Catesby Strategic Land Limited

Land south of Burford Road, Minster Lovell, Oxfordshire

Flood Risk Assessment

680568-R1(01)-FRA
November 2022

CIVILS | STRUCTURES | HYDROLOGY
an RSK company

RSK GENERAL NOTES

Project No.: 680568-R1(01)-FRA

Site: Land south of Burford Road, Minster Lovell

Title: Flood Risk Assessment

Client: Catesby Strategic Land Limited

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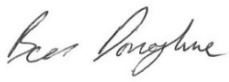
Signature		Signature	
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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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1 INTRODUCTION

RSK Land and Development Engineering Ltd were commissioned by Catesby Strategic Land Limited (the client) to provide a Flood Risk Assessment (FRA) to support the outline planning application at land south of Burford Road, Minster Lovell (the site).

The development is proposed to consist of up to 140 dwellings along with associated infrastructure (access roads, private roads, foul pumping station) and open green space.

The purpose of the FRA is to establish the risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime (in this case assumed to be 100 years) taking account of the vulnerability of its users, without increasing flood risk elsewhere.

This document has been produced to assess the flood risk from tidal, fluvial, surface water, groundwater, sewer, and artificial sources in line with the National Planning Policy Framework (NPPF)[1] and its corresponding Planning Practice Guidance (PPG)[2]. It includes a summary of the proposed surface water drainage strategy, showing how Sustainable Drainage Systems (SuDS) have been used to demonstrate surface water is appropriately managed on-site, with the aim that there is no increased risk of flooding on-site or elsewhere as a result of the development.

This assessment has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the Environment Agency (EA), the Lead Local Flood Authority (LLFA), the Local Planning Authority (LPA) (West Oxfordshire County Council), the Water Authority (Thames Water).

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

[1] Communities and Local Government, 'National Planning Policy Framework', published March 2012 and last updated July 2021.

[2] Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', published March 2014 and last updated August 2022. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/..

2 SITE DESCRIPTION & PROPOSALS

2.1 Existing site

2.1.1 Site description

The site is located to the south of Burford Road on the western fringe of the town of Minster Lovell, in the West Oxfordshire District of Oxfordshire. The site can be located at National Grid Reference 430632, 210528 and postcode OX29 0RU. A site location plan is included as **Figure 2.1**.

The site covers an area of approximately 10.07ha and currently comprises two agricultural fields separated by a hedgerow. The site is entirely greenfield and is located to the south and west of a site known as Dovecote Park, currently being developed by Bovis Homes.

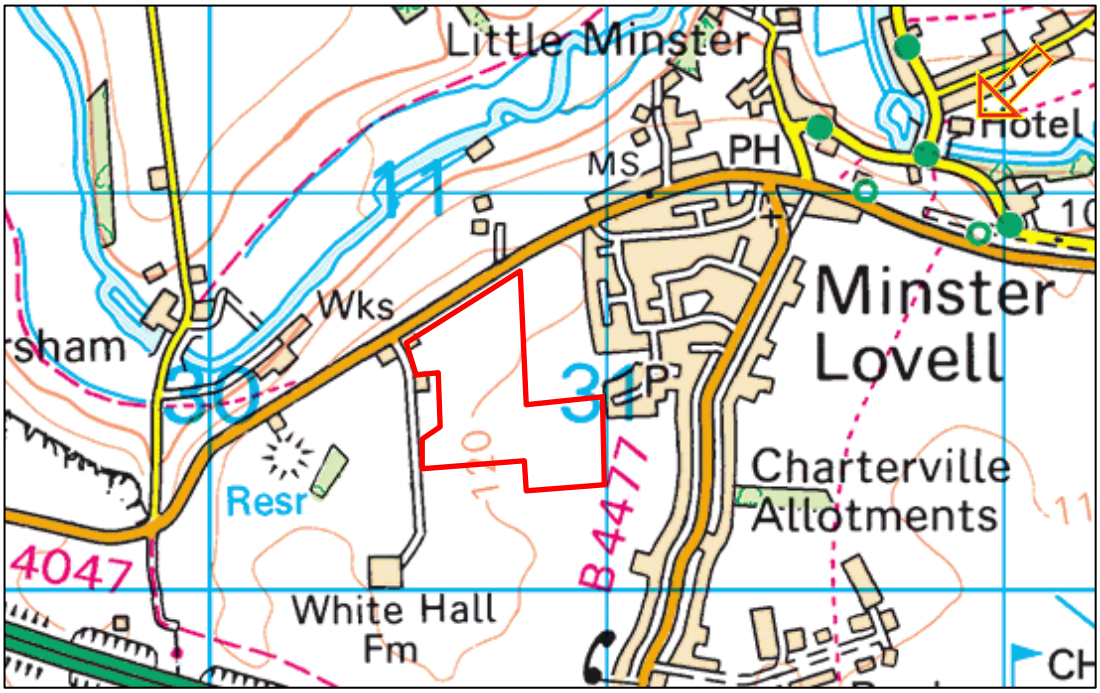

Figure 2.1: Site location plan

2.1.2 Topography

A site-specific topographic survey has been carried out by Greenhatch Surveys in July 2022. The survey shows the existing site levels vary from 122.32m above ordnance datum (mAOD) in the northwest corner and fall gently to the southeast down to 117.41mAOD in a localised low point in the easternmost corner.

The topographic survey is included in **Appendix B**.

2.1.3 Existing Drainage

Thames Water sewer plans have been obtained for the site and are included in **Appendix C**. These plans indicate the following network of sewers in the vicinity of the site:

- There are no existing public surface water sewers within the site boundary.
- There is a newly built surface and foul sewer network within the Dovecote Park estate to the north-east, which includes an infiltration basin for surface water and a pumped foul system connecting to a 100mm foul sewer off Upper Crescent in Minster Lovell.

2.2 Development proposals

This report is required to support an outline planning application (all matters reserved except access) for up to 140 residential dwellings and associated infrastructure.

The description of the proposed project is: -

"Outline planning permission for the development of up to 140 dwellings (Use Class C3) including means of access into the site (not internal roads) and associated highway works, with all other matters (relating to appearance, landscaping, scale, and layout) reserved."

The proposed site illustrative masterplan and framework plan are included in **Appendix D**.

3 ENVIRONMENTAL SETTING

3.1 Hydrology

Reference to Ordnance Survey (OS) mapping and the EA's web-based mapping indicates that the nearest EA Main River is the River Windrush, which is located approximately 250 metres to the north of the site which flows to the east and eventually outfalls into the River Thames over 13km from the site. The Windrush is located at a topographic level approximately 30m below the site.

Other surface water features in the vicinity of the site include a large pond within the garden of White Hall Farm located approximately 330m to the south/south-west.

3.2 Geology

Based on published geological records for the area (British Geological Survey online mapping), the site exhibits the following geology:

- Superficial Geology: No superficial deposits are reported at the site.
- Bedrock Geology: The site's western area is underlain by Forest Marble Formation, - Mudstone, the centre is underlain by Forest Marble Formation – Limestone, and the central eastern area is underlain by the White Limestone Formation.

No BGS borehole records are available for the site itself, however, a single borehole has been excavated to the south off the Lodge Road and the White Hall Farm (ref - SP31SW6). This borehole is on the Forest Marble Limestone and confirmed the general geology of White Limestone interbedded with bands of sand and clay although the borehole dates to 1942.

Site-specific intrusive ground investigations have been undertaken by GRM Development Solutions Ltd in July 2022 (see **Appendix E**). The results of the site investigation confirm the geology indicated on BGS mapping, with the exposed geology largely comprising a topsoil layer, thinly and thickly bedded limestone rock layers interbedded with brown sand, or sandy clay.

The trial pits were excavated between depths of 0.69m and 1.44m. Infiltration tests were performed in each pit in accordance with BRE 365. Neither groundwater seepage nor inflow was encountered in any of the trial pits.

Infiltration rates of more than 9 x 10^{-4} m/s were achieved in several pits although these rates did slow in the third repeat. These rates were so high that a head of water could not be provided deeper than 320mm. In pit SA04 (the site's topographical lowest point and closest to the proposed area for the site's principal attenuation system) infiltration rates were at least an order of magnitude slower, although the rates are still reasonable enough for use in infiltration. The investigation surmises that this rate difference is the result of a local increase in fines content (reducing overall porosity) or geological change, although no visual changes were noted on-site. **Table 3.1** summarises the infiltration testing results. The location of each of the testing locations is given in **Appendix E**.

Table 3.1: Infiltration Details

Soakaway Pit	Infiltration Rates (m/s)		
	Test 1	Test 2	Test 3
SA01	>9 x 10^{-4} (9 sec drain)	>9 x 10^{-4} (180 sec drain)	8 x 10^{-4}
SA02	1.23 x 10^{-4}	1.17 x 10^{-4}	1.10 x 10^{-4}
SA03	>9 x 10^{-4} (45 sec drain)	>9 x 10^{-4} (60 sec drain)	8 x 10^{-4}
SA04	1.96 x 10^{-5}	1.59 x 10^{-5}	Not Completed

3.3 Hydrogeology

Hydrogeological information was obtained from the online Magic Maps service. These maps indicate that the site is underlain by a Principal bedrock aquifer within the underlying Limestone and a Secondary A aquifer within the Mudstone. Both aquifers are classified as High Risk in terms of their vulnerability.

The site is not located within any Groundwater Source Protection Zone.

No shallow groundwater seepage was encountered during any of the various ground investigations.

4 SOURCES OF FLOOD RISK

4.1 Criteria

In accordance with the NPPF and advice from the EA, an assessment of the risk associated with various flooding sources is required along with consideration of the effects of climate change over the design life of the development (in this case assumed to be 100 years).

The EA's most recent climate change guidance, published in July 2022[3], should be referenced in order to identify the appropriate peak river flow and rainfall intensity allowances for the scheme. The appropriate allowance for peak river flow is based on the site's location in the country, the lifetime of development, the relevant flood zone, and the vulnerability of the proposed end use.

The flood risk elements that need to be considered for any site are defined in BS 8533 'Assessing and managing flood risk in development Code of practice'[4] as the "Forms of Flooding" and are listed as:

- Flooding from rivers (fluvial flood risk);
- Flooding from the sea (tidal flood risk);
- Flooding from the land;
- Flooding from groundwater;
- Flooding from sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from reservoirs, canals, and other artificial structures.

The following section reviews each of these in respect of the subject site.

4.2 Flooding from rivers (fluvial flood risk)

The EA Flood Zone mapping study for England is available on their website at: https://flood-map-for-planning.service.gov.uk.

The latest EA published flood zone map (**Figure 4.1**) shows that the site lies within Flood Zone 1, representing a less than 1 in 1000 annual probability of flooding from fluvial or tidal sources. The nearest fluvial floodplain is associated with the River Windrush located 300m to the north at a significantly lower elevation than the site.

Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks. Climate change guidance for river modelling was updated by the EA in July 2022.

[3] Environment Agency, 'Guidance: Flood Risk Assessments: Climate Change Allowances'. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances, July 2022.

[4] BSI, 'BS 8533-2017 Assessing and managing flood risk in development Code of practice', December 2017.

No model re-runs have been undertaken as part of this site-specific FRA, and the supplied EA data therefore represents the best available and up-to-date data when considering the flood risk to the site. The impact upon the site should be negligible given its location within Flood Zone 1.

The overall risk of fluvial flooding at the site is considered to be **very low**.

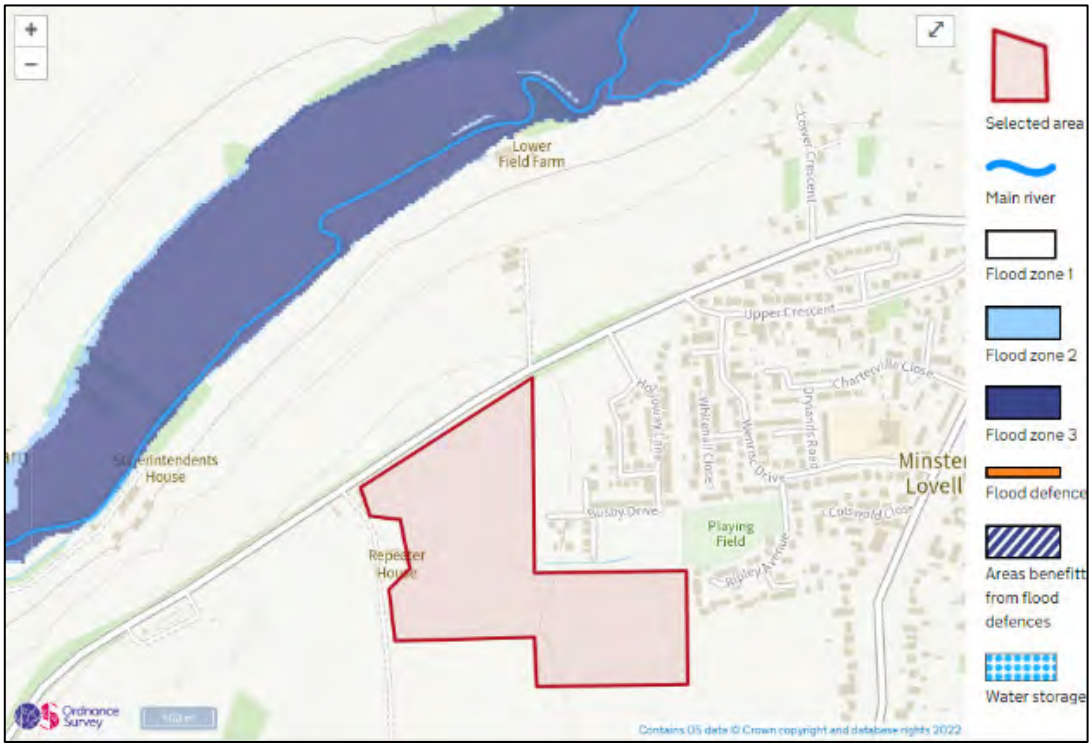

Figure 4.1: Environment Agency 'Flood map for planning'

4.3 Flooding from the sea (tidal flood risk)

The site is not considered to be at risk from tidal flooding due to its inland location.

