OXFORDSHIRE
STRATEGIC RAIL FREIGHT INTERCHANGE

**DCO Submission**

Environmental Statement

**Chapter 9:** Water Environment
Appendix 9.3: Sustainable Drainage Statement - Main Site

**Document 6.9C**
Rev P05

On behalf of
Oxfordshire Railfreight Limited

Prepared by BWB Consulting Ltd
**October 2026**

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**ADVISORY**

# Oxfordshire Railfreight Limited
# Oxfordshire Strategic Rail Freight Interchange
# Oxfordshire
# Sustainable Drainage Statement – Main Site

**ADVISORY**

# Oxfordshire Railfreight Limited
# Oxfordshire Strategic Rail Freight Interchange
# Oxfordshire
# Sustainable Drainage Statement – Main Site

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street, Manchester, M1 3HU
0161 233 4260

**Nottingham**
**Waterfront House, Station Street, Nottingham NG2 3DQ**
**T: 0115 924 1100**

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# 1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Oxfordshire Railfreight Limited in respect of a Development Consent Order (DCO) for Oxfordshire Strategic Rail Freight Interchange (OxSRFI).

1.3 A series of Flood Risk Assessments (FRAs) and SDS reports have been prepared to support the DCO submission:

- OxSRFI Main Site FRA – "OXSRFI-ZZ-XX-T-W-1006_FRA (Main Development Site)";
- OxSFRI Offsite and Highway Works Flood Risk Screening – "OXSRFI-BWB-ZZ-XX-T-W-1007_Offsite and Highway Works Flood Risk Screening"; and
- OXSRFI Offsite and Highway Works SDS – "OXSRFI-BWB-ZZ-XX-T-W-1051_Offsite and Highway Works SDS"

1.4 This SDS has been prepared in relation to the 'OxSRFI Main Site', referred to as 'the site' throughout.

1.5 The proposed development is to be submitted for a DCO, and as such the details have been developed in consultation with the relevant statutory bodies relating to flood risk and drainage for the site.

1.6 The Lead Local Flood Authority (LLFA) for the site are Oxfordshire County Council (OCC). The LLFA are not the prescribed consultee under the DCO process; however, Cherwell District Council, the Local Planning Authority (LPA), are. As the LPA is not the LLFA for the site, the Environment Agency (EA) have been deferred to as the relevant body to comment on the surface water drainage strategy. Despite this, as the LLFA is the body responsible for surface water flood risk in relation to planning, OCC have been consulted through the DCO consultation stage and will comment of the surface water drainage proposals, via the EA.

1.7 Thames Water (TW) are responsible for waste water disposal, although Anglian Water (AW) are responsible for waste water disposal to the north of the site within Ardley.

## Situational Context

1.8 The proposed development comprises a number of interrelated component parts as follows, and collectively they are the Oxfordshire SRFI:

- **SRFI Main Site**
  - Works No. 1 Railway works to existing Chiltern Main Line.
  - Works No. 2 Private Railway.
  - Works No. 3 Rail Terminal

- Works No. 4 Rail terminal or rail serves warehousing.
- Works No. 5 Rail sidings (warehousing).
- Works No. 6 Rail served warehousing.
- Works No. 7 Estate road.
- Works No. 8 Landscaping.
- Works No. 9 Central hub.
- Works No. 10 Ashgrove cottages.
- Works No. 11 Principal access to the main site.
- Works No. 12 Hayford Park Link Road.
- Works No. 30 Biodiversity and landscaping enhancement area (South).
- Works No. 35 Foul drainage outfall to Bicester.
- Works No. 36 B430 Station Road.

- **Offsite/Highways Works**
  - Works No. 13 Camp Road/Chilgrove Drive Junction and Bridleway.
  - Works No. 14 to 18 Junction 10 Highways Improvements.
  - Works No. 19, 20 & 21 Ardley Bypass.
  - Works No. 22 Junction 9 Highways Improvements.
  - Works No. 23 Middleton Stoney Relief Road (MSRR) pedestrian and cyclist connectivity.
  - Works No. 24 MSRR pedestrian and cyclist connectivity.
  - Works No. 25 B430 minor works.
  - Works No. 26 Quarry Cottages.
  - Works No. 27 Middleton Stoney Crossroads.
  - Works No. 28 Aves Ditch (North).
  - Works No. 29 Biodiversity and landscaping enhancement area (North West).
  - Works No. 31 to 33 Biodiversity and landscaping enhancement areas (Including Woodland Planting).
  - Works No. 34 Landfill work.
  - Works No. 37. Biodiversity and landscaping enhancement.
  - Works No. 38 Ardley Tunnel works.

1.9 A site location plan is provided as **Figure 1.1**, for ease of reference and for the purpose of the SDSs, the individual components have been grouped together based upon the geographical location. Although Works No. 29 and 34 are located within areas that could be considered with in the 'OxSRFI Main Site', these works have been included within the 'Offsite' category for the purpose of the drainage strategy presented within this report.

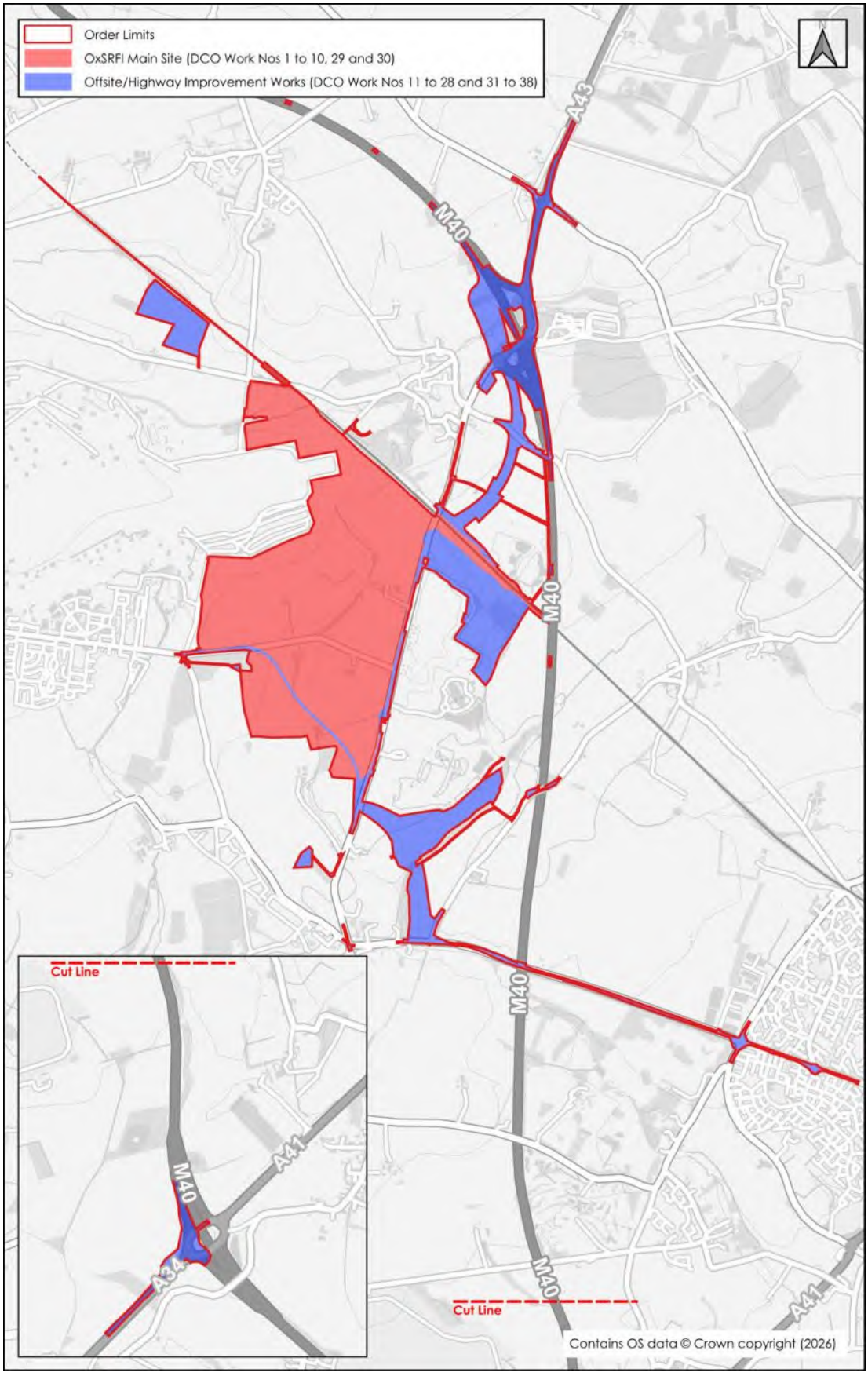


**Figure 1.1: Site Location**

1.10 Refer to Document DCO 2.5 for the parameters plan. Contextual information for the site is provided within **Table 1.1**.

**Table 1.1: Site Details**

| | |
|---|---|
| **Site Name** | Oxfordshire SRFI Main Site (DCO Works No. 1 to 12, 30, 35 and 36) |
| **Location** | Oxfordshire |
| **NGR (approx.)** | SP533261 |
| **Development Type** | Rail Freight Interchange |
| **Anticipated Development Lifetime** | 75-years* |
| **Lead Local Flood Authority** | Oxfordshire County Council |
| **Local Planning Authority** | Cherwell District Council |
| **EA Area** | Thames |
| **Sewerage Undertaker** | Thames Water (Anglian Water to the north) |

* In accordance with Paragraph 006 of the Flood Risk and Coastal Change Planning Practice Guidance

## Sustainable Drainage Guidance

Guidance Documents

1.11 This SDS and associated drainage strategy has been written with reference to the following guidance documents:

- OCC's Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire[1];
- OCC's Local Standards and Guidance for Major Development with Surface Water Drainage[2];
- The DEFRA Non-Statutory Technical Standards for SuDS (2015)[3];
- The National Standards for Sustainable Drainage Systems (SuDS) (2025)[4];
- The National Policy Statement for National Networks[5] (NPSNN); and
- The CIRIA C753 SuDS Manual[6].

1.12 This drainage strategy has been prepared using OCC's 2021 v1.2 guidance, however this guidance was updated in June 2026 to v2.0. The 2026 update requires planning applications to adhere to the 2025 National Standards for Sustainable Drainage Systems. Any future revisions of this drainage strategy will consider these new guidance

[1]Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire, V1.2 (Oxfordshire County Council, December 2021)
[2] Local Standards and Guidance for Major Development with Surface Water Drainage, V.2.0, June 2026 (Oxfordshire County Council)
[3] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems
[4] https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds#standard-7-design-of-drainage-for-construction-operation-maintenance-decommissioning-and-structural-integrity
[5] National Policy Statement for National Networks, Department for Transport, March 2024
[6] The SuDS Manual Version 6 (CIRIA, 2019)

documents. **Section 6** of this report shows how the proposed strategy would meet the requirements of the new standards.

Climate Change and Urban Creep Allowances

1.13 The site is located within the Cherwell and Ray Management Catchment within the Thames River Basin District. Table 2 from the EA's 'Flood risk assessments: climate change allowances', included as **Table 1.2**, shows the anticipated changes in peak rainfall intensity for the site.

**Table 1.2: Cherwell and Ray Management Catchment Peak Rainfall Allowances**

| Cherwell and Ray Management Catchment Allowance | Total Potential Change Anticipated for the '2050s' (Lifetime up to 2060) | Total Potential Change Anticipated for the '2070s' (2061 to 2125) |
|---|---|---|
| **1 in 30-Year Rainfall Event** | | |
| Upper End | 35% | 35% |
| Central | 20% | 25% |
| **1 in 100-Year Rainfall Event** | | |
| Upper End | 40% | 40% |
| Central | 20% | 25% |

1.14 The proposed development is anticipated to have a lifespan of up to 75 years; therefore, it would be appropriate to use the 2070's epoch central allowance.. However, in order to provide a conservative drainage design, calculations have been undertaken using the 2070's epoch upper end allowance to ensure that there is no increase in flood risk elsewhere and the built development will be safe from surface water flooding over the anticipated lifetime of the proposed development.

1.15 Based on the above guidance, an allowance of 40% will be applied to the 1 in 100-year return period within the drainage design calculations. During the detailed design stage a 35% climate change allowance should be applied to the 1 in 30-year return period within the drainage design calculations. As the development is built out, the latest EA climate change allowance should be reviewed and used for the detailed design calculations for each phase of the development.

1.16 Based on the proposed development use, no urban creep allowance has been applied to the drainage design calculations.

# 2. EXISTING CONDITIONS

2.1 The site is bound to the north by the Chiltern Main Line railway. A small section of the M40 and Ardley Road lie to the east. Agricultural fields bind the site to the south. The western boundary is bound by a mix of agricultural fields and the disused Upper Heyford Airfield. The site is predominantly greenfield in nature comprising a mix of agricultural fields with other notable features including Ashgrove Farm, Ardley Reservoir and Camp Road.

2.2 The Ashgrove Brook, an ordinary watercourse, initially flows from Upper Heyford Airfield through the site in a south easterly direction. The watercourse then flows in a south-westerly and southerly direction where it is culverted beneath Camp Road and the B430 where it continues east to its confluence with the Gagle Brook, approximately 1.4km downstream of the site.

2.3 A tributary of the Ashgrove Brook also flows from Upper Heyford Airfield, through the site, in a south-easterly direction. The tributary is culverted beneath Camp Road where it then outfalls to the Ashgrove Brook.

2.4 The Gagle Brook flows in a south westerly and southerly direction to the east of Middleton Stoney. The watercourse is culverted beneath the B4030 where it then flows in an easterly direction towards and beneath the M40.

2.5 A tributary of the Padbury Brook rises to the north of Upper Heyford Airfield and flows in a north-easterly direction to its confluence with the Padbury Brook approximately 390m downstream of the site.

2.6 The Padbury Brook rises to the north of the site within agricultural fields, east of Somerton. The watercourse generally flows in an easterly direction where it is culverted beneath the Chiltern Main Line Railway, M40 and A43. The watercourse then continues to flow in an easterly to north-easterly direction to its ultimate confluence with the Great River Ouse, approximately 30km downstream of the site.

2.7 The location of the site and key watercourses are illustrated in **Figure 2.1**.

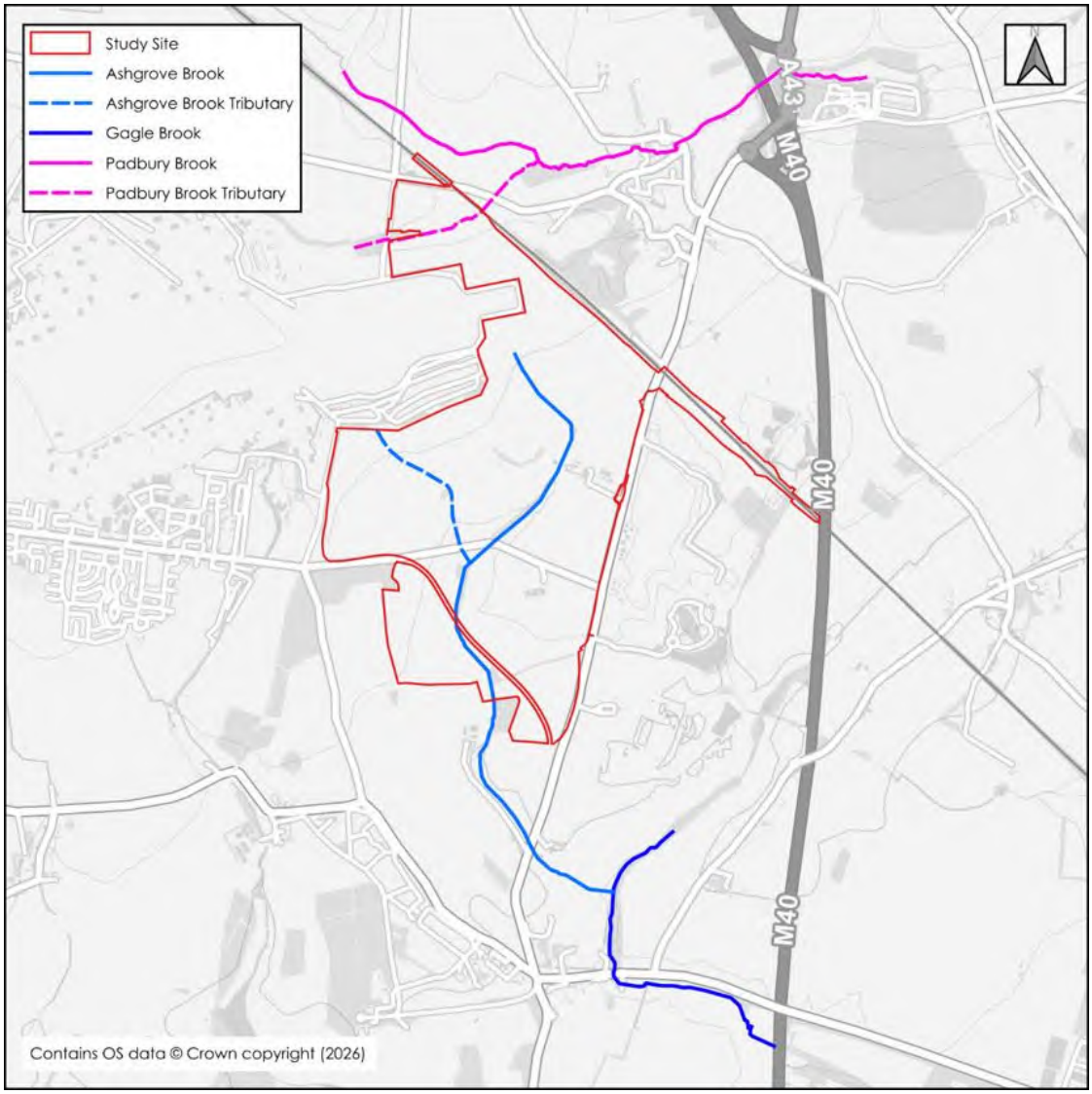


**Figure 2.1: Site Location and Watercourse Network**

2.8 Baseline hydraulic modelling of Ashgrove Brook, Ashgrove Brook Tributary and Gagle Brook, undertaken as part of the accompanying FRA, has identified that there are existing fluvial flood extents within the site, which is associated with these ordinary watercourses. More information on the existing flood risk constraints and proposed mitigation measures is presented within the OxSRFI Main Site FRA. This FRA concludes the site to have a low risk of surface water flooding.

2.9 The generalised topography of the site, as identified using EA Light Detection and Ranging (LiDAR) data, is shown in **Figure 2.2**, with a full topographical survey (reference: 36646_T) included as **Appendix 1**. The site demonstrates valley like topography where existing ground levels generally fall to the respective watercourses. In the very north of the site ground levels fall from the north and south towards the Padbury Brook ranging from approximately 124.6 metres Above Ordnance Datum (mAOD) to approximately 114.9mAOD. Elsewhere within the site ground levels fall from the west and east towards the Ashgrove Brook and Tributary ranging from approximately 124.7mAOD to approximately 102.0mAOD.

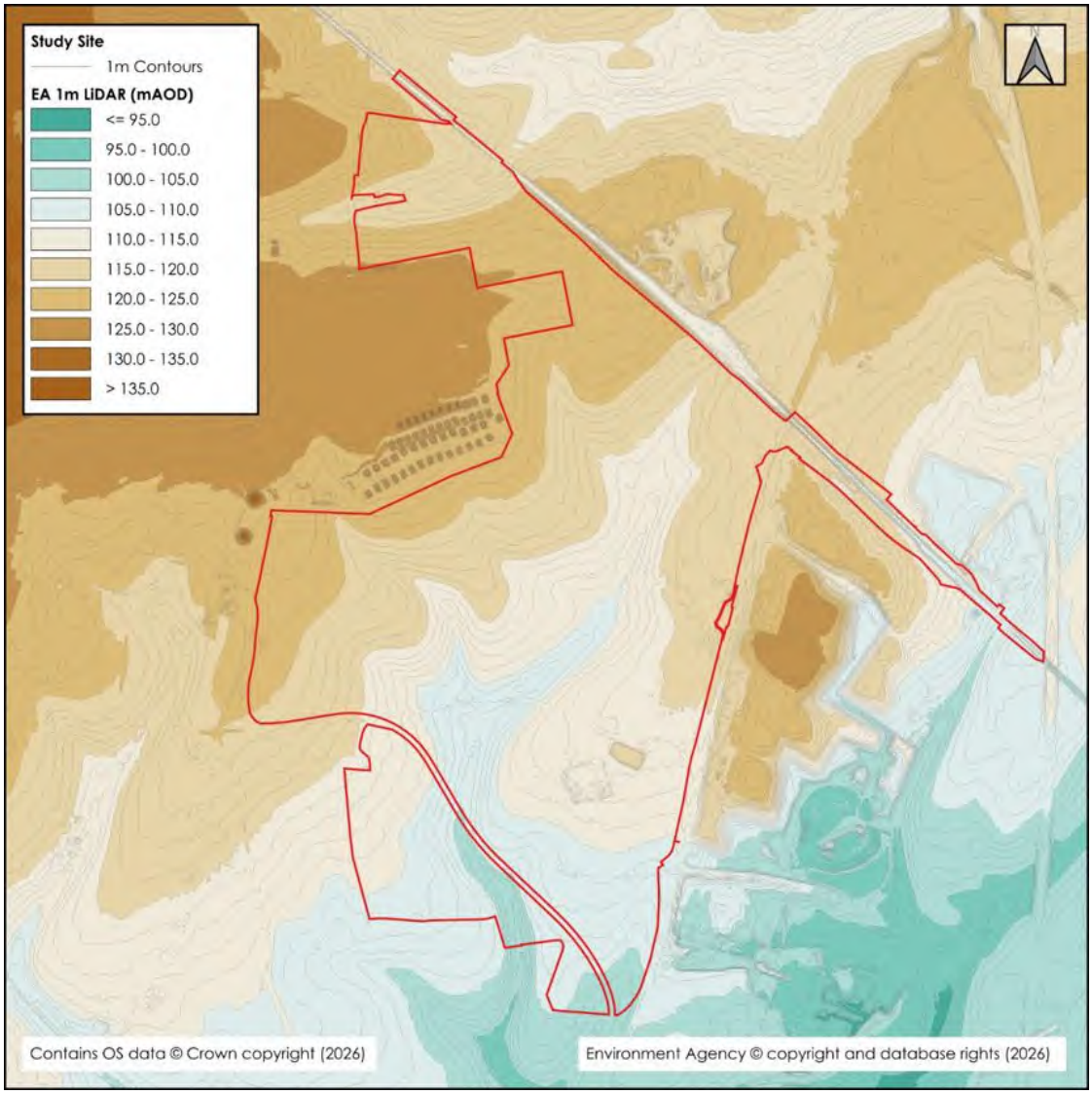


**Figure 2.2: Existing Site Topography based on EA 1m LiDAR**

2.10 The existing watercourse network and topography of the site splits the site into several drainage sub-catchments, all of which drain into Ashgrove Brook, either directly or via Ashgrove Brook Tributary, within the site and ultimately into Gagle Book downstream from the site.

2.11 Thames Water Sewer Asset Plans (**Appendix 2**) do not indicate the presence of any public sewerage assets within the site. There is an existing surface water public sewer network located within the disused Upper Heyford Airfield that discharges into a mapped 'land drain' which follows the alignment of the "Ashgrove Brook Tributary" on **Figure 2.1.** Correspondence with Thames Water (**Appendix 2**) confirms that this watercourse is not a Thames Water asset.

2.12 Thames Water sewer records identify the presence of a foul water sewer network located within Bicester, located approximately 4.5km to the southeast of the site.

2.13 Anglian Water Sewer Records (**Appendix 3**) identify an existing foul sewer system within Ardley, approximately 850m to the north of the site.

2.14 British Geological Survey (BGS) Mapping indicates the site to be underlain predominantly by White Limestone Formation (Principal Aquifer). A small area in the north is underlain by a mix of Rutland Formation Mudstone (Secondary B Aquifer), Forest Marble Formation – Limestone (Principal Aquifer) And Bladon Member - Mudstone and Limestone, Interbedded (Principal Aquifer).

2.15 Superficial deposits of Alluvium - Clay, Silt, Sand and Gravel (Secondary A Aquifer) and Head - Clay, Silt, Sand and Gravel (Secondary Undifferentiated Aquifer) are mapped within the study site along the alignment of the local watercourse network.

2.16 Aquifer definitions, as outlined by the EA, are summarised in **Table 2.1**.

**Table 2.1: Aquifer Definitions**

| Aquifer | Definition |
|---|---|
| Principal | Layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. |
| Secondary A | Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. |
| Secondary B | Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. |
| Secondary Undifferentiated | Assigned in cases where it has not been possible to attribute either category A or B to a rock type. |

2.17 A Phase 2 Geo-Environmental Assessment undertaken by BWB (reference: OFRI-BWB-ZZ-XX-RP-YE-0001_Ph1) included soakaway testing in line with BRE365 guidance in eleven locations (SA01 to SA11) across the site, and variable head permeability testing in eight locations (RO01 to RO08) at depths between 3m and 10m. The exploratory hole locations are illustrated on **Figure 2.3**, with the results of the BRE365 soakaway testing summarised within **Table 2.2**, the results of the variable head permeability testing summarised within **Table 2.3**, and the supporting logs and testing calculations sheets, as extracted from the Phase 2 report presented as **Appendix 4**.

