wetland or detention area at the downstream end of the system.

Outfall Arrangements

4.4.17 It is proposed that an open SuDS feature such as a pond, wetland or detention basin, or a combination of these is provided at the downstream end of the drainage system. This provides a site control feature for managing surface water runoff and a temporary storage area for flows that exceed the design capacity of the system.

4.4.18 In addition, the open SuDS feature will also provide a final stage of treatment to ensure that water quality standards are met.

4.4.19 The outlet from the pond and/or detention basin will be designed as an open feature such as a channel where appropriate to do so, to enhance ecological value. The existing culvert within the site could be replaced with an open feature subject to confirmation of the location of existing utilities and services easements.

4.4.20 There are three potential surface water outfall locations for the site as shown on Drawing No. WM10671-FRA001. The first option is to discharge to the open ditch course in the south-eastern corner of the large central field. This ditch continues in an easterly direction and is understood to discharge to a pond, as shown on available OS maps (see Section 2.2 for further details).

4.4.21 As an alternative (Option 2 on Drawing No. WM10671-FRA001), surface water could be directed southwards from the open SuDS feature towards Wykham Lane, through land under the control of Gallagher Estates, and ultimately discharge to the ordinary watercourse to the south of Wykham Lane. The characteristics of this feature will be determined at the detailed design stage and may be in the form of an open ditch course, swale or underground pipe. Requirements for service easements will be determined and accounted for in the design.

4.4.22 Option 3 provides an additional surface water outfall location to Options 1 or 2. This option provides a surface water outfall from the public open space in the eastern part of the site and ultimately discharges to the ordinary watercourse south of Wykham Lane as per Option 2. As with option 2, the characteristics of this feature will be determined at the detailed design stage and may be in the form of an open ditch course, swale or underground pipe. Requirements for service easements will be determined and accounted for in the design. The outfall would be located within land under the control of Gallagher Estates.

4.5 Residual Risk

4.5.1 There is always a possibility of a storm event that exceeds the design standards of the proposed flood risk management measures for new developments. Potential risks include exceedance of on-site sewer systems during storm events with an annual probability of occurrence greater than 1 in 30 years and, exceedance of surface water drainage features, including SuDS, during storm events with an annual probability of occurrence greater than 1 in 100 years (including an allowance for climate change).

4.5.2 Additionally, for sites with open watercourses and culverts there is a residual risk of flooding should the culvert or channel become blocked, preventing surface water from discharging from the site and resulting in flows coming out of channel. There are, however, no open watercourses or culverts within the site that could act as a source of flooding.

4.5.3 The design capacity of the surface water drainage system for the development is the 1 in 100 year event, including an allowance for climate change, this includes conveyance and storage features. For storm events with an annual probability of occurrence greater than this, the on-site drainage system may be exceeded. It is considered, however, that the probability of this is extremely low and, therefore, the residual risk is negligible.

4.5.4 Should the design capacity of the drainage system become exceeded, overland flood flows will be directed to safe areas away from buildings and temporarily stored, for example with school playing fields and other areas of POS. This will be achieved by careful design of the roads so that they act as secondary conveyance routes. In addition, overland flow routing will be achieved by careful design of the surface water drainage system to ensure that in the first instance, the risk of blockage is

minimised, and secondly to ensure there is connectivity throughout the site that allows water to flow to safe areas of storage.

5 CONCLUSIONS

5.1.1 This report gives details of the Flood Risk Assessment, which has been carried out in relation to the proposed site in accordance with the National Planning Policy Framework 2012 (NPPF).

5.1.2 The site is located within Flood Zone 1 according to the Environment Agency's current Flood Map.

5.1.3 The proposals are for a mixed use development incorporating residential units, employment land, a primary school, a local centre (commercial/retail uses) and formal and informal public open space. Residential use is classified as 'More Vulnerable' development in Table 2 of the NPPF Technical Guidance, which is an appropriate development type within Flood Zone 1. There are no local site-specific risks that would adversely affect this categorisation

5.1.4 The site has been assessed as being at a low or negligible risk of flooding from fluvial sources, groundwater, sewers, artificial sources and surface water runoff.

5.1.5 The risk of flooding posed by the development, from increased surface water runoff, is considered to be high without the recommended flood risk mitigation measures, which primarily include sustainable surface water management to restrict discharge rates from the site. With the recommended mitigation measures in place, the risk of flooding posed by the development is considered to be low.

5.1.6 Surface water runoff will either be discharged to ground by infiltration SuDS, or restricted to a minimum rate of 2 litres/second/hectare and discharged to nearby local watercourses or public sewer. Flows in excess of this will be attenuated on site for events up to and including the 1 in 100 year event including an appropriate allowance for climate change.

5.1.7 Attenuation will be provided throughout the site in a range of SuDS features, designed as part of a suitable SuDS management train. The choice of SuDS features will be determined at the detailed design stage and following an assessment of the ground conditions to determine the feasibility of infiltration methods.

5.1.8 The site is considered suitable for the type of development proposed.

APPENDICES

APPENDIX 1

Thames Water Public Sewer Records

Asset Location Search

Emma Skelley
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
STOKE ON TRENT
ST1 5BD

Search address supplied

445267 238350
Wykham Park Farm
Wykham
Banbury
Oxfordshire
OX16 9ER

Your reference N/A

Our reference ALS/ALS Standard/2012_2299859

Search date 22 August 2012

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
F 0118 923 6655/57
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

Search address supplied: 445267 238350, Wykham Park Farm, Wykham, Banbury, Oxfordshire, OX16 9ER

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.

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

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

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

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

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0118 925 1504, or use the address below:

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

Tel: 0118 925 1504
Fax: 0118 923 6657

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

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
F 0118 923 6655/57
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

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:

SP4438SW
SP4438NW
SP4438SE
SP4438NE
SP4439SE
SP4538SW
SP4538NW

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

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

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

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

For your guidance:

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

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
F 0118 923 6655/57
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Clean Water Services

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

Asset Location Search

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

SP4438SW
SP4438NW
SP4438SE
SP4438NE
SP4439SE
SP4538SW
SP4538NW

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 0845 920 0800. 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

An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 223, Swindon, SN38 2TW.

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
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I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search

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, 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: 0845 850 2777
Fax: 0118 923 6613
Email: developer.services@thameswater.co.uk

Should you require any further information regarding budget estimates, diversions or stopping up notices then please contact:

DevCon Team
Asset Investment
Thames Water
Maple Lodge STW
Denham Way
Rickmansworth
Hertfordshire
WD3 9SQ

Tel: 01923 898 072
Fax: 01923 898 106
Email: devcon.team@thameswater.co.uk

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F 0118 923 6655/57
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Asset Location Search

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: 0845 850 2777
Fax: 0208 213 8833
Email: developer.services@thameswater.co.uk

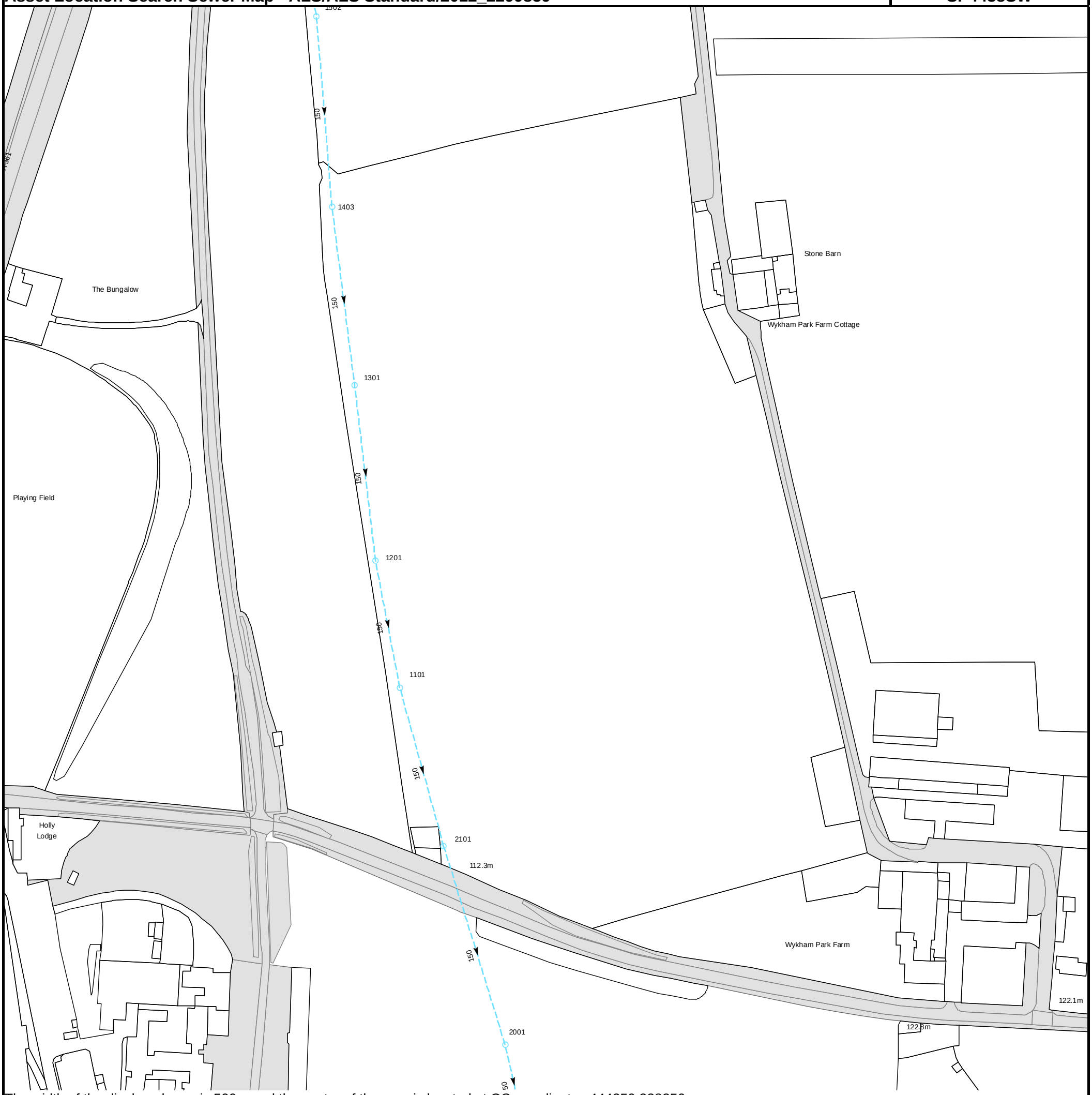
Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
F 0118 923 6655/57
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2012_2299859	SP4438SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444250,238250

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
2001	109.41	107.63
1101	113.68	112.13
2101	112.86	110.72
1502	123.18	121.2
1403	121.02	119.26
1301	118.66	117.12
-	-	-
1201	115.67	114.13