4.4 Flooding from the land (surface water flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff can occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

The EA's surface water flood map (**Figure 4.2**) shows that the vast majority of the site is at a 'very low' risk of surface water flooding, with only two isolated sections of the site shown to be at a 'low' risk of flooding from surface water. These comprise a small area

of low risk in the central southern site area and an area at the topographic low point of the site in the east.

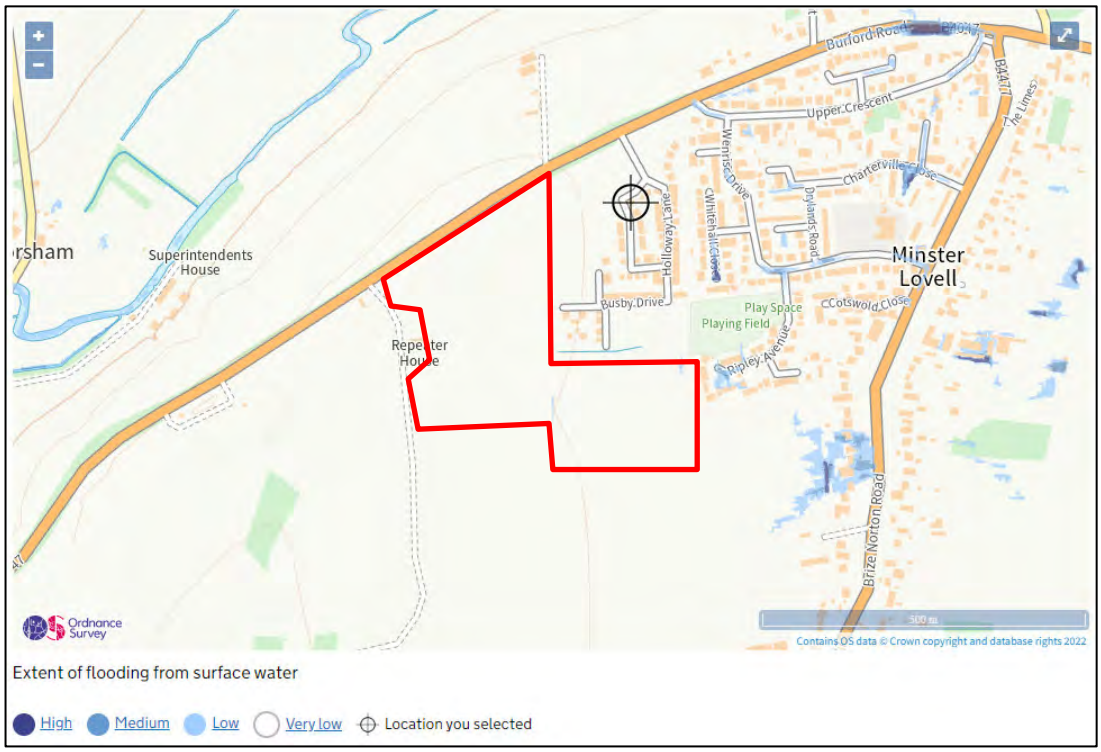

Figure 4.2: Environment Agency 'Flood risk from surface water' map

Surface water flooding is likely to increase as a result of climate change in a similar ratio to fluvial flooding. Increased intensity and frequency of precipitation is likely to lead to reduced infiltration and increased overland flow. Climate change guidance was updated by the EA in July 2022. Revised allowances for climate change have been included in the indicative drainage strategy described in Section 7.

The overall risk of surface water flooding at the site is considered to be **very low**.

4.5 Flooding from groundwater

Groundwater flooding tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

The Cherwell & West Oxfordshire Strategic Flood Risk Assessment (SFRA)[5] indicates that there have been no recorded incidents of groundwater flooding in Minster Lovell. There is no other evidence to suggest that groundwater flooding has occurred on-site and coupled with the site's position at a localised topographic high point, it is therefore concluded that the risk of groundwater flooding is low. The proposed development does not include any basement proposals. Therefore, aside from shallow foundations works, the proposals will have no material impact on the risk of groundwater flooding both to and from the development.

Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. If winter rainfall becomes more frequent and heavier, groundwater levels may increase. Higher winter recharge may, however, be balanced by lower recharge during the predicted hotter and drier summers. This is less likely to cause a significant change to flood risk than from other sources since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk is likely to be low.

The overall groundwater flood risk is considered to be **low**.

4.6 Flooding from sewers

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked, or it cannot discharge due to a high water level in the receiving watercourse. A sewer flood is often caused by surface water drains discharging into the combined sewer systems; sewer capacity is exceeded in large rainfall events causing the backing up of floodwaters within properties or discharging through manholes.

Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption[6]. One of the design parameters is that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30 year rainfall event. By definition a 1 in 100 year event would exceed the capacity of the surrounding sewer network as well as any proposed drainage.

The Cherwell & West Oxfordshire SFRA[7] indicates that there have been no recorded incidents of sewer flooding in Minster Lovell. Details from Thames Water (TW) indicates that Minster Lovell, located within the Brize Norton sub-catchment, drains all foul water flows to the Minster Lovell pumping station, whereby flows are initially pumped and then

[5]Scott Wilson, Cherwell and West Oxfordshire - Level 1 Strategic Flood Risk Assessment, https://www.westoxon.gov.uk/media/4eod0mwn/west-oxfordshire-level-1-strategic-flood-risk-assessment-sfra-2009.pdf, April 2009.

[6] Water UK / WRc, 'Sewers for Adoption' 8th Edition, August 2018.

[7]Scott Wilson, Cherwell and West Oxfordshire - Level 1 Strategic Flood Risk Assessment, https://www.westoxon.gov.uk/media/4eod0mwn/west-oxfordshire-level-1-strategic-flood-risk-assessment-sfra-2009.pdf, April 2009.

drain under gravity to Brize Norton pumping station. All foul water flows from the sub-catchment are then pumped to Witney Sewage Treatment Works.

Thames Water sewer plans have been obtained for the site and are included in **Appendix C**. There are no existing public surface water sewers within the site boundary. There is a newly built surface and foul network within the new development to the north-east, which include an infiltration basin for their surface water runoff and a pumped foul system to connect to a 100mm foul sewer off Upper Crescent in Minster Lovell.

When exceeded, the surcharged pipe work within the surrounding area could lead to flooding from backed up manholes and gully connections. This could lead to flooding within highways surrounding the site. However, the nearby sewer systems are generally to the east of the site and as described above, any surcharged surface water would likely follow the general topography to the east (away from the site).

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts, mains, and other drainage infrastructure.

To demonstrate that sewer and surface water flooding is not exacerbated, surface water must be considered within the design of the site. This demonstrates that any additional surface water and overland flows are managed correctly, to minimise flood risk to the site and the surrounding area. The proposed surface water network on the site should be designed to show exceedance of the network has been considered.

Climate change is likely to result in an increase in flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but would not be significant in terms of the proposed development.

The resultant sewer flood risk is considered to be **low**.

4.7 Flooding from reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs.

The EA reservoir flood map (reproduced as **Figure 4.3**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is unlikely that any actual flood would be this large.

The EA mapping was updated in 2021 to demonstrate the potential maximum extent of flooding for two scenarios - a "dry day scenario" in which river levels are "normal", and a "wet day scenario" where the flooding from the reservoir coincides with flooding from rivers.

The map shows that the site is not in a location at risk of reservoir flooding from either source.

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow, but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this site as a result of climate change.

The resultant flood risk is considered to be **very low**.

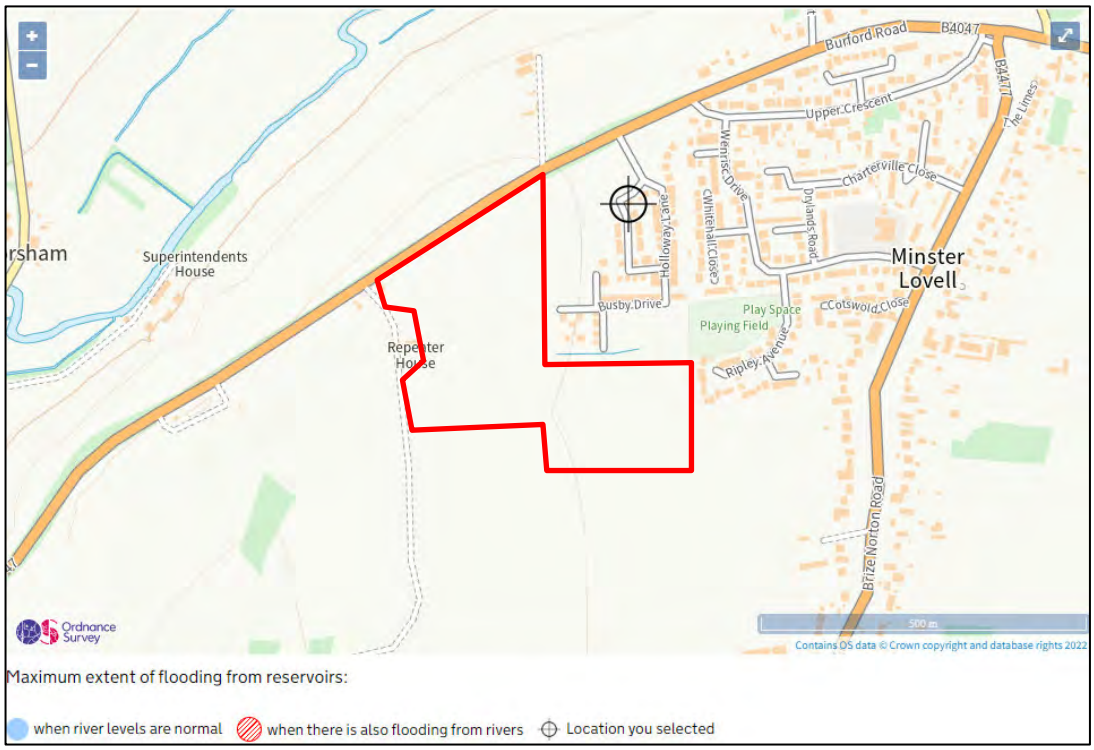

Figure 4.3: Environment Agency 'Flood risk from reservoirs' map

4.8 Other sources of flooding

4.8.1 Canals

There are no Canal & River Trust owned canals within the vicinity of the site.

4.8.2 Other artificial features

No other artificial features with the potential to result in a flood risk to the site have been identified.

5 MITIGATION MEASURES AND RESIDUAL RISK

5.1 Overland flood flow

No overland flow routes have been identified across the site. All surface water runoff up to the 1 in 100 year climate change storm generated on site will be stored on site and discharged via infiltration into the ground as detailed in Section 7.

Surface flows may be generated on site due to drainage capacity exceedance, which can be conveyed into the SuDS features via surface flows along the new roads.

5.2 Finished floor levels

As this site lies outside all fluvial flood zones there is no need to incorporate any freeboard levels into the finished floor levels of the design. Low lying areas that could lead to ponding of surface flows will be avoided by careful design of finished levels.

5.3 Flood compensation

The site is shown to be outside the 1 in 100 year climate change floodplain, so floodplain compensatory measures are not deemed necessary.

5.4 Safe access/egress

As the site lies outside of the 1 in 1000 year fluvial / tidal flood extent, safe access and egress will be available even during the most extreme flooding scenarios.

5.5 Basements

The proposed development does not include any basement proposals. Therefore, aside from shallow foundations works, the proposals will have no material impact on the risk of groundwater flooding both to and from the development.

6 PLANNING CONTEXT

6.1 Land use vulnerability

Table 2 of the PPG indicates the compatibility of various land uses in each flood zone, dependent on their vulnerability to flooding. Table 6.1 below is reproduced from Table 2 of PPG.

Table 6.1: Flood risk vulnerability and flood zone 'compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to Annex 3 of the NPPF, the proposed development, based on its residential use, is classed as 'more vulnerable'. This classification of development is appropriate for areas within Flood Zone 1 and therefore appropriate for the subject site.

6.2 Sequential Test

The Sequential Test aims to direct new development to areas with the lowest probability of flooding. The site has been identified as located within Flood Zone 1 with no other flooding issues from other sources. It is therefore considered to pass the Sequential Test.

6.3 Exception Test

In accordance with Table 6.1, there is no requirement to apply the Exception Test for a 'more vulnerable' development within Flood Zone 1.

7 SURFACE WATER DRAINAGE ASSESSMENT

7.1 Scope

This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the masterplan.

The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by regional and local policy. In accordance with the Defra Non-Statutory Technical Standards[8], the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to greenfield rates. Where a reduction to the greenfield rate is not practicable, the proposed surface water drainage strategy should not exceed the existing runoff rate.

In addition, Building Regulations Part H[9] requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

This assessment includes an overview and comparison of the existing greenfield scenario and proposed development scenario. The existing and proposed areas are provided in the table below:

Table 7.1: Existing and proposed site areas

Land use	Existing area	Proposed area
Impermeable	0 (0%)	2.96 ha (29.7%)
Permeable	10.07 ha (100%)	7.11 ha (70.3%)
Total	10.07 ha	10.07 ha

7.2 Pre-development situation

The existing site area is 10.07ha and 100% permeable. The pro-rata IoH 124[10] method has been used to estimate the greenfield surface water runoff rate for the site, using the

[8] DEFRA, 'Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems', March 2015.

[9] HM Government (2010 with 2013 amendments), 'The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)'.

[10] Institute of Hydrology (IoH), 'Flood Estimation for small catchments - Report 124', 1994.

HR Wallingford greenfield runoff rate estimation tool. Calculations are contained in **Appendix F**.