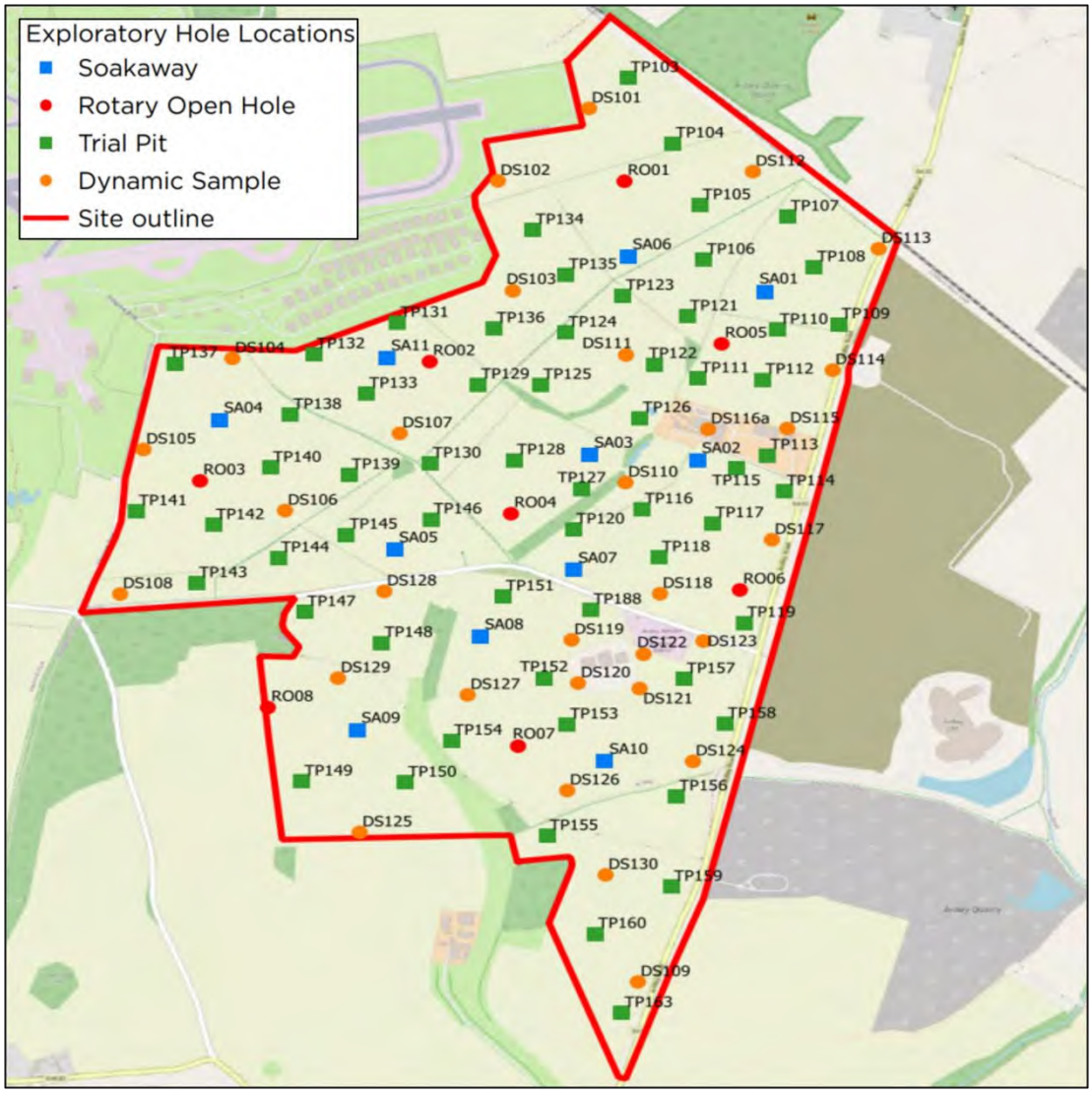


**Figure 2.3: Phase 2 Ground Investigation – Exploratory Hole Locations**

**Table 2.2: BRE 365 Soakaway Testing Results**

| Test Location | Geology | Test no. | Soil Infiltration Rate (m/s) | Permeability Class | Drainage Characteristics |
|---|---|---|---|---|---|
| SA01 | White Limestone Formation | 1 | $4.3x10^{-06}$ | Low | Good |
| SA02 | White Limestone Formation | 1 | $5.81x10^{-05}$ | Medium | Good |
| | | 2 | $4.35x10^{-05}$ | Medium | Good |
| | | 3* | $2.47x10^{-05}$ | Medium | Good |
| SA03 | White Limestone Formation | 1 | $1.17x10^{-05}$ | Medium | Good |
| | | 2* | $1.02x10^{-05}$ | Medium | Good |

| Test Location | Geology | Test no. | Soil Infiltration Rate (m/s) | Permeability Class | Drainage Characteristics |
|---|---|---|---|---|---|
| SA04 | White Limestone Formation | 1 | $1.66x10^{-04}$ | Medium | Good |
| | | 2 | $1.31x10^{-04}$ | Medium | Good |
| | | 3 | $1.19x10^{-04}$ | Medium | Good |
| SA05 | White Limestone Formation | 1** | N/A | N/A | N/A |
| SA06 | White Limestone Formation | 1 | $1.34x10^{-04}$ | Medium | Good |
| | | 2 | $1.31x10^{-04}$ | Medium | Good |
| | | 3 | $1.46x10^{-04}$ | Medium | Good |
| SA07 | White Limestone Formation | 1 | $3.00x10^{-05}$ | Medium | Good |
| | | 2*** | N/A | N/A | N/A |
| SA08 | White Limestone Formation | 1 | $7.10x10^{-05}$ | Medium | Good |
| | | 2 | $6.01x10^{-05}$ | Medium | Good |
| | | 3 | $4.07x10^{-05}$ | Medium | Good |
| SA09 | White Limestone Formation | 1 | $1.53x10^{-05}$ | Medium | Good |
| SA10 | White Limestone Formation | 1* | $4.56x10^{-06}$ | Low | Good |
| SA11 | White Limestone Formation | 1* | $7.18x10^{-06}$ | Low | Good |
| Note: * = Test ended early due to time constraints. ** = Test failed. *** = Not completed due to time constraints. | | | | | |

**Table 2.3: Permeability Testing Results**

| Test Location | Geology | Calculation Methodology | Permeability (m/s) | Permeability Class | Drainage Characteristics |
|---|---|---|---|---|---|
| RO01 | Limestone | Basic Time Lag Method | $6.51x10^{-06}$ | Low | Good |
| | | General Method | $6.01x10^{-06}$ | Low | Good |
| RO02 | Limestone | Basic Time Lag Method | $4.16x10^{-06}$ | Low | Good |
| | | General Method | $4.44x10^{-06}$ | Low | Good |
| RO03 | Limestone | Basic Time Lag Method | $3.00x10^{-06}$ | Low | Good |
| | | General Method | $1.40x10^{-06}$ | Low | Good |
| RO04 | Limestone | Basic Time Lag Method | $1.15x10^{-06}$ | Low | Good |
| | | General Method | $1.02x10^{-06}$ | Low | Good |
| RO05 | Limestone | Unable to generate a measurable head by either test method | N/A | N/A | N/A |
| RO06 | Limestone | Basic Time Lag Method | $6.58x10^{-07}$ | Low | Poor |
| | | General Method | $4.52x10^{-07}$ | Low | Poor |
| RO07 | Limestone | Basic Time Lag Method | $9.80x10^{-07}$ | Low | Poor |
| | | General Method | $9.70x10^{-07}$ | Low | Poor |
| RO08 | Limestone | Basic Time Lag Method | $4.70x10^{-06}$ | Low | Good |
| | | General Method | $4.30x10^{-06}$ | Low | Good |

2.18 The BWB Phase 2 Geo-Environmental Report notes that during the 2021 limited ground investigation, shallow groundwater strikes during excavation and drilling were encountered at depths between 1.3m and 2.0m below ground level (bgl). Water strikes were generally noted to be confined, with stratum of cohesive material identified above and below the water strike. The groundwater strike depths and associated stratum are summarised in **Table 2.4**.

**Table 2.4: Groundwater Strikes – Ground Investigation 2021**

| Location | Depth (m bgl) | Stratum |
|---|---|---|
| DS110 | 2.0 | Alluvium (Sand) |
| SA03 | 1.3 | White Limestone Formation (Limestone) |
| TP106 | 1.68 | White Limestone Formation (Limestone) |
| TP120 | 1.6 | White Limestone Formation (Sand) |
| TP121 | 1.45 | Alluvium (Sand and Gravel) |
| TP146 | 1.6 | White Limestone Formation (Gravel) |
| RO01 | 9.8 | White Limestone Formation (Limestone) |
| RO02 | 9.8 | White Limestone Formation (Limestone) |
| RO03 | 6.3 | White Limestone Formation (Limestone) |
| RO04 | 7.1 | White Limestone Formation (Limestone with Clay) |
| RO05 | 3.5 | White Limestone Formation (Limestone) |
| RO06 | 8.1 | White Limestone Formation (Clay with Limestone) |
| RO07 | 7.2 | White Limestone Formation (Clay with Limestone) |
| RO08 | 7.2 | White Limestone Formation (Clay with Limestone) |

2.19 It is considered that two groundwater bodies are present at the site; one is considered to be present within shallow deposits, while the second is within the deeper limestone deposits.

2.20 For the shallow groundwater unit, during the post-ground investigation monitoring programme resting groundwater levels were measured at depths ranging between 0.35m bgl (recorded on 04/10/2021) and 1.43m bgl (recorded on 11/10/2021). The resting levels were recorded at elevations raging between 106.42m AOD (recorded on 11/10/2021) and 107.77m AOD (recorded on 04/10/2021). The shallow groundwater body is considered to be a discontinuous groundwater unit, which was only identified in two locations at the site, as such no flow direction or hydraulic gradient was calculated as part of the Phase 2 Geo-Environmental Assessment Report.

2.21 For deeper groundwater unit, during the post-ground investigation monitoring programme resting groundwater levels were measured at depths ranging between 2.62m bgl (recorded on 18/10/2021) and 5.9m bgl (recorded on 04/10/2021). The resting levels were recorded at elevations raging between 93.68m AOD (recorded on 28/09/2021) and 115.1m AOD (recorded on 11/10/2021). The resting groundwater levels and Global Positioning System positions were used to infer the likely groundwater flow direction at the site, which is indicated to be in a south easterly direction with a gradient of approximately 1.74%. 'Drawing 6' of the Phase 2 Geo-Environmental Assessment Report shows the inferred groundwater flow profile across the site.

2.22 The accompanying FRA concludes the site to be at low risk of groundwater flooding.

2.23 Based on the above information, the existing drainage regime at the site is considered to consist of infiltration followed by rapid surface water runoff into either Ashbrook Grove Tributary or Ashbrook Grove before ultimately draining into Gagle Brook offsite.

## Existing Runoff Rates

2.24 An assessment of the existing surface water runoff rates from the site has been undertaken on a litres per second per hectare basis and is summarised within **Table 2.5**, with the supporting calculations included within **Appendix 5**.

2.25 The runoff rates have been estimated using the IH124 method, with appropriate prorated adjustments for a site of less than 50ha, as recommended in Interim Code of Practice for Sustainable Drainage[7]. This was undertaken using the UKSUDS Greenfield Runoff Rate Estimation Tool[8], which makes the necessary adjustments for small sites automatically.

**Table 2.5: Existing Runoff Rate per hectare from the Site**

| Return Period (Yrs.) | Runoff Rate (l/s/ha) |
|---|---|
| 1 | 0.1 |
| Mean Annual Flow Rate (QBAR) | 0.2 |
| 30 | 0.4 |
| 100 | 0.5 |

2.26 The above existing greenfield runoff rates are representative of a site which has permeable soil characteristics and suggests that infiltration may be occurring across the site.

## Existing Runoff Volume

2.27 An assessment of the existing surface water runoff rates from the site has been made for a 1 in 100-year, 6 hour storm, on a per hectare basis.

2.28 As the existing site is permeable, the runoff volume has been calculated using the 'pre-development discharge' calculator in Causeway Flow to be **48m³/ha**. The supporting calculations are provided within **Appendix 5**.

[7] The National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage
[8] UKSUDS Greenfield Runoff Rate Estimation Tool, HR Wallingford, last accessed 09/12/2025. Available From: https://www.uksuds.com/tools/greenfield-runoff-rate-estimation

# 3. SURFACE WATER DRAINAGE STRATEGY

3.1 The proposed drainage strategy sets out the principles that should inform the future detailed design. An Illustrative Surface Water Drainage Strategy is presented as **Appendix 6**, with the supporting attenuation calculations provided within **Appendix 7**.

3.2 The proposed contributing impermeable areas have been measured from the proposed Illustrative Masterplan plan (DCO Document 2.5). The following impermeable area assumptions have been used:

- Rail port = 100%;
- Development plots = 90%;
- Central highways = 100%; and
- Attenuating SuDS basins = 100%.

3.3 Based on the illustrative masterplan and above impermeable area assumptions, the calculated contributing impermeable area from the proposed development of the main site is anticipated to be approximately 134.2ha.

3.4 Given the nature of DCO applications being approved based on the parameters plan, as the development is built out, the contributing areas may change and therefore the final attenuation requirements and discharge rates from the proposed development may differ from the calculations outlined within this SDS. The principles set out within this report should be carried through as the development is built out.

### Drainage Hierarchy

3.5 The SuDS Manual[9] identifies that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. Collection for non-potable use;
ii. into the ground (infiltration);
iii. to a surface water body;
iv. to a surface water sewer, highway drain, or another drainage system;
v. to a combined sewer.

3.6 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

<u>Collection for non-potable use</u>

3.7 Whilst rainwater harvesting may offer opportunities for reducing water demand, it cannot be relied upon as part of the surface water management strategy because

[9] The SuDS Manual (C753). CIRIA 2015.

storage tanks may already be full during peak rainfall events and therefore cannot be assumed to provide attenuation storage.

3.8 The end occupiers of the development have not yet been confirmed, and consequently the future demand for non-potable water is currently unknown. The potential for rainwater harvesting will therefore be reviewed further as part of the detailed design process, once tenant requirements and building-specific water demands have been established.

3.9 Rainwater harvesting systems may result in higher energy use and imbedded carbon over the lifetime of a building. This should be considered when weighing up the advantages and disadvantages of including rainwater harvesting systems.

Infiltration

3.10 Based on the ground investigation information discussed in **Section 2**, it is considered likely that the use of infiltration drainage techniques would be viable at the site in its current condition.

3.11 There is a significant degree of earthworks required to deliver the proposed development, which will result in the finished levels on site changing from the sites current condition.

3.12 The BRE365 soakaway testing was undertaken at depths approximately 2m below the existing ground level. Therefore, these infiltration rates are potentially not representative of the post-earthworks ground conditions. Permeability testing undertaken at deeper levels does indicate the infiltration is still occurring within deeper strata on site; however, BRE365 testing should be redone following the completion of the enabling earthworks to inform the detailed drainage design. No assumptions will be made regarding infiltration in made ground until testing has been undertaken in placed and fully compacted ground. Infiltration rates should be greater than 1 $x10^{-6}$.

3.13 It should be noted that the use of soakaway drainage should be avoided in areas of significant fill, where finished levels are to be raised, as soakaways should not be sited in made ground.

3.14 Groundwater monitoring should be undertaken for at least a year to inform the detailed design; available water data will also be used for the local area where available from the EA or other ground investigation studies (such as Magic, DEFRA/EA, local BGS reports, LLFA records, Water Companies). Monitoring will ensure infiltration designs will take into consideration peak groundwater levels.

3.15 The base of any infiltration features should be a minimum of 1m above the maximum recorded groundwater level at the location of each infiltration structure. It is noted that there are pockets of shallow groundwater across the main site and this should be considered in the future detailed drainage design works.

3.16 Based on the above, it is considered that infiltration drainage is potentially viable as a means of discharge surface water from the proposed development; however, at this stage, a drainage strategy with a positive drainage solution has been provided, to

demonstrate that a deliverable drainage strategy is viable on site, should future ground investigative works deem soakaway drainage unviable following the completion of the enabling earthworks.

3.17 If future infiltration testing and groundwater monitoring confirms soakaways to be viable for the proposed development, the use of soakaway drainage system should be prioritised within the future drainage design of the development.

Surface waterbodies

3.18 It is proposed that surface water from the development will discharge to the existing waterbodies within the site. Existing waterbodies are present within the order limits and these receptors can be drained to via gravity.

3.19 The proposed surface water outfall locations across the site are as follows:

- Ashgrove Brook; and
- Gagle Brook.

3.20 Ordinary watercourse consent will be required from the LLFA prior to the construction of any structures within the channels of ordinary watercourses.

### Peak Flow and Volume Control

3.21 In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[10], runoff from greenfield developments should not exceed the equivalent greenfield rates for the 1 and 100-year return period events.

3.22 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[11] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6 hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

i. The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2l/s/ha or less. Or,
ii. All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,
iii. All the runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

3.23 The LLFA's local SuDS guidance states that there are two options for providing storage in order to limit peak discharge rates and volumes from a developed site. It is proposed

[10] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems
[11] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

to utilise the 'Simple approach' outlined within the local guidance, at 2l/s/ha for all events up to the 1 in 100-year plus climate change critical storm.

3.24 Therefore, to comply with the peak flow and volume control criterion, it is proposed to restrict the discharge rate of surface water from the development to 2l/s/ha for all events up to and including the 1 in 100-year + 40% critical storm event. This is summarised within **Table 3.1**.

**Table 3.1: Existing & Proposed Runoff Rates**

| Return Period (Yr.) | Existing Runoff Rate (l/s/ha) | Proposed Discharge Rate (l/s/ha) |
|---|---|---|
| 1 | 0.1 | 2.0 |
| QBAR | 0.2 | |
| 30 | 0.4 | |
| 100 | 0.5 | |
| 100 + CC% | - | |

3.25 This approach fulfils the necessary peak runoff and volume control criteria.

3.26 Based on the assumed contributing impermeable area of 134.2ha, the maximum discharge rate from the proposed development will be limited to 268.4l/s for all events up to the 1 in 100-year + 40% critical storm. The discharge rates from the proposed development will be confirmed as the details of the development come forward.

## Drainage Catchments

3.27 Given the scale of the development, the drainage strategy has been split up into sub-catchments based on idealised development blocks, topography, and location of surface water outfalls. The assumed drainage catchments at this stage, and their proposed outfall locations are outlined within **Table 3.2**; however, these sub-catchments should be reviewed as the scheme develops in more detail.

3.28 Several of the sub-catchments are served by shared attenuation features with a singular outfall to their respective outfall receptors; therefore, these catchments have been grouped together.

3.29 The assumed drained areas, based on the illustrative masterplan and above impermeable area assumptions, are outlined within **Table 3.2** below.

**Table 3.2: Catchment Details**

| Catchment | Contributing Area (ha) | Maximum Discharge Rate (l/s) | Outfall Location |
|---|---|---|---|
| 1 | 13.4 | 26.8 | Gagle Brook |
| 2 and 3 | 32.3 | 64.6 | Ashgrove Brook |
| 4, 5, 6 and 7 | 79.2 | 158.4 | Ashgrove Brook |
| Highway Catchment 1 | 3.4 | 6.8 | Gagle Brook |
| Highway Catchment 2 | 1.6 | 3.2 | Ashgrove Brook |
| Highway Catchment 3 | 3.0 | 6.0 | Ashgrove Brook |
| Highway Catchment 4 | 1.3 | 2.6 | Ashgrove Brook |
| **Total** | **134.2** | **268.4** | |

3.30 Catchment 1 and the Northern Highway Catchment currently drain to Ashgrove Brook in the existing scenario; however, in order to achieve a gravity positive outfall from the development, the flows from these catchments are to be diverted to Gagle Brook. It should be noted that Ashgrove Brook ultimately drains into Gagle Brook downstream from the site.

3.31 Due to level constraints within Highway Catchment 4 (i.e., Hayford Park Link Road, Works No. 12) the far east of the proposed highway will need to be drained via the proposed drainage system for Middleton Stoney Relief Road (Works No. 23). Refer to BWB Report OXSRFI-BWB-ZZ-XX-T-W-1051_Offsite and Highway Works SDS.

### Attenuation Storage

3.32 As the development proposals require a restricted runoff rate, it will be necessary to provide attenuation storage to balance the excess volume in a safe manner within the site.

3.33 In line with Oxfordshire guidance, volumetric runoff coefficients (Cv) of 0.9 will be used for highway drainage attenuations calculations, and a Cv of 0.95 will be used for plot areas and the rail port.

3.34 The surface water storage should be located within the site in a position where it can receive runoff from the development and discharge from the site by gravity and also is a position where it is hydraulically isolated from any fluvial floodplain or external surface water floodplain / overland flow route that may be present in the site.

3.35 Highway basins have been designed to accommodate the 1 in 100 year + 40% climate change critical storm event with 300mm of freeboard.

3.36 Plot drainage basins have been designed to accommodate the 1 in 100-year + 40% climate change critical storm event with 400mm of freeboard.

3.37 After considering the site constraints and development aspirations it is suggested that the necessary surface water storage volume is found within detention basins located within the open spaces between the proposed development areas and outfall locations.

3.38 A simulation has been undertaken within Causeway Flow, using Flood Estimation Handbook-22 (FEH-22) rainfall data, to identify the necessary storage provision, using a restriction of 2l/s/ha, the anticipated attenuation storage required for the proposed development is anticipated to be 920m$^3$/ha for the 1 in 100-year + 25% critical storm, increasing to 1,050m$^3$/ha when factoring in the 1 in 100-year + 40% critical storm. The supporting calculation is provided within **Appendix 7**.

3.39 Further to the above, a Causeway Flow model has been prepared to size up the attenuation basins shown on the Illustrative Surface Water Drainage Strategy presented within **Appendix 6**. The estimated attenuation volumes from the indicate model are outlined within **Table 3.3**.

**Table 3.3: Outline Attenuation Requirements**

| Catchment | Storage Structure | Maximum Volume (m$^3$) – 1 in 100-year + 25% | Maximum Volume (m$^3$) – 1 in 100-year + 40%* |
|---|---|---|---|
| 1 | Basin 1A/B | 11,500 | 13,085 |
| 2 - 3 | Basin 5 | 7,655 | 8,685 |
| | Basin 6 | 8,785 | 9,990 |
| | Basin 7 | 10,155 | 11,610 |
| 4 - 7 | Basin 2 | 16,140 | 18,340 |
| | Basin 3 | 13,625 | 15,590 |
| | Basin 4 | 40,825 | 46,030 |
| | Basin 8 | 4,890 | 5,890 |
| Highway Catchment 1 | Highway Basin 1 | 2,744 | 3,118 |
| Highway Catchment 2 | Highway Basin 2 | 1,395 | 1,589 |
| Highway Catchment 3 | Highway Basin 3 | 2,425 | 2,754 |
| Highway Catchment 4 | Highway Basin 4 | 1,060 | 1,207 |
| **Total** | | **121,199** | **137,888** |

* Sensitivity test to ensure that necessary storage is provided for upper end climate change allowance

3.40 It is envisaged that the final required attenuation storage volume will be determined during the detailed design stage, once the development layout and drainage areas are fixed.

### Watercourse Diversions

3.41 To facilitate the development of the site, Ashgrove Brook Tributary and Ashgrove Brook are proposed to be diverted through the development. The proposed diversion route is provided on the Illustrative Surface Water Drainage Strategy (**Appendix 6**) and more details regarding the diversionary works are outlined within the accompanying FRA.

### Sustainable Drainage Systems

3.42 The drainage strategy proposes to utilise a series of detention basins and conveyance swales within the open spaces to provide both attenuation and water quality treatment to surface water flows prior to discharge from the site.

3.43 Given the nature of the DCO application, the internal plot layouts, and therefore the potential on-plot SuDS options, are not confirmed. As the plots are built out, the following SuDS should be considered for incorporation into the on-plot drainage system prior to discharging into the spine drainage network conveying flows towards the sitewide SuDS:

- Rainwater Harvesting;
- Silt traps;
- Sump outfall units/gullies;
- Filter Drains;
- Geocellular attenuation crates;
- Tree pits;
- Raingardens;
- Proprietary vortex separators;
- Permeable paving / bypass separator (for office parking areas); and
- Full retention separators (for service yard areas).

3.44 The spine highways should utilise either roadside ditches / swales or silt traps and sump units for any highway gullys.

3.45 The detention basins will have a low flow channel and the incorporation of any ecological features will be confirmed at detailed design.

3.46 In order to achieve a gravity connection to the Gagle Brook, the outfall pipe for Catchment 1 and the Northen Highway Catchment will potentially be laid at a gradient shallower than self-cleansing velocity for the peak flows to drain through the pipe. Therefore, it is proposed that a vortex separator is to be utilised on the downstream headwall of the final detention basins serving these catchments, to provide further silt removal prior to surface water being conveyed through the outfall pipe.

3.47 Vortex separators are proposed on the downstream outlet of the highway detention basins to provide sufficient treatment prior to discharging into the surrounding watercourses.

3.48 The bunds located across the development will be managed via filter / toe drains located along the base of each bund which will capture and attenuate any runoff from these features. It is anticipated that runoff from the bunds will be discharged via either infiltration, or a positive outfall to the nearest surface water body, within the order limits at 2/l/s/ha.

3.49 During the detailed design stage, the management of everyday rainfall events should be considered, ideally with the 5mm of rainfall being contained within the site via interception storage design. SuDS systems should be unlined, where practical, to allow for residual infiltration loses to achieve this requirement.

### Water Quality

3.50 In accordance with the SuDS Manual a simple index approach to water quality risk management should be undertaken for the proposed development. This will be compiled to provide a comprehensive account of the water quality treatment provided by the proposed surface water drainage system.