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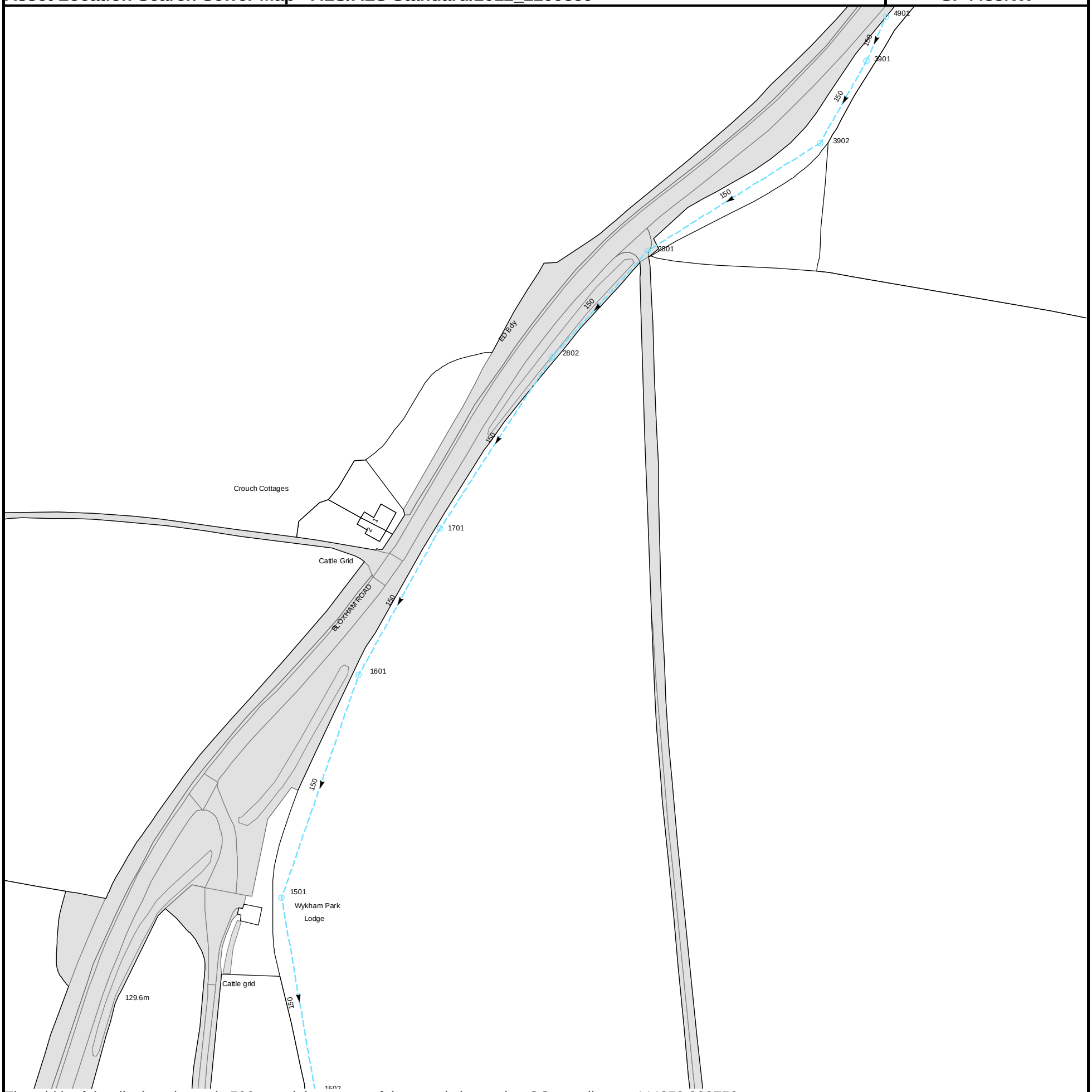
Asset Location Search Sewer Map - ALS/ALS Standard/2012_2299859

SP4438NW



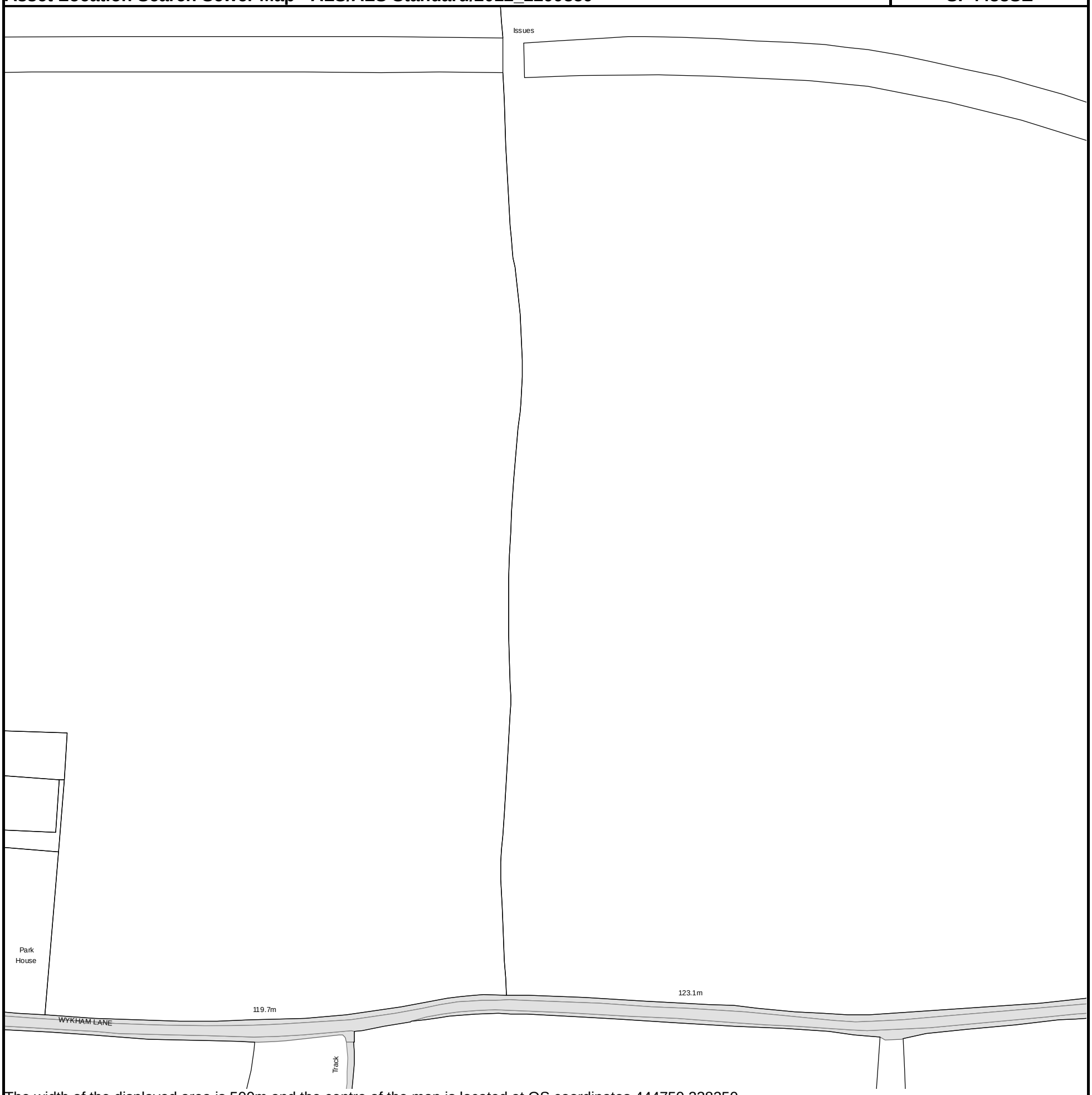
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444250,238750

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444250,238750

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
3902	132.96	132.96
3901	133.05	130.49
4901	n/a	n/a
2802	132.34	129.21
2801	132.48	129.62
1701	130.55	128.72
1501	124.84	122.97
-	-	-
1601	128.11	126.52

Asset Location Search Sewer Map - ALS/ALS Standard/2012_2299859	SP4438SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,238250

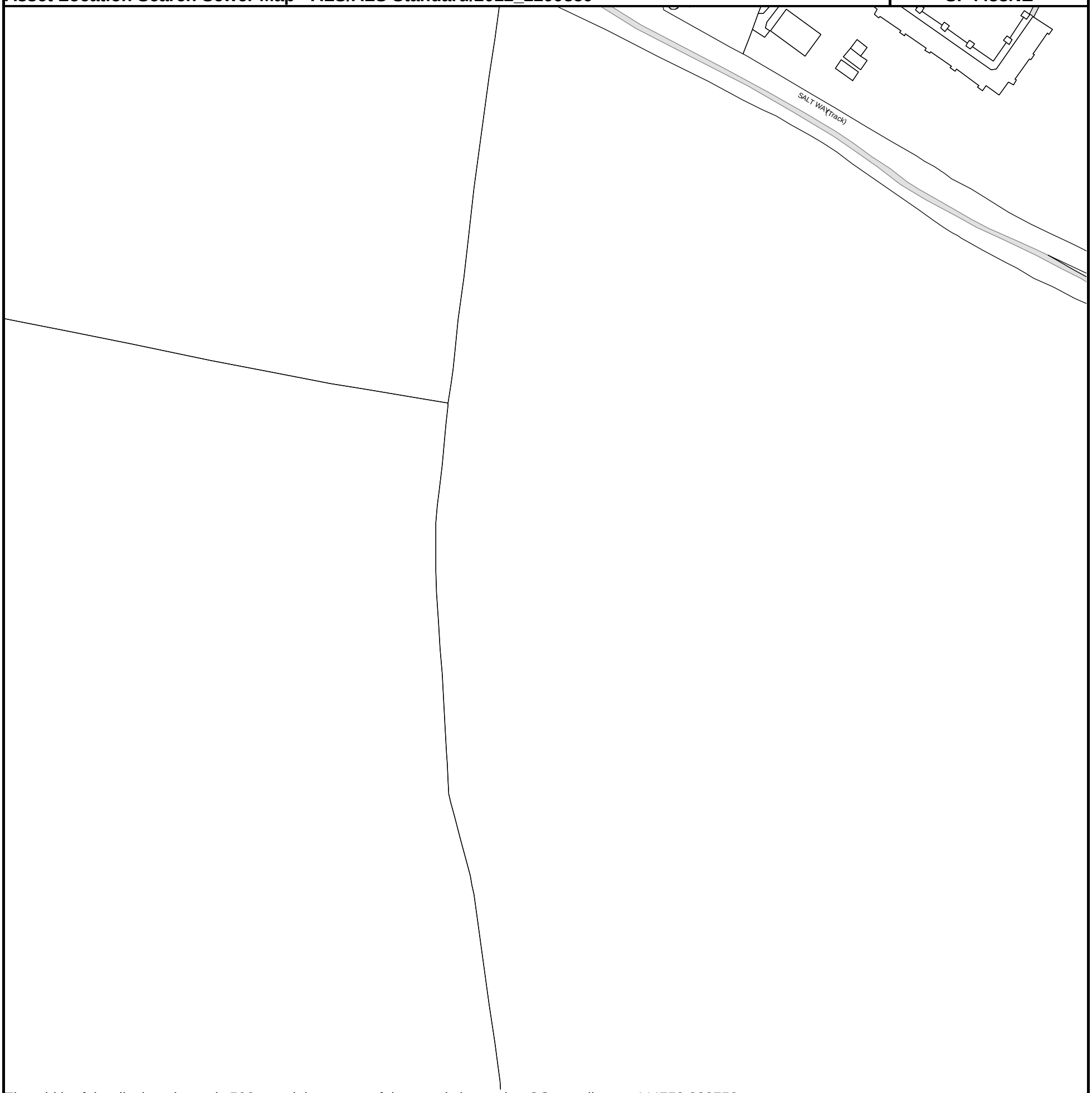
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual 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/2012_2299859 | **SP4438NE**



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,238750

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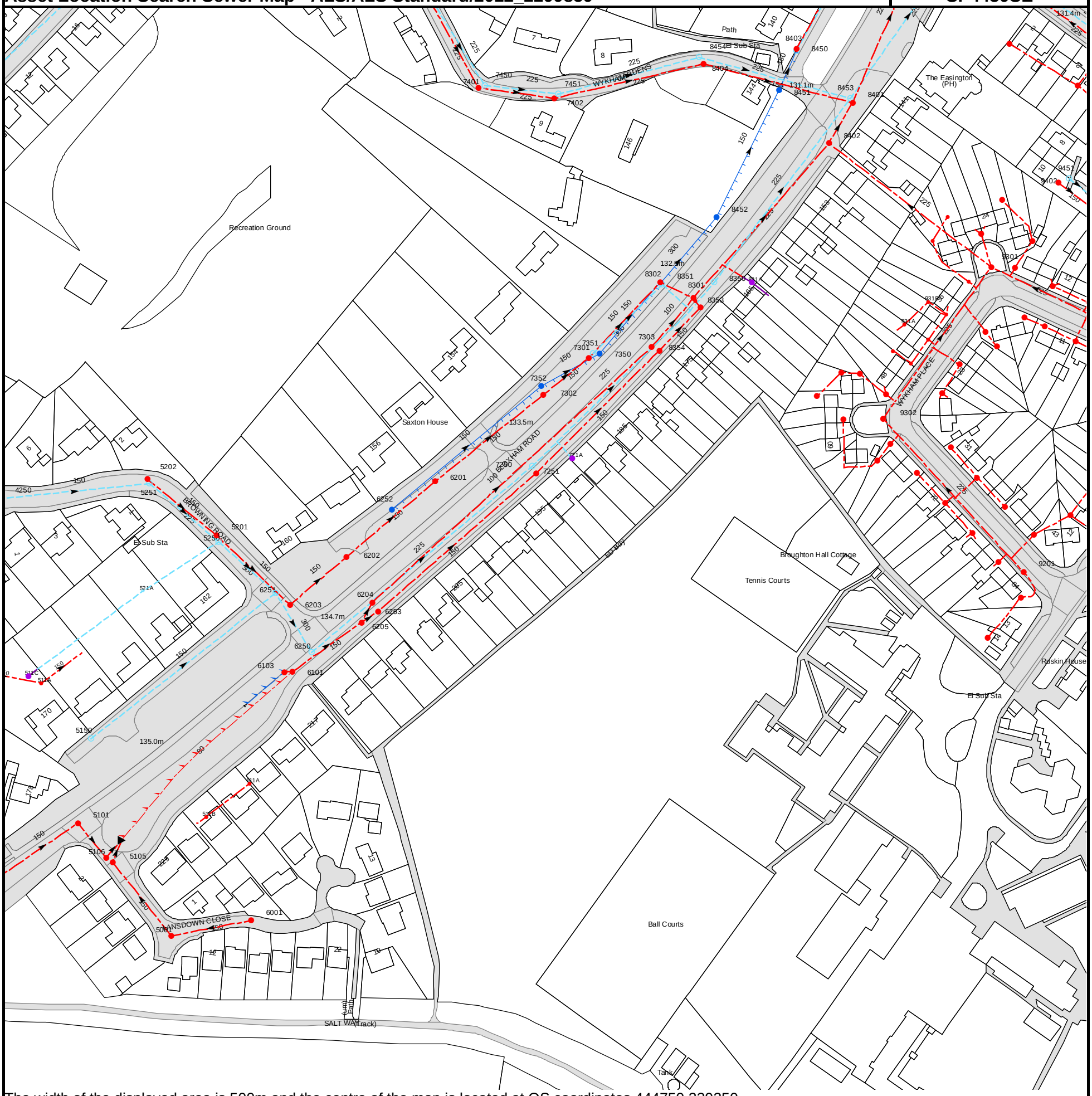
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
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/2012_2299859