Table 7.2: IOH 124 surface water runoff (greenfield)

Return period	Peak flow (l/s)
QBar	1.60
1 in 1 year	1.36
1 in 30 year	3.68
1 in 100 year	5.10

7.3 Post-development situation

The proposed development is for a residential end use and will result in an increase in impermeable area and surface water runoff across the site. It will therefore be necessary to manage surface water on-site through conveyance towards the proposed point of discharge, whilst providing sufficient attenuation for all events up to the 1 in 100 year event inclusive of 40% climate change (based on latest climate change guidance).

7.3.1 Point of discharge

Discharge options from the site have been considered in line with the SuDS hierarchy, as follows.

Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed study area. The effectiveness of infiltration is completely dependent on the physical conditions at the study area. Potential obstacles include:

- Local variations in permeability preventing infiltration - It is understood from the local geology and Site Investigation Report that the site is situated on an area of the White Limestone Formation and Forest Marble Formations (Mudstone and Sandstone), which is considered suitable for the use of soakaways due to its high permeability. Soakaway testing was undertaken in July 2022 by GRM Development Solutions Limited, and infiltration rates were shown to be substantial. In pit SA04 (located in the proposed area for the site's principal attenuation system) the rates were lower than most of the site, however, the rates are still sufficient for use in infiltration (in this case 1.59×10^{-5} m/s or 0.05724 m/hr).
- Shallow groundwater table - For infiltration drainage devices, Building Regulation approved document H2 states that these *"should not be built in ground where the water table reaches the bottom of the device at any time of the year"*. Groundwater was not observed in any of the ground investigations undertaken at the site.

- Source Protection Zones - The study area is not located within a Groundwater Source Protection Zone.

From the information available in the GRM Site Investigation Report, infiltration is considered a viable option for the surface water drainage strategy. Based on testing undertaken in July 2022, infiltration-based SuDS will be suitable due to the rates obtained.

Discharge to watercourse

Due to the lack of watercourses or land drainage ditches within the immediate vicinity of the site, it is not considered feasible to discharge surface water in this way.

Discharge to surface water sewer

Due to the lack of surface water sewers within the immediate vicinity of the site, it is not considered feasible to discharge surface water to a sewer.

7.3.2 Storage estimates

To determine the approximate volume of attenuation storage that would be required on the site, the WinDes 'Quick Storage' calculation has been used. WinDes 'Quick Storage' calculations provide a range of volumes as an approximation of the storage requirement. These volumes can be later revised at detail design stage by the introduction of specific flow control methods.

It is intended that surface water runoff from the proposed development will be discharged directly to ground to closely mimic the existing greenfield situation, as stated above.

Calculations have been run using the lowest measured infiltration rate of 0.05724 m/hr (1.59×10^{-5} m/s) for trial pit SA4 closest to the proposed infiltration basin and using the measured impermeable area of 2.96ha. Figures are shown in Table 7.3. Calculations can be found in **Appendix G**. The maximum storage required on-site to accommodate the 1 in 100 year plus 40% climate change rainfall event is approximately 2161m^3 with infiltration factored in.

Table 7.3: Quick storage estimates

Return period	Quick Storage volume (m^3)		Storage with Infiltration (m^3)	
	Minimum	Maximum	Minimum	Maximum
1 in 30 year	2434	2434	454	1208
1 in 100 year	2967	2967	596	1542
1 in 100 year + 40% CC	4154	4154	836	2161

7.3.3 Proposed drainage strategy

The proposed SuDS for the site include a combination of permeable paving, swales and a large infiltration basin which have been located depending on the positions of proposed buildings. The proposed SuDS features are designed to provide the required storage

volume to retain the 1 in 100 plus 40% climate change event. At this indicative design stage, the attenuation basin has been sized to accommodate all of the surface water runoff, however, the conveyance swales and areas of permeable paving will need to be factored in at the detailed design stage to ensure appropriate water quality benefits. This will likely mean that the basin will reduce in size at the detailed design phase.

The indicative SuDS measures are outlined in the Indicative Surface Water Strategy as attached in **Appendix H**.

In principle, the strategy contains the following features:

- **Infiltration techniques** are considered suitable on site due to the permeable nature of the underlying geology and therefore an **infiltration basin** is the main feature incorporated into the indicative drainage design at the outline planning stage.
    - Individual house soakaways may be possible depending on ownership and responsibility. Alternatively modular storage could also be designed as soakaways beneath communal parking areas.
    - All soakaways will need to be designed taking into consideration groundwater levels (to prevent any interference with the water table), any potential contamination and the site-specific infiltration rates, all of which will need to be confirmed at the detailed design stage.
    - All soakaway or infiltration features should be located at a minimum 5m distance from buildings in accordance with Building Regulations Part H[9];
- **Permeable paving** can be provided in various areas around the site where private car parking and non-adopted highways are located. This feature provides additional surface water attenuation and water quality benefits. Main roads will not be constructed using permeable paving due to ownership and future maintenance issues, where responsibility will most likely lie with the highway authority. At this stage areas of permeable paving are shown indicatively in **Appendix H**, but are not included in the overall attenuation requirements;
- A network of **swales** can act as conveyance features around the site, gathering surface runoff from various roads, sewer networks and general runoff. This is then conveyed into the main drainage network to be discharged to the infiltration basin for final outfall. Given the site includes areas of high infiltration rates there will also be a degree of point infiltration within the swales themselves. At this stage the swales are shown indicatively in **Appendix H**, but are not included in the overall attenuation requirements;
- A large **infiltration basin** has been strategically located within the area of open space to the south-east of the site. The topography in this area is suitable for SuDS features. To accommodate the required volumes, the feature has been designed up to 1m deep and has side slopes of 1:4 to comply with safety and maintenance guidelines as highlighted in the SuDS Manual[11].

Given the favourable rates of infiltration across the site it is possible that a large scale use of infiltration features could be employed at this site ranging from individual house soakaways to various swales or permeable paving with direct discharge to the underlying ground. However, at this outline planning stage, the surface water drainage strategy has considered a single major attenuation/infiltration basin structure located in the topographically lowest point of the site.

[11] CIRIA, 'The SUDS Manual – C753', 2015.

The dimensions, volumes and location of the SuDS features will need to be revised during the detailed planning stage, including the wider use of attenuation features across the site. Preliminary design criteria have been based upon guidance given in the CIRIA publication 'The SUDS Manual'[11].

Temporary drainage should be established for the construction phase of development to prevent silt mobilisation, potentially impacting on flow regimes and silt pollution downstream. The construction of SuDS should be considered in the early stages of site design.

7.3.4 Adoption and maintenance

Maintenance of SuDS features should be undertaken in line with maintenance schedules outlined in the SuDS Manual and if adopted, any Thames Water maintenance guidance. An example of a typical maintenance regime for permeable paving, swales and infiltration basins can be found in **Appendix I**. Full maintenance schedules should be confirmed at the detailed design stage in consultation with appropriate product suppliers.

7.4 Water quality

The SUDS Manual contains guidance on how to assess water quality, stating *"Determining the hazard posed by the land use activities at a site and the extent to which underlying soil layers and/or proposed treatment components reduce the associated risk can be done using a variety of methods that vary in complexity and data requirements."*

The assessment methodology required is determined by reference to Table 4.3 of the SuDS Manual. Based on this, the quality impacts of the proposed development can be summarised with the following pollution hazard levels and management requirements for discharge to the receiving groundwater (there will be no off-site discharge, therefore receiving surface water is not considered here):

- Residential roofs – **Very Low** Pollution Hazard – Simple Index Approach;
- Individual property driveways, roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – **Low** Pollution Hazard – Simple Index Approach; and
- Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals / retail), all roads except low traffic roads and trunk roads/motorways – **Medium** Pollution Hazard – Simple Index Approach

It is therefore considered appropriate to use the Simple Index Approach (SIA) for the purpose of this assessment. The Simple Index Approach (SIA) to assessing water quality management requirements has been developed by CIRIA to support the implementation of the water quality management design methods set out in the SuDS Manual, with appropriate cross referencing to the relevant 'Design Conditions'. The CIRIA Susdrain website contains a spreadsheet based procedure that can be used for all the UK.

Table 26.1 of the SUDS Manual indicates that for the Simple Index Approach:

- Simple pollution hazard indices should be based on land use (e.g., Table 26.2); and
- Risk reduction for Surface Water should be done using Simple SuDS hazard mitigation indices (e.g., Table 26.3)
- Risk reduction for groundwater should be done using Simple SuDS hazard mitigation indices (e.g., Table 26.4)

Extracts of Tables 26.2 and 26.4 are replicated below, highlighting the relevant features applicable to this site:

Table 7.4: Extract of SuDS Manual Table 26.2: Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change (e.g., schools, offices) i.e., <300 traffic movements/day	Low	0.5	0.4	0.4

Table 7.5: Extract of SuDS Manual Table 26.4: Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydro-carbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.6	0.5	0.6
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e., graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.4	0.4

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydro-carbons
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

The SuDS Manual States:

Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

Taking each land type use in turn:

- Residential roofs – an infiltration trench alone (i.e., individual, or shared soakaway) (mitigation 0.4) is sufficient to mitigate for any of the potential pollutants (indices 0.05-0.2);
- Individual property driveways, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – permeable pavement alone (mitigation 0.6-0.7) is sufficient to mitigate for any of the potential pollutants (indices 0.4-0.5).

In addition to these features, the use of an infiltration basin and other sustainable drainage systems (i.e., swales and permeable paving, where applicable) will provide additional levels of treatment.

Aside from residential roof runoff, all surface water runoff should pass through a treatment train of at least two features and therefore the water quality requirements are considered to be met by the proposed indicative drainage strategy.

8 CONCLUSIONS & RECOMMENDATIONS

This FRA complies with the NPPF and Planning Practice Guidance and demonstrates that flood risk from all sources has been considered in the proposed development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

The proposed development site lies in an area designated by the EA as Flood Zone 1 and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year.

The NPPF sets out a Sequential Test, which states that preference should be given to development located within Flood Zone 1 and at the lowest risk of flooding from all sources. This FRA demonstrates that the requirements of the Sequential Test have been met. The proposed development is classified as 'more vulnerable' and therefore considered appropriate within Flood Zone 1 without application of the Exception Test.

This FRA has considered multiple sources of flooding and concluded the following:

Table 8.1: Flood risk summary

Source	Level of risk	Mitigation
Fluvial	Very Low Flood Zone 1	None required.
Tidal	Very Low	None required.
Surface water	Very Low	The development will incorporate a surface water drainage strategy to accommodate surface water generated on site. Surface water will be attenuated on site and discharged directly to the ground via infiltration. SuDS will be utilised to control surface water flows, designed to store the volume of water associated with a 1 in 100 year rainfall event (including an allowance for climate change) before being infiltrated into the underlying ground. Any risk from overland exceedance flow paths can be mitigated by minor grading of land levels.
Groundwater	Low	None required.
Sewers	Low	None required.
Reservoir	Very Low	None required.
Other source	Very Low	None required.

Overall, taking into account the above points, the development of the site should not be precluded on flood risk grounds.

APPENDIX A
RSK GROUP SERVICE CONSTRAINTS

1. This report and the drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Catesby Strategic Land Limited (the "client") in accordance with the terms of a contract between RSK and the "client" dated July 2022. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable civil engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates, or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate, or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the appropriate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
TOPOGRAPHIC SURVEY

N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	430846.203	210860.842	120.711
GH2	430735.487	210807.540	121.501
GH2A	430733.776	210789.251	121.577
GH2B	430678.489	210757.402	121.654
GH3	430562.851	210709.805	122.462
GH4	430451.622	210626.531	122.699
F1	430677.712	210660.292	121.363
F2	430682.816	210477.052	120.158
F3	430746.849	210362.752	120.271
F4	430840.275	210431.401	118.754

OS Note:

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) 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 OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) 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 and datum.

Legend:

Buildings
Hedge
Kerb line
Low Retaining Wall
Edge of Road
Centre line
Top of Bank
100.000
Spot Level
R Ridge Level
E Eaves Level
F Flat Roof Level
Gate
Fence types:
SW Stonework
IR Iron Railings
WM Wire Mesh
PR Post & Rail
PW Post & Wire
CL Chain Link
WP Wooden Panels
CB Close Boarded
SP Steel Palisade
Overhead Cable
Concrete edge
Tarmac edge
Grass verge
Edge
Bottom of bank
Woodland
Area of Undergrowth
Tree / Bush / Sapling

IC	Inspection chamber	Bol	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Rg	Back gully	Vp	Vent pipe
Dp	Down pipe	GH	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Stmp	Tree Stump
WL	Water level	Sly	Slide
FL	Flood light	IFL	Internal floor level
Lp	Lamp post	TrHL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trialhole
TL	Traffic light	BH	Borehole
Bus	Bus stop	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	CTele	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick pavior
Gav	Gas valve	CPS	Concrete paving slabs
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	Rtwall	Retaining wall
Ws	Wash out	TWL	Top of Wall Level
Re	Rodding eye	TCL	Tree canopy level
BB	Belisha beacon	G	Grills
CTV	Cable tv	MG	Multi grills
Mkr	Marker post	IC	Inspection chamber
Gmkr	Gas marker post	CL	Cover level
Sc	Shaft	IL	Invert level
Fh	Fire hydrant	UTR	Unable to raise

Rev	Date	Description	Drawn	Q. Rev

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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NE4 7YL
t. (01912) 736391

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27, Cornwall Terrace Mews
Regents Park
London
NW1 5LL
t. (02072) 241806

CLIENT
Catesby Estates plc

PROJECT
Minster Lovell
Oxfordshire
OX29 0AW

TITLE
Topographical Survey

SCALE	DATE
A0@ 1: 1000	29.06.22
DRAWN	QUALITY REF
DAC	GH14231

Level datum	See note
Grid orientation	See note
Job number	44275

Drawing No. 44275_T
Rev. 0

Comments
This plan should only be used for its original purpose. Greenhatch Group 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:

N

NOTES;

In all cases please call the BT Dial before you dig service to mark their own plant before any site works commence 0800 917 3993