3.51 The SuDS Manual Mitigation Index will be used to assess the treatment levels proposed in relation to the pollution hazard posed from the proposed land use(s). This methodology is adopted to ensure that surface water flows receive adequate treatment through all areas of the site prior to final outfall.

3.52 **Table 3.4** shows the pollution hazard indices for the land use classification(s) that are relevant to the proposed development, as described within table 26.2 in the SuDS Manual.

**Table 3.4: Pollution Hazard Indices for Different Land Use Classifications**

| Land Use | Pollution Hazard Level | Total Suspended Solids (TSS) | Metals | Hydrocarbons |
|---|---|---|---|---|
| Industrial roofs | Low | 0.3 | 0.2 | 0.05 |
| Non-residential parking | Medium | 0.7 | 0.6 | 0.7 |
| Industrial sites | High | 0.8 | 0.8 | 0.9 |

3.53 The SuDS Mitigation Indices that are relevant to the proposed development, at this stage, as described within table 26.3 of the SuDS Manual, are outlined in **Table 3.5.**

**Table 3.5: SuDS Mitigation Indices**

| Type of SuDS Component | Mitigation Indices | | |
|---|---|---|---|
| | TSS | Metals | Hydrocarbons |
| Swale | 0.5 | 0.6 | 0.6 |
| Permeable Pavement | 0.7 | 0.6 | 0.7 |
| Detention Basin | 0.5 | 0.5 | 0.6 |
| Bypass Separator* | 0.8 | 0.6 | 0.9 |
| Full Retention Separator* | 0.8 | 0.6 | 0.9 |
| Vortex Separator^ | 0.5 | 0.4 | 0.5 |

* Based on SPEL Enhanced Silt Retention bypass / full flow [12] range (other products may vary)
^ Based on Hydro International Downstream Defender 'Advanced Vortex'[13] (other products may vary)

3.54 The sitewide SuDS treatment system (i.e., series of detention basins and swales located within open areas) will provide the majority of the water quality mitigation for the proposed development. Given the proposed development use, appropriate SuDS / proprietary treatment systems, in the form of bypass or full retention separators, will be used on each plot as required to provide a first stage of treatment prior to connecting into the site wide drainage system.

3.55 At this stage, it is anticipated that in addition to the site wide SuDS treatment system, the following on plot SuDS treatment measures will be incorporated, as a minimum:

- Full retention separators – for service yards; and
- Bypass separators or permeable block paving – for car parking areas;

3.56 The following SuDS treatment measures for each catchment land use is outlined within **Table 3.6**.

[12] SPEL Stormceptor Enhanced Silt Retention bypass (https://spelproducts.co.uk/spel-esr-bypass/) / full flow (https://spelproducts.co.uk/spel-esr-full-flow/) treatment system
[13] Hydro International Downstream Defender 'Advanced Vortex' (https://hydro-int.com/en/products/downstream-defender?_gl=1*hp5mv1*_up*MQ..*_gs*MQ..&gbraid=0AAAADz81nmuhOElzqh5sqrGrEqmZFmaT)

**Table 3.6: SuDS treatment measures for each catchment**

| Catchment | Land use | SuDS Treatment Measures |
|---|---|---|
| 1 | Rail port | Detention basin (2no.) + Vortex Separator |
| 2 - 3 | Commercial Roof | Detention basin (3no.) + Swale |
| | Non-residential Parking | Permeable Paving / Bypass Separator + Detention basin (3no.) + Swale |
| | Service Yards | Full Retention Separator + Detention basin (3no.) + Swale |
| 4 - 7 | Commercial Roof | Detention basin (4no.) |
| | Non-residential Parking | Permeable Paving / Bypass Separator + Detention basin (4no.) |
| | Service Yards | Full Retention Separator + Detention basin (4no.) |
| Highway Catchment 1 | Highways | Detention basin + Vortex Separator |
| Highway Catchment 2 | Highways | Swale + Detention Basin + Vortex Separator |
| Highway Catchment 3 | Highways | Swale + Detention Basin + Vortex Separator |
| Highway Catchment 4 | Highways | Swale + Detention Basin + Vortex Separator |

3.57 The pollution hazard rating and proposed SuDS Mitigation Index for each drainage Catchment is compared within **Table 3.7**. Where more than one SuDS component is proposed, a factor of 0.5 has been applied to the downstream (i.e., secondary and/or tertiary) treatment stages to account for the reduced performance due to reduced inflow concentrations.

**Table 3.7: Comparison of Pollution Hazard Rating against Proposed Mitigation Index**

| Catchment | Land use | Pollution Hazard Rating | | | Proposed Mitigation Index | | | Sufficient Treatment Provided? |
|---|---|---|---|---|---|---|---|---|
| | | TSS | Metals | Hydrocarbons | TSS | Metals | Hydrocarbons | |
| 1 | Rail port | 0.8 | 0.8 | 0.9 | 1.0 | 0.95 | 1.15 | ✓ |
| 2-3 | Commercial Roof | 0.3 | 0.2 | 0.05 | 1.25 | 1.3 | 1.5 | ✓ |
| | Non-residential Parking | 0.7 | 0.6 | 0.7 | 1.7 | 1.6 | 1.9 | ✓ |
| | Service Yards | 0.8 | 0.8 | 0.9 | 1.7 | 1.6 | 2.1 | ✓ |
| 4-7 | Commercial Roof | 0.3 | 0.2 | 0.05 | 1.25 | 1.25 | 1.5 | ✓ |
| | Non-residential Parking | 0.7 | 0.6 | 0.7 | 1.7 | 1.6 | 1.9 | ✓ |
| | Service Yards | 0.8 | 0.8 | 0.9 | 1.8 | 1.6 | 2.1 | ✓ |
| Highway Catchment 1 | Highways | 0.8 | 0.8 | 0.9 | 1.0 | 0.95 | 1.15 | ✓ |
| Highway Catchment 2 | Highways | 0.8 | 0.8 | 0.9 | 1.0 | 1.05 | 1.15 | ✓ |
| Highway Catchment 3 | Highways | 0.8 | 0.8 | 0.9 | 1.0 | 1.05 | 1.15 | ✓ |
| Highway Catchment 4 | Highways | 0.8 | 0.8 | 0.9 | 1.0 | 1.05 | 1.15 | ✓ |

3.58 **Table 3.7** demonstrates that the proposed drainage system will provide significant treatment to surface water prior to discharge from the proposed development. It should be noted that for the on-plot parking water quality assessment, to provide a robust assessment, it is assumed that permeable paving will be used as this SuDS treatment measure provides a lesser pollution mitigation index score compared to bypass separators.

3.59 In addition to providing treatment for routine surface water pollutants, the drainage strategy will incorporate measures to mitigate the effects of infrequent but severe pollution incidents that could occur across the development. Sliding-gate penstocks will be installed at key locations within the drainage network to enable sections of the system to be isolated during a pollution event, preventing the downstream spread of contaminants and protecting receiving watercourses and drainage infrastructure. The final design and number of locations for these features will be determined through detailed design, secured by the DCO. A Construction Environmental Management Plan (CEMP) will be prepared to support the DCO application and to ensure that the surrounding watercourses are not adversely affected during the construction stages.

### Residual Risk and Designing for Exceedance

3.60 It is recommended that the final layout uses the proposed road infrastructure to provide drainage exceedance (overland flood flow) routes through the development and towards the surrounding SuDS for events in excess of the capacity of the drainage system.

3.61 The detention basins have been designed to not flood during the 1 in 100-year + 40% critical storms, with appropriate freeboard provided. In the event that the outfall for a basin becomes blocked, each detention basin flow control chamber will have a weir wall set above the anticipated 1 in 100-year +40% climate change critical storm water level, to provide a controlled location for water to overtop and drain into the downstream network, to be attenuated in the next detention basin, rather than immediately exceeding onto surrounding land.

3.62 The development plots should be designed such that any exceedance flows in the event of system blockage is kept on-plot and pools within the car parking and/or service yard areas.

3.63 In addition to the volume of storage provided within the main attenuation, there will be capacity within upstream pipes, manholes and swales which has not been accounted for at this stage and a further level of redundancy to the network will therefore be provided.

# 4. MAINTENANCE

4.1 All drainage assets within the main development site will remain private. A management company will be appointed to maintain the drainage network, including SuDS features, vegetation maintenance, trash screen clearing and regular outfall inspections.

4.2 The foul drainage connection from the site to Bicester will be adopted by Thames Water, who will be responsible for its future maintenance.

4.3 Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site and should be undertaken by the site management. Any specialist or proprietary products that are specified at detailed design should have a manufacturer specific maintenance regime which should be included within the document.

4.4 It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples for the proposed swales and detention basins are provided below in **Table 4.1** and **Table 4.2**, respectively.

4.5 Alongside the maintenance requirements for the wider drainage system, the final Operation and Maintenance Plan will include a routine inspection, testing and maintenance schedule for all penstocks to ensure their continued functionality and to prevent seizure. Penstocks are assumed to be of the sliding gate type and will be installed, operated and maintained in accordance with the manufacturer's specification.

**Table 4.1: The SuDS Manual Typical Maintenance Schedule for Swales**

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

**Table 4.2: The SuDS Manual Typical Maintenance Schedule for Detention Basins**

| Maintenance Schedule | Typical Frequency | Required Action |
|---|---|---|
| Regular Maintenance | Monthly | • Remove litter and debris;<br>• Inspect inlets, outlets and overflows for blockages, and clear if required; and<br>• Inspect banksides, structures, pipework etc for evidence of physical damage. |
| | Monthly (during growing season, or as required | • Cut grass – for spillways and access routes. |
| | Monthly for first year, then annually or as required | • Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies. |
| | Monthly at start, then as required | • Manage other vegetation and remove nuisance plants. |
| | Half yearly (spring – before nesting season, and autumn | • Cut grass – meadow grass in and around basin. |
| | Annually or as required | • Check any penstocks and other mechanical devices;<br>• Tidy all dead growth before start of growing season;<br>• Manage wetland plants in outlet pool – where provided; and<br>• Remove sediment from inlets, outlet and forebay. |
| Occasional Maintenance | As required | • Reseed areas of poor vegetation growth. |
| | Every 2 years, or as required | • Prune and trim any trees and remove cuttings. |
| | Every 5 years, or as required | • Remove sediment from inlets, outlets, forebay and main basin when required. |
| Remedial Action | As required | • Repair/rehabilitation of inlets, outlets and overflows;<br>• Repair erosion and other damage by reseeding or returfing;<br>• Realignment of rip-rap; and<br>• Relevel uneven surfaces and reinstate design levels. |

# 5. FOUL WATER DRAINAGE

5.1 Foul water will be drained from the proposed development separately to surface water.

5.2 Based on level constraints within the site and the location of the nearby public sewer infrastructure, foul flows from the development cannot drain via gravity. Therefore, it is proposed that foul flows will be collected and conveyed through the development towards a terminal pumping station, to be located in a central area of the development.

5.3 It is proposed that foul flows will be pumped to the existing Thames Water foul sewer network located in Bicester, approximately 4.5km to the southeast of the site. Discussions with Thames Water regarding the proposed drainage connection are ongoing; however, a requisition route and project brief for the proposed works are provided within **Appendix 2**.

5.4 A conceptual foul drainage strategy, which identifies the potential outfall location and connection route, is provided on the Illustrative Foul Drainage Strategy drawing, provided as **Appendix 8**.

# 6. DESIGN REVIEW AGAINST UPDATED OCC GUIDANCE

6.1 It is acknowledged OCC published updated guidance in June 2026, their latest standards essentially align with the DEFRA National Standards for Sustainable Drainage Systems.

6.2 **Table 6.1** shows how each of the standards would be met by the proposed drainage strategy.

**Table 6.1: Review of New Standards**

| Standard | BWB Comments |
|---|---|
| **Standard 1: Runoff Destinations**<br>1.1 A 'SuDS approach' shall be adopted to address the management of surface water by the development and where it should be discharged. Runoff shall be treated as a resource and managed in a way that avoids negative impacts of the development on flood risk, the morphology and water quality of receiving waters and the associated ecology.<br>1.2 Runoff from the development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:<br>• priority 1: collected for non-potable use<br>• priority 2: infiltrated to ground<br>• priority 3: discharged to an above ground surface water body<br>• priority 4: discharged to a surface water sewer, or another piped surface water drainage system<br>• priority 5: discharged to a combined sewer<br>1.3 To utilise a lesser priority final destination, appropriate evidence shall be provided that demonstrates all higher priority final destinations have been utilised to the maximum extent practicable. Higher cost alone shall not be a reason to utilise lower priority final destinations.<br>1.4 Where more than one final destination is utilised, each final destination's ability to accept runoff shall be maximised in order of priority. | A SuDS approach has been adopted throughout the drainage strategy.<br><br>Rainwater harvesting should be considered in accordance with priority 1; however, the future occupiers of the development have not yet been identified and therefore future non-potable water demand cannot currently be quantified. Furthermore, rainwater harvesting cannot be relied upon as part of the surface water management strategy as attenuation storage may not be available during significant rainfall events when tanks are already full, thus the inclusion of rainwater harvesting systems will not materially change the submitted drainage strategy and can be considered through detailed design.<br><br>Infiltration may potentially be feasible based on available ground investigation data, although further infiltration testing and groundwater monitoring will be undertaken during detailed design to confirm viability. Subject to confirmation of ground conditions, runoff will be directed to infiltration features to the maximum extent practicable, in line with the hierarchy, with controlled discharge to receiving watercourses provided where required.<br><br>If further investigation reveals that infiltration would not be appropriate, the development will discharge to the watercourses across the site at 2l/s/ha as described within this report. |
| **Standard 2: management of everyday rainfall (interception)**<br>2.1 Apply a 'SuDS approach' so that at least the first 5mm of rainfall for the majority of rainfall events does not result in runoff from the site to surface waters or piped drainage systems.<br>2.2 Evidence shall be provided that the approach to managing runoff from 'everyday' rainfall has been developed alongside and in support of the management of runoff quality (standard 4) and the delivery of amenity and biodiversity benefits (standards 5 and 6). | The guidance states the following: Areas of the development drained to detention basins with a flat unlined base where infiltration rates are greater than $1x10^{-6}$ m/s shall be assumed to comply where the drained impermeable surface area is up to 25 times the base area of the basin.<br><br>Infiltration testing undertaken to date records rates in excess of 1 x $10^{-6}$ m/s and hence the in-situ strata is sufficiently permeable to facilitate a high degree of interception within the detention basins. Additional SuDS features which are proposed at a plot level will provide further treatment to flows and offer further interception such that compliance with Standard 2 is met.<br><br>Compliance with the interception requirements of Standard 2 will be confirmed during detailed design once the final drainage scheme (including all components) is fixed. |
| **Standard 3: Management of extreme rainfall and flooding**<br>3.1 A 'SuDS approach' shall be adopted to address the management of development runoff during extreme rainfall, including allowances for climate change and urban creep to:<br>• protect people and property on the development from flooding of the surface water drainage system<br>• mitigate any increased flood risk to people and property adjacent to or downstream of the development<br>• protect the receiving water body from morphological damage or minimise the impact on sewer capacity<br>3.2 When discharging to an infiltration feature, the system shall be appropriately sized to accommodate the design event based on ground conditions and contributing areas.<br>3.3 When discharging to an above ground surface water body, sewer or other piped drainage system, the surface water runoff (rate and volume) for the 1% annual exceedance probability (AEP) | The final drainage strategy for the development will be confirmed after infiltration testing and ground water monitoring have been undertaken at the appropriate final levels.<br><br>If infiltration is confirmed to be feasible, surface water runoff will be infiltrated within appropriately sized basins. Findings of the intrusive ground investigation would suggest that infiltration basins would require less overall attenuation than if flows are restricted via a positive outfall. If infiltration is not viable, surface water runoff from the development will be attenuated within a network of detention basins and restricted to a discharge rate of **2 l/s/ha for all rainfall events**, including the 1 in 100-year event plus climate change allowance. This discharge rate is more restrictive than the minimum requirements of the National Standards and satisfies both runoff rate and runoff volume requirements.<br><br>The drainage strategy includes exceedance routing and freeboard within the basin network to ensure flood risk is not increased on site or elsewhere. Overall, the proposed SuDS network replicates a natural drainage response whilst providing long-term resilience to climate change. |

| | |
|---|---|
| event shall be controlled to ensure the runoff from the development does not increase flood risk elsewhere.<br>3.4 When discharging to an above ground surface water body, sewer or other piped drainage system, the surface water runoff rate for the 50% AEP event shall be controlled to ensure development runoff from an event of this magnitude has no negative impact.<br>3.5 Any flooding from the surface water drainage system for events up to the 1% AEP event shall be managed within the development.<br>3.6 Any flooding from off-site sources for the 1% AEP event should be managed on site or safely routed through the site, ensuring any downstream risks are not increased compared to the pre-development scenario.<br>3.7 The risks (both on and off the development) associated with flooding from the surface water drainage system for exceedance events greater than the 1% AEP event shall be appropriately managed. | |
| **Standard 4: Water Quality**<br>4.1 Apply a 'SuDS approach' that protects surface waters, groundwater and coastal waters by managing the quality of the surface water runoff to adequately address water quality risks from the development.<br>4.2 The proposed SuDS management train(s) shall be based on a robust water quality risk assessment, appropriate to the pollution hazard and sensitivity of receiving waters, reflecting industry recognised guidance or other quantitative assessment as agreed with the approving body and permitting requirements. | The drainage strategy incorporates a SuDS management train comprising vegetated conveyance and storage features that provide treatment of routine surface water pollutants before discharge. For higher risk area of the site (e.g. service yards) it will be appropriate to incorporate petrol interceptors as the first stage of treatment before flows pass through the wider system.<br><br>In addition, penstocks are proposed at strategic locations within the drainage network to enable containment of accidental spillages associated with commercial or industrial operations.<br><br>The treatment train will provide suitable water quality management in accordance with CIRIA C753 and the National Standards. The Index approach to the assessment is set out within **Table 3.5, 3.6, 3.7 & 3.8** of this report. |
| **Standard 5: Amenity**<br>5.1 A 'SuDS approach' shall be adopted that maximises benefits for amenity through the creation of multi-functional places and landscapes. | The proposed detention basins and drainage corridors have been integrated within the wider landscape of the development to provide multifunctional benefits. In addition to managing runoff, these features contribute to the site's green corridor and provide visual amenity, open space and landscape enhancement. The drainage strategy therefore provides amenity benefit whilst maintaining its primary drainage function. |
| **Standard 6: biodiversity**<br>6.1 A 'SuDS approach' shall be adopted to ensure the surface water drainage system maximises biodiversity benefits throughout the development lifecycle.<br>6.2 The surface water drainage system shall add biodiversity value by:<br>• creating diverse, self-sustaining, resilient local ecosystems which contribute to net gains in biodiversity<br>• supporting and promoting natural local habitat and species, for example, through local nature recovery strategies (LNRS)<br>• contributing to the delivery of local biodiversity strategies<br>• contributing to habitat connectivity | The proposed drainage network has been developed in close collaboration with the project ecologists to ensure that drainage and biodiversity objectives are integrated across the site. SuDS features, including vegetated basins, wet grassland habitats, wetland margins and narrow drainage channels, have been designed to provide suitable habitat for a range of species, including newts and other amphibians, whilst also enhancing ecological connectivity. The drainage features have been deliberately designed to avoid the creation of permanent standing open water bodies, with water generally confined to narrow channels that provide ecological benefits for amphibians whilst remaining too small to attract birds that could give rise to bird strike concerns. The drainage strategy therefore delivers biodiversity benefits alongside its surface water management function and is consistent with Potential Measure PM82 of the Oxfordshire Local Nature Recovery Strategy, which promotes wildlife-friendly measures that also reduce flood risk and increase climate resilience within developed areas. Detailed planting proposals and habitat enhancements will be refined through the detailed design process. |
| **Standard 7: design of drainage for construction, operation, maintenance, decommissioning and structural integrity** | The drainage strategy has been developed with long-term operation and maintenance as a key design consideration. The proposed SuDS network predominantly comprises above-ground features, including detention basins and swales, which are readily accessible for inspection, maintenance and repair |

| | |
|---|---|
| 7.1 A 'SuDS approach' shall be adopted to ensure that surface water drainage systems are designed so they can be easily and safely constructed, operated and maintained taking account of the need to minimise negative impacts on natural resources and the environment.<br>7.2 The designer shall provide a management and maintenance plan that supports the design objectives detailed in standards 1 to 6 and ensures the performance of the surface water drainage system with regards to runoff destinations, everyday and extreme rainfall, water quality, amenity and biodiversity is maintained throughout the lifetime of the development.<br>7.3 Surface water drainage design shall examine for the likelihood and consequences of potential failure scenarios that may occur during the operation phase and safely manage the associated risks.<br>7.4 The surface water drainage system shall be designed to ensure structural integrity of all components under anticipated loading conditions for the design life of the development so that it does not affect the structural integrity of any existing or proposed components within, or adjacent to, the development. | throughout the lifetime of the development. The detention basins have been designed with shallow side slopes and suitable maintenance access, allowing routine activities such as grass cutting, vegetation management, sediment removal and inspection of inlets, outlets and flow controls to be undertaken safely and efficiently. Indicative maintenance activites have been outlined within this report and will be developed into a detailed Operation and Maintenance Plan during the detailed design stage, setting out inspection frequencies, maintenance procedures and management responsibilities. Requirement for this are secured through the DCO. |

# 7. SUMMARY

7.1 the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

7.2 This SDS is intended to support a DCO and as such the level of detail included is commensurate and subject to the nature of the proposals.

**Table 7.1: Sustainable Drainage Statement Summary**

| | | Existing Site | Proposed Development |
|---|---|---|---|
| **Impermeable Contributing Area (Ha)** | | 0 | 134.2 |
| **Outfall Location** | | Infiltration / Watercourse | Watercourse (infiltration to be confirmed at detailed design) |
| **Peak Runoff Rate (l/s/ha)** | **QBAR** | 0.2 | 2.0 |
| | **1 in 30-Year** | 0.4 | |
| | **1 in 100-Year** | 0.5 | |
| | **1 in 100-Year + 40%** | - | |
| **Infiltration Rate** | | Refer to **Table 2.2** and **Table 2.3** | To be confirmed enabling post-earthworks |
| **Volume Control** | | - | Discharge rate limited to QBAR 2/s/ha (i.e., LLFA's 'Simple Approach') |
| **Proposed Storage Volume** | | - | 137,888m$^3$ |
| **Flow Control Type** | | - | Vortex |
| **SuDS Features** | | - | Detention Basins, Swales and Downstream Defender |
| **Maintenance Responsibility** | | - | Management Company |

7.3 It is envisaged that the final drainage strategy will be determined during the detailed design stage, as the development layout is finalised.

# *APPENDICES*

# Appendix 1: Topographical Survey


Fritwell
Fewcott
Upper Heyford Airfield
(disused)
Caulcott
Stoke Wood
Kilby's Copse
Kilby's Barn
Middleton Stoney
Sandyhill Clump
Timberyard Clump
Pedigree Plantation
Sycamore Grove
Motorway Service Area
Needles Farm
Allington Farm
Recycling Centre
Quarry (disused)
RAILWAY LAND NO VISIBILITY FROM SURROUNDING AREA
EXISTING ACCESS ARRANGEMENTS
Swann Farm Quarry
Gordon 10
Cricket Ground
Gravel Pit
Sewage Works
Caravan Park
Kennel Copse
Cowpasture Plantation
Earthworks
Ardley Wood
Ardley Cottages
Ardley Field Farm
Ardley Bungalow
Ardley College
Workings (disused)
Manor Farm Cottages
Hawkwell Farm
Hawkwell Cottages
Hawkwell Wood
Hawkwell Field
Hawkwell Cottage
Baynard's Green Farm
Baynard's Green Cottages
Willowbank Farm
Lodge Farm
Cross Roads Farm
Oxgrove Farm
Oxgrove Park
Oxgrove Cottages
Oxgrove Wood
Oxgrove Field
Playing Field
Heyford Park
Heyford Park Cottages
Heyford Park Gate
Heyford Park Gate Cottages
Heyford Park Gate Lodge
Heyford Park Gate Kiosk
Heyford Park Gate Cabin
Heyford Park Gate Cabin
Heyford Park Gate Cabin

## Appendix 2: Thames Water Sewer Asset Plans and Correspondence

# Asset location search

Property Searches

Engineering Services Consultancy Limited
Griffin House
19Ludgate Hill
BIRMINGHAM
B3 1DW

**Search address supplied** OX27 7PH

**Your reference** Q-CPC-Ardley

**Our reference** ALS/ALS Standard/2018_3817907

**Search date** 19 June 2018

**Keeping you up-to-date**

Knowledge of features below the surface is essential in every development. The benefits of this not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility for any commercial or residential project.

An asset location search provides information on the location of known Thames Water clean and/or wastewater assets, including details of pipe sizes, direction of flow and depth. Please note that information on cover and invert levels will only be provided where the data is available.

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

0845 070 9148

# Asset location search

Property Searches

**Search address supplied:** OX27 7PH

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 0845 070 9148, or use the address below:

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

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

## Waste Water Services

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

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

SP5226SW
SP5226NW
SP5226SE
SP5226NE
SP5326NW

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

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

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

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

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

SP5225NW
SP5225NE
SP5325NW
SP5326SW

For your guidance:

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

## Clean Water Services

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

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

SP5225NW
SP5225NE
SP5325NW

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.