SP4439SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,239250

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9455	n/a	n/a
9307	n/a	n/a
9452	n/a	n/a
9208	n/a	n/a
9318	n/a	n/a
9312	n/a	n/a
9207	n/a	n/a
9309	n/a	n/a
9320	n/a	n/a
9301	131.43	128.75
9319	n/a	n/a
9453	n/a	n/a
9206	n/a	n/a
9311	n/a	n/a
9314	n/a	n/a
9310	n/a	n/a
9315	n/a	n/a
9313	n/a	n/a
9402	133.76	132.55
9451	133.64	132.79
9204	n/a	n/a
9316	n/a	n/a
9454	n/a	n/a
9210	n/a	n/a
9209	n/a	n/a
9317	n/a	n/a
9305	n/a	n/a
9306	n/a	n/a
931A	n/a	n/a
931B	n/a	n/a
9308	n/a	n/a
9214	n/a	n/a
9213	n/a	n/a
9201	130.88	129.41
9212	n/a	n/a
9205	n/a	n/a
9211	n/a	n/a
8451	131.33	130.66
8353	132.4	130.64
8301	132.49	128.82
8350	132.13	130.25
831A	n/a	n/a
8452	132.09	131.37
8404	131.02	128.84
8454	131.01	129.66
8450	130.84	130.22
8403	130.84	130.06
8357	n/a	n/a
8402	131.55	128.31
8356	n/a	n/a
8358	n/a	n/a
8453	131.6	129.09
8401	131.53	128.06
8355	n/a	n/a
9202	n/a	n/a
9302	131.59	129.07
9303	n/a	n/a
9203	n/a	n/a
9304	n/a	n/a
7251	133.73	131.81
7250	134.09	131.45
721A	n/a	n/a
7302	134.25	131.29
7352	134.11	132.38
7301	133.72	130.92
7350	133.61	132.99
7351	133.64	131.22
8354	132.89	131.02
7303	132.99	131.11
8351	132.79	130.66
8302	132.82	130.18
7402	132.31	129.57
7451	132.29	129.9
7401	133.23	130.36
7450	133.23	130.58
6205	134.91	133.31
6253	134.85	132.98
6204	135.1	133.04
6252	135.01	133.79
6201	134.78	131.77
6103	n/a	n/a
6101	135.07	133.62
6250	135.15	132.77
6203	135.62	132.8
6251	135.8	133.02
6202	135.19	132.53
5105	134.13	130.21
5106	134.17	130.14
5101	134.5	130.32
5150	135.35	133.69
511A	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
511C	n/a	n/a
5001	133.51	130.79
6001	133.15	131.18
511B	n/a	n/a
611A	n/a	n/a
521A	n/a	n/a
5250	136.28	133.52
5201	136.34	133.24
5251	136.86	134.44
5202	136.88	134.12

Asset Location Search Sewer Map - ALS/ALS Standard/2012_2299859

SP4538SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 445250,238250

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

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Asset Location Search Sewer Map - ALS/ALS Standard/2012_2299859

SP4538NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 445250,238750

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
4852	n/a	n/a
3801	n/a	n/a
3803	n/a	n/a
4802	128.63	127.91
4850	128.62	127.97
4801	128.51	127.82
4902	128.52	127.75
4951	128.56	127.8
4950	128.5	127.4
4901	128.48	127.53
3705	n/a	n/a
3712	n/a	n/a
3711	n/a	n/a
3704	n/a	n/a
3710	n/a	n/a
4704	n/a	n/a
3703	n/a	n/a
3709	n/a	n/a
3702	n/a	n/a
3708	n/a	n/a
3701	n/a	n/a
4853	n/a	n/a
4854	n/a	n/a
3802	n/a	n/a
3804	n/a	n/a
4855	n/a	n/a
4652	n/a	n/a
3603	n/a	n/a
3602	n/a	n/a
4604	126.86	126.16
4651	126.81	125.5
4602	126.61	125.96
4603	126.56	126.11
4601	126.56	125.54
3601	n/a	n/a
4650	126.56	124.25
4703	n/a	n/a
3714	n/a	n/a
3707	n/a	n/a
3713	n/a	n/a
3706	n/a	n/a
4701	126.74	125.71
471G	n/a	n/a
471H	n/a	n/a
471I	n/a	n/a
471J	n/a	n/a
471K	n/a	n/a
471L	n/a	n/a

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.

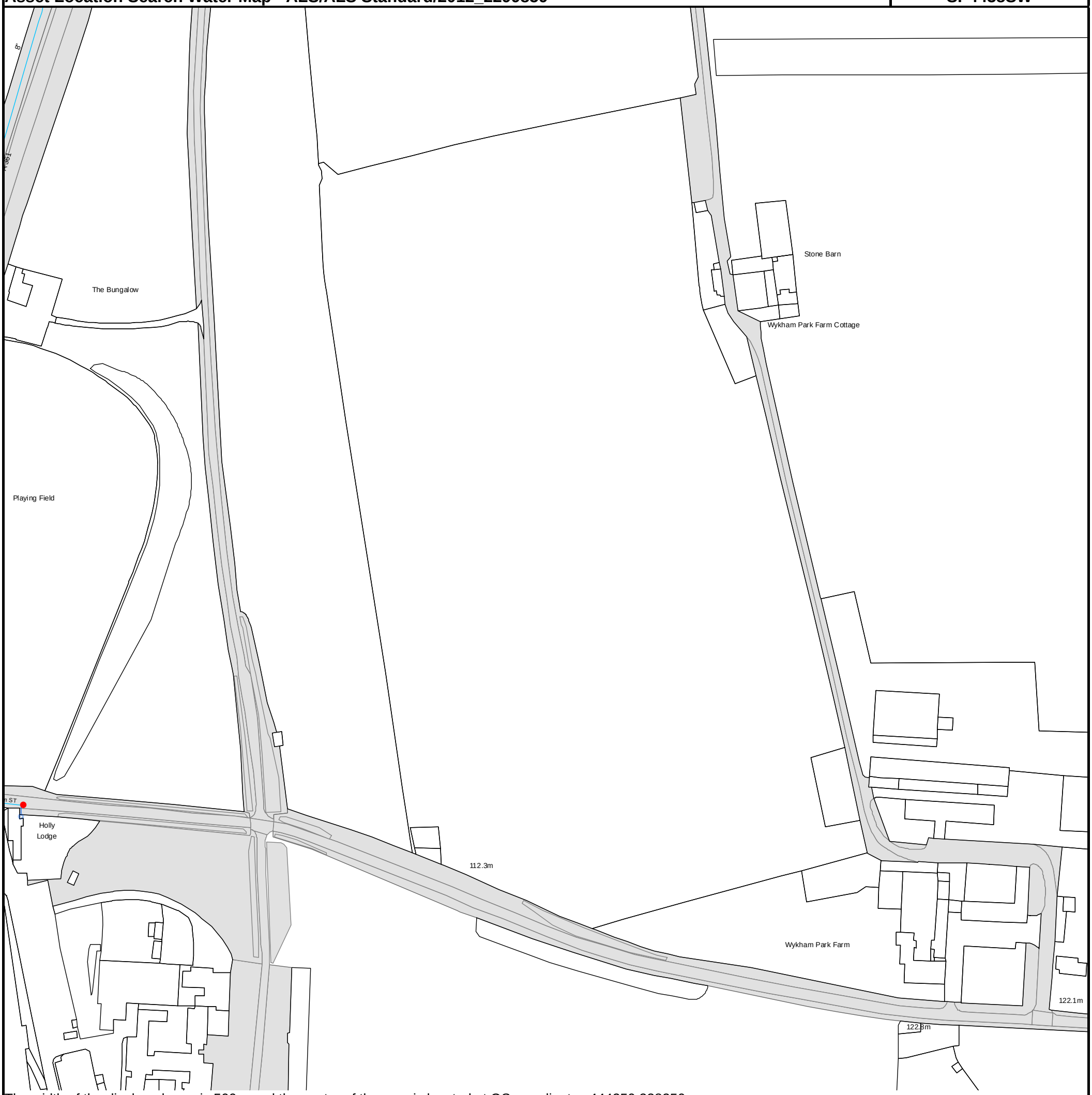
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

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 Insight on 0118 925 1504.