Always consult utility plans

1. *Power and Radio sweeps undertaken where possible. Limited sweeps possible due to crops in field at time of survey.*
2. *GPR sweeps limited to the perimeter of the field due to the crops.*
3. *No pipes located. All 3 shown in area added from record.*
4. *Revisit recommended when crops in field are no longer present for a greater chance of establishing results.*

UTILITY LINETYPES

UTILITY SURVEY INFORMATION

LEGEND

PAS 128 : 2014 LEVEL B SURVEY

QUALITY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL	ACCURACY
QL-B4	A UTILITY SEGMENT WHICH IS SUSPECTED TO EXIST BUT HAS NOT BEEN DETECTED AND THEREFORE SHOWN AS AN ASSUMED ROUTE. **(NO DETECTION POSSIBLE)**	**UNDEFINED**
QL-B3/B3P	POSITION OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. **(EML OR GPR DETECTION WITH LIMITED CONFIDENCE IN DEPTH)**	**+/- 500mm HORIZONTAL. UNDEFINED VERTICAL**
QL-B2/B2P	POSITION AND DEPTH OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. **(EML OR GPR DETECTION WITH CONFIDENCE IN DEPTH)**	**+/- 250mm OR +/- 40% OF DETECTED DEPTH, WHICHEVER IS GREATER (HORIZONTAL) & +/- 40% OF DETECTED DEPTH (VERTICAL)**
QL-B1/B1P	POSITION AND DEPTH OF THE UTILITY DETECTED BY MULTIPLE GEOPHYSICAL TECHNIQUES. **(EML + GPR DETECTION)**	**+/- 150mm OR +/- 15% OF DETECTED DEPTH, WHICHEVER IS GREATER (HORIZONTAL) & +/- 15% OF DETECTED DEPTH (VERTICAL)**

DISCLAIMER

Whilst every effort has been taken in the preparation of this drawing, the original land marks/apparatus configuration may have been altered since the survey/drawing was produced. The user shall make further enquiries and investigations to satisfy himself as to the accuracy of this drawing and position of the apparatus. The exact positions of the apparatus should be verified by the use of suitable detection devices and safe digging practices in accordance with HSG47, further advice on the location of apparatus should be recommended by the owner. No representation is made by Greenhatch Group, its agents or servants as to the accuracy, completeness, and sufficiency or otherwise of this drawing and the position of the apparatus.

All apparatus shall be treated as live unless proved otherwise by the owner. It is the users responsibility to ensure that the information on the location of apparatus is provided to all persons (either direct labour or contractors) working in proximity to the apparatus.

Rev	Date	Description	Drawn	Q. Ref.

greenhatch group

Topographical Surveys
Site Engineering
Utility / CCTV Surveys
Measured Building Surveys
3D Laser Scanning
Revit & BIM Models

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Regents Park
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NW1 5LL
t. (02072) 241806

CLIENT
Catesby Estates plc

PROJECT
Minster Lovell
Oxfordshire
OX29 0AW

TITLE
Water Pipe Trace

SCALE	DATE
A0@ 1: 500	06/07/22
DRAWN	**QUALITY REF**
NS	GH14242

Level datum	See OS Note
Grid orientation	See OS Note
Job number	44275

Drawing No. 44275_T_UG   Rev. 0

Comments

This plan should only be used for its original purpose. Greenhatch Group 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:

APPENDIX C
THAMES WATER SEWER RECORDS

Asset location search

Property Searches

Catesby Property Group
Catesby House 5b
Edgehill Drive
WARWICK
CV34 6LG

Search address supplied 33
Whitehall Close
Minster Lovell
Witney
OX29 0SB

Your reference Minster Lovell

Our reference ALS/ALS Standard/2022_4617312

Search date 31 March 2022

Knowledge of features below the surface is essential for every development

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

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

Contact us to find out more.

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

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

0800 009 4540

Asset location search

Property Searches

Search address supplied: 33, Whitehall Close, Minster Lovell, Witney, OX29 0SB

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

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

Asset location search

Thames Water Property Searches

Waste Water Services

Please provide a copy extract from the public sewer map.

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

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

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

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

For your guidance:

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

Clean Water Services

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

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

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

Asset location search

Property Searches

For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

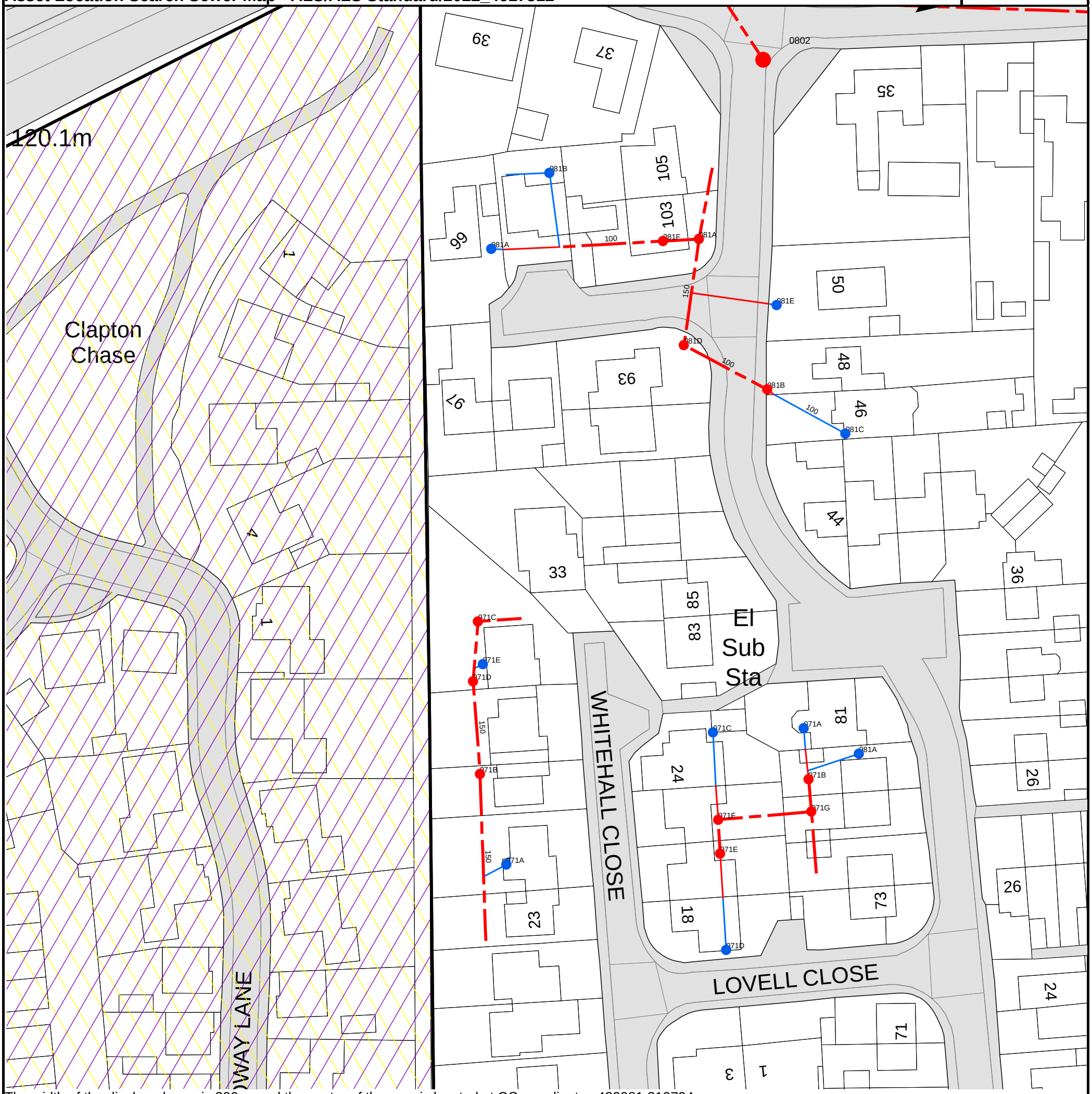
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4617312



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 430981,210794

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

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

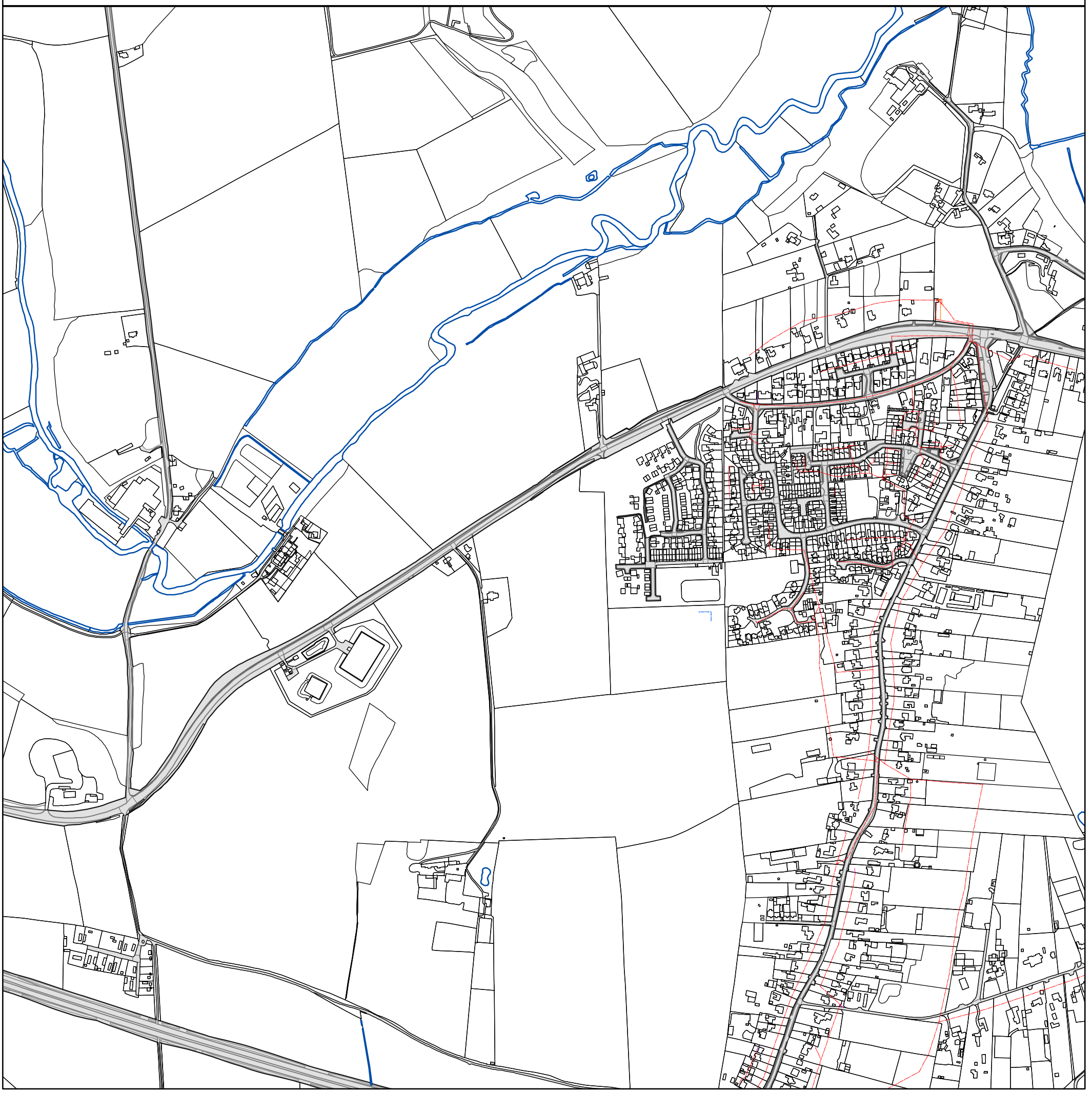
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
981A	n/a	n/a
981B	n/a	n/a
081F	n/a	n/a
081D	n/a	n/a
081A	n/a	n/a
0802	119.43	118.15
081B	n/a	n/a
081E	n/a	n/a
081C	n/a	n/a
971B	n/a	n/a
971A	n/a	n/a
071C	n/a	n/a
071F	n/a	n/a
071E	n/a	n/a
071D	n/a	n/a
071A	n/a	n/a
071B	n/a	n/a
071G	n/a	n/a
081A	n/a	n/a
971D	n/a	n/a
971C	n/a	n/a
971E	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.