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

SP5226SW
SP5226NW
SP5226SE
SP5226NE
SP5326SW
SP5326NW

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/2018_3817907 | SP5226SW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452250,226250

**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. 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 |
|---|---|---|
| 1301 | n/a | n/a |
| 1201 | n/a | n/a |
| 4401 | n/a | n/a |
| 5404 | n/a | n/a |
| 0402 | n/a | n/a |
| 0401 | n/a | n/a |

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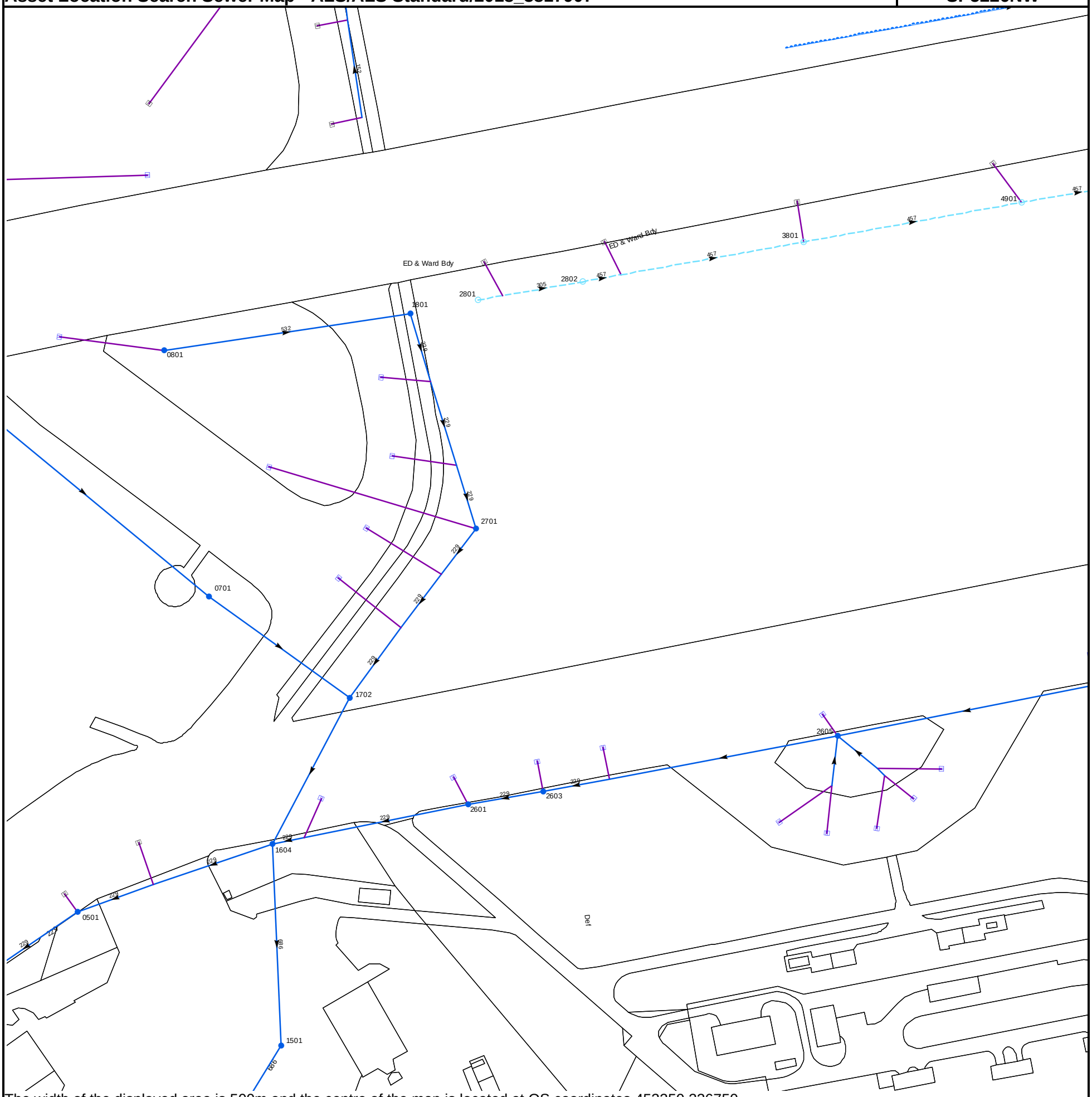
# Asset Location Search Sewer Map - ALS/ALS Standard/2018_3817907

**SP5226NW**




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452250,226750

**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.**

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

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 1702 | n/a | n/a |
| 1801 | n/a | n/a |
| 2601 | n/a | n/a |
| 2701 | n/a | n/a |
| 2801 | n/a | n/a |
| 2603 | n/a | n/a |
| 2802 | n/a | n/a |
| 3801 | n/a | n/a |
| 2605 | n/a | n/a |
| 4901 | n/a | n/a |
| 0501 | n/a | n/a |
| 0801 | n/a | n/a |
| 0701 | n/a | n/a |
| 1604 | n/a | n/a |
| 1501 | n/a | n/a |

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| Asset Location Search Sewer Map - ALS/ALS Standard/2018_3817907 | SP5226SE |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452750,226250

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452750,226250

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

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 5407 | n/a | n/a |
| 5403 | n/a | n/a |
| 5406 | n/a | n/a |
| 5405 | n/a | n/a |
| 5409 | n/a | n/a |

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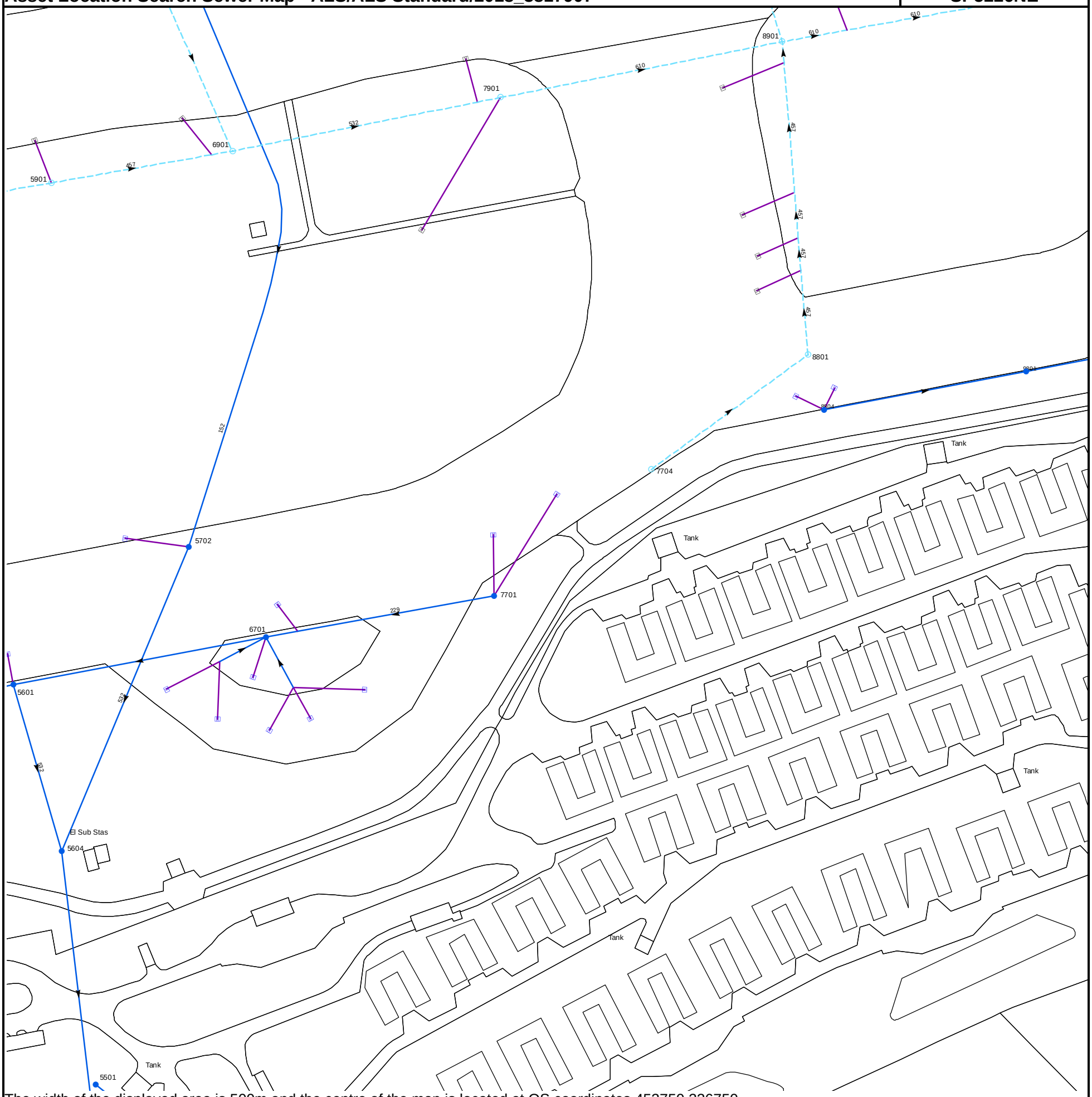
## Asset Location Search Sewer Map - ALS/ALS Standard/2018_3817907 | SP5226NE




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452750,226750

**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.**

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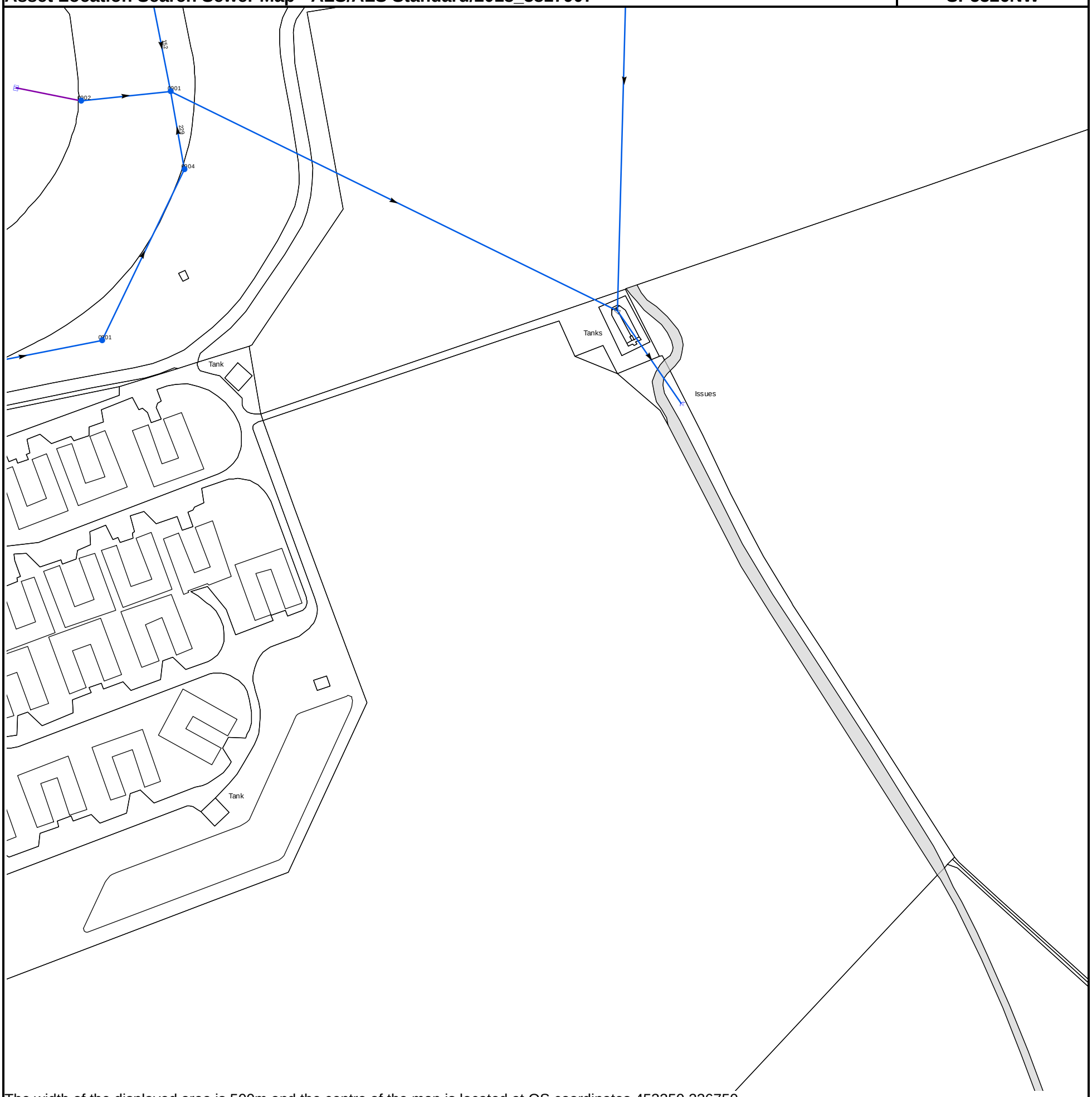
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 7901 | n/a | n/a |
| 7704 | n/a | n/a |
| 8901 | n/a | n/a |
| 8801 | n/a | n/a |
| 8804 | n/a | n/a |
| 9801 | n/a | n/a |
| 5601 | n/a | n/a |
| 5901 | n/a | n/a |
| 5604 | n/a | n/a |
| 5501 | n/a | n/a |
| 5702 | n/a | n/a |
| 6901 | n/a | n/a |
| 6701 | n/a | n/a |
| 7701 | n/a | n/a |

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

| Asset Location Search Sewer Map - ALS/ALS Standard/2018_3817907 | SP5326NW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 453250,226750

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

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 0801 | n/a | n/a |
| 0901 | n/a | n/a |
| 0904 | n/a | n/a |
| 0902 | 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/2018_3817907



0 45 90 180 270 360
Meters

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 before any works are undertaken. Crown copyright Reserved

| | |
|---|---|
| **Scale:** | 1:7165 |
| **Width:** | 2001m |
| **Printed By:** | dshivaji |
| **Print Date:** | 19/06/2018 |
| **Map Centre:** | 452819,226164 |
| **Grid Reference:** | SP5226SE |

**Comments:**

# ALS Sewer Map Key

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

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

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

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

- Trunk Surface Water
- Trunk Foul
- Storm Relief
- Trunk Combined
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

## Sewer Fittings

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

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

## Operational Controls

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

- Control Valve
- Drop Pipe
- Ancillary
- Weir

## End Items

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

- Outfall
- Undefined End
- Inlet

## Other Symbols

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

- Public/Private Pumping Station
- Change of characteristic indicator (C.O.C.I.)
- Invert Level
- Summit

**Areas**

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

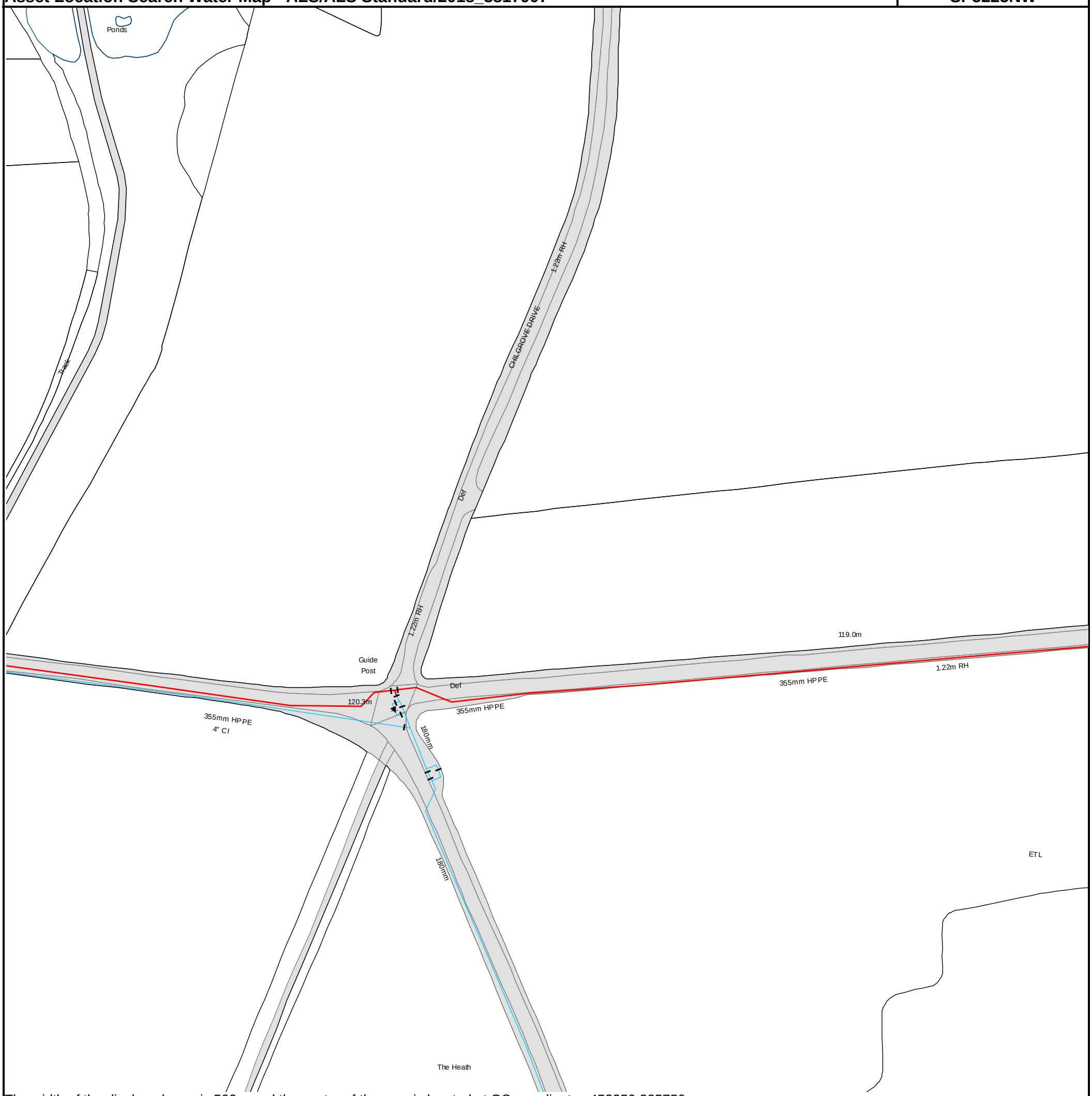
## Other Sewer Types (Not Operated or Maintained by Thames Water)

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

**Notes:**

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

| Asset Location Search Water Map - ALS/ALS Standard/2018_3817907 | SP5225NW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452250,225750

**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.**

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| Asset Location Search Water Map - ALS/ALS Standard/2018_3817907 | SP5225NE |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 452750,225750

**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.**

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| Asset Location Search Water Map - ALS/ALS Standard/2018_3817907 | SP5325NW |
|---|---|




The width of the displayed area is 500m and the centre of the map is located at OS coordinates 453250,225750

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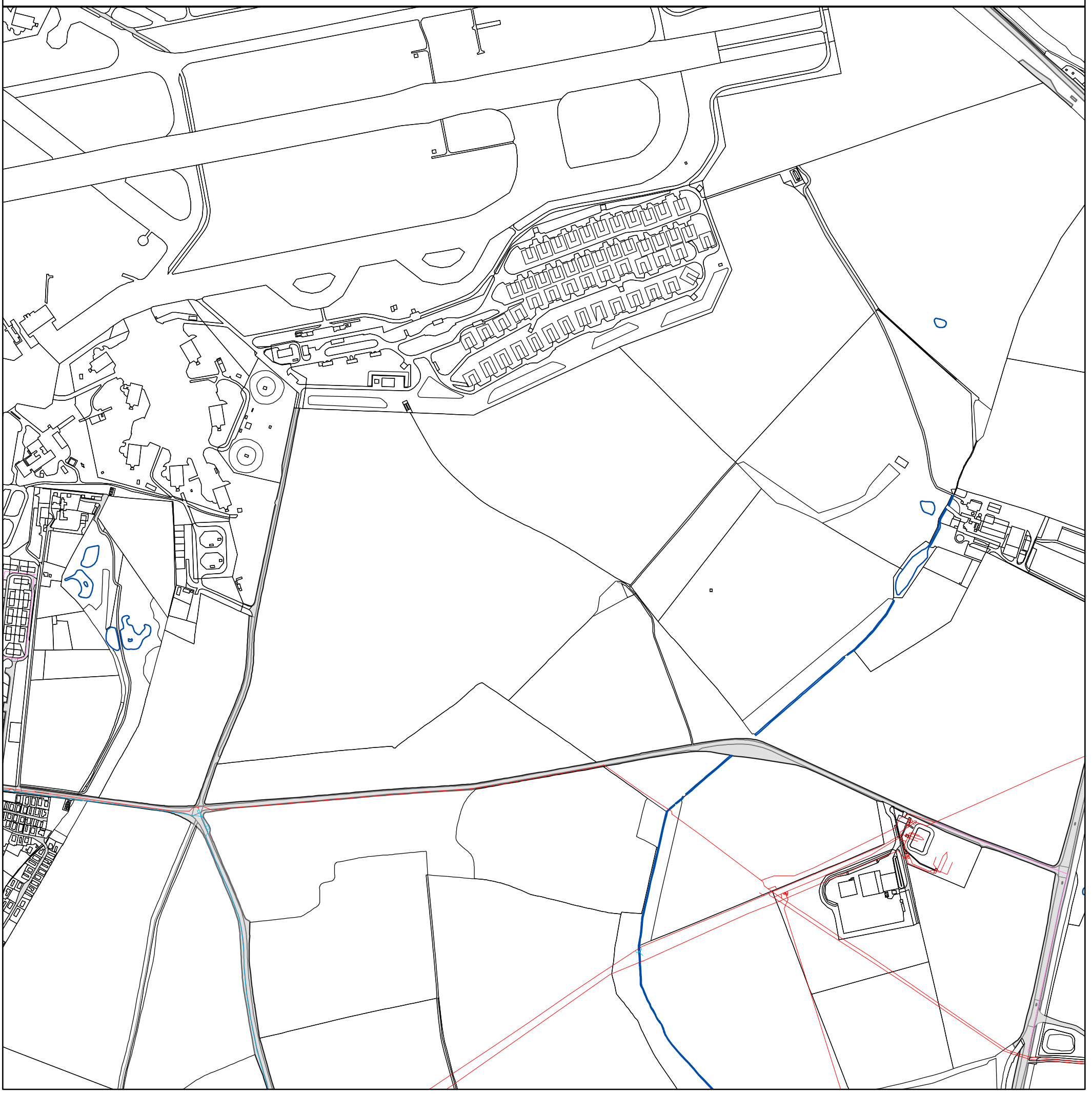
# ALS/ALS Standard/2018_3817907



0 45 90 180 270 360
Meters

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| | |
|---|---|
| **Scale:** | 1:7165 |
| **Width:** | 2001m |
| **Printed By:** | dshivaji |
| **Print Date:** | 19/06/2018 |
| **Map Centre:** | 452819,226164 |
| **Grid Reference:** | SP5226SE |

**Comments:**

# ALS Water Map Key

## Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

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

3" SUPPLY

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

3" FIRE

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

3" METERED

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

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

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

## Valves

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

## Hydrants

- Single Hydrant

## Meters

- Meter

## End Items

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

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

## Operational Sites

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

## Other Symbols

- Data Logger

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

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

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

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

## Terms and Conditions

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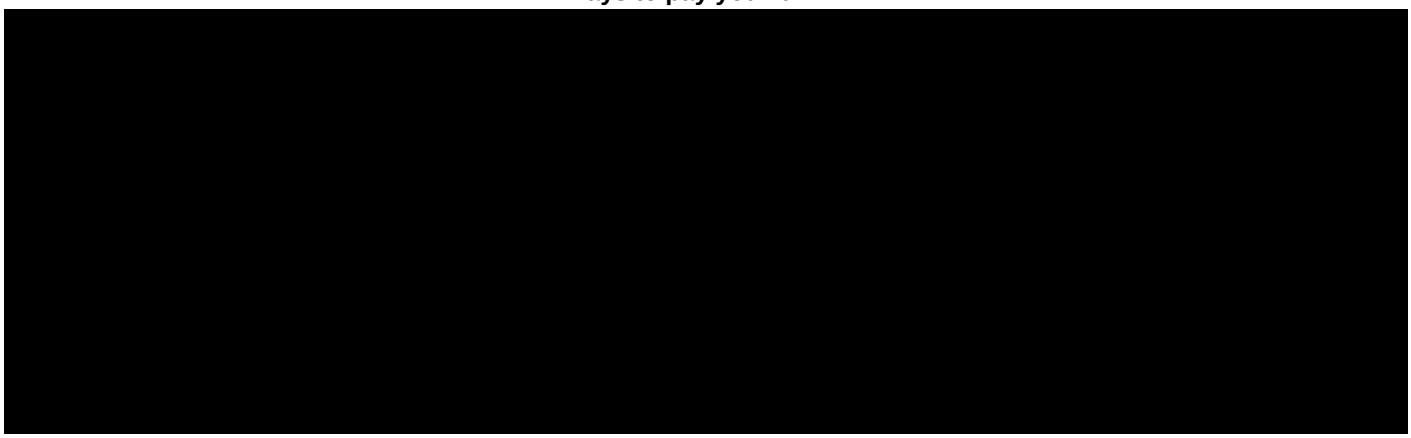
We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

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



## Search Code

**IMPORTANT CONSUMER PROTECTION INFORMATION**

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

**The Search Code:**

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

**The Code's core principles**

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

**Complaints**

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

**Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.**

**TPOs Contact Details**

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

You can get more information about the PCCB from www.propertycodes.org.uk

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

# Asset location search

Property Searches

BWB Consulting Limited
5th Floor,Waterfront House Waterfront House
Station Street
NOTTINGHAM
NG2 3DQ

**Search address supplied** [redacted]

**Your reference** NTH2479

**Our reference** ALS/ALS Standard/2022_4672882

**Search date** 15 July 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

Thames Water Property Searches

**Search address supplied:** [redacted]

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.