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859

SP4438SW

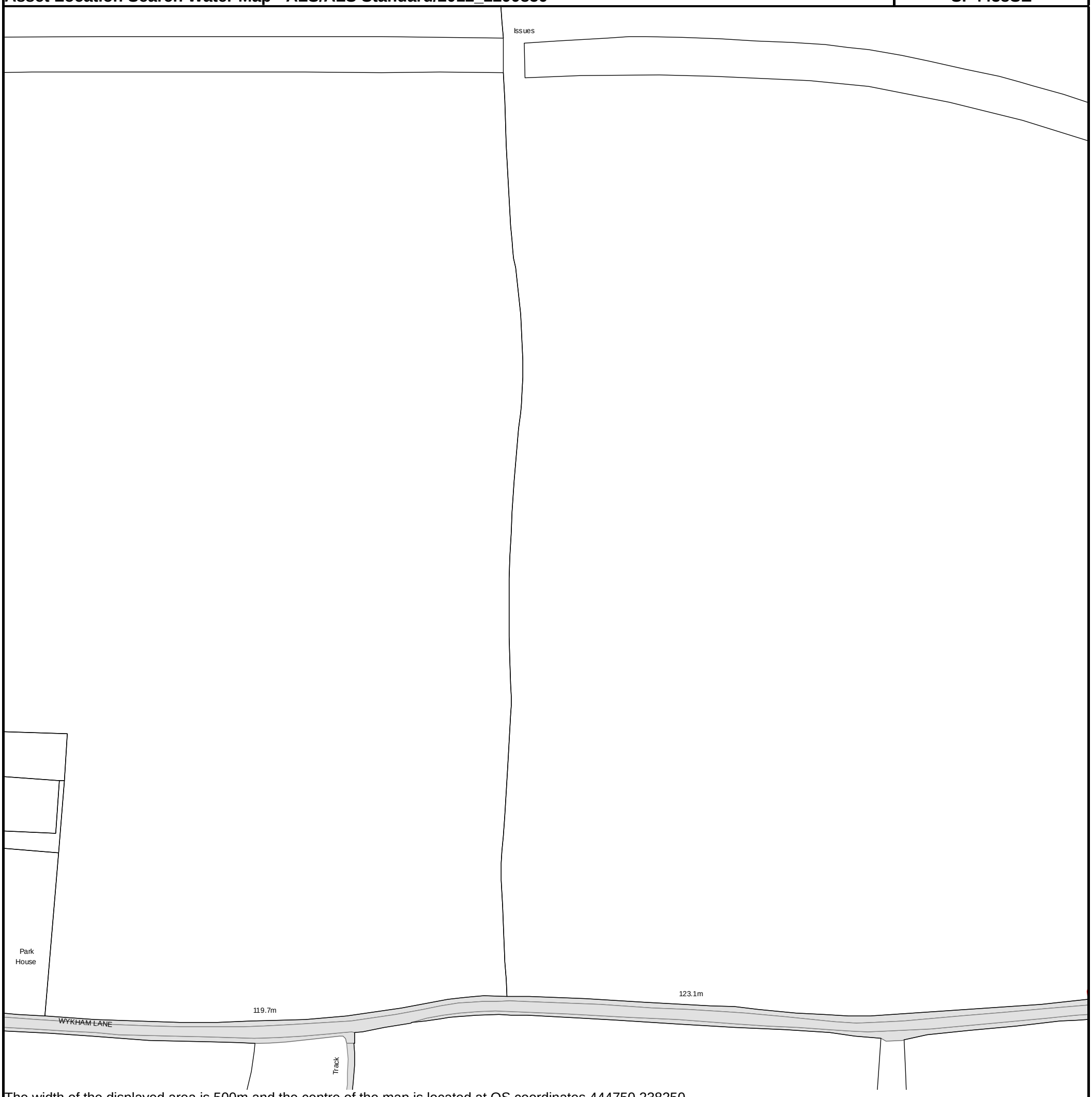


The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444250,238250

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859 | **SP4438NW**

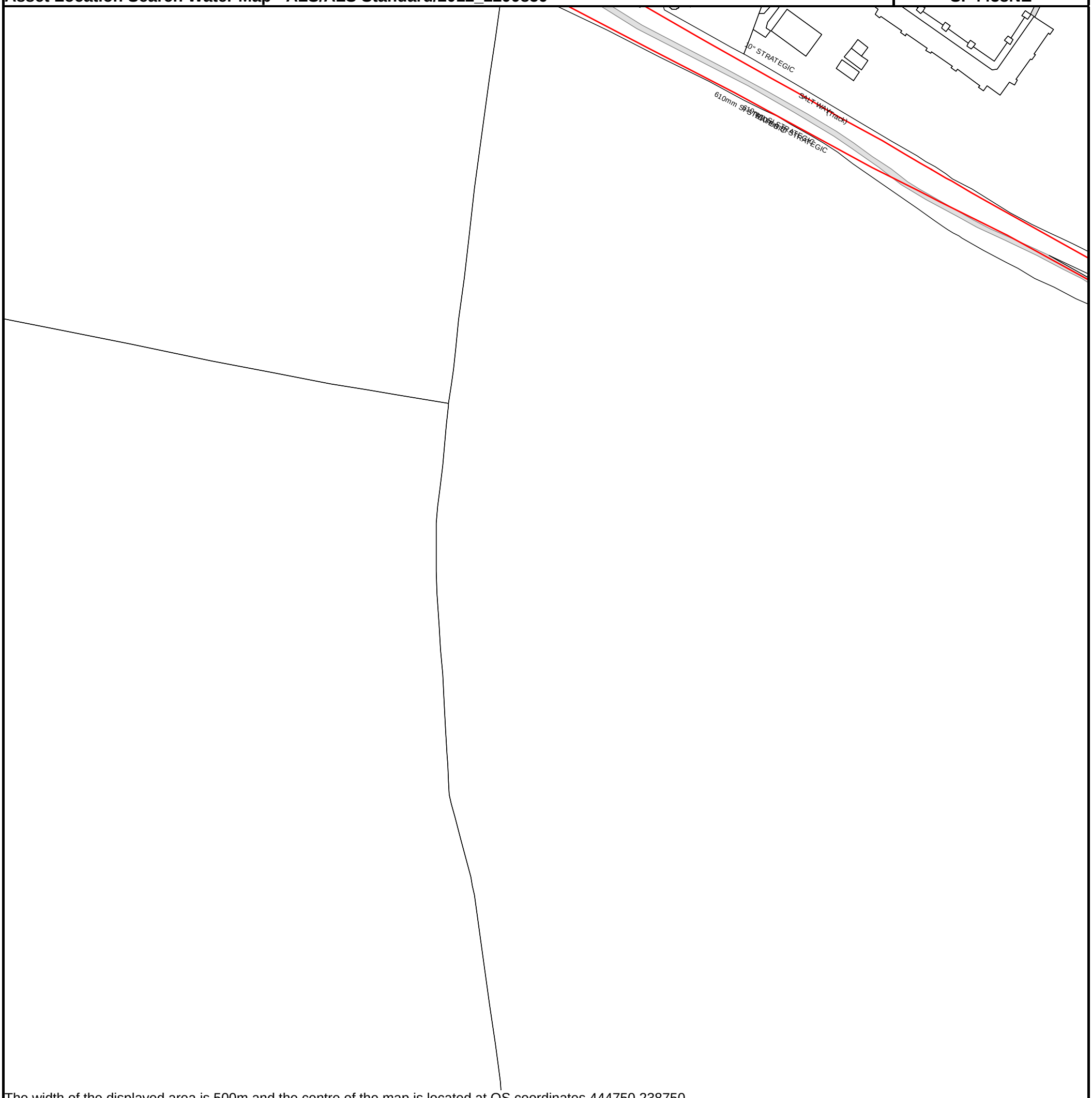
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444250,238750

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859	SP4438SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,238250

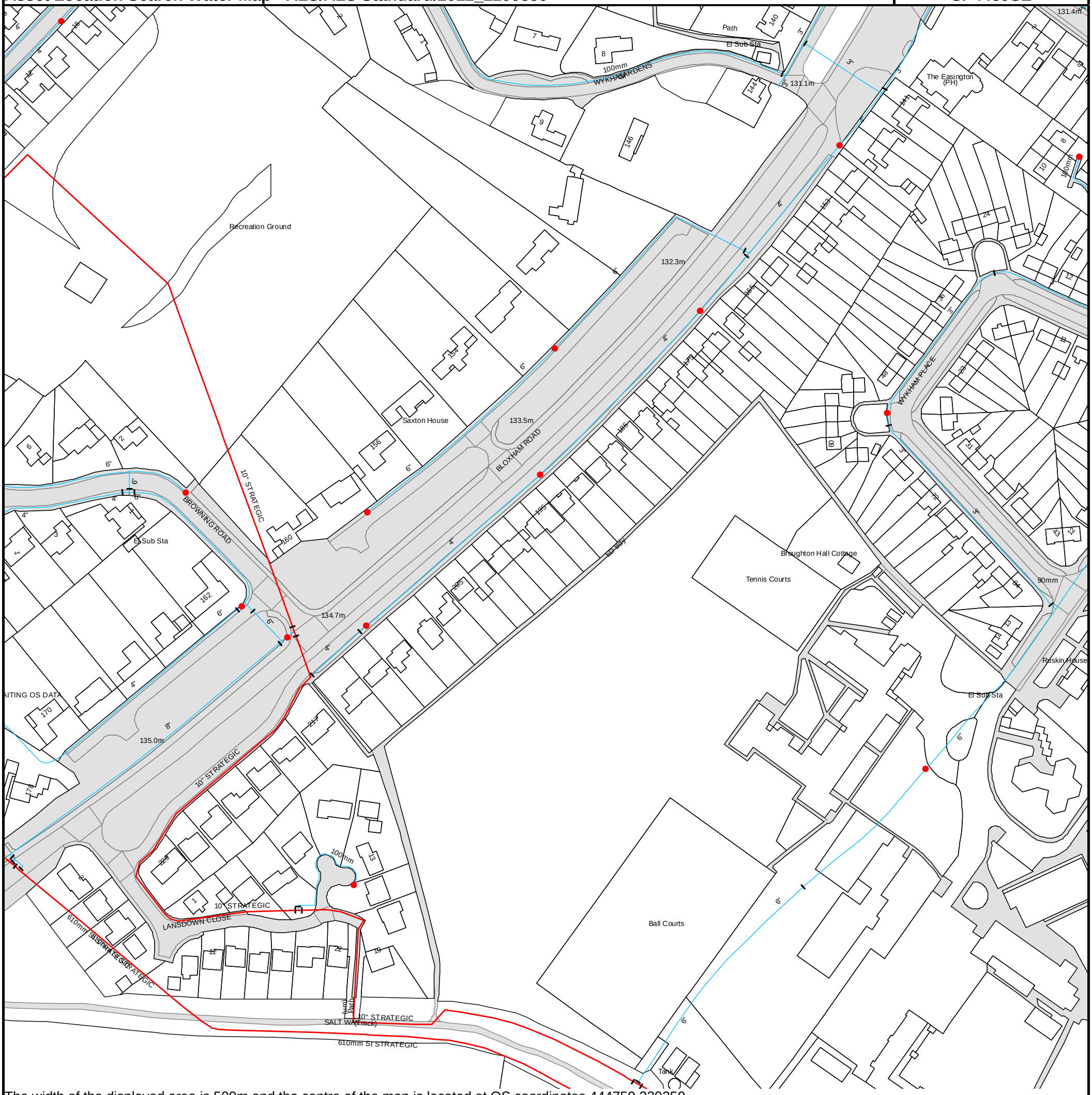
Asset Location Search Water Map - ALS/ALS Standard/2012_2299859 | **SP4438NE**



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,238750

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859

SP4439SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 444750,239250

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859

SP4538SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 445250,238250

Asset Location Search Water Map - ALS/ALS Standard/2012_2299859

SP4538NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 445250,238750

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.

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

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.

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

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4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
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By Post – Cheque only, made payable to 'Thames Water Utilities Ltd' writing your Thames Water account number on the back. Please fill in the payment slip below and send it with your cheque to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW	**By BACS Payment** direct to our bank on account number 90478703, sort code 60-00-01 may be made. A remittance advice must be sent to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW. Or fax to 01793 424599 or email: cashoperations@thameswater.co.uk	**Telephone Banking** By calling your bank and quoting your invoice number and the Thames Water's bank account number 90478703 and sort code 60-00-01	**By Swift Transfer** You may make your payment via SWIFT by quoting **NWBKGB2L** together with our bank account number 90478703, sort code 60-00-01 and invoice number

Invoice

Emma Skelley

Wardell Armstrong LLP

Forge Lane
Stoke on Trent
ST1 5BD

Thames Water Utilities Ltd.
PO Box 223
Swindon
SN38 2TW

Customer Reference: N/A

Invoice No: ADS12333975
Our Ref: ALS/ALS Standard/2012_2299859

Customer Number: ADS110911
Purchase Order No: **ST11148**

Posting Date: 22-08-2012
Due Date: 05-09-2012

Search Address Supplied: 445267 238350, Wykham Park Farm, Wykham, Banbury, Oxfordshire, OX16 9ER

Description of Charges	Qty	Unit Price	VAT (20%)	Amount (Inc VAT)
Asset Location Search	1	£92.00	£18.40	£110.40

OUTSTANDING AMOUNT (Inc. VAT) £110.40

Please send any outstanding amount to Thames Water, PO Box 223, Swindon, SN38 2TW..

Your payment terms are within 14 days. Please see previous page for ways to pay.

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VAT Reg. No GB 537456915

Girobank Trans cash

Girobank plc Bootle Merseyside GIR 0AA

Payment slip

bank giro credit

138
208
70

Reference (customer account number): ADS110911 / ADS12333975

Credit account number: 257 1706

Amount due (40p fee payable at PO counter): £ 110.4

Cheque NOT acceptable at Post Office

By transfer from Alliance and Leicester Giro account number

Cashiers stamp and initials

Signature

Date

Wardell Armstrong LLP

Forge Lane
Stoke on Trent
ST1 5BD

NatWest
Collection Account
Thames Water
Utilities Ltd

57-17-06

Cash

Cheques

£

Items Fee

Please do not write or mark below this line and do not fold this counterfoil

Paragon 9630 01/2004

010010003339754 V7702571706 000110400 74 X

Search Code

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- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

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The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