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2022_4617312



Scale:	1:7162
Width:	2000m
Printed By:	Rveldhur
Print Date:	31/03/2022
Map Centre:	430626,210630
Grid Reference:	SP3010NE

Comments:

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

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

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

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

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

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

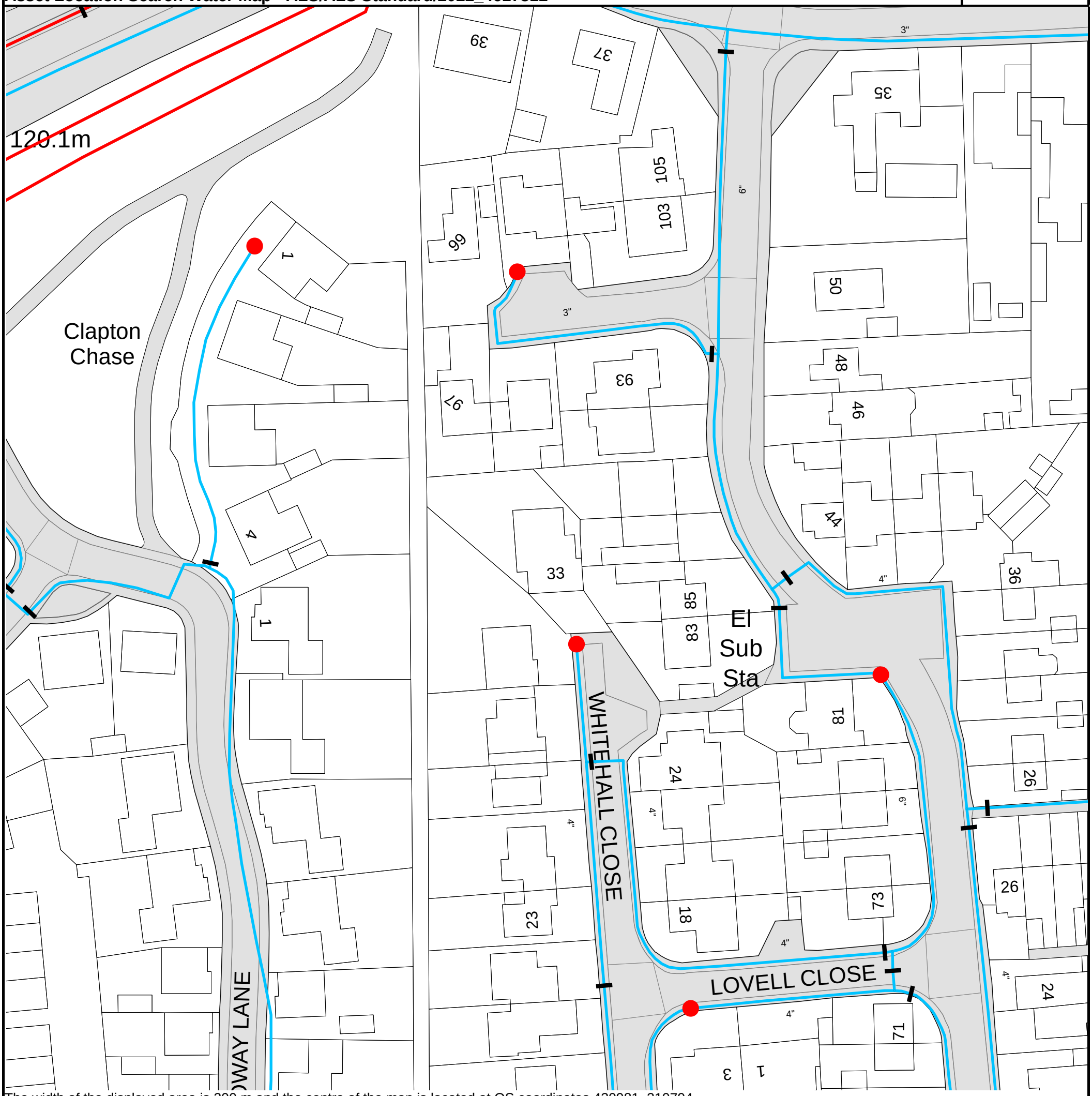
- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2022_4617312

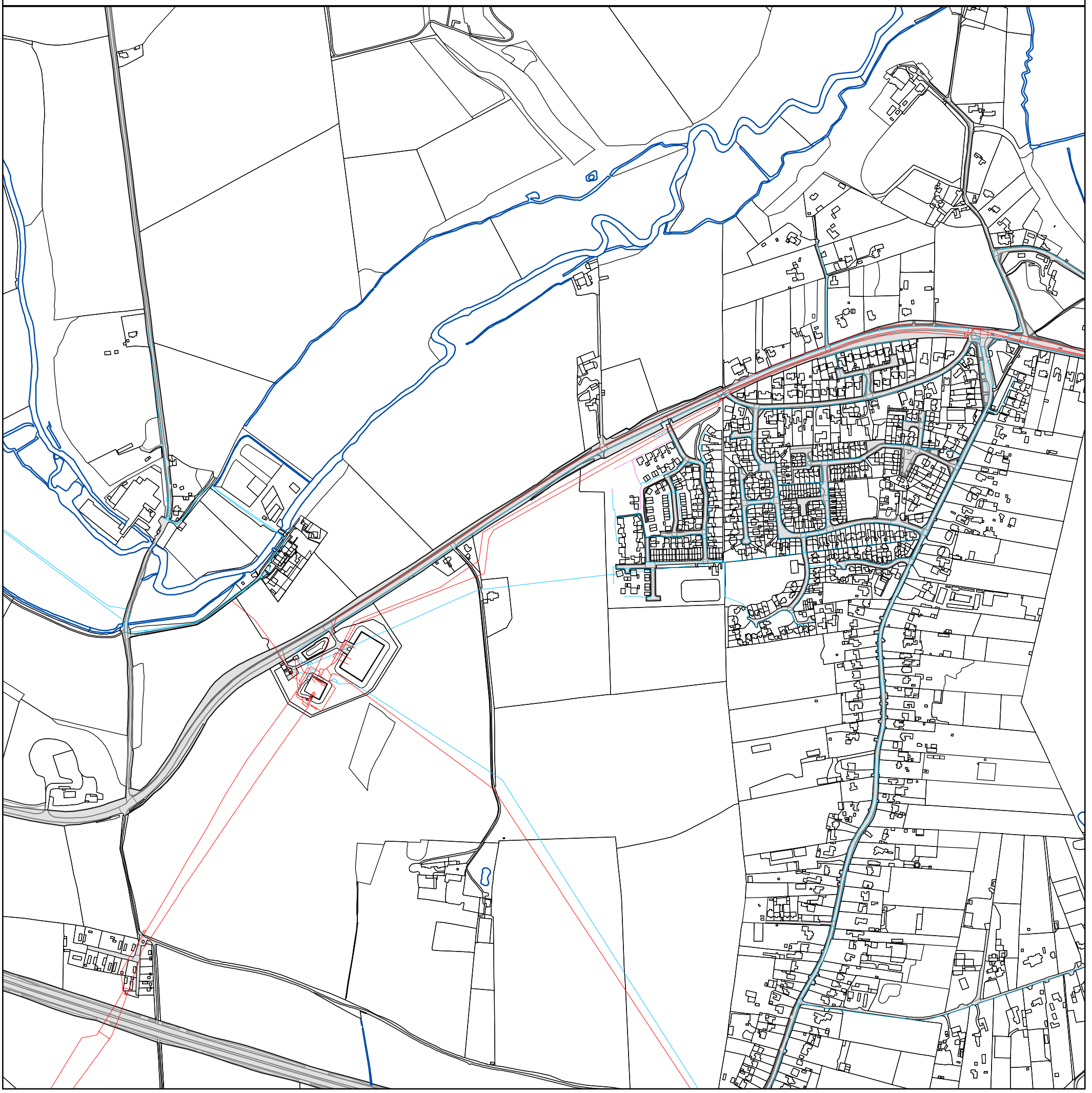


The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 430981, 210794.

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

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2022_4617312



0 45 90 180 270 360
Meters

Scale:	1:7162
Width:	2000m
Printed By:	Rveldhur
Print Date:	31/03/2022
Map Centre:	430626,210630
Grid Reference:	SP3010NE

Comments:

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

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

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

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

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

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

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

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

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

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

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

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

Terms and Conditions

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

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

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

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

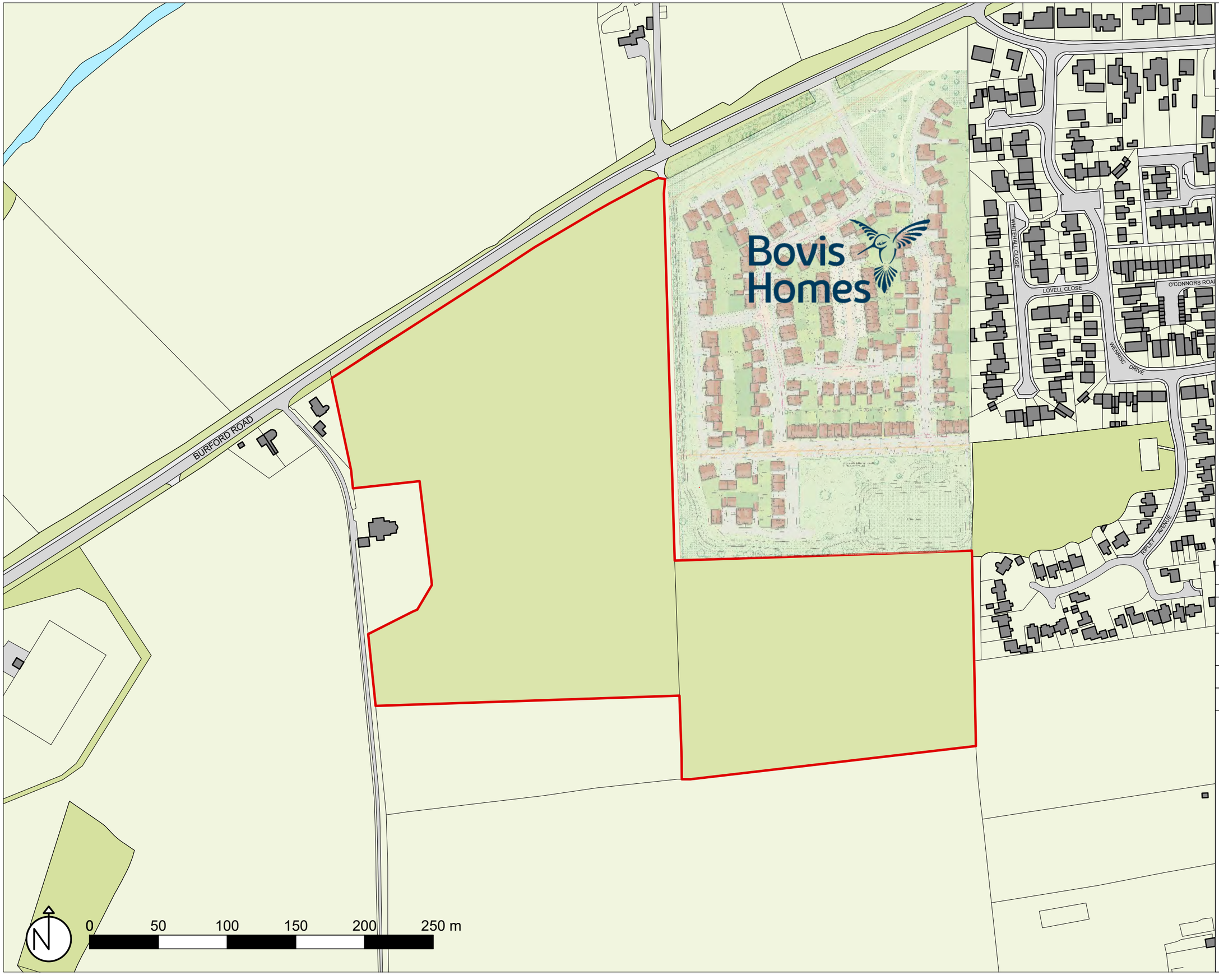
If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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

Ways to pay your bill

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

APPENDIX D
PROPOSED SITE LAYOUT



PRELIMINARY

Site boundary *(10.07xha)*

Rev.	Date	Description
B	22.10.13	Amended site boundary
A	22.10.12	Amended site boundary

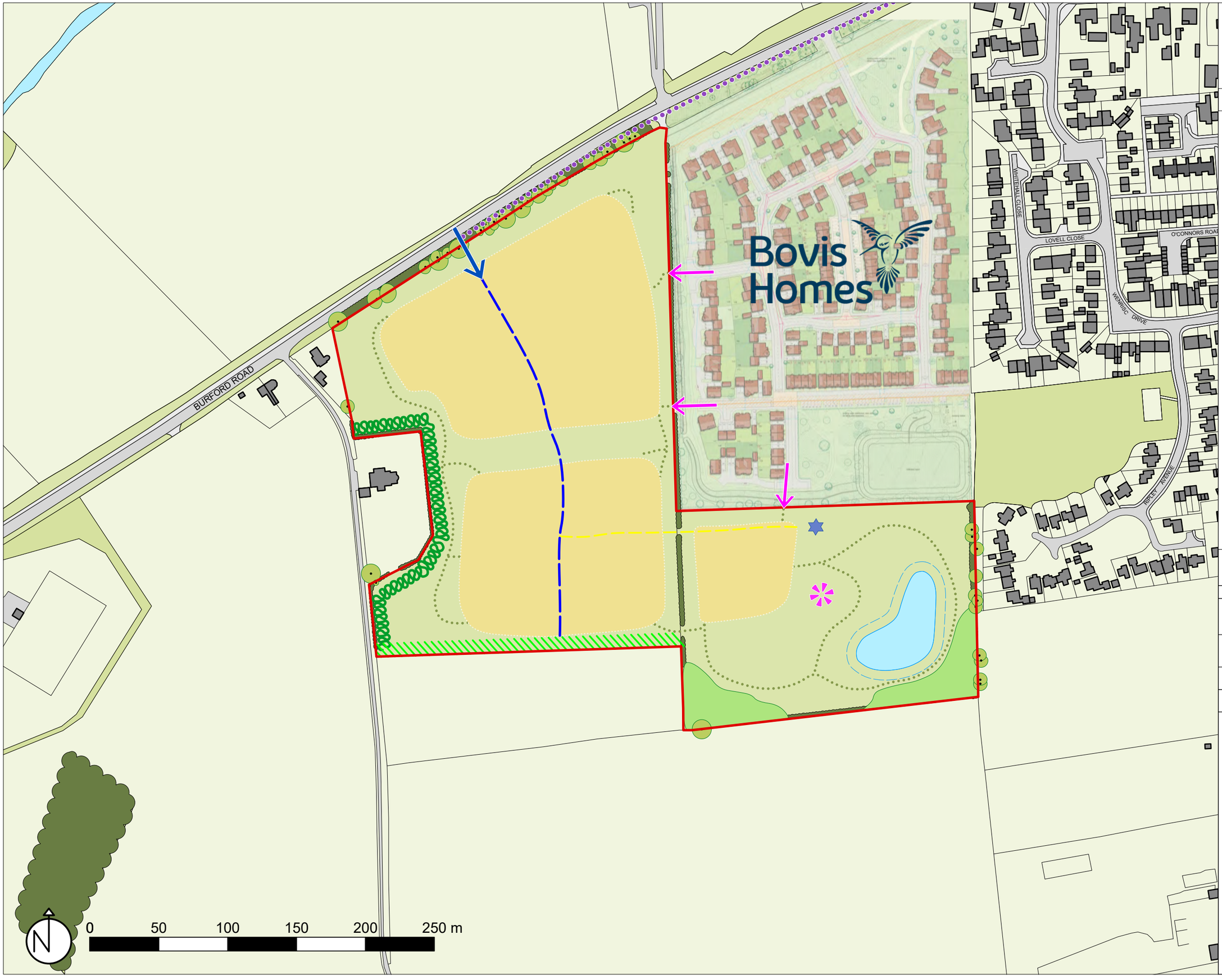
Land to the west of MINSTER LOVELL

Site Location Plan

Job ref:	Drawing number:	Revision:
466	L01	B

Scale:	Date:
1:2,500 @ A3	October 2022

part of
edge Placemaking Group Ltd
Suite 2
7 Buttermarket
Thame
Oxfordshire
OX9 3EW
01865 522395
enquiries@edgeUD.co.uk
www.edgeUD.co.uk