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

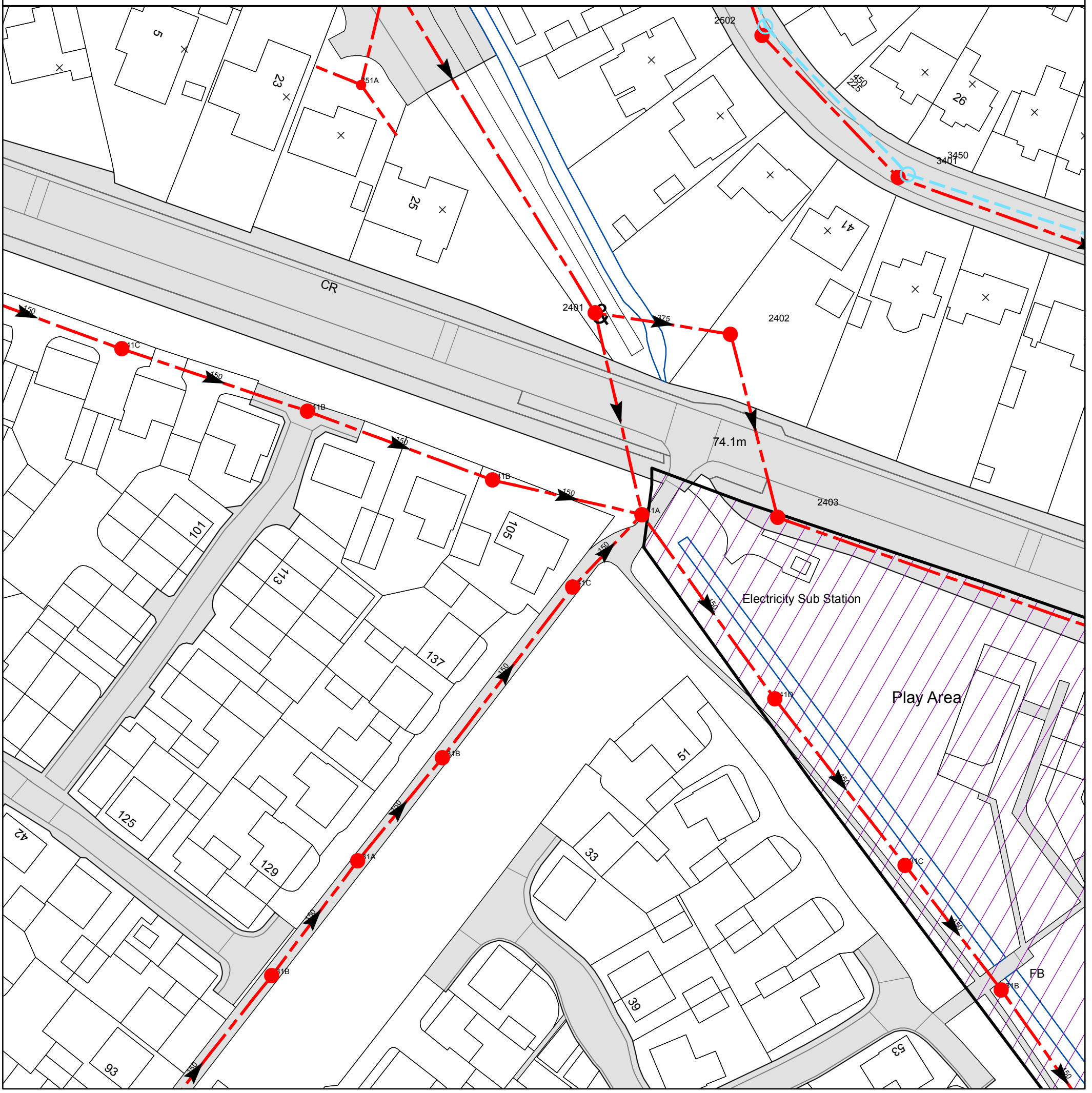
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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

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

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

# ALS/ALS Standard/2022_4672882




0 4.5 9 18 27 36 Meters

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 before any works are undertaken. Crown copyright Reserved

| | |
|---|---|
| **Scale:** | 1:715 |
| **Width:** | 200m |
| **Printed By:** | G1KANAGA |
| **Print Date:** | 15/07/2022 |
| **Map Centre:** | 457235,222429 |
| **Grid Reference:** | SP5722SW |

**Comments:**

# ALS/ALS Standard/2022_4672882

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

| REFERENCE | COVER LEVEL | INVERT LEVEL |
|---|---|---|
| 2402 | | |
| 2551 | 74.34 | 72.83 |
| 3401 | 74.29 | 72.42 |
| 2401 | | |
| 141C | | |
| 131B | | |
| 141B | | |
| 231A | | |
| 231B | | |
| 331C | | |

| REFERENCE | COVER LEVEL | INVERT LEVEL |
|---|---|---|
| 2502 | 74.33 | 72.53 |
| 2403 | | |
| 3450 | 74.31 | 72.78 |
| 251A | | |
| 241D | | |
| 241A | | 70.48 |
| 241C | | |
| 241B | | |
| 331B | | |

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# Asset Location Search - Sewer Key

## Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

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

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

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

## Sewer Fittings

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

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

## Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

## End Items

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

- Inlet
- Outfall
- Undefined End

## Other Symbols

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

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

## Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

## Ducts or Crossings

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

**Notes:**

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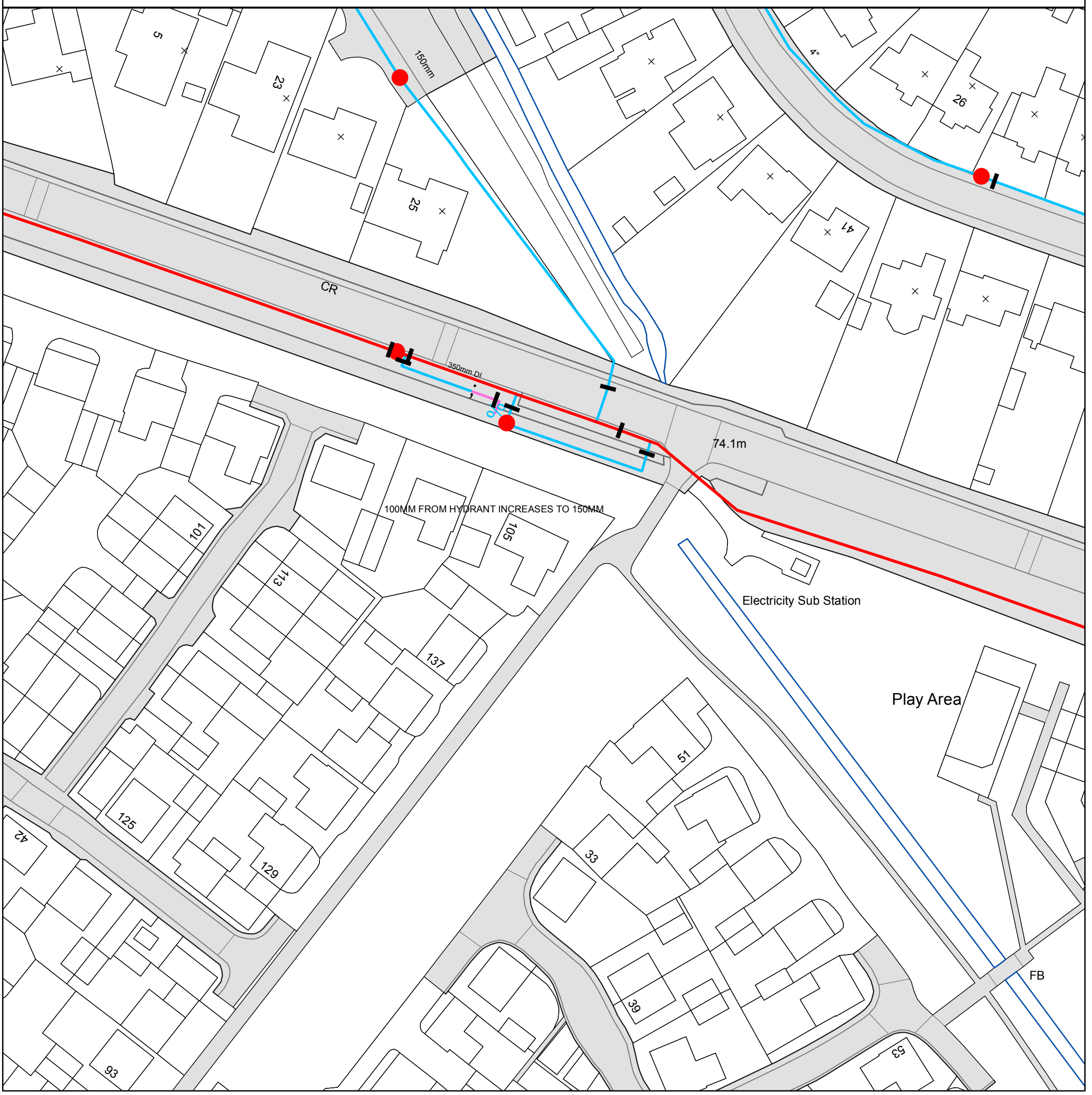


0 4.5 9 18 27 36 Meters

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| **Scale:** | 1:715 |
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| **Printed By:** | G1KANAGA |
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**Comments:**

# Asset Location Search - Water Key

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

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**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 |
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## 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.

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### Ways to pay your bill



Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Outlook

## RE: Sewer Map Query - Ardley

**From** DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
**Date** Thu 16/09/2021 11:12
**To** [redacted]

**This email originated from outside of our organisation. Please exercise caution with content, links and attachments.**

[redacted]

That's correct, our responsibility ends at the outfall on the public sewer.

The land drain is shown on the public records for information only so that it can be seen where the public sewer discharges, we also show rivers, streams and named water courses.

Regards

[redacted]

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

-

**Get advice on making your sewer connection correctly at connectright.org.uk**

Original Text

**From:** [redacted]
**To:** DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
**CC:**
**Sent:** 09.09.21 11:50:25
**Subject:** RE: Sewer Map Query - Ardley

[redacted]

Thanks for confirmation. We will investigate on site but just to confirm, as far as you are concerned your assets do not encroach past the headwall shown? We will need to divert the land drain and gain Land Drainage Consent for doing so at the relevant time which I understand but am keen to

make sure your asset register doesn't shown anything along the route of the land drain? Is there a reason it would be shown as such on your plans – there are obviously lots of outfalls to ditches, would this be anything different?

Thanks again.

Regards,

[redacted]

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
[redacted] W www.bwbconsulting.com

---

**From:** DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
**Sent:** 09 September 2021 10:15
**To:** [redacted]
**Subject:** RE: Sewer Map Query - Ardley

**This email originated from outside of our organisation. Please exercise caution with content, links and attachments.**

---

[redacted]

Thank you for your email. The land drain is protected by the Land Drainage Act 1991 and you should discuss your proposals with the Drainage Officer at the Local Authority. If you would like a joint virtual meeting with us and the Local Authority, I would be happy to set aside some time.

We are only responsible for the public surface water sewers which are shown in light blue.

Regards

[redacted]
developer.services@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online atdevelopers.thameswater.co.uk

**Get advice on making your sewer connection correctly atconnectright.org.uk**

Original Text

**From:** [redacted]
**To:** DEVELOPER.SERVICES@THAMESWATER.CO.U <developer.services@thameswater.co.uk>
**CC:**

[redacted]

**Sent:** 02.09.21 11:21:10
**Subject:** Sewer Map Query - Ardley

Hi

On the attached records plan (page 10) you have two sewers discharging via a headwall into a 'Land Drain'. On site there is both a ditch on the surface and possibly a pipe underneath. At the point it says 'issues' there is a visible pipe into a ditch.

Please could you confirm what your understanding is of these assets and whether the Land Drain is indeed an asset that you maintain or whether it is simply a riparian ditch to which you have a right to discharge. There are proposals to construct in this area and I'd like to understand whether there is a formal diversion required or not.

Thanks in advance.

[redacted]

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
[redacted]W www.bwbconsulting.com

BWB Consulting

**Registered in England and Wales**

**Registered Office:** 5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
**Company No.** 5265863
**VAT Reg No.** 648 1142 45

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**Company No.** 5265863
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# Project Brief

X4502-1942

Middleton Stoney Road, Bicester, Oxfordshire, OX26 2BN

# X4502-1942 – Middleton Stoney Road, Bicester, Oxfordshire, OX26 2BN

## Foul Water Rising Main Requisition (S98 WIA 1991)

### Background

This budget estimate is in response to a new strategic freight rail interchange to be constructed on Land Off B430, Ardley, Oxfordshire, OX27 7PH, which will contain several large industrial units, new roadways and new railway infrastructure. The Developer has submitted a Section 98 application under the Water Industry Act (1991) to request a requisition for a new foul water rising main to serve the new interchange.

The foul water rising main is proposed to be constructed using 280mm PE100 SDR11 pipe with an approximate total length of 5.6km. It will commence at a pumping station to be constructed by the developer to the south of the proposed site at the approximate grid reference E: 453390, N: 225041. It then passes south along Ardley Road (for approximately 650m) and enters greenfield land (for approximately 1.5km) before being routed east along the B4030 and Middleton Stoney Road (for a total length of 3.45km). The majority of this route is covered by the development consent order boundary. The rising main will discharge to a Ø1350mm PCC break manhole before discharging to the proposed connection point under gravity in a Ø375mm concrete sewer. The proposed connection point is the existing foul water manhole (reference: SP57222403) in Middleton Stoney Road, Bicester, Oxfordshire, OX26 2BN.

### Assumptions

Further investigation during detailed design will be required to understand the route of the proposed requisition. The method of construction will also be reviewed at the detailed design stage once further investigations have been carried out, but for the purposes of this budget estimate an open-cut solution has been assumed. The depth to cover of the rising main along the requisition route is assumed to be 1.2m

It is assumed that appropriate access will be available to undertake the works, and that there is sufficient space to setup a site compound for the works within the development land.

It is also assumed that the foul rising main requisition serves multiple curtilages and is classed as a sewer rather than a lateral drain.

### Initial Investigations

DEFRA Magic Maps show a number of environmental considerations present in proximity to the requisition route including: an ancient woodland (Burntclose Copse); a number of species for CS targeting such as brown hairstreaks and lapwings; a SSSI (Ardley Trackways) and 2 No. Grade II listed buildings. The local authority and Natural England will need to be consulted to make sure there are no special requirements for working within the area. It is assumed that any vegetation clearance required along the route will be completed as part of the wider DCO work. An environmental screening assessment will be undertaken during detailed design to confirm the environmental constraints of the site.

The BGS website indicates that the requisition route runs within a bedrock geology of Cornbrash and White Limestone Formation. Borehole logs in the area do not indicate the presence of groundwater; however, the route does cross some watercourses (Gagle Brook) so dewatering is assumed to be required for part of the requisition route. Geotechnical ground investigations for soil properties and ground water levels will be required at detailed design to understand the geology within the area.

According to Thames Water GET Maps, high voltage electricity cables and gas mains run along the requisition route predominantly along the B4030 and Middleton Stoney Road. It is assumed that these are not required to be diverted and the attached budget estimate does not include any costs associated with diverting these utilities. The location of third-party assets will need to be confirmed by undertaking full utility searches, topographical and GPR surveys as well as trial holes where required.

### Legislative Requirement

This project is in response to a request for a foul water rising main requisition served under Section 98 of the Water Industry Act 1991. The pumping station is to be constructed by the developer to an adoptable standard and adopted by Thames Water under Section 104 of the Water Industry Act 1991. The latter adoption is not included in this budget estimate but is a requirement to proceed with this requisition.

### Scope of Works

The scope of works is for the requisition works only. All other works associated with the development are not allowed for within this estimate and must be agreed with Thames Water with a separate agreement.

The scope of works that is subject to the attached budget estimate is as follows:

1. Construct 5.60km of 280mm PE100 SDR11 foul water rising main between new pumping station and new break chamber (reference: MH1) using open cut construction and with an assumed depth to cover = 1.20m.
   Assume the following ground profile:
   a. 650m in Ardley Road (minor road)
   b. 1.50km in greenfield land
   c. 2.50km in B4030 (minor road)
   d. 950m in Middleton Stoney Road (major road)
2. Construct 56 No. total access points (either washouts or air valves) – assuming 1 per 100m section of rising main.
3. Construct 1 No. Ø1350mm PCC manhole break chamber (reference: MH1) in Middleton Stoney Road (major road) to receive rising main. Assumed depth to invert to be approx. = 1.60m
4. Construct 5m of Ø375mm concrete foul water gravity sewer between new break chamber (reference: MH1) and existing Thames Water manhole (reference: SP57222403) within Middleton Stoney Road (major road) using open cut construction. Assumed depth to the pipe invert to be approx. = 1.65m.
5. Connect to and rebuild existing Thames Water manhole (reference: SP57222403) using Ø1350mm PCC rings in Middleton Stoney Road (major road). Assumed depth to invert = 1.70m.
6. Test and commission assets upon completion of works.

7. Complete topographical and ground penetrating radar (GPR) surveys as well as utility searches and trial holes (assumed 45 No.) to confirm location of other third-party assets.
8. Complete a manhole and CCTV survey of the connection manhole (reference: SP57222403) and sewer.
9. Geotechnical ground investigations for soil properties and groundwater levels (assume 11 No. boreholes).
10. Groundwater dewatering (assume for 16 weeks).
11. Complete an environmental screening assessment.
12. Water Industry Act noticing and third-party land negotiations through Bruton Knowles.
13. Undertake traffic management along Ardley Road (minor road), the B4030 (minor road) and Middleton Stoney Road (major road) for 13 weeks, 50 weeks and 19 weeks respectively. Assume a single lane closure.
14. Public and customer relations input.
15. Liaison with Local Council, Natural England, National Highways and Environment Agency.
16. Flow management for the connection to the existing network.

## Delivery options

| | |
|---|---|
| Via TW | Delivering the project under Section 98 of the Water Industry Act. |
| Via Developer and TW | The Developer undertakes the work themselves under a Section 104/106 agreement. |

## CDM Responsibilities

The developer will be the Client and duty holder under the Construction, Design & Management (CDM2015) regulations. The 'Client' is responsible for appointing the other duty holder roles, namely the Principal Designer (PD) and the Principal Contractor (PC). The 'Client' has a specific duty under CDM2015 to submit an F10 form to the Health & Safety Executive (HSE) of a 'Notifiable Project' before construction starts on site.

Note a 'Notifiable Project' is where a project is to have 20 workers for 30 days or more OR exceed 500 person days.

## Programme

| | |
|---|---|
| Detailed Design | 9 – 12 months. |
| Procurement | 6 months. |
| Construction | 18 – 24 months. |
| Total Project Duration | 33 – 42 months. |

## Funding

The total estimated project cost is £11,063,933.99 (+VAT as applicable).

## Allowances

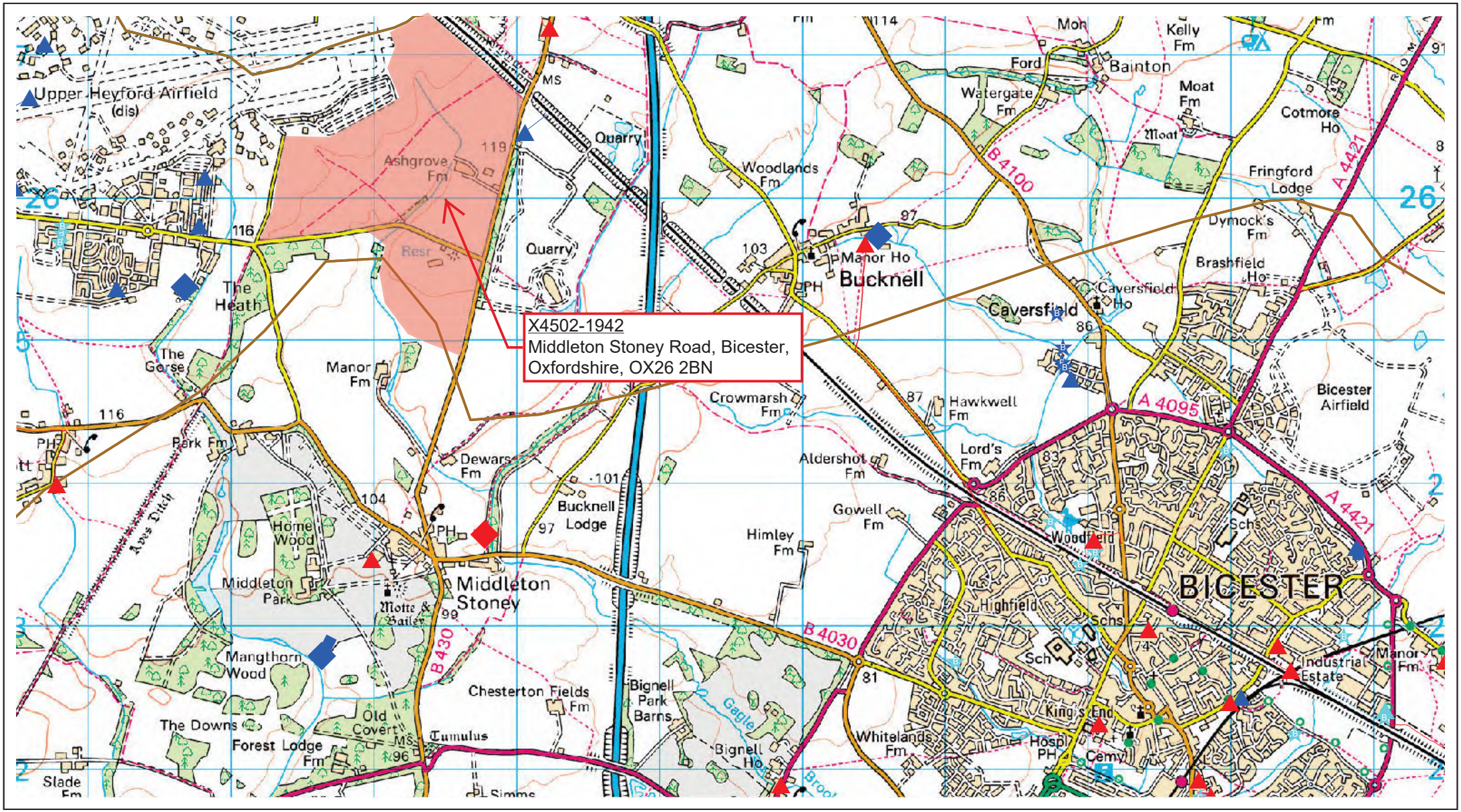
This budget estimate summary has been produced for indicative purposes only and has been constructed using standard budget estimate rates in the absence of detailed site, soil, utility, ecology, heritage, environmental and structural/land/condition surveys as well as information on affected third party land and buildings. These budget estimates are to enable customers to decide whether they wish for Thames Water to proceed with the works by commencing full design and approaching affected landowners and stakeholders.

For additional exclusions, assumptions and project risks see the separate Budget Estimate Summary.