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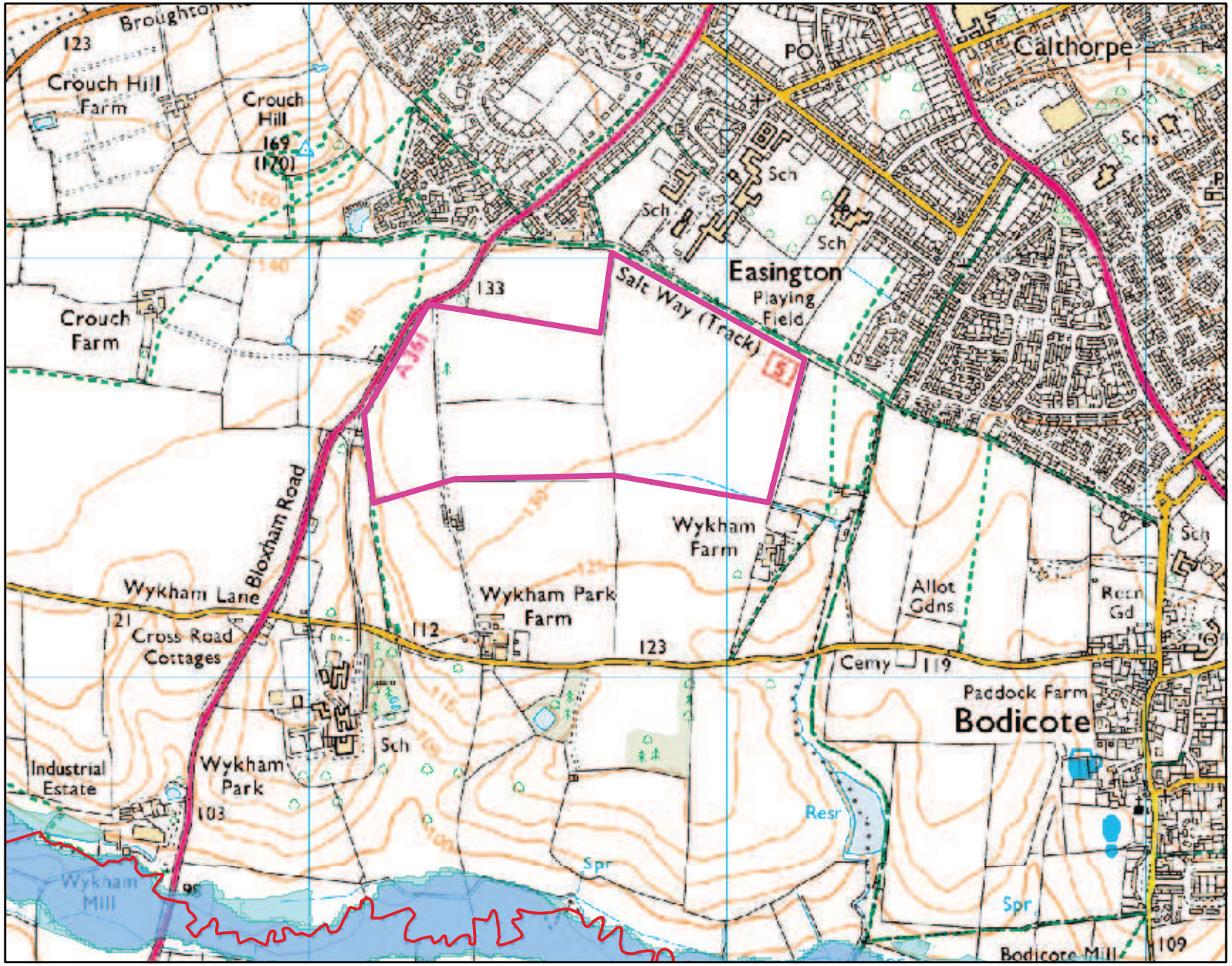
PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

APPENDIX 2

Environment Agency Flood Map

Flood Map centred on Wykham Park Farm, Wykham ,Banbury
Created 20/09/2012 - REF: OX_0095_01



Environment Agency

Kilometres

0 0.15 0.3

N W E S

Legend

- Main River
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

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APPENDIX 3

Environment Agency Correspondence

Skelley, Emma

From: Skelley, Emma
Sent: 21 August 2012 14:53
To: 'planning-wallingford@environment-agency.gov.uk'
Subject: FRA enquiry - Wykham, Banbury, Oxon [WM10671]
Attachments: Plan Base.pdf

Dear Sir/Madam

I'm currently preparing a Flood Risk Assessment and outline drainage strategy for a large site (circa 52ha) south of Banbury. We have been commissioned to prepare this report in readiness for promoting the site through the emerging Core Strategy.

The site address is below and I have attached a location plan for your reference.
Wykham Park Farm
Wykham
Banbury
Oxon
OX16 9ER
Grid ref: 445267, 238350

The outline proposals are for a mixed use development with circa 1000 residential units, a primary school, a local centre (circa 2.5ha) and employment land (circa 2ha).

The online flood map indicates that the site lies within Flood Zone 1. We would however, be grateful of your comments with regards to the scope for the FRA and outline drainage strategy. If you feel there are any site-specific issues that should be considered as part of the FRA we would be grateful if you could highlight these in your response. We would welcome any recommendations for surface water drainage. Should you have any queries please do not hesitate to contact me.

Kind regards,
Emma

Emma Skelley
Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888
www.wardell-armstrong.com

Skelley, Emma

From: planning-wallingford@environment-agency.gov.uk
Sent: 18 September 2012 15:46
To: Skelley, Emma
Subject: Environment Agency Response to: -
Attachments: PlanningProposal.rtf

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Wykham Park

The proposal has been reviewed and I enclose the Environment Agency's comments on:
Wykham Park Farm,
Wykham, Banbury, Oxon, OX16 9ER

LPA ref: -

Ms Emma Skelley
Wardell Armstrong Ltd
Sir Henry Doulton House Forge Lane
Stoke-on-Trent
Staffordshire
ST1 5BD

Our ref: WA/2012/112955/01-L01

Date: 18 September 2012

Dear Ms Skelley

MIXED USE DEVELOPMENT WITH CIRCA 1000 RESIDENTIAL UNITS, A PRIMARY SCHOOL, A LOCAL CENTRE (CIRCA 2.5HA) AND EMPLOYMENT LAND (CIRCA 2HA).
WYKHAM PARK FARM, WYKHAM, BANBURY, OXON, OX16 9ER

Thank you for consulting us on this pre-development enquiry. We received your e-mail, dated 21 August 2012 and we have the following comments.

The site is located within Flood Zone 1 and as such the primary flood risk associated with this development is that from surface water run-off. Development within this zone can generate significant volumes of water particularly where there is a proposed increase in the impermeable area. The requirement to assess the flood risks posed by the development includes an assessment of the run-off implications of development, appropriate to the nature and scale of that development.

In summary, we require a baseline drainage assessment to inform a more detailed drainage strategy/FRA. The drainage strategy should be developed alongside the development masterplan to ensure that adequate land is left for the drainage features and that the site layout considers their orientation.

These can be associated with SUDS features which will be required for the surface water drainage. This will also ensure that the surface water from this site does not increase the flood risk in the river system mentioned above.

There maybe limited infiltration across the site and therefore above ground sustainable drainage features could be more appropriate across the development. Discharge of surface water should be to existing watercourses across the site and should mimic the natural drainage patterns of the catchment. The natural drainage characteristics of the site can be used to shape the design of the surface water drainage and the masterplan for the site.

Cont/d..

Positive drainage of surface water across the development should be limited and we would expect that outfall to watercourses is provided through open channels or wetland features rather than piped systems. This opportunity should be discussed further to ensure that the future ecological and drainage reports do not contradict each other.

You will need to establish how the site currently responds under all rainfall events up to the 1 in 100 year event to determine the existing greenfield run-off rate. Catchment areas within the site should also be clearly defined with an associated greenfield run-off rate. This will then inform the drainage strategy with regards to a required surface water volume to be attenuated in order to design the indicative sustainable urban drainage system.

Existing overland flow routes should be established and it should be demonstrated how these routes will be maintained or managed in a sustainable way without increasing flood risk within the site and the surrounding area.

This also applies to overland flow routes within the development for any future proposed drainage strategy for any proposed informal drainage routes over the 1 in 30 year rainfall event up to the 1in 100 year event with a 30% allowance for climate change.

Residual flood risk, in the form of events greater than the design rainfall event, should also be considered to ensure that during extreme rainfall events the development is not at risk of flooding.

We would seek to ensure that the SUDS within the site are designed, located, constructed and managed in such a way as to positively contribute to the nature conservation value of the site.

<u>Any scheme should include the following features</u>

- Confirmation as to whether the individual SUDS are to be seasonally dry or have areas of permanent water. Wet and dry SUDS provide different habitat opportunities for invertebrates and macrophytes. Providing both wet and dry SUDS increases the habitat diversity available.
- The land around lakes and ponds, including SUDS basins can be valuable for wildlife if designed and managed appropriately. Therefore, a wide buffer zone should be established around each SUDS and the management of this zone provide maximum benefits for wildlife.
- Any planting within and around SUDS and ponds should be done with locally native species only. Non-native species can become invasive and result in the loss of habitat for native species and an increase in management costs due to control management being required. Using locally native species may increase the success rate of planting schemes as the species are able to cope with local conditions.
- A long term management plan of the open spaces (including the management of SUDS) should be included to ensure the features are managed for biodiversity in the long term.

SUDS and ponds can form part of a wider green & blue infrastructure strategy for the development, linking with other existing and proposed green infrastructure in the wider environment.

You should also look to use appropriate SUDS to ensure the water quality of local

watercourses is protected. This should be done by taking the requirements of the Water Framework Directive into account. The proposed development falls within waterbody Sor Brook (Broughton to Adderbury) GB106039037260, currently at Good Ecological Status. They must ensure that the proposed development doesn't cause deterioration in status of any WFD element. The site is also approximately 3 km upstream of a Thames Water drinking water abstraction. The applicant will need to ensure the development does not increase any water quality risk to it.

Yours sincerely

Mr Jack Moeran
Planning Liaison Officer

Direct dial 01491 828367
Direct e-mail planning-wallingford@environment-agency.gov.uk

End

Skelley, Emma

From: Skelley, Emma
Sent: 20 September 2012 12:31
To: 'planning-wallingford@environment-agency.gov.uk'
Subject: FAO Mr Jack Moeran - WA/2012/112955/01-L01 - Wykham Park Farm

Dear Mr Moeran

Thank you for your pre-planning response in relation to the above site. We will take your comments into consideration in the FRA and as part of the Masterplanning process.
With regards to surface water runoff, we would like to agree a discharge rate for the site with the Environment Agency to assist us with future calculations and preparation of the drainage strategy.

We have reviewed the Wallingford WRAP maps and followed the IH124 method and note that the soil is classified as being relatively permeable. The result of this is a QBAR value of approximately 0.15 litres/second/hectare and, therefore, in accordance with the EA/Defra document 'Preliminary Rainfall Runoff Management for Developments' (Rev E) we propose that surface water runoff rates from the development are restricted to 2 litres/second/hectare, and attenuated on site for events up to and including the 1 in 100 year event + climate change.

We would be grateful if you could confirm that our proposal to discharge surface water runoff from the development to existing watercourses, at a rate of 2 litres/second/hectare, is acceptable to the Environment Agency.

Your earliest response would be much appreciated so that we can prepare preliminary attenaution estimates to inform the Masterplan. If you have any queries please do not hesitate to call on 01782 276700.

Kind regards,

Emma Skelley

-----Original Message-----
From: planning-wallingford@environment-agency.gov.uk [mailto:planning-wallingford@environment-agency.gov.uk]
Sent: 18 September 2012 15:46
To: Skelley, Emma
Subject: Environment Agency Response to: -

The proposal has been reviewed and I enclose the Environment Agency's comments on:
Wykham Park Farm,
Wykham, Banbury, Oxon, OX16 9ER

LPA ref: -

Skelley, Emma

From: planning-wallingford@environment-agency.gov.uk
Sent: 30 October 2012 13:33
To: Skelley, Emma
Subject: Environment Agency Response to: -
Attachments: PlanningProposal.rtf

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Wykham Park, Pending

The proposal has been reviewed and I enclose the Environment Agency's comments on:
Wykham Park Farm,
Wykham, Banbury, Oxon, OX16 9ER

LPA ref: -

Ms Emma Skelley
Wardell Armstrong Ltd
Sir Henry Doulton House
Forge Lane
Stoke-on-Trent
Staffordshire
ST1 5BD

Our ref: WA/2012/112955/02-L01

Date: 30 October 2012

Dear Ms Skelley

MIXED USE DEVELOPMENT WITH CIRCA 1000 RESIDENTIAL UNITS, A PRIMARY SCHOOL, A LOCAL CENTRE (CIRCA 2.5HA) AND EMPLOYMENT LAND (CIRCA 2HA).
WYKHAM PARK FARM, WYKHAM, BANBURY, OXON, OX16 9ER

Thank you for consulting us on this matter. We received your email on the 20 September 2012 and we are now in a position to respond.

Having reviewed the details we note that there is a significant difference between the Qbar runoff rate, which is extremely low, and the 2l/s/ha as referenced in the Preliminary Rainfall Runoff document. It is possible that one of the design parameters is incorrect, as a quoted runoff rate of 0.15l/s/ha. If however this rate is correct then we would prefer that it is used to design the drainage features.

In order to provide a degree of betterment a runoff rate which is below any calculated rate could be used for design purposes.

Yours sincerely

Mr Jack Moeran
Planning Liaison Officer

Direct dial 01491 828367
Direct e-mail planning-wallingford@environment-agency.gov.uk

Please note that the view expressed in this letter by the Environment Agency is a response to a pre application enquiry only and does not represent our final view in relation to any future planning application made in relation to this site. We reserve the right to change our position in relation to any such application.