PRELIMINARY

- Site boundary *(10.07xxha)*
- Proposed residential development *(4.66ha)*
- Open space
- Proposed woodland
- Existing trees/hedgerows (incl. areas of undergrowth) to be retained *(where possible)*
- Proposed landscape buffer features
- Enhanced boundary planting
- Proposed site access point
- Proposed pedestrian/cycle access
- Proposed footpath along Burford Rd
- Primary street *(indicative alignment only)*
- Secondary street *(indicative alignment only)*
- Proposed recreational routes *(indicative only)*
- Play area *(indicative only)*
- Approximate zone to accommodate surface water attenuation feature *(indicative only)*
- Location for foul pump station *(indicative only)*

N.B.
- All land use zone areas allow for a limit of deviation 5m either side of the illustrated line, except for when immediately adjoining existing properties or protected vegetation/ ecology sensitive areas.
- Maximum building height is 2 storey (9m to ridgeline)

Rev.	Date	Description
E	22.10.13	Amendments to site boundary
D	22.10.12	Amendments to site boundary
C	22.10.06	Amendments to footpath
B	22.09.30	Amendments to footpath
A	22.09.29	Amendments to key & proposals

Land to the west of MINSTER LOVELL

Framework Plan

Job ref:	Drawing number:	Revision:
466	P02	E

Scale:	Date:
1:2,500 @ A3	October 2022

part of
edge Placemaking Group Ltd
Suite 2
7 Buttermarket
Thame
Oxfordshire
OX9 3EW
01865 522395
enquiries@edgeUD.co.uk
www.edgeUD.co.uk

PRELIMINARY

- Site boundary (10.07ha)
- 1 Proposed vehicular and pedestrian access
- 2 Proposed pedestrian/cycle connection
- 3 Primary street
- 4 Secondary street
- 5 Private drive
- 6 Proposed recreational route
- 7 Proposed playspace
- 8 Proposed attenuation basin
- 9 Existing vegetation retained and enhanced as necessary with locally characteristic and native species
- 10 Proposed woodland edge
- 11 Proposed green buffer to existing property
- 12 Proposed pumping station
- 13 Proposed footpath along Burford Road

Rev.	Date	Description
D	22.10.13	Amended site boundary
C	22.10.12	Amended site boundary
B	22.10.06	Amended landscape
A	22.09.29	Amended proposed layout

Land to the west of
MINSTER LOVELL

Illustrative Masterplan

Job ref:	Drawing number:	Revision:
466	P03	D

Scale:	Date:
1:2,500 @ A3	October 2022

part of
edge Placemaking Group Ltd
Suite 2
7 Buttermarket
Thame
Oxfordshire
OX9 3EW
01865 522395
enquiries@edgeUD.co.uk
www.edgeUD.co.uk

APPENDIX E
GROUND INVESTIGATION REPORT

GRM Development Solutions Ltd
Laurus House
First Avenue
Centrum 100
Burton upon Trent
Staffordshire
DE14 2WH

Tel: 01283 551 249
Web: www.grm-uk.com

Our Ref: P10086/SA Let.

Date: 14th September 2022

Catesby Strategic Land Ltd
Orchard House,
Papple Close,
Houlton,
Rugby,
CV23 1EW

For the attention of Mr. J. Findlay

Dear James,

RE: Soakaway Testing – Land South of Burford Road, Minster Lovell, Oxfordshire

This letter report should be read in conjunction with GRM Phase I Desk Study Assessment (ref. GRM/P9940/DS.1/Rev. A, dated July 2022), prepared on behalf of the Catesby Strategic Land Ltd.

Further to your instruction GRM have attended the above site to carry out soakaway testing at four locations to confirm the infiltration characteristics of the underlying soils. The proposed development has been assumed to comprise private residential housing and associated infrastructure.

Information reviewed as part of the Phase I Desk Study assessment indicated the site was likely to be largely underlain by a combination of the White Limestone Formation in the east and the Forest Marble Formation (both limestone and mudstone facies) across the remainder of the site.

Four mechanically excavated trial pits (SA01-SA04) were advanced on the 1st September 2022 at locations targeting the recorded locations of both the White Limestone Formation and the Forest Marble Formation (limestone facies only) to provide a representative assessment of the geologies present. A Location Plan showing the position of the tests is attached to this letter report along with the exploratory hole logs.

The strata encountered were visually similar in all four locations. The strata in SA03 have been classified as White Limestone Formation based on the geological mapping. Further investigation is recommended to confirm the recorded geology and its distribution across the site.

The Forest Marble Formation was encountered in SA01, SA02 and SA04 and the White Limestone in SA03.

Proven Ground Conditions

Soakaway Pit	Depth From and To (m)	Stratum Description
SA01	0.0 - 0.25	Topsoil: brown, slightly clayey, gravelly, SAND with gravel comprising limestone.
	0.25 – 1.0	Forest Marble Formation: dense, yellowish-brown, sandy, cobbly GRAVEL. Gravel and cobbles comprise limestone.
	1.0 – 1.5	Forest Marble Formation: very dense, yellowish-brown, slightly sandy, very gravelly COBBLES. Gravel and cobbles comprise limestone.
SA02	0.0 – 0.3	Topsoil: brown, slightly clayey, gravelly, SAND with gravel comprising limestone.
	0.3 – 0.6	Forest Marble Formation: dense yellowish-brown, sandy, cobbly, GRAVEL. Gravel and cobbles comprise limestone.
	0.6 – 1.6	Forest Marble Formation: very dense, yellowish-brown, sandy, gravelly, COBBLES. Gravel and cobbles comprise limestone.
	1.6 – 1.95	Forest Marble Formation: weak to moderately strong, yellowish-brown LIMESTONE.
SA03	0.0 – 0.3	Topsoil: brown, slightly clayey, gravelly SAND with gravel comprising limestone.
	0.3 – 1.0	White Limestone Formation: dense yellowish-brown, sandy, cobbly GRAVEL. Gravel and cobbles comprise limestone.
	1.0 – 1.5	White Limestone Formation: very dense, pale, yellowish-brown, sandy, gravelly COBBLES. Gravel and cobbles comprise limestone.
SA04	0.0 – 0.3	Topsoil: brown, slightly clayey, gravelly SAND with gravel comprising limestone.
	0.3 – 1.0	Forest Marble Formation: dense, yellowish-brown, sandy, cobbly, GRAVEL. Gravel and cobbles comprise limestone.
	1.0 – 1.3	Forest Marble Formation: very dense, yellowish-brown, sandy, gravelly, COBBLES. Gravel and cobbles comprise limestone.

Groundwater seepage / inflow was not observed during the excavation of the pits.

Soakaway Testing

The soakaway pits were installed with a series of plastic storm crates in order to maintain pit stability during testing. Each of the tested locations was filled with water to levels of between 0.69m and 1.44m below ground level (begl) and the level of water present was monitored over time.

Infiltration rates have been calculated from the data obtained. Three tests were completed in SA01-03 and two in SA04, due to time constraints.

Soakaway Pit	Infiltration Rates (m/s)		
	Test 1	**Test 2**	**Test 3**
SA01	>9 x 10^{-4} empty after 90 seconds	>9 x 10^{-4} empty after 180 seconds	8 x 10^{-4}
SA02	1.23 x 10^{-4}	1.17 x 10^{-4}	1.10 x 10^{-4}
SA03	>9 x 10^{-4} empty after 45 seconds	>9 x 10^{-4} empty after 60 seconds	8 x 10^{-4}
SA04	1.96 x 10^{-5}	1.59 x 10^{-5}	Not completed

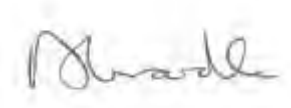
Infiltration rates >9 x 10^{-4} m/s were achieved in tests 1 and 2 in pits SA01 and SA03, before slowing to 8 x 10^{-4}. The infiltration rates were such that it was not possible to establish a head of water greater than 320mm. In SA04 the infiltration rates were generally at least a magnitude slower, although still

reasonable, which is likely to be due to increased fines content or a change in geology or a combination of the two; however, no visual change was noted.

The results of the testing should be provided to the project's drainage engineer for inclusion within the site's surface water drainage design after taking into account suitable factors of safety. It may be prudent to consider targeted testing to delineate the areas of slower drainage dependant upon the sensitivity of the drainage design.

We trust that the above is sufficient for your current purposes, however if you have any queries, please do not hesitate to contact us.

Yours sincerely,
for GRM Development Solutions Ltd



Paul Wardle BSc, MA
Acting Principal Geologist.

Attached: Soakaway Pit Location Plan.
Exploratory Hole Logs.

NOTES: NOTES	CLIENT: CLIENT	PROJECT No: E/P ref	DATE: DATE	DESIGN/DRAWN: INITIALS
	PROJECT: PROJECT NAME	DRAWING NUMBER: Drawing Number	ISSUE: ISSUE	
	TITLE: DRAWING TITLE			

GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.com www.grm-uk.com

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

Trial Pit Log

Trial Pit No
SA01
Sheet 1 of 1

Site Name: Minster Lovell, West Oxfordshire

Ground Level (mAOD)
121.20

Client: Catesby Strategic Land Ltd

GRM Project Ref: P10086

Coordinates
430687 E
210635 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.25	120.95		Brown, slightly clayey, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Contains frequent rootlets. TOPSOIL
				1.00	120.20		Dense, yellowish brown, sandy cobbly GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE
				1.50	119.70		Very dense, yellowish brown, slightly sandy, very gravelly COBBLES. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE
							End of Pit at 1.500m

1
2
3
4

Date Excavated: 01/09/2022
Date Backfilled: 01/09/2022
Shoring: None.
Stability: Stable during excavation.
Plant Used: JCB 3CX
Logged by: RP

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.60 × 2.50

Reason for termination of Trial Pit:
Achieved required depth.

General Remarks:

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

Trial Pit Log

Trial Pit No
SA02
Sheet 1 of 1

Site Name: Minster Lovell, West Oxfordshire

Ground Level (mAOD)
119.90

Client: Catesby Strategic Land Ltd

GRM Project Ref: P10086

Coordinates
430718 E
210428 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Brown, slightly clayey, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Contains frequent rootlets. TOPSOIL
				0.30	119.60		Dense, yellowish brown, sandy cobbly GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE
				0.60	119.30		Very dense, yellowish brown, sandy gravelly COBBLES. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE
				1.60	118.30		Weak to moderately strong, yellowish brown LIMESTONE. Recovered as gravel and cobbles. Very low ripability. FOREST MARBLE FORMATION - LIMESTONE
				1.95	117.95		End of Pit at 1.950m

1
2
3
4

Date Excavated: 01/09/2022
Date Backfilled: 02/09/2022
Shoring: None.
Stability: Stable during excavation.
Plant Used: JCB 3CX
Logged by: RP

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.60
2.50

Reason for termination of Trial Pit:
Achieved required depth.

General Remarks:

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

Trial Pit Log

Trial Pit No
SA03
Sheet 1 of 1

Site Name: Minster Lovell, West Oxfordshire

Ground Level (mAOD)
120.10

Client: Catesby Strategic Land Ltd

GRM Project Ref: P10086

Coordinates
430716 E
210530 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	119.80		Brown, slightly clayey, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Contains frequent rootlets. TOPSOIL
				1.00	119.10		Dense, yellowish brown, sandy cobbly GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. WHITE LIMESTONE FORMATION
				1.50	118.60		Very dense, pale yellowish brown, sandy gravelly COBBLES. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. WHITE LIMESTONE FORMATION
							End of Pit at 1.500m

1
2
3
4

Date Excavated: 01/09/2022
Date Backfilled: 01/09/2022
Shoring: None.
Stability: Stable during excavation.
Plant Used: JCB 3CX
Logged by: RP

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.60 × 2.50

Reason for termination of Trial Pit:
Achieved required depth.

General Remarks:

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

Trial Pit Log

Trial Pit No
SA04
Sheet 1 of 1

Site Name: Minster Lovell, West Oxfordshire

Ground Level (mAOD)
118.00

Client: Catesby Strategic Land Ltd

GRM Project Ref: P10086

Coordinates
430908 E
210494 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	117.70		Brown, slightly clayey, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Contains frequent rootlets. TOPSOIL
				1.00	117.00		Dense, yellowish brown, sandy cobbly GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE
				1.30	116.70		Very dense, yellowish brown, sandy gravelly COBBLES. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are of limestone. FOREST MARBLE FORMATION - LIMESTONE End of Pit at 1.300m

Date Excavated: 01/09/2022
Date Backfilled: 02/09/2022
Shoring: None.
Stability: Stable during excavation.
Plant Used: JCB 3CX
Logged by: RP

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.60 × 2.50

Reason for termination of Trial Pit:
Achieved required depth.