Thames
Water

Based on the Ordnance Survey Map with the Sanction of the
Controller of H.M Stationery Office License Number 100019345

# Middleton Stoney Road




0 405 810 1,620 2,430 3,240

Metres

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Printed At ( A3 ) :1:25000
Printed By :MHUBBART
Print Date :03/10/2022
Map Centered On :455496,224539
Grid Reference :SP5524

Based on the Ordnance Survey Map with the Sanction of the
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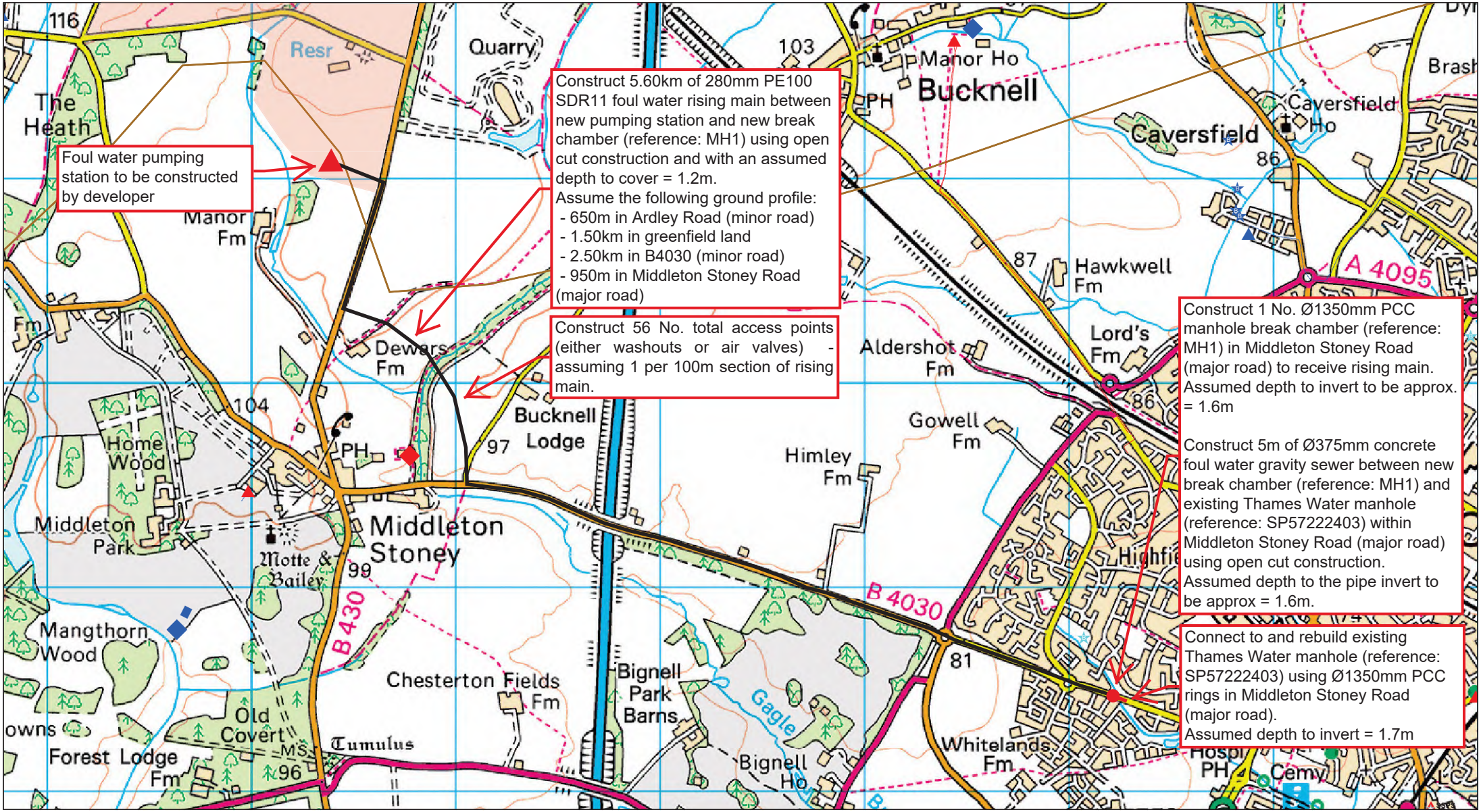
# Middleton Stoney Road

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| | |
|---|---|
| Printed At ( A2 ) | :1:12500 |
| Printed By | :MHUBBART |
| Print Date | :03/10/2022 |
| Map Centered On | :455393,223884 |
| Grid Reference | :SP5523 |

Based on the Ordnance Survey Map with the Sanction of the
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# Middleton Stoney Road



0 405 810 1,620 2,430 3,240
Metres

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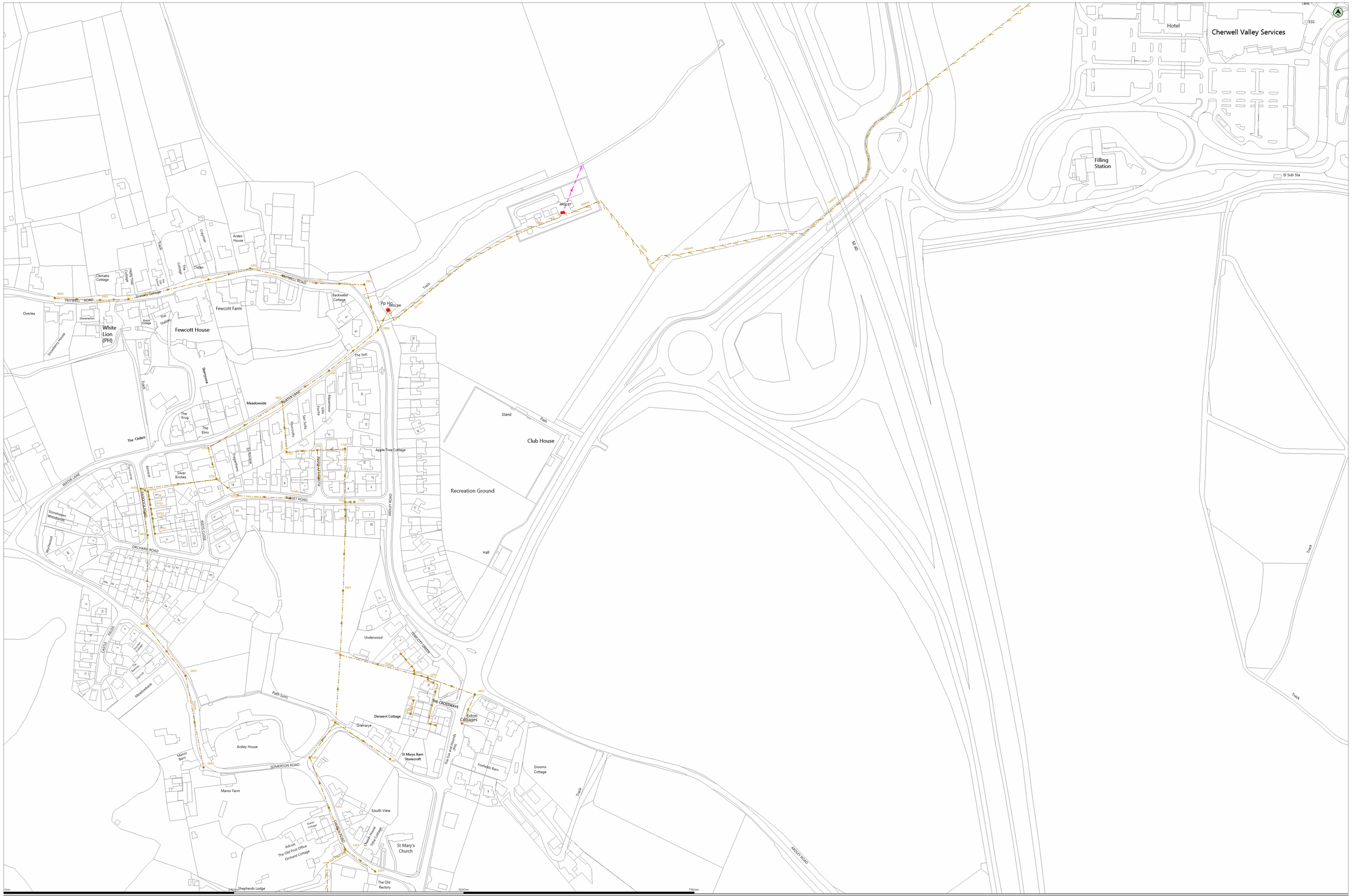
Printed At ( A3 ) :1:25000
Printed By :MHUBBART
Print Date :03/10/2022
Map Centered On :455496,224539
Grid Reference :SP5524

## Appendix 3: Anglian Water Sewer Asset Plans

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Date: 17/05/21 | Scale: 1:1250 | Map Centre: 454546,227795 | Data updated: 30/04/21 | Our Ref: 559544 - 1 | Wastewater Plan A0

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water Services Limited for any inaccuracy or omission in providing the failure to accurately show the position of any apparatus. Anglian Water Services Limited disclaims any liability for any loss, damage or interference to any apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2021 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer
Final Effluent
Rising Main*
Sewer*
Decommissioned Sewer*
Outfall*
Inlet*
Manhole*
Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station
*(Colour denotes effluent type)

ESC1423 Ardley 2

love every drop
anglianwater

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|
| 0401 | 454033 | 227448 | F | 119.64 | 118.09 | 1.55 |
| 0501 | 454013 | 227548 | F | 118.17 | 116.45 | 1.72 |
| 0701 | 454038 | 227795 | F | 112.51 | 110.99 | 1.52 |
| 0702 | 454047 | 227761 | F | - | - | - |
| 0703 | 454070 | 227743 | F | - | - | - |
| 0901 | 454038 | 227978 | F | 122.97 | 110.1 | 12.87 |
| 0902 | 454083 | 227990 | F | 113.08 | 109.74 | 3.34 |
| 1301 | 454186 | 227359 | F | 119.73 | 118.14 | 1.59 |
| 1401 | 454176 | 227497 | F | 118.53 | 116.68 | 1.85 |
| 1402 | 454148 | 227459 | F | 118.93 | 117.03 | 1.9 |
| 1403 | 454169 | 227404 | F | 119 | 117.53 | 1.47 |
| 1501 | 454181 | 227570 | F | - | - | - |
| 1601 | 454184 | 227640 | F | - | - | - |
| 1701 | 454156 | 227793 | F | 113.6 | 111.96 | 1.64 |
| 1702 | 454158 | 227762 | F | 113.67 | 112.57 | 1.1 |
| 1703 | 454197 | 227736 | F | 114.84 | 113.86 | 0.98 |
| 1704 | 454186 | 227736 | F | 114.57 | 113.44 | 1.13 |
| 1705 | 454187 | 227721 | F | 114.91 | 113.68 | 1.23 |
| 1706 | 454186 | 227794 | F | 114.12 | 112.45 | 1.67 |
| 1707 | 454123 | 227791 | F | 113.29 | 111.44 | 1.85 |
| 1708 | 454127 | 227740 | F | - | - | - |
| 1801 | 454169 | 227879 | F | 111.77 | 110.03 | 1.74 |
| 1802 | 454118 | 227845 | F | 112.16 | 110.31 | 1.85 |
| 1901 | 454155 | 227974 | F | 111.5 | 109.4 | 2.1 |
| 2301 | 454219 | 227335 | F | 119.76 | 118.38 | 1.38 |
| 2401 | 454235 | 227457 | F | 119.43 | 118.06 | 1.37 |
| 2501 | 454276 | 227546 | F | - | - | - |
| 2502 | 454261 | 227550 | F | - | - | - |
| 2503 | 454261 | 227521 | F | - | - | - |
| 2504 | 454258 | 227506 | F | - | - | - |
| 2901 | 454207 | 227973 | F | 110.75 | 108.99 | 1.76 |
| 2902 | 454222 | 227923 | F | 111.23 | 108.71 | 2.52 |
| 3401 | 454313 | 227496 | F | 120.04 | 118.67 | 1.37 |
| 3501 | 454327 | 227527 | F | 120.16 | 118.11 | 2.05 |
| 8901 | 453871 | 227958 | F | 112.21 | 111.09 | 1.12 |
| 9501 | 453971 | 227602 | F | - | - | - |
| 9601 | 453972 | 227701 | F | 114.28 | 113.32 | 0.96 |
| 9701 | 453980 | 227702 | F | 114.22 | 113.28 | 0.94 |
| 9702 | 453977 | 227718 | F | 113.91 | 112.96 | 0.95 |
| 9703 | 453976 | 227729 | F | 113.63 | 112.73 | 0.9 |
| 9704 | 453974 | 227739 | F | 113.32 | 112.44 | 0.88 |
| 9705 | 453972 | 227748 | F | 113.16 | 112.17 | 0.99 |
| 9706 | 453964 | 227751 | F | 113.07 | 111.66 | 1.41 |
| 9901 | 453951 | 227957 | F | 111.78 | 110.48 | 1.3 |
| 9902 | 453920 | 227956 | F | - | - | - |

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|

| Manhole Reference | Easting | Northing | Liquid Type | Cover Level | Invert Level | Depth to Invert |
|---|---|---|---|---|---|---|

# Appendix 4: Ground Investigation Report Extracts

# Dynamic Sample Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 13/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453468.14 N226040.31 |
| Project No. : C10172 | Crew Name: RGI | Drilling Equipment: Premier 110 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| DS110 | WS | 108.12m AoD | JM | 1:10 | FINAL |

| Well | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.20 | ES1 | | | | | Soft dark brownish black slightly gravelly sandy CLAY with frequent rootlets. Gravel is subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 107.82 | | |
| | | 0.50 | D1 | | | | | Soft light brown mottled light grey slightly sandy slightly gravelly clayey SILT. Gravel is angular to subangular fine to coarse limestone, sand is fine to coarse. |
| | | 0.50 | ES2 | | | | | |
| | | 1.00 | D2 | | | | | |
| | | 1.00 | ES3 | | | | | |
| | | 1.20 | D3 | | | | | |
| | | 1.20 | SPT | N=8 (2,2/3,2,1,2) | | | | |
| | | 1.40 | D4 | | | | | |
| | | | | | | | | *At 1.50m bgl: Occasional sand lenses (<50mm).* |
| | | | | | 1.70 | 106.42 | | Soft grey slightly organic slightly sandy slightly gravelly silty CLAY with slight organic odour. Gravel is subangular fine and medium limestone. |
| | | 1.80 | ES4 | | | | | |

1

| Hole Diameter | | Casing Diameter | | Water Strike General | | |
|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Strike | Date Time | Remarks |
| | | | | 2.00 | | |

Remarks

1. Hole terminated at target depth. 2. Groundwater encountered at 2.0m bgl. 3. Inspection pit from ground level to 1.2m bgl.

# Dynamic Sample Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 13/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453468.14 N226040.31 |
| Project No. : C10172 | Crew Name: RGI | Drilling Equipment: Premier 110 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| DS110 | WS | 108.12m AoD | JM | 1:10 | FINAL |

| Well | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| | | | | | | | | Soft grey slightly organic slightly sandy slightly gravelly silty CLAY with slight organic odour. Gravel is subangular fine and medium limestone. | |
| | | | | | 1.90 | 106.22 | | | |
| | ▼ | 2.00<br>2.00 | D5<br>SPT | N=16 (4,6/6,4,3,3) | | | | Medium dense grey slightly gravelly silty fine SAND. Gravel is angular to subangular fine to coarse limestone. | 2 |
| | | | | | 2.40 | 105.72 | | | |
| | | 2.50 | D6 | | | | | Firm greenish grey slightly silty slightly sandy slightly gravelly CLAY with occasional shell fragments. Gravel is subangular fine to medium limestone, sand is fine. | |
| | | 3.00<br>3.00 | D7<br>SPT | 50 (25 for 8mm/50 for 20mm) | 3.03 | 105.08 | | | 3 |
| | | | | | | | | End of Borehole at 3.03m | |

| Hole Diameter | | Casing Diameter | | Water Strike General | | |
|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Strike | Date Time | Remarks |
| | | | | | | |

Remarks

1. Hole terminated at target depth. 2. Groundwater encountered at 2.0m bgl. 3. Inspection pit from ground level to 1.2m bgl.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453465.72 N226886.42 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO01 | RO | 119.06m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 5.80 | 113.26 | | Drillers description: Brown Limestone. |

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.5m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.5m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 9.8m bgl on completion.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453465.72 N226886.42 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO01 | RO | 119.06m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | End of Borehole at 10.00m |

9
10
11
12
13
14
15
16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.5m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.5m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 9.8m bgl on completion.

# Rotary Core Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453006.46 N226379.80 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO02 | RO | 117.24m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.20 | 117.04 | | Drillers description: TOPSOIL. |
| | | | | | | | | | | | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 4.10 | 113.14 | | Drillers description: Grey LIMESTONE. |
| | | | | | | | | | 4.30 | 112.94 | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 5.50 | 111.74 | | |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 9.8m bgl on completion.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453006.46 N226379.80 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO02 | RO | 117.24m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | End of Borehole at 10.00m |

9
10
11
12
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14
15
16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 9.8m bgl on completion.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452464.63 N226045.00 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO03 | RO | 119.20m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.20 | 119.00 | | Drillers description: TOPSOIL. |
| | | | | | | | | | | | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 5.10 | 114.10 | | Driller description: Grey CLAY. |
| | | | | | | | | | 5.30 | 113.90 | | Driller description: Grey LIMESTONE. |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 6.3m bgl on completion.

EXPLORATION & TESTING ASSOCIATES

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452464.63 N226045.00 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO03 | RO | 119.20m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Driller description: Grey LIMESTONE. |
| | | | | | | | | | 10.00 | 109.20 | | End of Borehole at 10.00m |

9 10 11 12 13 14 15 16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 6.3m bgl on completion.

EXPLORATION & TESTING ASSOCIATES

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 13/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453198.00 N225952.82 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO04 | RO | 110.30m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.30 | 110.00 | | Drillers description: TOPSOIL. |
| | | | | | | | | | | | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 2.20 | 108.10 | | Driller description: Grey CLAY. |
| | | | | | | | | | 2.40 | 107.90 | | Drillers description: Grey LIMESTONE with CLAY bands. |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.3m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.3m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.1m bgl on completion.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 13/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453198.00 N225952.82 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO04 | RO | 110.30m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 10.00 | 100.30 | | Drillers description: Grey LIMESTONE with CLAY bands. End of Borehole at 10.00m |

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.3m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.3m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.1m bgl on completion.

# Rotary Core Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453694.82 N226429.88 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO05 | RO | 110.67m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Drillers description: TOPSOIL. |
| | | | | | | | | | 0.80 | 109.87 | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 5.10 | 105.57 | | Drillers description: Grey CLAY with grey LIMESTONE bands. |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.8m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.8m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 3.5m bgl on completion.

EXPLORATION & TESTING ASSOCIATES

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453694.82 N226429.88 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO05 | RO | 110.67m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Drillers description: Grey CLAY with grey LIMESTONE bands. |
| | | | | | | | | | 10.00 | 100.67 | | End of Borehole at 10.00m |

9 10 11 12 13 14 15 16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.8m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.8m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 3.5m bgl on completion.

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 16/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453737.96 N225738.65 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO06 | RO | 113.64m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.20 | 113.44 | | Drillers description: TOPSOIL. |
| | | | | | | | | | | | | Drillers description: GRAVELS. |
| | | | | | | | | | 0.50 | 113.14 | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 6.90 | 106.74 | | Drillers description: Grey CLAY with thin grey LIMESTONE bands. |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 8.1m bgl on completion.

EXPLORATION & TESTING ASSOCIATES

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 16/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453737.96 N225738.65 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO06 | RO | 113.64m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Drillers description: Grey CLAY with thin grey LIMESTONE bands. |
| | | | | | | | | | 10.00 | 103.64 | | End of Borehole at 10.00m |

9 10 11 12 13 14 15 16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.2m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.2m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 8.1m bgl on completion.

# Rotary Core Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 17/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453327.63 N225174.34 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO07 | RO | 97.56m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.30 | 97.26 | | Drillers description: TOPSOIL. |
| | | | | | | | | | | | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 3.60 | 93.96 | | Drillers description: Grey LIMESTONE. |
| | | | | | | | | | 6.40 | 91.16 | | Drillers description: Grey CLAY with thin grey LIMESTONE bands. |

1 2 3 4 5 6 7 8

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.3m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.3m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.2m bgl on completion.

EXPLORATION & TESTING ASSOCIATES

# Rotary Core Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 17/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453327.63 N225174.34 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO07 | RO | 97.56m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Drillers description: Grey CLAY with thin grey LIMESTONE bands. |
| | | | | | | | | | 10.00 | 87.56 | | End of Borehole at 10.00m |

9 10 11 12 13 14 15 16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.3m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.3m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.2m bgl on completion.

# Rotary Core Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 17/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452624.71 N225408.47 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO08 | RO | 111.74m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.00 | | | Drillers description: Dig pit/TOPSOIL. |
| | | | | | | | | | 0.90 | 110.84 | | Drillers description: Brown LIMESTONE. |
| | | | | | | | | | 4.60 | 107.14 | | Driller description: Grey LIMESTONE. |
| | | | | | | | | | 5.10 | 106.64 | | Driller description: Grey CLAY with LIMESTONE bands. |
| | | | | | | | | | 7.40 | 104.34 | | Drillers description: Grey LIMESTONE. |
| | | | | | | | | | 8.00 | | | |

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.9m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.9m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.2m bgl on completion.

# Rotary Core Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 17/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452624.71 N225408.47 |
| Project No. : C10172 | Crew Name: ACE Drilling Services | Drilling Equipment: Beretta T44 |

| Borehole Number | Hole Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| RO08 | RO | 111.74m AoD | JAM | 1:40 | FINAL |

| Well | Water | Depth (m) | Type | FI | Coring TCR | Coring SCR | Coring RQD | Diameter Recovery (SPT) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 103.74 | | Drillers description: Grey CLAY. |
| | | | | | | | | | 8.40 | 103.34 | | Drillers description: Grey LIMESTONE. |
| | | | | | | | | | 10.00 | 101.74 | | End of Borehole at 10.00m |

9 10 11 12 13 14 15 16

| Hole Diameter | | Casing Diameter | | Chiselling | | | | Inclination and Orientation | | | | Drilling Flush | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth Base | Diameter | Depth Base | Diameter | Depth Top | Depth Base | Duration | Tool | Depth Top | Depth Base | Inclination | Orientation | Depth Top | Depth Base | Type | Colour | Min (%) | Max (%) |
| | | | | | | | | | | | | | | | | | |

Remarks

1. Inspection pit from ground level to 0.9m bgl, stopped due to difficult digging. 2. Rotary open hole from 0.9m to target depth. 3. Monitoring standpipe installed to hole base on completion. 4. Groundwater level measured at 7.2m bgl on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453653.00 N226666.00 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP106 | TP | 114.95m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.20 | ES1 | | 0.30 | 114.65 | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is subangular fine to coarse limestone, sand is fine to medium. |
| | | 0.50<br>0.50 | D1<br>ES2 | | 0.80 | 114.15 | | Yellowish brown and light grey clayey sandy angular to subangular fine to coarse limestone GRAVEL with low cobble content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone. |
| | | 1.00 | D2 | | | | | Stiff yellowish brown and light grey slightly sandy gravelly CLAY, with frequent calcareous concretions and shell fragments. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | 1.20 | | HVP=124 | | | | |
| | | 1.50 | D3 | | | | | |
| | ▼ | | | | 1.68 | 113.27 | | Weak to moderately strong light grey LIMESTONE. |
| | | | | | 1.70 | 113.25 | | End of Trial Pit at 1.70m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | 1.68 | |

Remarks

1. Groundwater encountered at 1.68m bgl, moderate flow. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 20/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453345.00 N225910.00 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP120 | TP | 109.45m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.10 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is subangular to subrounded fine to coarse limestone.. Sand is fine to medium. |
| | | | | | 0.25 | 109.20 | | |
| | | 0.30 | ES2 | | | | | Firm dark brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone. Sand is fine to medium. |
| | | | | | 0.40 | 109.05 | | |
| | | 0.50 | D1 | | | | | Firm yellowish brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse limestone, sand is fine. |
| | | 0.50 | ES3 | | | | | |
| | | 1.00 | D2 | | | | | |
| | | 1.00 | | HVP=152 | | | | |
| | | | | | 1.40 | 108.05 | | Light brown becoming dark grey silty fine and medium SAND. |
| | | 1.50 | D3 | | | | | |
| | ▼ | | | | | | | |
| | | | | | 1.80 | 107.65 | | Firm to stiff dark grey slightly gravelly slightly sandy to sandy CLAY, with a moderate organic odour and rare evaporite veins. Gravel is subangular fine to coarse limestone, sand is fine to medium. |
| | | 2.00 | D4 | | | | | |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | 1.60 | |

Remarks

1. Groundwater was encountered at 1.6m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 20/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453345.00 N225910.00 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP120 | TP | 109.45m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 2.00 | ES4 | | | | | Firm to stiff dark grey slightly gravelly slightly sandy to sandy CLAY, with a moderate organic odour and rare evaporite veins. Gravel is subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 2.38 | 107.07 | | Weak to moderately strong light grey LIMESTONE. |
| | | | | | 2.40 | 107.05 | | End of Trial Pit at 2.40m |

3

4

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | | |

Remarks

1. Groundwater was encountered at 1.6m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453613.56 N226507.05 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP121 | TP | 112.35m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.20 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is subangular to subrounded fine to coarse limestone.. Sand is fine to medium. |
| | | | | | 0.30 | 112.05 | | |
| | | 0.50 | ES2 | | | | | Brown slightly clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse limestone. |
| | | 0.70 | D1 | | | | | |
| | | 1.00 | B1 | | | | | |
| | ▼ | | | | 1.45 | 110.90 | | |
| | | 1.50 | D2 | | | | | Firm becoming stiff grey becoming dark bluish grey with depth silty CLAY. |
| | | 1.70 | | HVP=144 | | | | |
| | | 1.80 | D3 | | | | | |
| | | 1.90 | B2 | | | | | |
| | | 2.00 | D4 | | | | | |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | 1.45 | |

Remarks

1. Groundwater was encountered at 1.45m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 15/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453613.56 N226507.05 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP121 | TP | 112.35m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 2.20<br>2.20 | D5 | HVP=168 | 2.10 | 110.25 | | Firm becoming stiff grey becoming dark bluish grey with depth silty CLAY. |
| | | | | | 2.40 | 109.95 | | Very stiff light bluish grey slightly gravelly CLAY. Gravel is subangular fine to medium extremely weak mudstone.<br>End of Trial Pit at 2.40m |

3

4

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | | |

Remarks

1. Groundwater was encountered at 1.45m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 16/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453008.86 N225936.84 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP146 | TP | 110.29m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Firm dark brown slightly sandy slightly gravelly silty CLAY, with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | 0.20 | ES1 | | | | | |
| | | | | | 0.30 | 109.99 | | |
| | | | | | | | | Firm light brown mottled light grey and yellowish brown slightly sandy slightly gravelly silty CLAY with occasional shell fragments. Gravel is subangular fine to coarse limestone, sand is fine to medium. |
| | | 0.40 | ES2 | | | | | |
| | | 0.50 | D1 | | | | | |
| | | 0.80 | | HVP=68 | | | | |
| | | 1.00 | D2 | | | | | |
| | | | | | 1.40 | 108.89 | | Light grey slightly clayey sandy subangular fine to coarse limestone GRAVEL, with a low cobble content. Sand is fine to medium, cobbles are subangular to subrounded extremely weak to weak limestone. |
| | | 1.50 | D3 | | | | | |
| | ▼ | | | | 1.60 | 108.69 | | Firm to stiff yellowish brown mottled light grey and orangish brown slightly sandy slightly gravelly silty CLAY, with occasional sandy silt bands (<100mm) and shell fragments. Gravel is angular to subangular fine to coarse limestone, sand is fine to coarse. |
| | | 1.70 | D4 | | | | | |
| | | 1.80 | | HVP=108 | | | | |
| | | | | | 1.90 | 108.39 | | Very stiff grey slightly gravelly CLAY. Gravel is subangular fine to medium extremely weak mudstone. |
| | | 2.00 | D5 | | | | | |