You should seek your own expert advice in relation to technical matters relevant to any planning application before submission

End

Skelley, Emma

From: Skelley, Emma
Sent: 02 November 2012 10:22
To: 'jack.moeran@environment-agency.gov.uk'
Subject: RE: WA/2012/112955 Wykham Park Farm
Attachments: PlanningProposal.rtf.rtf

Dear Mr Moeran

Thank you for your pre-planning response re Wykham Park Farm runoff rates (attached). We consider that the QBAR rate of 0.15 litres/second/ha is unrealistic/incorrect and will, therefore, use 2 litres/second/ha in our calculations (as per current best practice guidance) to design the surface water drainage features, and will apply a climate change allowance appropriate to the lifetime of the development.

Kind regards
Emma Skelley

Emma Skelley
Senior Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888
www.wardell-armstrong.com

-----Original Message-----
From: planning-wallingford@environment-agency.gov.uk [mailto:planning-wallingford@environment-agency.gov.uk]
Sent: 30 October 2012 13:33
To: Skelley, Emma
Subject: Environment Agency Response to: -

The proposal has been reviewed and I enclose the Environment Agency's comments on:
Wykham Park Farm,
Wykham, Banbury, Oxon, OX16 9ER

LPA ref: -

We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

If we have sent you information and you wish to use it please read our terms and conditions which you can get by calling us on 08708 506 506. Find out more about the Environment Agency at www.environment-agency.gov.uk

APPENDIX 4

Thames Water Correspondence

Skelley, Emma

From: Geoff.Nokes@thameswater.co.uk
Sent: 20 September 2012 15:34
To: Skelley, Emma
Subject: Re: FW: Enquiry - Wykham Park Farm, Banbury, Oxon

Emma

We would most likely accept 5l/s into both of the proposed SW sewers as this is the realistic minimum attenuation rate. If it could be demonstrated that the existing is more then we would honour that discharge but for the surface water discharge the EA are the statutory consultee.

Regards
Geoff
Development Engineer - Waste
02035779228

|------------>
| From: |
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|"Skelley, Emma" <eskelley@wardell-armstrong.com>
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|------------>
| To: |
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|<Geoff.Nokes@thameswater.co.uk>
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|------------>
| Date: |
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>----------|
|20/09/2012 14:47
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|------------>
| Subject: |
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>----------|
|FW: Enquiry - Wykham Park Farm, Banbury, Oxon
|
>----------|

Dear Geoff

Further to our recent correspondence (attached below) regarding the site at Wykham Park Farm, we will shortly be submitting an application for a formal impact study as you recommended. Although the impact study will ultimately provide information on suitable discharge locations, rates and necessary upgrading works for both foul and surface water flows, we are in the meantime preparing an outline drainage strategy (surface water) and would be grateful if you could provide your comments to the following question:

1. We are proposing to discharge the majority of surface water runoff to nearby watercourses due to the relatively impermeable nature of the ground. There are, however, two small areas of the site which are at lower elevations (up to 4 – 5m) than the proposed discharge location. These areas are a parcel of land in the south-eastern corner, and a parcel of land in the south-western corner of the site. We propose, therefore, that surface water from these two areas is discharged to two nearby public surface water sewers at the following locations:
   i. Sheet SP4538NW Manhole Ref 3603 or 4652;
   ii. Sheet SP4438NW Manhole Ref 1501 or Sheet SP4438SW Manhole ref 1403.

We would, of course, restrict surface water discharge rates into the public sewers to your requirements, and would be grateful if you could comment as to whether discharge to the public sewers would be acceptable in principle, and an indication of an acceptable discharge rate. We appreciate that the formal impact study will provide greater details and confirmation on discharge locations and rates, but if we could make an 'in principle' agreement with yourselves in the meantime it would be gratefully appreciated.

Kind regards,

Emma Skelley
Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888
www.wardell-armstrong.com

-----Original Message-----
From: Geoff.Nokes@thameswater.co.uk [mailto:Geoff.Nokes@thameswater.co.uk]
Sent: 04 September 2012 16:26
To: Skelley, Emma
Subject: RE: Enquiry - Wykham Park Farm, Banbury, Oxon

Emma

Go straight to Impact study and with the details provided should be enough

regards
Geoff

|------------>
| From: |
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  |"Skelley, Emma" <eskelley@wardell-armstrong.com
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|------------>
| To: |
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  |<Geoff.Nokes@thameswater.co.uk
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  |04/09/2012
15:32 |

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|------------>
| Subject: |
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  |RE: Enquiry - Wykham Park Farm, Banbury, Oxon |

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Geoff

Thank you for this information, I will pass this on to our Client and get back in touch should we wish to proceed with the study. Am I correct in assuming that the impact study could be carried out on the data I have already provided to you, since we do not have any more details should they be required for the study.

If you could confirm the above it would be gratefully appreciated.

As an alternative, I could attempt to submit a formal developer enquiry form to the Developer Services team for a charge. Could you give me your opinion on whether they are likely to process an application that doesn't have all the details they ask for eg anticipated flows. I have avoided submitting such an enquiry to date because I'm aware that I can't complete all of the details, but if you think there's a chance of it getting a response I might try.

Kind regards,

Emma Skelley
Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

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(Embedded image moved to file: pic14615.gif) -----Original Message-----
From: Geoff.Nokes@thameswater.co.uk [mailto:Geoff.Nokes@thameswater.co.uk]
Sent: 04 September 2012 15:22
To: Skelley, Emma
Subject: Re: Enquiry - Wykham Park Farm, Banbury, Oxon

Emma

Unfortunately, we have a charge for giving this information, it will require an impact study as this would be a significant load on our small local Network, this requires a £400+vat cheque to obtain the scope and quote for the impact study, which is produced in about 2 weeks and an impact study of this kind could be £10k and need 12 weeks to complete.

Regards
Geoff
Development Engineer - Waste
02035779228

|------------>
| From: |
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  |"Skelley, Emma" <eskelley@wardell-armstrong.com
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|------------>
| To: |

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  |<geoff.nokes@thameswater.co.uk
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| Date: |
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  |04/09/2012
11:54 |

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|------------>
| Subject: |
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----------|
  |Enquiry - Wykham Park Farm, Banbury,
Oxon |

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Dear Mr Nokes

Further to my recent telephone call with the Developer Services team, I have been asked to forward my original email enquiry to you. Please see below. Since sending the email on 21/08 I have received the asset plans for the site and I am therefore aware of the locations of the public sewers.

I look forward to receiving your response. Pease do not hesitate to call me to discuss further.

Kind regards,

Emma Skelley
Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent
Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888

www.wardell-armstrong.com

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From: Skelley, Emma
Sent: 21 August 2012 10:12
To: 'developer.services@thameswater.co.uk'
Subject: Pre-application Enquiry - Wykham Park Farm, Banbury, Oxon

Dear Sir/Madam

I am currently preparing a Flood Risk Assessment and outline drainage strategy for the following site (see attached plan):
Wykham Park Farm
Wykham
Banbury
Oxon
OX16 9ER
Grid Ref: 445267, 238350

The outline proposals are for a mixed use development with circa 1000 residential units, a primary school, a local centre (circa 2.5ha) and employment land (circa 2ha). The total site area is approximately 52ha.
I will shortly be requesting a copy of the public sewer records for the area, but I would be grateful if you could provide an indication of whether foul water flows could, in principle, be discharged to the public sewer network, or not. It is currently proposed that surface water will be managed using SUDS and discharged to watercourse. I would welcome your comments on the following:

- Are there any sewer easements affecting the site?
- Does the local public sewer network have sufficient capacity to accept foul water flows from a development of this scale without abnormal cost to the developer?
- Would Thames Water accept, in principle, a pumped discharge?
- Which manhole could foul water flows be discharged to?
- Would there be a restriction on discharge rate, and what would this be?
- If for whatever reason surface water cannot be discharged by any other means, would Thames Water accept discharge to public sewer?
  - If yes, would there be a restriction on the rate of discharge? At what MH location could surface water be discharged?

At this stage we are only gathering information on the site in readiness for promoting it through the emerging core strategy so I do not have any details other than what has been described above. I therefore, appreciate that you can only provide a response in principle to my questions above, and this will be sufficient for my purposes at this time. We would like to be fully aware of any potential development constraints, and significant abnormal costs as early as possible and hence your response to the above would be much appreciated. If you have any queries please do not hesitate to contact me on 01782 276700.

Kind regards,

Emma Skelley
Geologist
Wardell Armstrong LLP
Sir Henry Doulton House
Forge Lane
Etruria
Stoke on Trent

Staffordshire
ST1 5BD

Tel: 0845 111 7777
Fax: 0845 111 8888
www.wardell-armstrong.com

(Embedded image moved to file: pic08166.gif)

[attachment "Plan Base.pdf" deleted by Geoff Nokes/CWS/ThamesWater]

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Find juggling your finances a struggle? Spread your bill payments by setting up a Direct Debit . You stay in control with advance notice of your payments and a choice of payment dates. Visit http://www.thameswater.co.uk

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Our vision: If customers had a choice, they would choose Thames Water.

APPENDIX 5

Preliminary Surface Water Runoff and Attenuation Estimates

Calculation Sheet

REF:

CLIENT:	PROJECT:	JOB NO.:	CALC. REF. NO.:
Gallagher Estates	Wykham Park Farm	WM10671	PAGE: 1 OF 1
CALCULATION	CALC. BY:	CHECKED BY:	APPROVED BY:
Estimation of Greenfield Runoff & Attenuation Calcs	(NAME AND SIGNATURE) E Skelley	(NAME AND SIGNATURE)	(NAME AND SIGNATURE)
	DATE: 05/09/2012	DATE:	DATE:

Following IH 124 method

SAAR	653	obtained from the Wallingford Procedure
SOIL	0.1	obtained from the Wallingford Procedure (SOIL = $0.1SOIL_1 + 0.3SOIL_2 + 0.37SOIL_3 + 0.47SOIL_4 + 0.53SOIL_5$)
Site Area	0.3	(square kilometers)

$QBAR_{RURAL} = 0.00108AREA^{0.89}.SAAR^{1.17}.SOIL^{2.17}$

$= 0.00108 \times 0.5^{0.89} \times 653^{1.17} \times 0.1^{2.17}$

$= \mathbf{0.0077}$ m^3/second

$= \mathbf{7.74}$ litres/second

ICP SUDS (to pro-rata IH124 method for sites less than 50 hectares)