General Remarks:

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

APPENDIX F
GREENFIELD RUNOFF CALCULATIONS

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Benjamin Donoghue

Site name: Burford Road

Site location: Minster Lovell

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

Site Details

Latitude: 51.79267° N

Longitude: 1.55675° W

Reference: 3940235601

Date: Nov 03 2022 11:54

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 10.07

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

Hydrological characteristics	Default	Edited
SAAR (mm):	667	667
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	1.6	1.6
1 in 1 year (l/s):	1.36	1.36
1 in 30 years (l/s):	3.68	3.68
1 in 100 year (l/s):	5.1	5.1
1 in 200 years (l/s):	5.98	5.98

APPENDIX G
SURFACE WATER DRAINAGE CALCULATIONS

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 780 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	116.653	0.353	18.2	745.9	O K
30 min Summer	116.753	0.453	18.9	972.6	O K
60 min Summer	116.849	0.549	19.5	1195.9	O K
120 min Summer	116.933	0.633	20.1	1397.2	O K
180 min Summer	116.971	0.671	20.4	1490.7	O K
240 min Summer	116.991	0.691	20.5	1537.8	O K
360 min Summer	117.006	0.706	20.6	1575.7	O K
480 min Summer	117.006	0.706	20.6	1576.2	O K
600 min Summer	116.998	0.698	20.5	1555.2	O K
720 min Summer	116.987	0.687	20.5	1530.1	O K
960 min Summer	116.967	0.667	20.3	1478.9	O K
1440 min Summer	116.926	0.626	20.0	1380.8	O K
2160 min Summer	116.871	0.571	19.7	1247.8	O K
2880 min Summer	116.819	0.519	19.3	1126.0	O K
4320 min Summer	116.724	0.424	18.7	906.5	O K
5760 min Summer	116.640	0.340	18.1	717.9	O K
7200 min Summer	116.568	0.268	17.6	559.0	O K
8640 min Summer	116.507	0.207	17.2	426.9	O K
10080 min Summer	116.456	0.156	16.9	319.9	O K
15 min Winter	116.694	0.394	18.5	837.5	O K
30 min Winter	116.805	0.505	19.2	1093.1	O K
60 min Winter	116.912	0.612	19.9	1346.5	O K
120 min Winter	117.008	0.708	20.6	1580.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	138.153	26
30 min Summer	90.705	41
60 min Summer	56.713	70
120 min Summer	34.246	128
180 min Summer	25.149	188
240 min Summer	20.078	246
360 min Summer	14.585	364
480 min Summer	11.622	482
600 min Summer	9.738	580
720 min Summer	8.424	626
960 min Summer	6.697	750
1440 min Summer	4.839	1010
2160 min Summer	3.490	1416
2880 min Summer	2.766	1824
4320 min Summer	1.989	2604
5760 min Summer	1.573	3400
7200 min Summer	1.311	4112
8640 min Summer	1.129	4840
10080 min Summer	0.994	5464
15 min Winter	138.153	26
30 min Winter	90.705	40
60 min Winter	56.713	70
120 min Winter	34.246	126

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	117.053	0.753	20.9	1692.2	O K
240 min Winter	117.077	0.777	21.1	1752.3	O K
360 min Winter	117.099	0.799	21.3	1809.1	O K
480 min Winter	117.105	0.805	21.3	1824.0	O K
600 min Winter	117.101	0.801	21.3	1814.4	O K
720 min Winter	117.092	0.792	21.2	1790.2	O K
960 min Winter	117.064	0.764	21.0	1721.3	O K
1440 min Winter	117.015	0.715	20.7	1598.0	O K
2160 min Winter	116.938	0.638	20.1	1408.6	O K
2880 min Winter	116.862	0.562	19.6	1227.5	O K
4320 min Winter	116.723	0.423	18.7	903.3	O K
5760 min Winter	116.601	0.301	17.8	632.3	O K
7200 min Winter	116.500	0.200	17.2	413.1	O K
8640 min Winter	116.420	0.120	16.7	244.5	O K
10080 min Winter	116.365	0.065	16.3	131.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
180 min Winter	25.149	184
240 min Winter	20.078	242
360 min Winter	14.585	356
480 min Winter	11.622	470
600 min Winter	9.738	580
720 min Winter	8.424	686
960 min Winter	6.697	796
1440 min Winter	4.839	1088
2160 min Winter	3.490	1544
2880 min Winter	2.766	1988
4320 min Winter	1.989	2812
5760 min Winter	1.573	3576
7200 min Winter	1.311	4256
8640 min Winter	1.129	4928
10080 min Winter	0.994	5440

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time / Area Diagram

Total Area (ha) 2.961

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.987	4-8	0.987	8-12	0.987

Model Details

Storage is Online Cover Level (m) 117.700

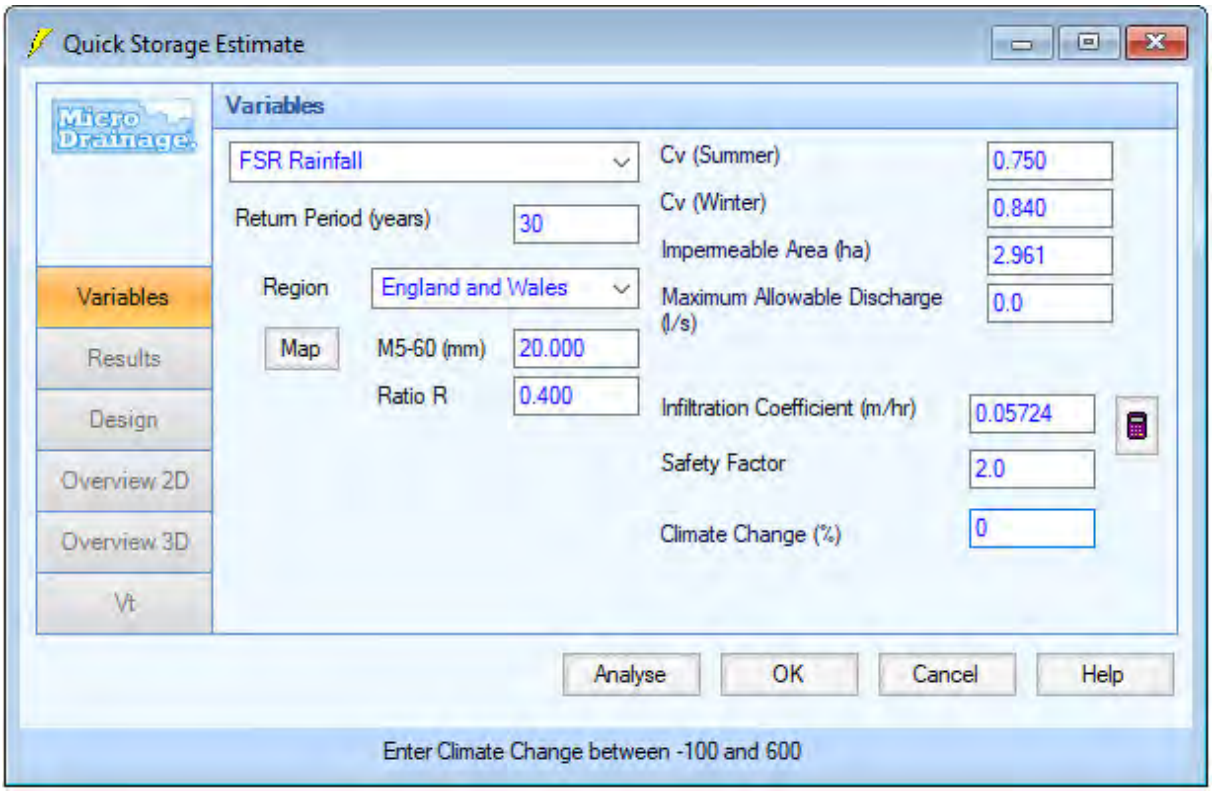
Infiltration Basin Structure

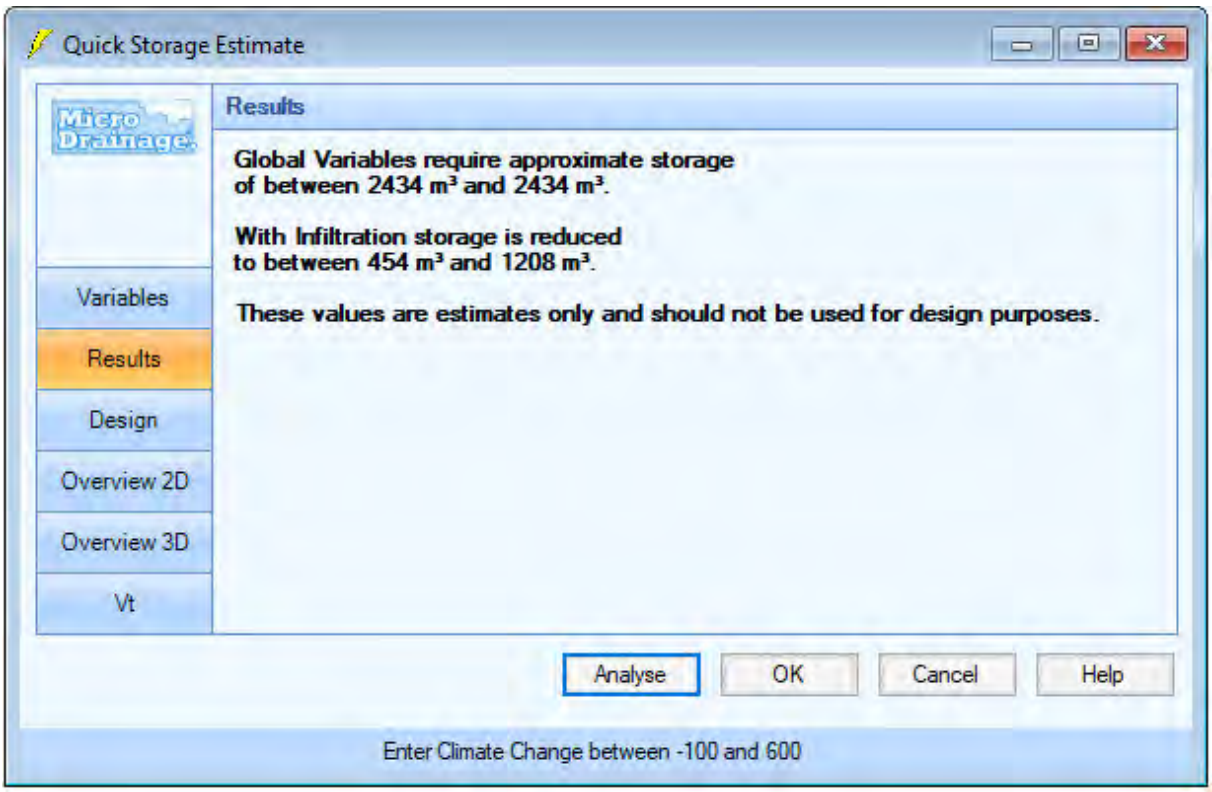
Invert Level (m) 116.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.05724 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.05724

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2000.0	0.600	2398.6	1.200	2833.3	1.800	0.0	2.400	0.0
0.100	2063.9	0.700	2468.5	1.300	2909.3	1.900	0.0	2.500	0.0
0.200	2128.8	0.800	2539.5	1.400	2986.3	2.000	0.0		
0.300	2194.8	0.900	2611.4	1.401	0.0	2.100	0.0		
0.400	2261.7	1.000	2684.4	1.600	0.0	2.200	0.0		
0.500	2329.6	1.100	2758.4	1.700	0.0	2.300	0.0		