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | 1.60 | |

## Remarks

1. Groundwater was encountered at 1.6m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 16/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453008.86 N225936.84 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| TP146 | TP | 110.29m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 2.00 | | HVP=164 | | | | Very stiff grey slightly gravelly CLAY. Gravel is subangular fine to medium extremely weak mudstone. |
| | | | | | 2.10 | 108.19 | | End of Trial Pit at 2.10m |

3

4

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | Stable | | | | |

Remarks

1. Groundwater was encountered at 1.6m bgl. 2. No collapse. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 21/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453796.14 N226574.08 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA01 | TP | 115.06m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | | | | | | | Firm dark brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone. Sand is fine to medium. |
| | | | | | 0.30 | 114.76 | | Dark brown becoming light brown clayey sandy angular to subangular fine to coarse limestone GRAVEL, with a low to medium cobble and a low boulder content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone, and boulders are <220mm subrounded of weak to moderately strong limestone. |
| | | | | | 1.35 | 113.71 | | Light brown clayey very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse limestone, sand is fine to coarse. |
| | | | | | 1.69 | 113.37 | | Weak to moderately strong light grey LIMESTONE. |
| | | | | | 1.70 | 113.36 | | End of Trial Pit at 1.70m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.70 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Minor collapse of test pit sides during soakaway test. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 21/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453719.10 N226063.77 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA02 | TP | 115.17m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.20 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone. Sand is fine to medium. |
| | | | | | 0.30 | 114.87 | | |
| | | 0.40 | D1 | | | | | Light brown clayey sandy angular to subangular fine to coarse limestone GRAVEL. Sand is fine to medium. |
| | | | | | 0.65 | 114.52 | | |
| | | 0.90 | D2 | | | | | Light brown clayey sandy angular to subangular fine to coarse limestone GRAVEL, with a low to medium cobble. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone. |
| | | | | | 1.50 | 113.67 | | End of Trial Pit at 1.50m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.70 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Minor collapse of test pit sides during soakaway test. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 22/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453384.07 N226118.09 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA03 | TP | 110.67m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.10 | ES1 | | | | | Dark brown slightly gravelly clayey fine and medium SAND with frequent rootlets. Gravel is angular to subangular fine to coarse limestone. |
| | | | | | 0.20 | 110.47 | | Firm brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | 0.30 | ES2 | | | | | |
| | | | | | 0.50 | 110.17 | | Firm orangish brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | 0.60 | D1 | | | | | |
| | | | | | 1.00 | 109.67 | | Firm light brown mottled light grey slightly gravelly silty CLAY with occasional shell fragments and calcareous concretions. Gravel is angular to subangular fine to coarse limestone. |
| | | 1.10 | D2 | | | | | |
| | | | | | 1.20 | 109.47 | | Firm light grey gravelly silty CLAY. Gravel is angular to subangular fine to coarse limestone. |
| | ▼ | 1.25 | D3 | | | | | |
| | | | | | 1.30 | 109.37 | | Weak light grey LIMESTONE. |
| | | | | | 1.35 | 109.32 | | End of Trial Pit at 1.35m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.70 | 0.70 | | | | 1.30 | |

Remarks

1. Groundwater encountered at 1.3m bgl. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452510.93 N226215.99 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA04 | TP | 121.30m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.10 | ES1 | | | | | Firm dark brown slightly sandy slightly gravelly silty CLAY, with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.25 | 121.05 | | |
| | | 0.50 | D1 | | | | | Firm brown slightly sandy gravelly CLAY, with low cobble content. Gravel is subangular fine to medium limestone, cobbles are <90mm angular to subangular of extremely weak to weak limestone, sand is fine to medium. |
| | | 0.50 | ES2 | | | | | |
| | | | | | 0.60 | 120.70 | | |
| | | 1.00 | D2 | | | | | Light yellowish brown clayey sandy angular to subangular fine to coarse limestone GRAVEL with low boulder and medium cobble content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone, and boulders are <220mm subrounded of weak to moderately strong limestone. |
| | | | | | 1.10 | 120.20 | | End of Trial Pit at 1.10m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 1.70 | 0.60 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 22/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452923.70 N225852.00 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA05 | TP | 109.45m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.10 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 109.15 | | |
| | | 0.40 | ES2 | | | | | Firm light brown becoming dark greyish brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.50 | 108.95 | | |
| | | 0.60 | D1 | | | | | Soft to firm dark greyish brown slightly gravelly silty CLAY with occasional calcareous concretions. Gravel is angular to subangular fine to coarse limestone. |
| | | 1.00 | | HVP=34 | | | | |
| | | | | | 1.20 | 108.25 | | |
| | | 1.30 | D2 | | | | | Firm yellowish brown mottled light grey and orange slightly sandy clayey angular to subangular fine to coarse limestone GRAVEL. Sand is fine to medium. |
| | | | | | 1.50 | 107.95 | | End of Trial Pit at 1.50m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453474.75 N226675.07 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA06 | TP | 114.76m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.20 | ES1 | | | | | Firm dark brown slightly sandy slightly gravelly silty CLAY, with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 114.46 | | |
| | | 0.50 | D1 | | | | | Firm brown slightly sandy gravelly CLAY, with low cobble content. Gravel is subangular fine to medium limestone, cobbles are <90mm angular to subangular of extremely weak to weak limestone, sand is fine to medium. |
| | | 0.50 | ES2 | | | | | |
| | | | | | 0.70 | 114.06 | | |
| | | 1.00 | D2 | | | | | Light yellowish brown clayey sandy angular to subangular fine to coarse limestone GRAVEL with low boulder and medium cobble content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone, and boulders are <220mm subrounded of weak to moderately strong limestone. |
| | | | | | 1.10 | 113.66 | | End of Trial Pit at 1.10m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 1.70 | 0.60 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 21/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453346.00 N225796.00 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA07 | TP | 112.79m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.10 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse limestone. Sand is fine to medium. |
| | | | | | 0.25 | 112.54 | | |
| | | 0.50 | D1 | | | | | Dark brown becoming light brown clayey sandy angular to subangular fine to coarse limestone GRAVEL, with a low to medium cobble and a low boulder content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone, and boulders are <220mm subrounded of weak to moderately strong limestone. |
| | | | | | 0.90 | 111.89 | | |
| | | 1.00 | D2 | | | | | Stiff light yellowish brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 1.24 | 111.55 | | Weak to moderately strong light grey LIMESTONE. |
| | | | | | 1.25 | 111.54 | | End of Trial Pit at 1.25m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.60 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 23/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453125.86 N225607.69 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA08 | TP | 109.84m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.15 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 109.54 | | |
| | | 0.50 | D1 | | | | | Light brown slightly clayey to clayey sandy angular to subangular fine to coarse limestone GRAVEL, with a low to medium cobble. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone. |
| | | 1.10 | B1 | | | | | |
| | | 1.10 | D2 | | | | | |
| | | | | | 1.35 | 108.49 | | End of Trial Pit at 1.35m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.40 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 23/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452835.06 N225345.30 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA09 | TP | 108.92m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | | | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 108.62 | | |
| | | 0.70 | B1 | | | | | Light yellow brown slightly clayey sandy angular to subrounded fine to coarse extremely weak to weak limestone GRAVEL and COBBLES with low boulder content. Sand is fine to medium, boulders are <250mm subrounded of weak to moderately strong limestone. |
| | | | | | 1.16 | 107.76 | | End of Trial Pit at 1.16m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.70 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Collapse of test pit sides between 0.3 m and 1.16m bgl. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 23/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E453419.36 N225257.96 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA10 | TP | 108.70m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.10 | ES1 | | | | | Firm dark brown slightly gravelly sandy CLAY with frequent rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 108.40 | | |
| | | 0.40 | ES2 | | | | | Firm brown slightly sandy very gravelly CLAY, with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.55 | 108.15 | | |
| | | 0.60 | D1 | | | | | Light brown slightly clayey to clayey sandy angular to subangular fine to coarse limestone GRAVEL, with a low to medium cobble. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone. |
| | | 1.00 | D2 | | | | | |
| | | | | | 1.20 | 107.50 | | End of Trial Pit at 1.20m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 2.70 | 0.70 | | | | | |

Remarks

1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

| | | |
|---|---|---|
| Project Name: Oxfordshire RFI | Client: BWB Consulting Ltd | Date: 14/09/2021 |
| Location: Oxfordshire | Contractor: Exploration & Testing | Co-ords: E452905.04 N226390.96 |
| Project No. : C10172 | Crew Name: T&A Cox | Equipment: JCB 3CX |

| Location Number | Location Type | Level | Logged By | Scale | Status |
|---|---|---|---|---|---|
| SA11 | TP | 120.58m AoD | JAM | 1:10 | FINAL |

| Backfill | Water Strikes | Sample and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | |
| | | 0.20 | ES1 | | | | | Firm dark brown slightly sandy slightly gravelly silty CLAY, with occasional rootlets. Gravel is angular to subangular fine to coarse limestone, sand is fine to medium. |
| | | | | | 0.30 | 120.28 | | |
| | | 0.50 | ES2 | | | | | Light yellowish brown clayey sandy angular to subangular fine to coarse limestone GRAVEL with low boulder and medium cobble content. Sand is fine to medium, cobbles are angular to subangular of extremely weak to weak limestone, and boulders are <210mm subrounded of weak to moderately strong limestone. |
| | | 0.60 | D1 | | | | | |
| | | | | | 1.10 | 119.48 | | End of Trial Pit at 1.10m |

1

2

| Dimensions | | Trench Support and Comment | | | Water Stike General | |
|---|---|---|---|---|---|---|
| Pit Length | Pit Width | Pit Stability | Shoring Used | Remarks | Depth Strike | Date Time |
| 1.60 | 0.60 | | | | | |

Remarks

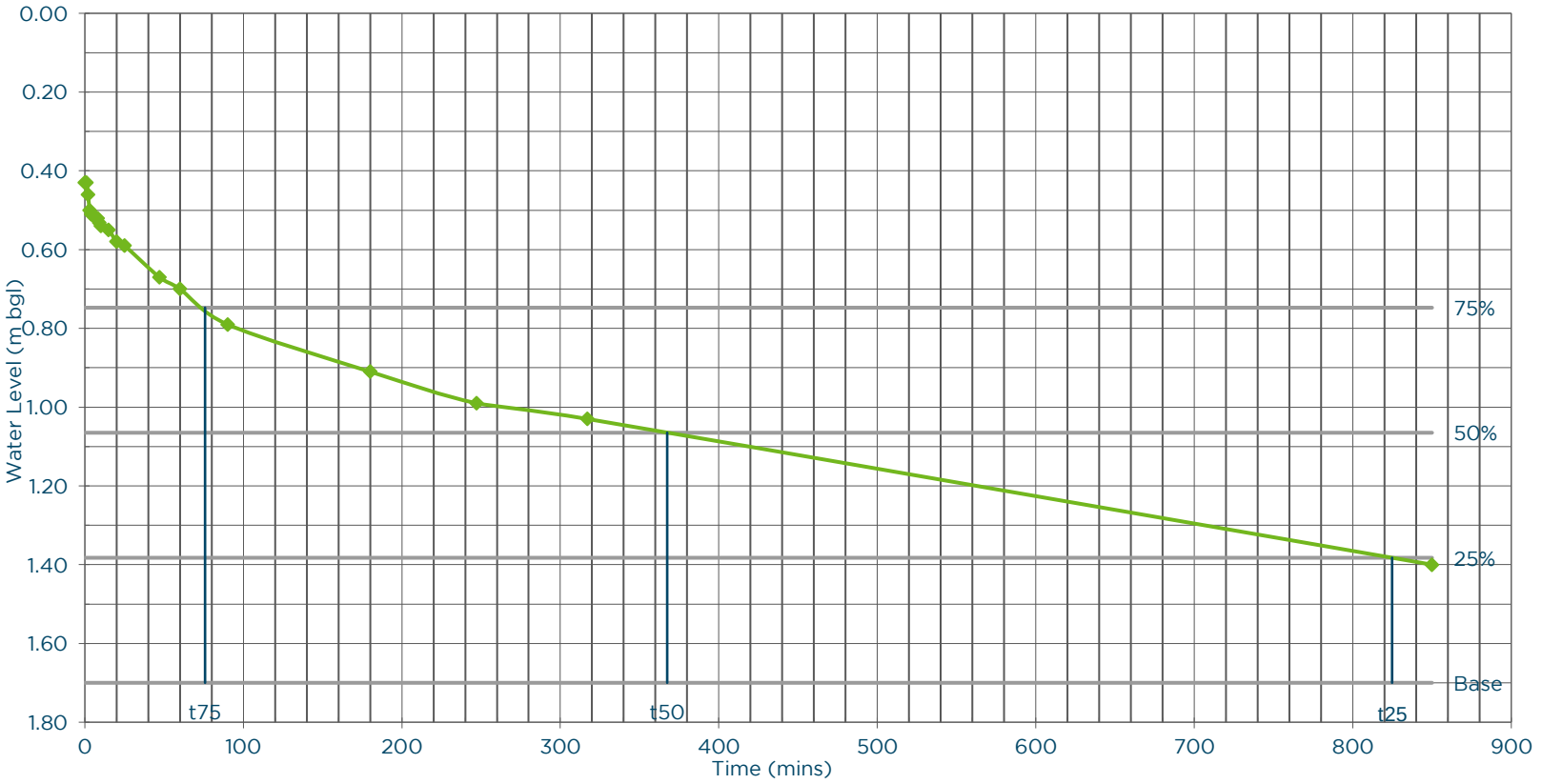
1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA01 |
| Depth (m): | 1.70 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.43 |
| 1.0 | 0.43 |
| 2.0 | 0.46 |
| 3.0 | 0.50 |
| 4.0 | 0.51 |
| 5.0 | 0.51 |
| 6.0 | 0.52 |
| 7.0 | 0.52 |
| 8.0 | 0.52 |
| 9.0 | 0.53 |
| 10.0 | 0.54 |
| 15.0 | 0.55 |
| 20.0 | 0.58 |
| 25.0 | 0.59 |
| 47.0 | 0.67 |
| 60.0 | 0.70 |
| 90.0 | 0.79 |
| 180.0 | 0.91 |
| 247.0 | 0.99 |
| 317.0 | 1.03 |
| *850.0* | *1.40* |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 9:13 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.70 |
| Effective Storage Depth (m) | 0.43 |
| Effective Drop (m) | 1.27 |
| 75% Effective Depth (m) | 0.75 |
| 50% Effective Depth (m) | 1.07 |
| 25% Effective Depth (m) | 1.38 |
| $t_{75}$ (min) | 75.83 |
| $t_{50}$ (min) | 367.42 |
| $t_{25}$ (min) | 824.79 |
| $V_{p75-25}$ | 1.20 |
| Adjusted $V_p$ for Gravel Fill | 1.20 |
| $a_{s50}$ | 6.21 |
| $t_{p75-25}$ | 748.96 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 4.30E-06 |
| Soil Infiltration Rate (mm/hr) | 1.55E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

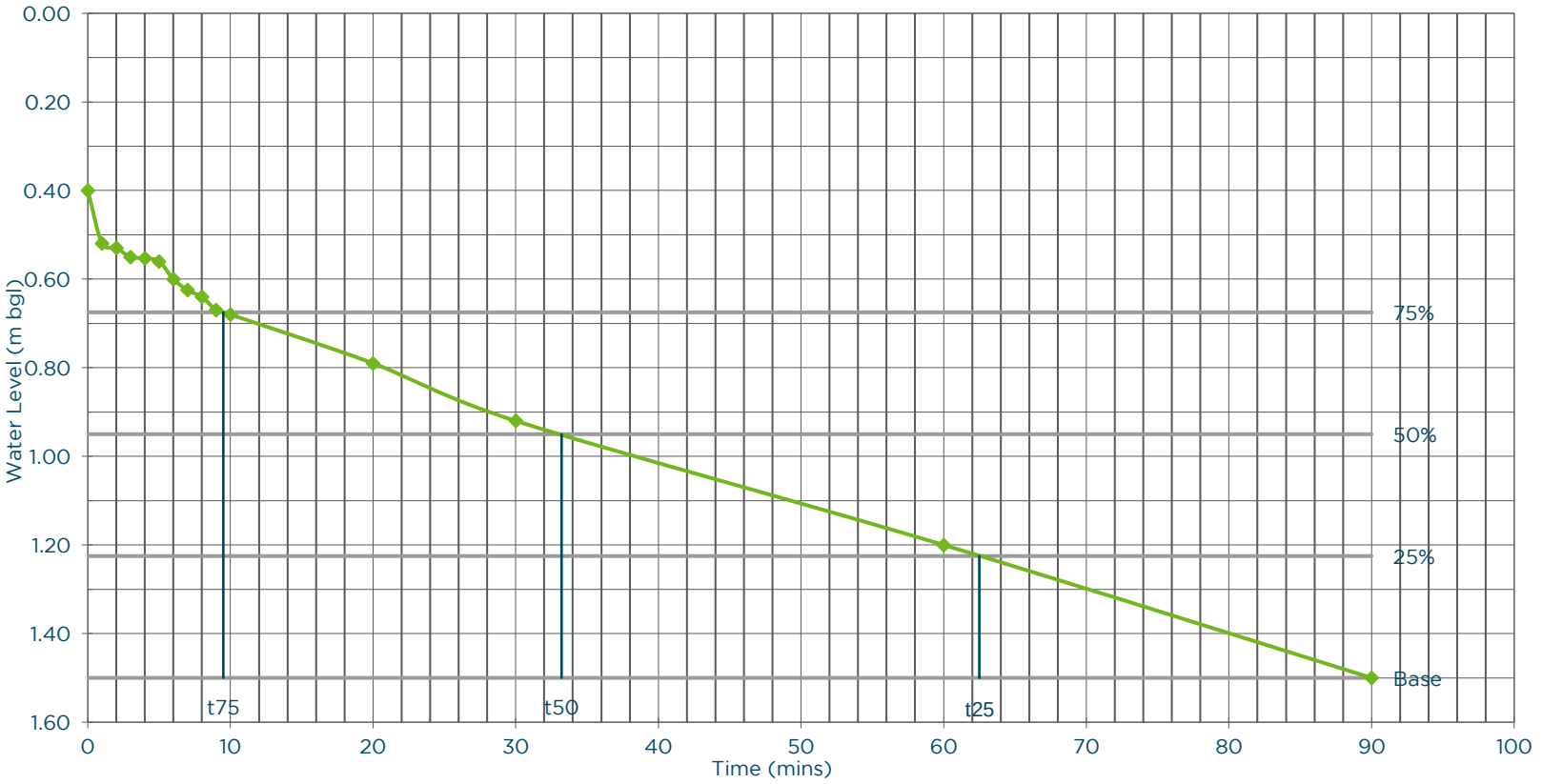
At 7 minutes small pit collapse on the south side. At 20 minutes small central collapse. Extrapolated from 317mins

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA02 |
| Depth (m): | 1.50 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.40 |
| 1 | 0.52 |
| 2 | 0.53 |
| 3 | 0.55 |
| 4 | 0.55 |
| 5 | 0.56 |
| 6 | 0.60 |
| 7 | 0.63 |
| 8 | 0.64 |
| 9 | 0.67 |
| 10 | 0.68 |
| 20 | 0.79 |
| 30 | 0.92 |
| 60 | 1.20 |
| 90 | 1.50 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 11:06 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.50 |
| Effective Storage Depth (m) | 0.40 |
| Effective Drop (m) | 1.10 |
| 75% Effective Depth (m) | 0.68 |
| 50% Effective Depth (m) | 0.95 |
| 25% Effective Depth (m) | 1.23 |
| $t_{75}$ (min) | 9.50 |
| $t_{50}$ (min) | 33.21 |
| $t_{25}$ (min) | 62.50 |
| $V_{p75-25}$ | 1.04 |
| Adjusted $V_p$ for Gravel Fill | 1.04 |
| $a_{s50}$ | 5.63 |
| $t_{p75-25}$ | 53.00 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 5.81E-05 |
| Soil Infiltration Rate (mm/hr) | 2.09E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

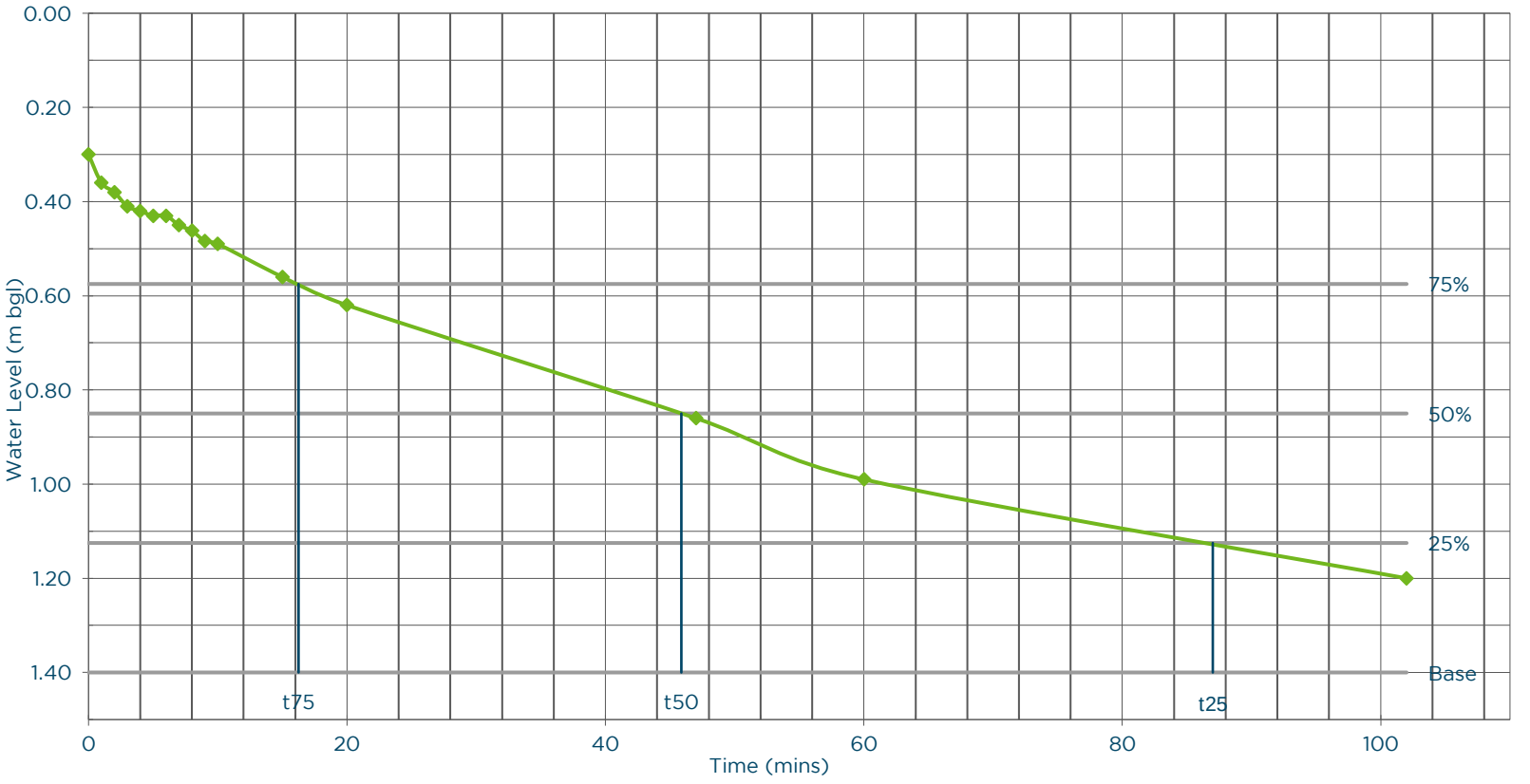
Small side wall collapse at 10 minutes. Fully drained by 90 minutes.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA02 |
| Depth (m): | 1.40 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.30 |
| 1 | 0.36 |
| 2 | 0.38 |
| 3 | 0.41 |
| 4 | 0.42 |
| 5 | 0.43 |
| 6 | 0.43 |
| 7 | 0.45 |
| 8 | 0.46 |
| 9 | 0.48 |
| 10 | 0.49 |
| 15 | 0.56 |
| 20 | 0.62 |
| 47 | 0.86 |
| 60 | 0.99 |
| 102 | 1.20 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 12:38 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.40 |
| Effective Storage Depth (m) | 0.30 |
| Effective Drop (m) | 1.10 |
| 75% Effective Depth (m) | 0.58 |
| 50% Effective Depth (m) | 0.85 |
| 25% Effective Depth (m) | 1.13 |
| $t_{75}$ (min) | 16.25 |
| $t_{50}$ (min) | 45.88 |
| $t_{25}$ (min) | 87.00 |
| $V_{p75-25}$ | 1.04 |
| Adjusted $V_p$ for Gravel Fill | 1.04 |
| $a_{s50}$ | 5.63 |
| $t_{p75-25}$ | 70.75 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 4.35E-05 |
| Soil Infiltration Rate (mm/hr) | 1.57E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