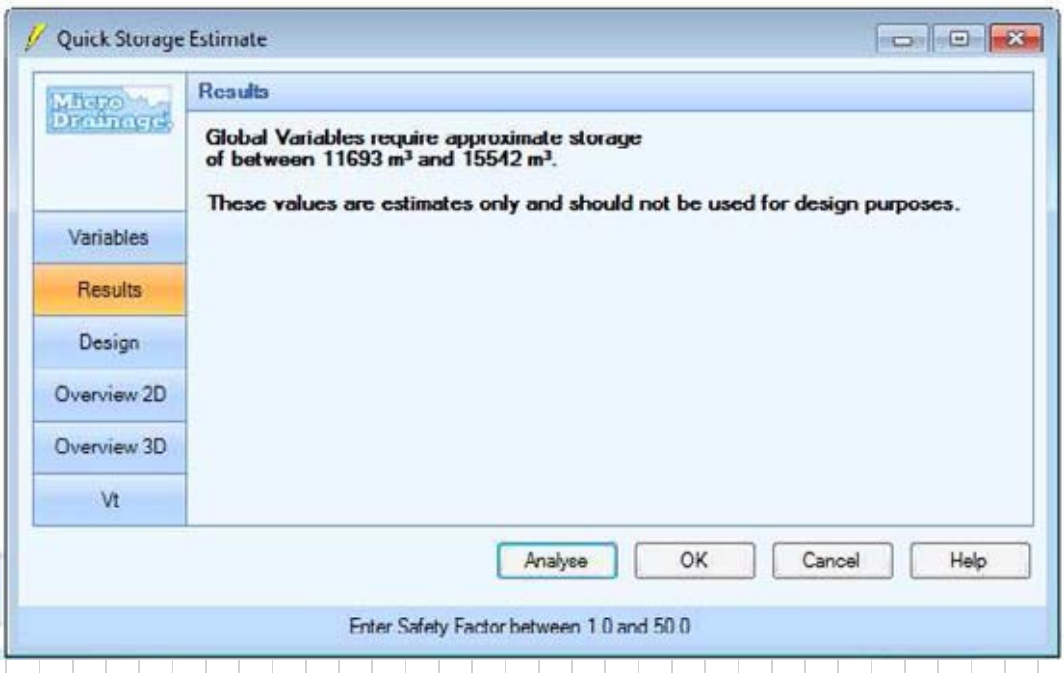
$= QBAR_{RURAL} / 0.5$ x Site area

$= 0.015 \times 0.3$

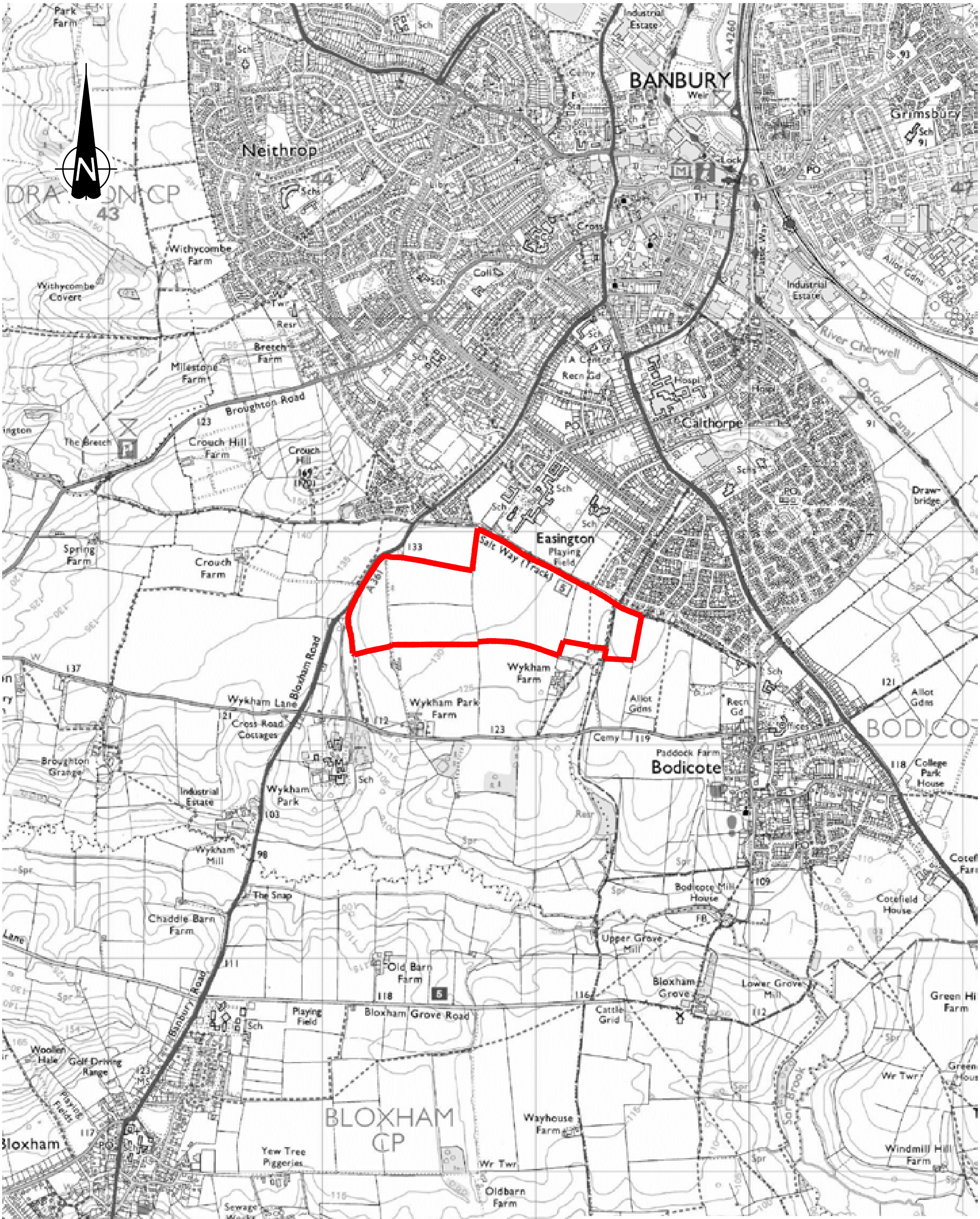
= 0.00465 m^3/second over site area

= 4.65 litres/second over site area

= **0.15** litres/second/hectare



DRAWINGS



CLIENT	DRG No.	SCALE	DATE
GALLAGHER ESTATES LTD	WM10671-001	1:25,000	17/10/12
PROJECT	DRAWN BY	CHECKED BY	APPROVED BY
WYKHAM PARK FARM, BANBURY	HRK		
DRAWING TITLE			
SITE LOCATION	wardell armstrong	your earth our world	

ILLUSTRATIVE DEVELOPMENT FRAMEWORK

WYKHAM PARK FARM

David Lock Associates
Town Planning and Urban Design

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	444431.290	239044.170	133.925
GH2	444349.700	238951.094	133.021
GH3	444294.201	238905.233	132.912
GH4	444260.807	238873.611	132.472
GH5	444213.547	238809.084	131.416
GH6	444182.866	238756.703	130.001
GH7	444100.706	238658.323	129.207
GH8	444061.752	238601.231	129.763
GH3A	444301.201	238821.918	133.139
GH4A	444706.775	238802.197	131.058
GH5A	445155.976	238585.165	128.397
GH6A	444726.606	238486.293	129.815
GH7A	444320.439	238522.190	131.869
GH8A	444304.909	238696.572	132.543
MS1	445376.532	238668.449	126.802
MS2	445310.445	238717.386	127.167
MS3	445385.532	238636.941	126.220

Note:
Some services may have been omitted due to parked vehicles.
The Ordnance Survey tile is to be used as a guide only.

OS Buildings — Surveyed Buildings

This survey has been orientated to the Ordnance Survey (O.S) National Grid (OSGB36) via a Global Position System (GPS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN02 & OSGM02 transformation models.
The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Legend:

Buildings / walls, Kerb line, Edge of surface, Canopy / Overhang, Line Marking, Centre Line, Barrier, Hand rail, Hedge, Overhead Powerline, Chamber, Woodland, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Gate, Inspection chamber, Manhole, Cover, Unable To Lift, Gully, Back Gully, Tree canopy level, Tree girth + Multi-girth, Tree Tag, Eaves level, Ridge level, Flat roof level, Concrete paving slabs, Tac tile paving, Road name board, Retaining wall

Fence types: Interwoven, Iron Railings, Wire Mesh, Post & Rail, Post & Wire, Chain Link, Wooden Panels, Concrete Panels, Steel Palisade

Electric, British Telecom, Fire Hydrant, Stop tap, Stop valve, Wash Out, Water Meter, Service Marker, Rodding eye, Lamp Post, Sign Post, Electricity Post, Telegraph Post, Bollard, Water level, Height, Internal floor level, Threshold level, Gas, Earth rod

Rev	Date	Description	Drawn	Q. Ref.
1	Dec 12	Phase 1.2 added	SS	C0871

greenhatch group
Topographical Surveys
Site Engineering
Measured Building Surveys
3D Laser Scanning
Rowan House
Duffield Road
Little Eaton
Derby
DE21 5DR
Tel (01332) 830044 Fax (01332) 830055
admin@greenhatch-group.co.uk

CLIENT
JJ Gallagher Ltd

PROJECT
Wykham Park Banbury

TITLE
Topographical Survey

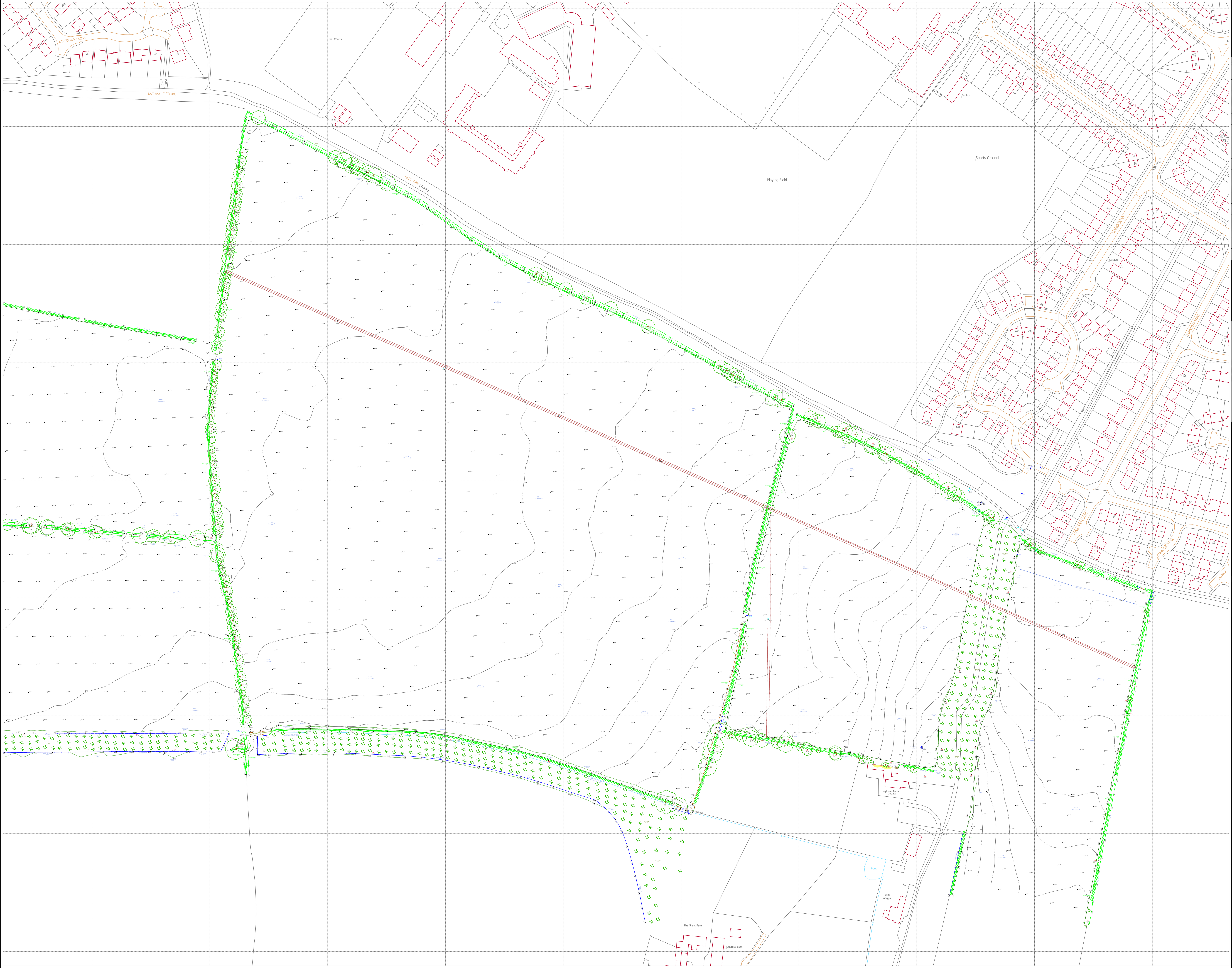
SCALE	DATE	DRAWN	QUALITY REF
1: 1000	Nov 2012	SS/CS	C0871

Level datum: OS GPS Verified
Grid orientation: OS GPS Verified
Job number: 17711
Drawing No.: 17711 OGL
Rev.: 1

Comments
This plan should only be used for its original purpose. GreenHatch Ltd accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

DO NOT SCALE



Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	444431.290	239044.170	133.925
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GH3	444294.201	238905.233	132.912
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GH5	444213.547	238809.084	131.416
GH6	444182.866	238756.703	130.001
GH7	444100.706	238658.323	129.207
GH8	444061.752	238601.231	129.763
GH3A	444301.201	238821.918	133.139
GH4A	444706.775	238802.197	131.058
GH5A	445155.976	238585.165	128.397
GH6A	444726.606	238486.293	129.815
GH7A	444320.439	238522.190	131.869
GH8A	444304.909	238696.572	132.543
MS1	445376.532	238668.449	126.802
MS2	445310.445	238717.386	127.167
MS3	445385.532	238636.941	126.220

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No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Legend:

Buildings / walls
Kerb line
Edge of surface
Canopy / Overhang
Line Marking
Centre Line
Barrier
H\R Hand rail
Hedge
Overhead Powerline
Chamber
Woodland
1 100.000 Station and Name / Station Level
Bush Sap Tree / Bush / Sapling
Area of Undergrowth
Gate
IC Inspection chamber
MH Manhole
Cvr Cover
UTL Unable To Lift
Gy Gully
Bg Back Gully
TCL Tree canopy level
G Tree girth =
MG Multi-girth
G136 Tree tag
E: Eaves level
R: Ridge level
F: Flat roof level
CPS Concrete paving slabs
TT Tac tile paving
Rnb Road name board
R\wall Retaining wall