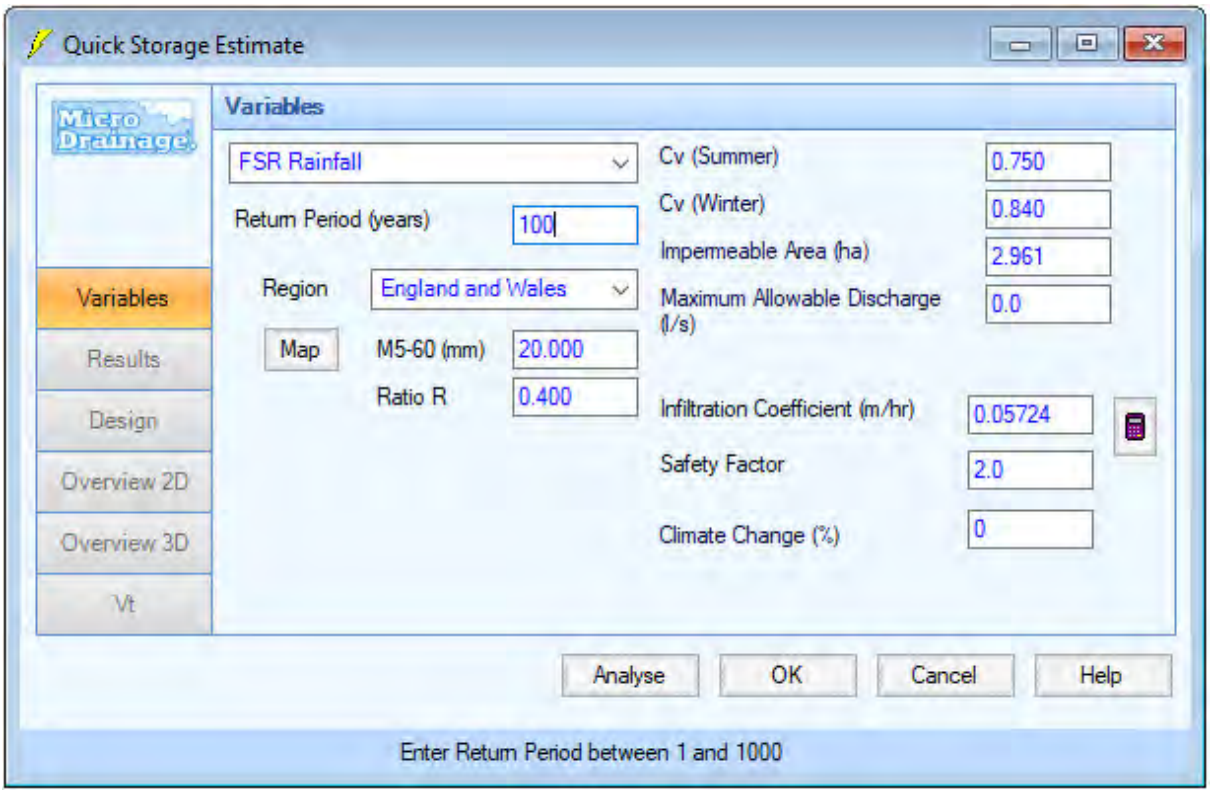
Quick Storage Estimates

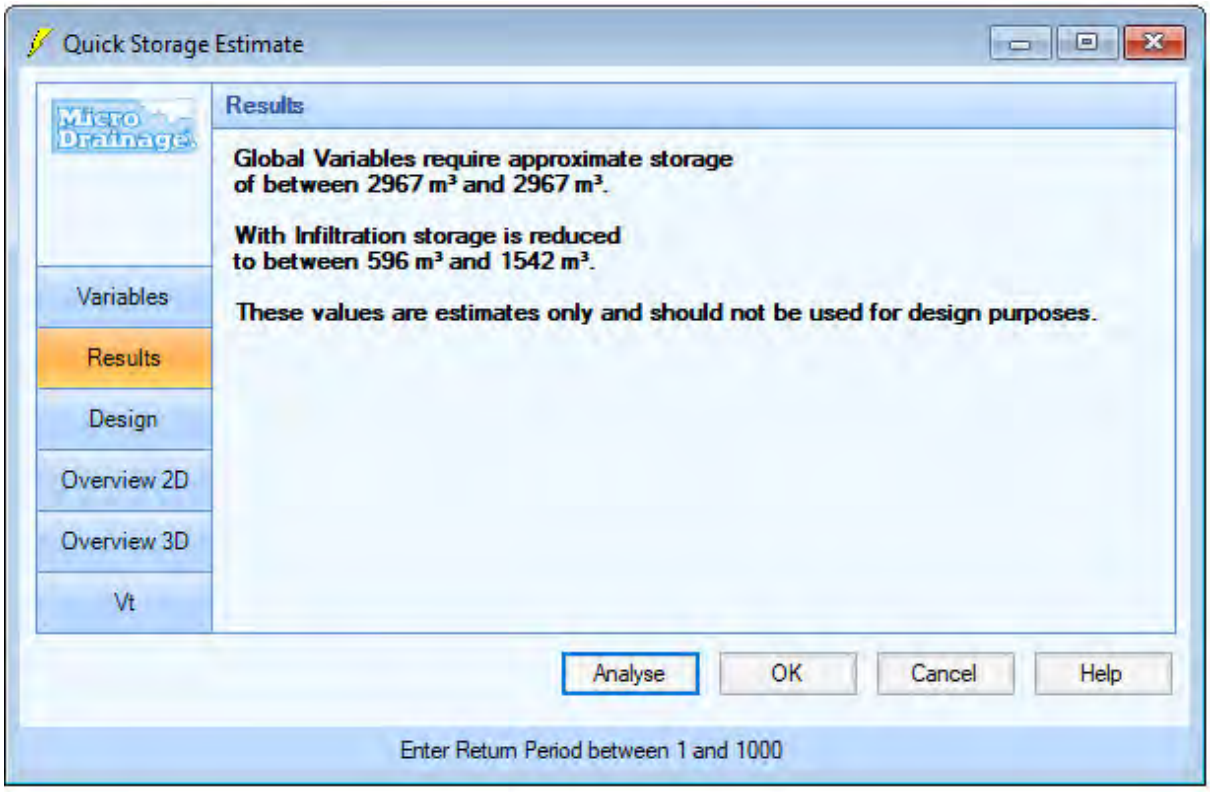
1 in 30 yr



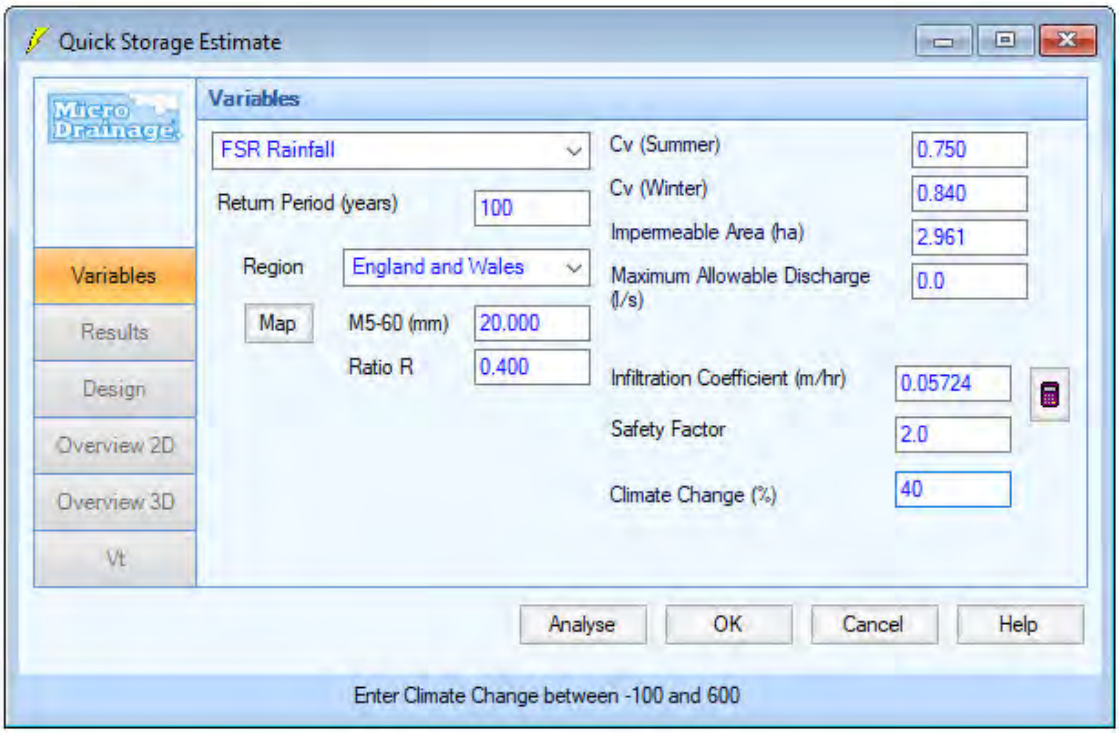


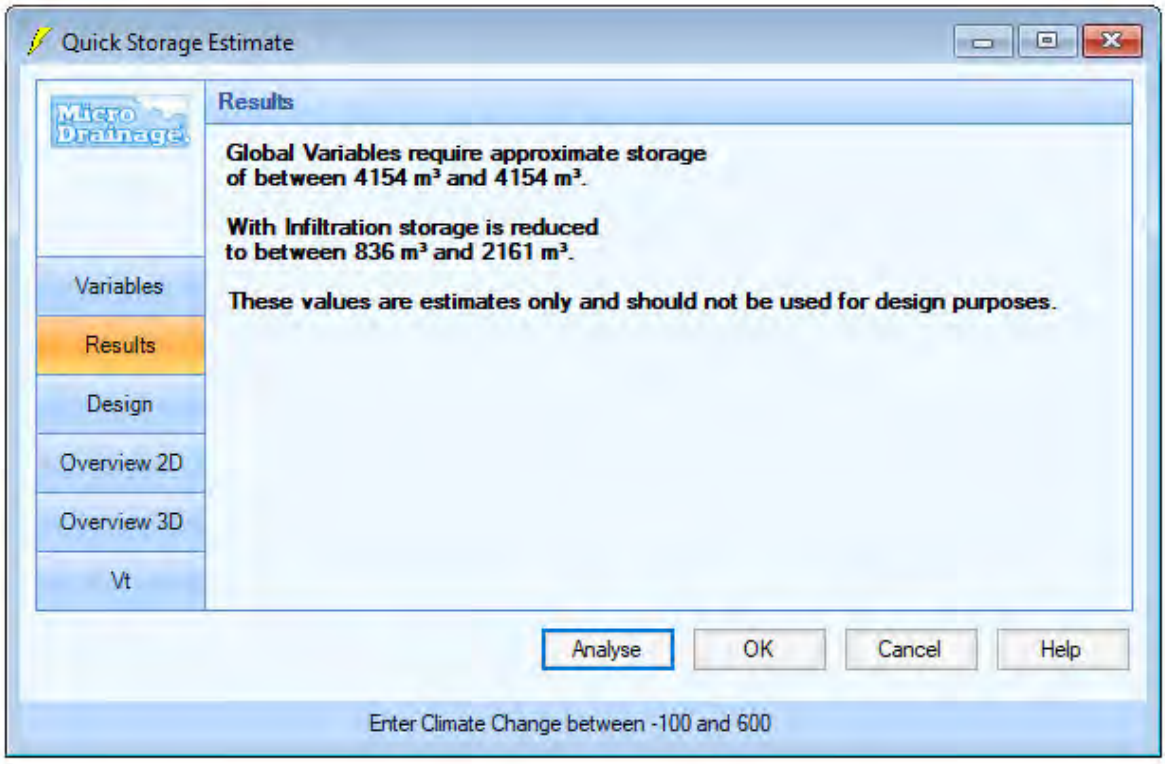
1 in 100 yr


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years)
100
Region
England and Wales
Map
M5-60 (mm)
20.000
Ratio R
0.400
Cv (Summer)
0.750
Cv (Winter)
0.840
Impermeable Area (ha)
2.961
Maximum Allowable Discharge (l/s)
0.0
Infiltration Coefficient (m/hr)
0.05724
Safety Factor
2.0
Climate Change (%)
0
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 2967 m³ and 2967 m³.
With Infiltration storage is reduced to between 596 m³ and 1542 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000

1 in 100yr +40% climate change





APPENDIX H
SURFACE WATER DRAINAGE STRATEGY

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

KEY

- Red Line Boundary
- Proposed Impermeable Area
- Proposed Surface Water Sewer
- Outfall Headwall
- Indicative Permeable Paving
- Conveyance Swale (possible infiltration potential)
- Infiltration Basin

Notes:

1. This drawing has been produced to planning/viability purposes only.
2. This drawing is to be read in conjunction with all other relevant drawings.
3. All dimensions are in metres U.N.O
4. All levels in metres.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P01	24.10.22	Preliminary Issue	BD	MEC	MEC

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Client

CATESBY STRATEGIC LAND LTD

Project Title

LAND SOUTH OF BURFORD ROAD
MINSTER LOVELL
OXFORDSHIRE

Status: WORK IN PROGRESS

Drawing Title

DRAINAGE STRATEGY

Drawn	Date	Checked	Date	Approved	Date
BD	24.10.22	MC	24.10.22	MC	24.10.22

Scale	Orig Size	Dimensions	Revision
1:1000	A1	M	P01

Drawing File
680568-RSK-A-ALL-13-10-22 - DRAINAGE STRATEGY.DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
680568	RSK		ALL	05	01	01

Scale 1:1000
0 10 20 30 40 50m

APPENDIX I
SUDS MANAGEMENT STRATEGY

Catesby Strategic Land Limited

Land off Burford Road, Minster Lovell

Sustainable Drainage System (SuDS) Management Strategy

Project No.680568

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

OCTOBER 2022

RSK GENERAL NOTES

Project No.: 680568-R1(0)
Title: SuDS Management Strategy
Client: Catesby Strategic Land Limited
Date: October 2022
Office: Coventry
Status: Draft

Author	B Donoghue	**Technical reviewer**	M Cheeseman
			
Date:	24.10.22	Date:	24.10.22
Technical Approver	A Cadge		
Date:	24.10.22		

CONTENTS

1 INTRODUCTION

This management strategy has been prepared by RSK Land and Development Engineering Ltd on behalf of Catesby Strategic Land Limited, to accompany the outline planning application for land off Burford Road, Minster Lovell (The Development).

The SuDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of one hundred years plus climate change. This is required so that the development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to the underlying strata via infiltration features. Such features indicatively include the following:

- Permeable paving;
- Swales;
- Infiltration Basins;

The following indicative design drawings issued for construction should be referred to when reading this document for details of the SuDS features utilised on this site:

- 680568-RSK-A-ALL – 26-09-2022 Surface Water Strategy Drawing;

This document outlines the long term maintenance of the proposed surface water system and will make reference to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, *'The SuDS Manual'*, 2015
- CIRIA Report C625, *'Model Agreements for Sustainable Water Management Systems'*, 2004
- CIRIA Report C768, *'Guidance on the Construction of SuDS'*, 2017; and
- Interpave, *'Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements'*, ed. 4, 2006.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For The Development, the drainage responsibilities will be divided between the following:

- **Private Landowner** – each Householder will be responsible for the maintenance of drainage features within individual property curtilages; and
- **Communal Areas** - A Management company will be set up for the Development to maintain all permeable paving, stormwater attenuation tanks, detention basins, outfalls, and any associated flow controls within communal areas. However, it should be noted that if, the Flood and Water Management Act 2022 is ever fully implemented this allows a surface water drainage system to be vested to the SuDS approving body (SAB). This would be reviewed at the time of any implementation of the act.

3 MAINTENANCE REGIME

As the maintenance of the communal SuDS features will likely be carried out via a Management Company (detailed to be confirmed at the detailed planning stage), the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SuDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Permeable Paving

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation

Maintenance schedule	Required action	Typical frequency
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.2 Infiltration Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter, debris, and trash	Monthly
	Cut grass-for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass-meadow in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional maintenance	Reseed areas of poor vegetation growth	Annually or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets, and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silty accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

3.3 Swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass- to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspection inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design level	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface	As required
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

3.4 Operation and Maintenance Requirements for Trees

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Manage other vegetation and remove nuisance plants	Monthly
	Inspect inlets and outlets	Monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually
	Water	As required
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

APPENDIX A
INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g., biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying construction or ground (e.g. underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								

Inspection Date	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date completed
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)								
Does any part of the system require weeding, pruning, or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity, and visual aspects?								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Other observations								
Information appended (e.g. photos)								
Continue as current Increase maintenance Decrease maintenance								
Proposed date for next inspection								