Fence types:

I\W Interwoven
I\R Iron Railings
W\M Wire Mesh
P\R Post & Rail
P\W Post & Wire
C\L Chain Link
W\P Wooden Panels
C\P Concrete Panels
S\P Steel Palisade

Elec Electric
BT British Telecom
Fh Fire Hydrant
St Stop tap
Sv Stop valve
Wo Wash Out
Wm Water Meter
Mkr Service Marker
Re Rodding eye
Lp Lamp Post
Sp Sign Post
Ep Electricity Post
Tp Telegraph Post
Bo Bollard
WL Water level
ht Height
IFL Internal floor level
THL Threshold level
Gas Gas
Er Earth rod

Rev	Date	Description	Drawn	Q. Ref.
1	DEC 12	Phase 1.2 added	SS	C0871

greenhatch group

Topographical Surveys
Site Engineering
Measured Building Surveys
3D Laser Scanning

Rowan House
Duffield Road
Little Eaton
Derby
DE21 5DR
Tel (01332) 830044 Fax (01332) 830055
admin@greenhatch-group.co.uk

CLIENT

JJ Gallagher Ltd

PROJECT

Wykham Park Banbury

TITLE

Topographical Survey

SCALE	DATE	DRAWN	QUALITY REF
1: 1000	Nov 2012	SS/CS	C0871

Level datum: OS GPS Verified
Grid orientation: OS GPS Verified
Job number: 17711

Drawing No.: 17711 OGL
Rev.: 1

Comments

This plan should only be used for its original purpose. GreenHatch Ltd accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

DO NOT SCALE

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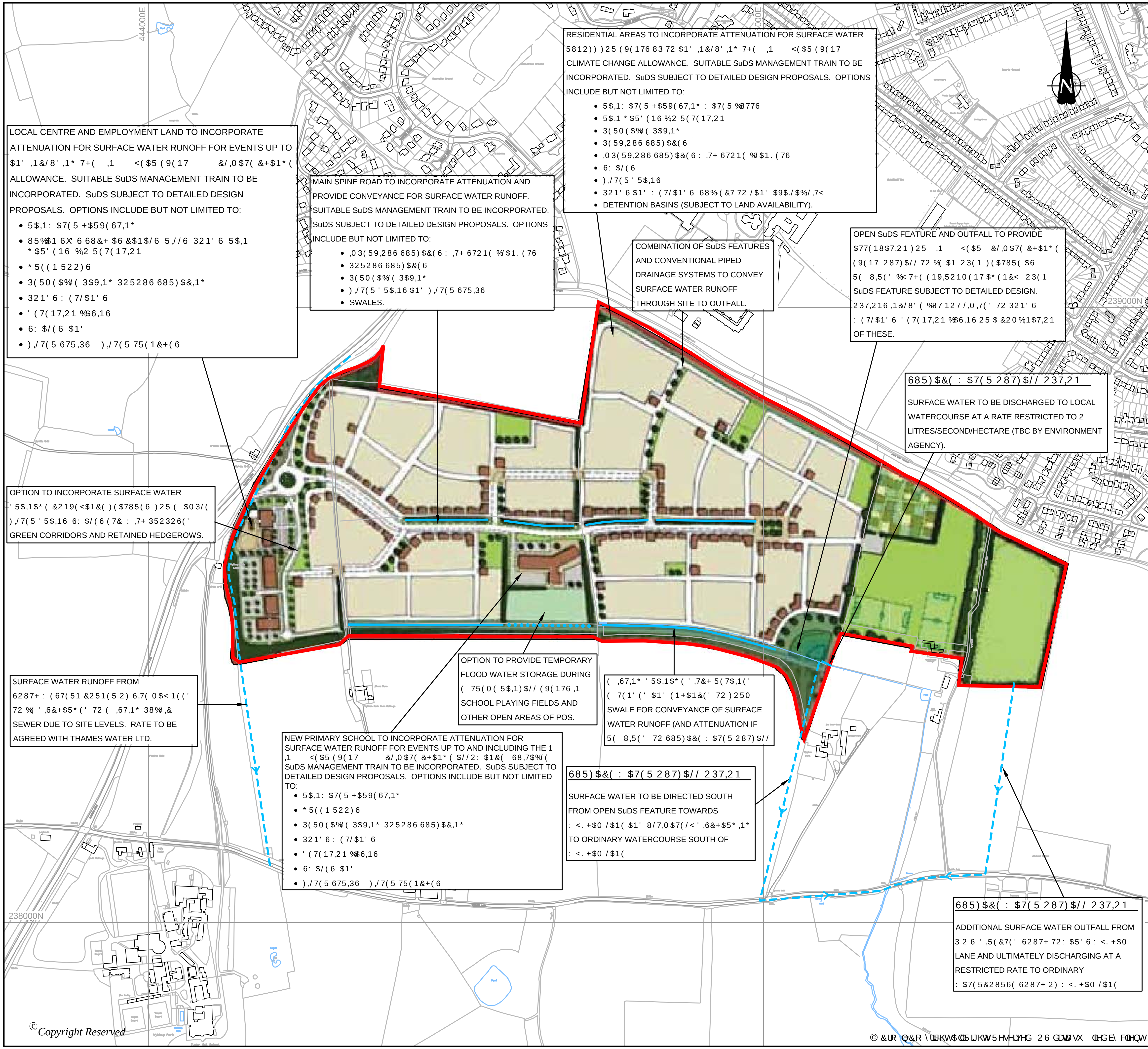
1321 Golden Land Building,
No. 32 Lian Ma Qiao Road
Chaoyang District
Beijing,
China
Tel: +86 (0)10 64 64 6118

your earth our world

wardell armstrong



NOTE:
7KLV GUDZLQJ KDV EHHQ EDVHG RQ WKH ,QGLFDWLYH 0DVWHUSODQ --* (GDWHG) EUXDU\ DV SURYLGHG E\ WKH Client.

INDICATIVE ONLY

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
A	First Issue	27/02/13	JD	JG	JG

CLIENT
* DOODJKHU (VWDWHV /WG

PROJECT
(QYLURQPHQWDO$VVHVVPHQW : \NKDP 3DUN Farm Banbury

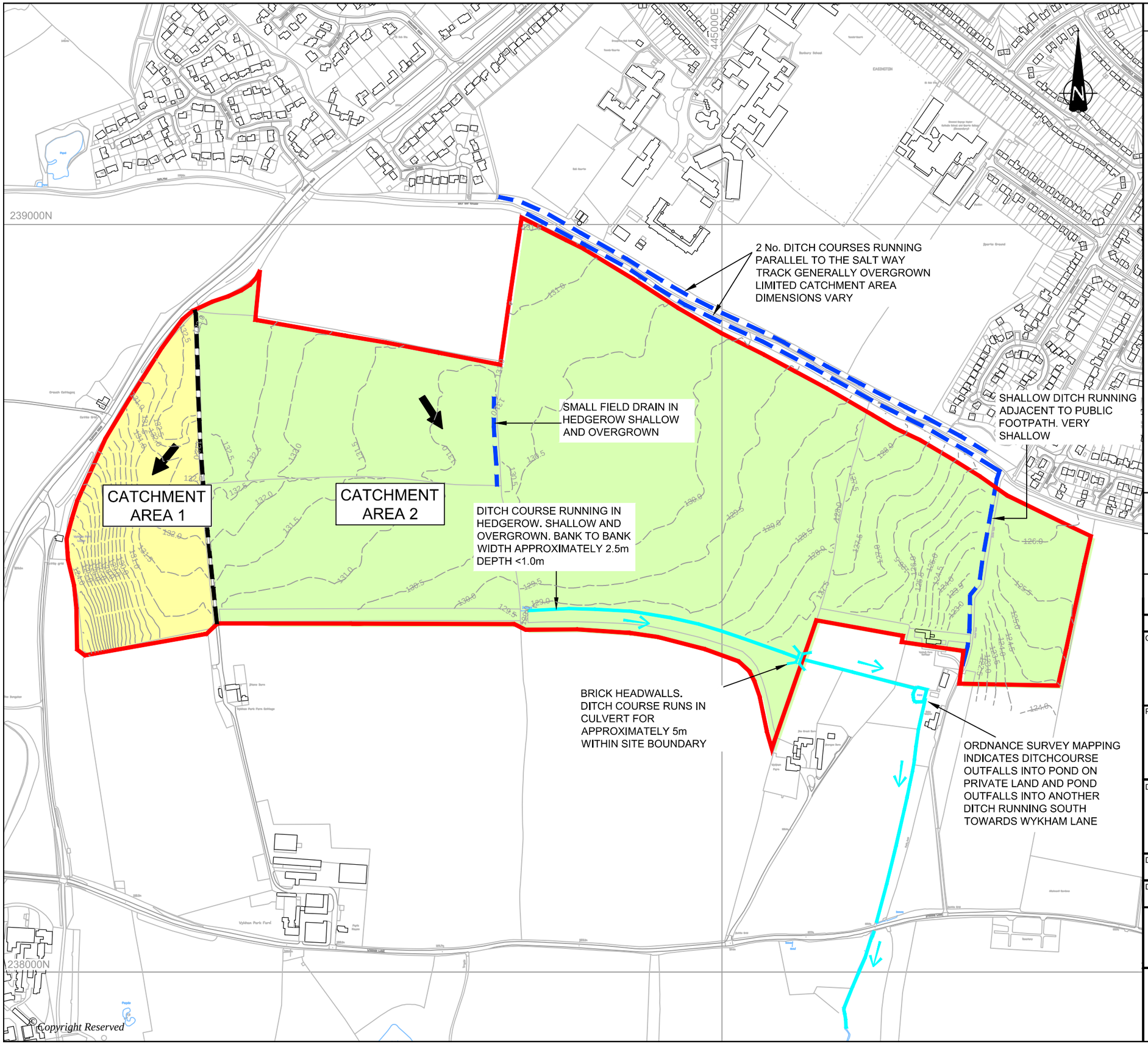
DRAWING TITLE
,QGLFDWLYH 6XUIDFH : DWHU Management Plan

DRG No.	SCALE	DATE
: 0)5$	NTS @ A3	14/11/12
DRAWN BY	&+(&.(' %<	APPROVED BY
SJB	JG	JG

■ 672.(21 75(17 (HEAD OFFICE)	TEL 0845 111 7777	☐ CARDIFF	TEL 029 2072 9191
		☐ LEIGH	TEL 01942 260101
☐ NEWCASTLE UPON TYNE	TEL 0191 232 0943	☐ SHEFFIELD	TEL 0114 245 6244
☐ WEST BROMWICH	TEL 0121 580 0909	☐ EDINBURGH	TEL 0131 555 3311
☐ LONDON	TEL 020 7287 2872	☐ LIVERPOOL	TEL 0151 494 5431

wardell armstrong
your earth our world

DO NOT SCALE FROM THIS DRAWING



KEY

- PLANNING APPLICATION BOUNDARY
- 126 — SURFACE CONTOURS
- CATCHMENT AREA 1
- CATCHMENT AREA 2
- GENERAL DIRECTION OF FALL
- DITCH COURSES / FIELD DRAINS IDENTIFIED DURING SITE WALKOVER
- DITCH COURSES AND WATER COURSES IDENTIFIED ON ORDNANCE SURVEY MAPPING

NOTES:

1. PUBLIC SEWERS NOT SHOWN FOR CLARITY SEPERATE PLANS AVAILABLE.
2. CONTOURS SHOWN ARE TAKEN FROM TOPOGRAPHICAL SURVEY BY GREENHATCH LTD (DRAWING No 17711 OGL REV 1 NOV 2012)

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
A	First Issue	27/02/13	DR	JG	JG

CLIENT: Gallagher Estates Ltd

PROJECT: Environment Assessment - Wykham Park Farm Banbury

DRAWING TITLE: Existing Drainage Characteristics

DRG No.	SCALE	DATE
WM10671-FRA002	1:5000 @ A3	15/11/12

DRAWN BY	CHECKED BY	APPROVED BY
SJB	JG	JG

■ STOKE-ON-TRENT (HEAD OFFICE)	TEL 0845 111 7777	CARDIFF	TEL 029 2072 9191
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WEST BROMWICH	TEL 0121 580 0909	SHEFFIELD	TEL 0114 245 6244
LONDON	TEL 020 7287 2872	EDINBURGH	TEL 0131 555 3311
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