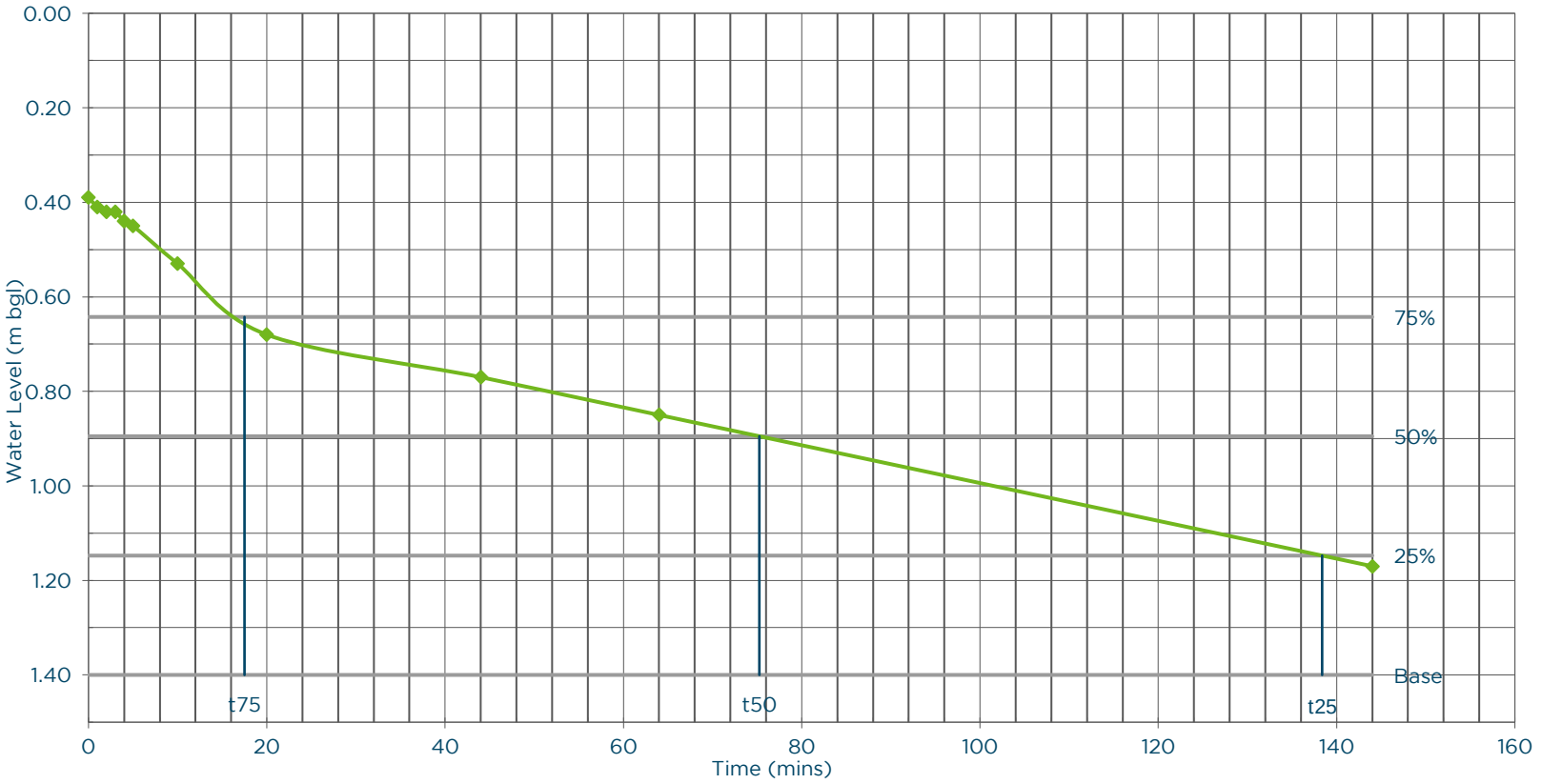
Base depth reduced to 1.4m following collapse during Test 1.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA02 |
| Depth (m): | 1.40 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.39 |
| 1 | 0.41 |
| 2 | 0.42 |
| 3 | 0.42 |
| 4 | 0.44 |
| 5 | 0.45 |
| 10 | 0.53 |
| 20 | 0.68 |
| 44 | 0.77 |
| 64 | 0.85 |
| *144.0* | *1.17* |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 3 |
| Test Start Time: | 14:26 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.40 |
| Effective Storage Depth (m) | 0.39 |
| Effective Drop (m) | 1.01 |
| 75% Effective Depth (m) | 0.64 |
| 50% Effective Depth (m) | 0.90 |
| 25% Effective Depth (m) | 1.15 |
| $t_{75}$ (min) | 17.50 |
| $t_{50}$ (min) | 75.25 |
| $t_{25}$ (min) | 138.38 |
| $V_{p75-25}$ | 0.95 |
| Adjusted $V_p$ for Gravel Fill | 0.95 |
| $a_{s50}$ | 5.32 |
| $t_{p75-25}$ | 120.88 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 2.47E-05 |
| Soil Infiltration Rate (mm/hr) | 8.90E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

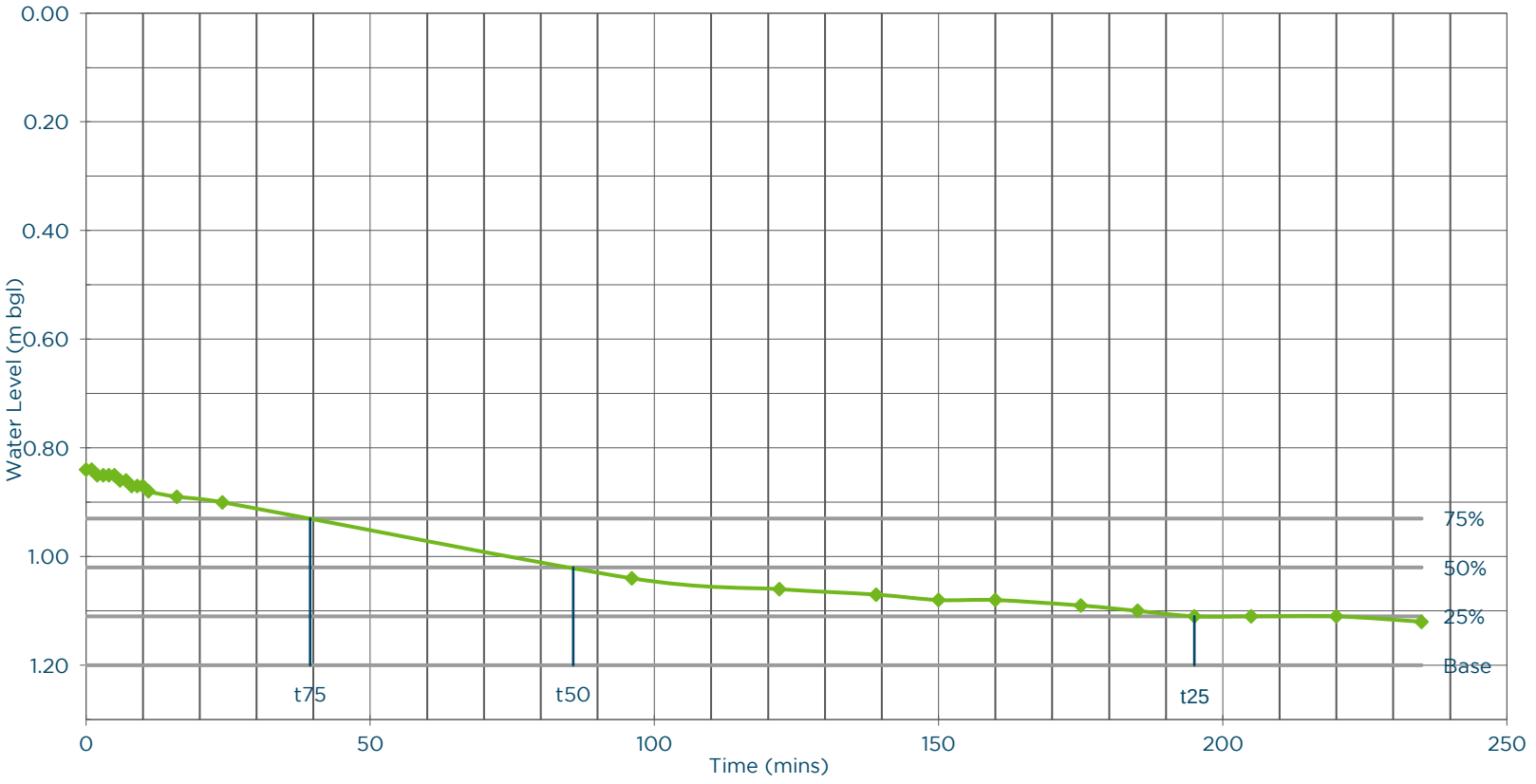
Test not completed due to time constraints. Italicised results are extrapolated values.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 22/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA03 |
| Depth (m): | 1.20 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | 1.20 |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.84 |
| 1 | 0.84 |
| 2 | 0.85 |
| 3 | 0.85 |
| 4 | 0.85 |
| 5 | 0.85 |
| 6 | 0.86 |
| 7 | 0.86 |
| 8 | 0.87 |
| 9 | 0.87 |
| 10 | 0.87 |
| 11 | 0.88 |
| 16 | 0.89 |
| 24 | 0.90 |
| 96 | 1.04 |
| 122 | 1.06 |
| 139 | 1.07 |
| 150 | 1.08 |
| 160 | 1.08 |
| 175 | 1.09 |
| 185 | 1.10 |
| 195 | 1.11 |
| 205 | 1.11 |
| 220 | 1.11 |
| 235 | 1.12 |
| | |
| | |
| | |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 8:54 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.84 |
| Effective Drop (m) | 0.36 |
| 75% Effective Depth (m) | 0.93 |
| 50% Effective Depth (m) | 1.02 |
| 25% Effective Depth (m) | 1.11 |
| $t_{75}$ (min) | 39.43 |
| $t_{50}$ (min) | 85.71 |
| $t_{25}$ (min) | 195.00 |
| $V_{p75-25}$ | 0.34 |
| Adjusted $V_p$ for Gravel Fill | 0.34 |
| $a_{s50}$ | 3.11 |
| $t_{p75-25}$ | 155.57 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.17E-05 |
| Soil Infiltration Rate (mm/hr) | 4.21E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

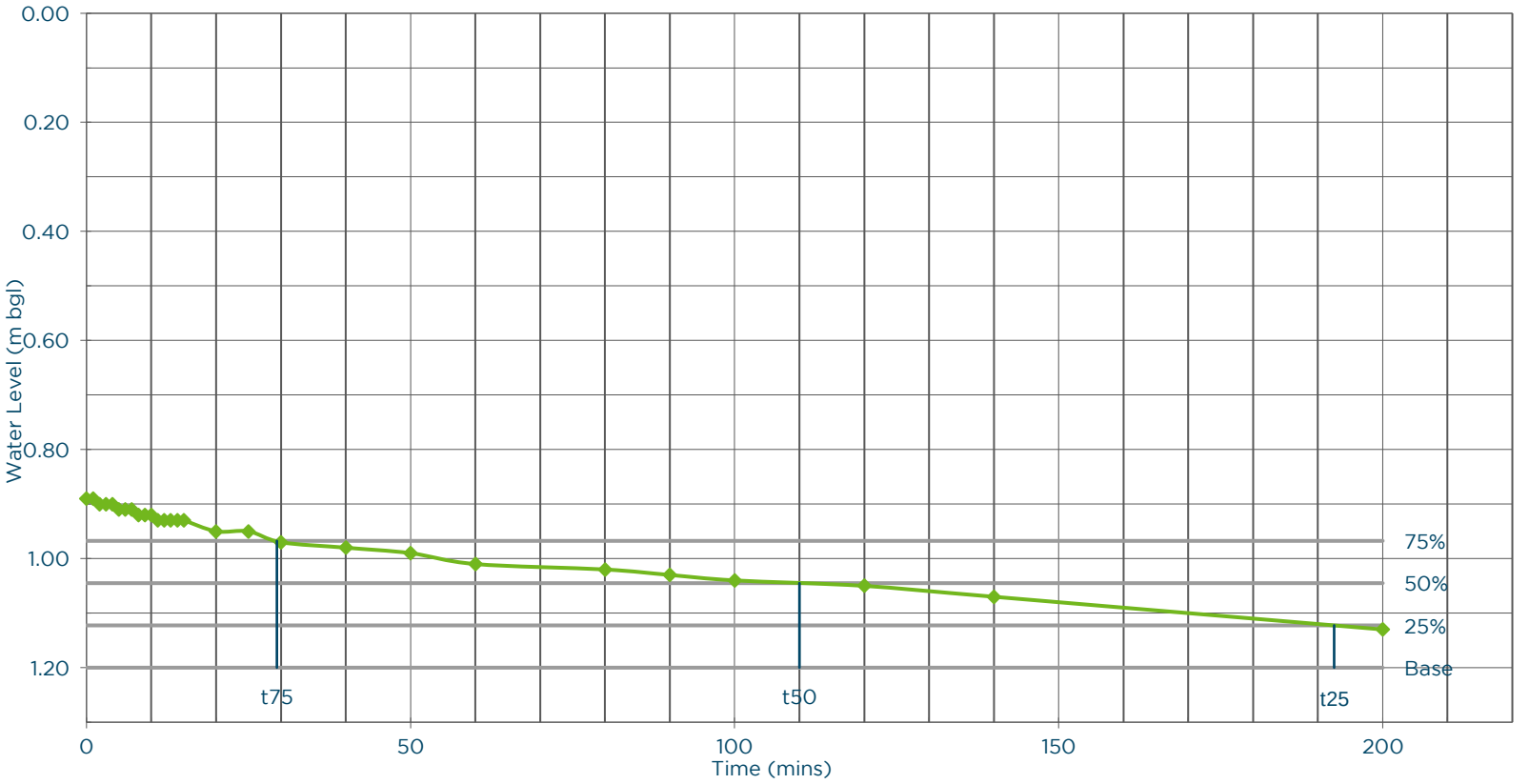
Perched water at 1.20m below ground level.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB |
| Date: | 22/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA03 |
| Depth (m): | 1.20 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | 1.20 |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.89 |
| 1 | 0.89 |
| 2 | 0.90 |
| 3 | 0.90 |
| 4 | 0.90 |
| 5 | 0.91 |
| 6 | 0.91 |
| 7 | 0.91 |
| 8 | 0.92 |
| 9 | 0.92 |
| 10 | 0.92 |
| 11 | 0.93 |
| 12 | 0.93 |
| 13 | 0.93 |
| 14 | 0.93 |
| 15 | 0.93 |
| 20 | 0.95 |
| 25 | 0.95 |
| 30 | 0.97 |
| 40 | 0.98 |
| 50 | 0.99 |
| 60 | 1.01 |
| 80 | 1.02 |
| 90 | 1.03 |
| 100 | 1.04 |
| 120.0 | 1.05 |
| 140.0 | 1.07 |
| *200.0* | *1.13* |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 13:10 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.89 |
| Effective Drop (m) | 0.31 |
| 75% Effective Depth (m) | 0.97 |
| 50% Effective Depth (m) | 1.05 |
| 25% Effective Depth (m) | 1.12 |
| $t_{75}$ (min) | 29.38 |
| $t_{50}$ (min) | 110.00 |
| $t_{25}$ (min) | 192.50 |
| $V_{p75-25}$ | 0.29 |
| Adjusted $V_p$ for Gravel Fill | 0.29 |
| $a_{s50}$ | 2.94 |
| $t_{p75-25}$ | 163.13 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.02E-05 |
| Soil Infiltration Rate (mm/hr) | 3.66E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

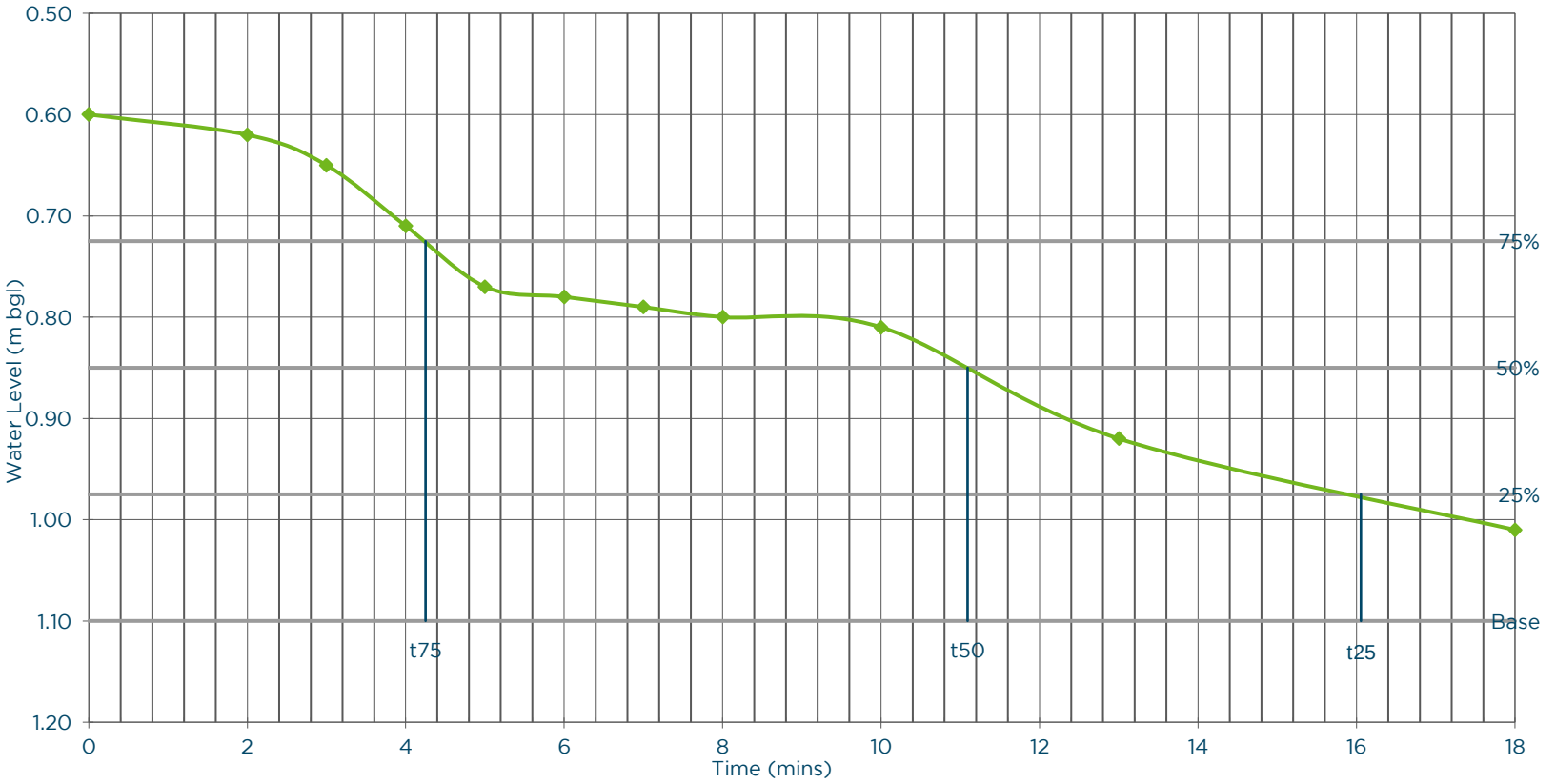
Partial pit collapse at 7 minutes and 20 minutes. Test not completed due to time constraints. Extrapolated values are italicised.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA04 |
| Depth (m): | 1.10 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.60 |
| 2.0 | 0.62 |
| 3.0 | 0.65 |
| 4.0 | 0.71 |
| 5.0 | 0.77 |
| 6.0 | 0.78 |
| 7.0 | 0.79 |
| 8.0 | 0.80 |
| 10.0 | 0.81 |
| 13.0 | 0.92 |
| 18.0 | 1.01 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 12:50 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.10 |
| Effective Storage Depth (m) | 0.60 |
| Effective Drop (m) | 0.50 |
| 75% Effective Depth (m) | 0.73 |
| 50% Effective Depth (m) | 0.85 |
| 25% Effective Depth (m) | 0.98 |
| $t_{75}$ (min) | 4.25 |
| $t_{50}$ (min) | 11.09 |
| $t_{25}$ (min) | 16.06 |
| $V_{p75-25}$ | 0.26 |
| Adjusted $V_p$ for Gravel Fill | 0.26 |
| $a_{s50}$ | 2.17 |
| $t_{p75-25}$ | 11.81 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.66E-04 |
| Soil Infiltration Rate (mm/hr) | 5.97E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

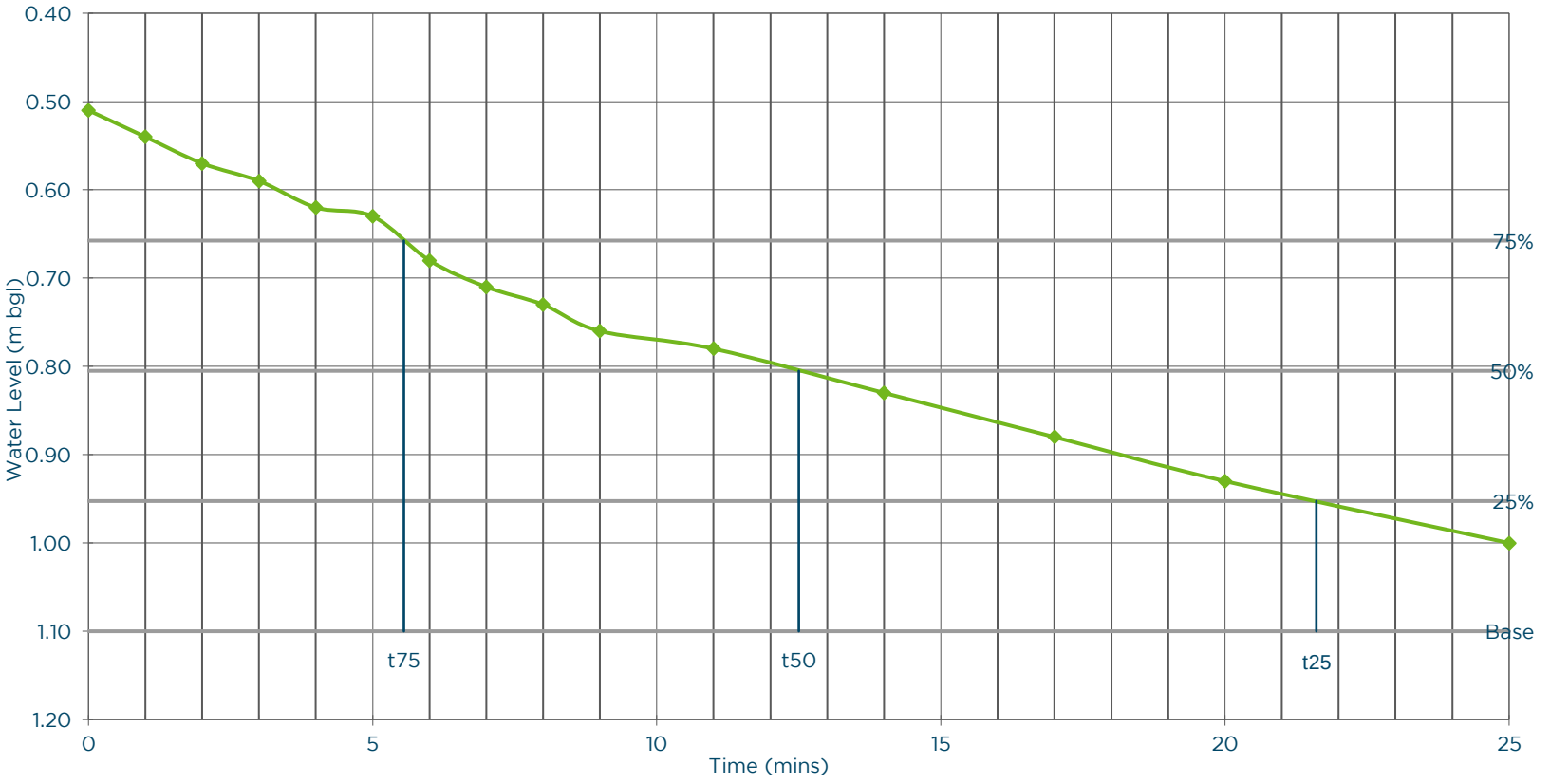
**Comments**

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA04 |
| Depth (m): | 1.10 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.51 |
| 1.0 | 0.54 |
| 2.0 | 0.57 |
| 3.0 | 0.59 |
| 4.0 | 0.62 |
| 5.0 | 0.63 |
| 6.0 | 0.68 |
| 7.0 | 0.71 |
| 8.0 | 0.73 |
| 9.0 | 0.76 |
| 11.0 | 0.78 |
| 14.0 | 0.83 |
| 17.0 | 0.88 |
| 20.0 | 0.93 |
| 25.0 | 1.00 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 13:11 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.10 |
| Effective Storage Depth (m) | 0.51 |
| Effective Drop (m) | 0.59 |
| 75% Effective Depth (m) | 0.66 |
| 50% Effective Depth (m) | 0.81 |
| 25% Effective Depth (m) | 0.95 |
| $t_{75}$ (min) | 5.55 |
| $t_{50}$ (min) | 12.50 |
| $t_{25}$ (min) | 21.61 |
| $V_{p75-25}$ | 0.30 |
| Adjusted $V_p$ for Gravel Fill | 0.30 |
| $a_{s50}$ | 2.38 |
| $t_{p75-25}$ | 16.06 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.31E-04 |
| Soil Infiltration Rate (mm/hr) | 4.73E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

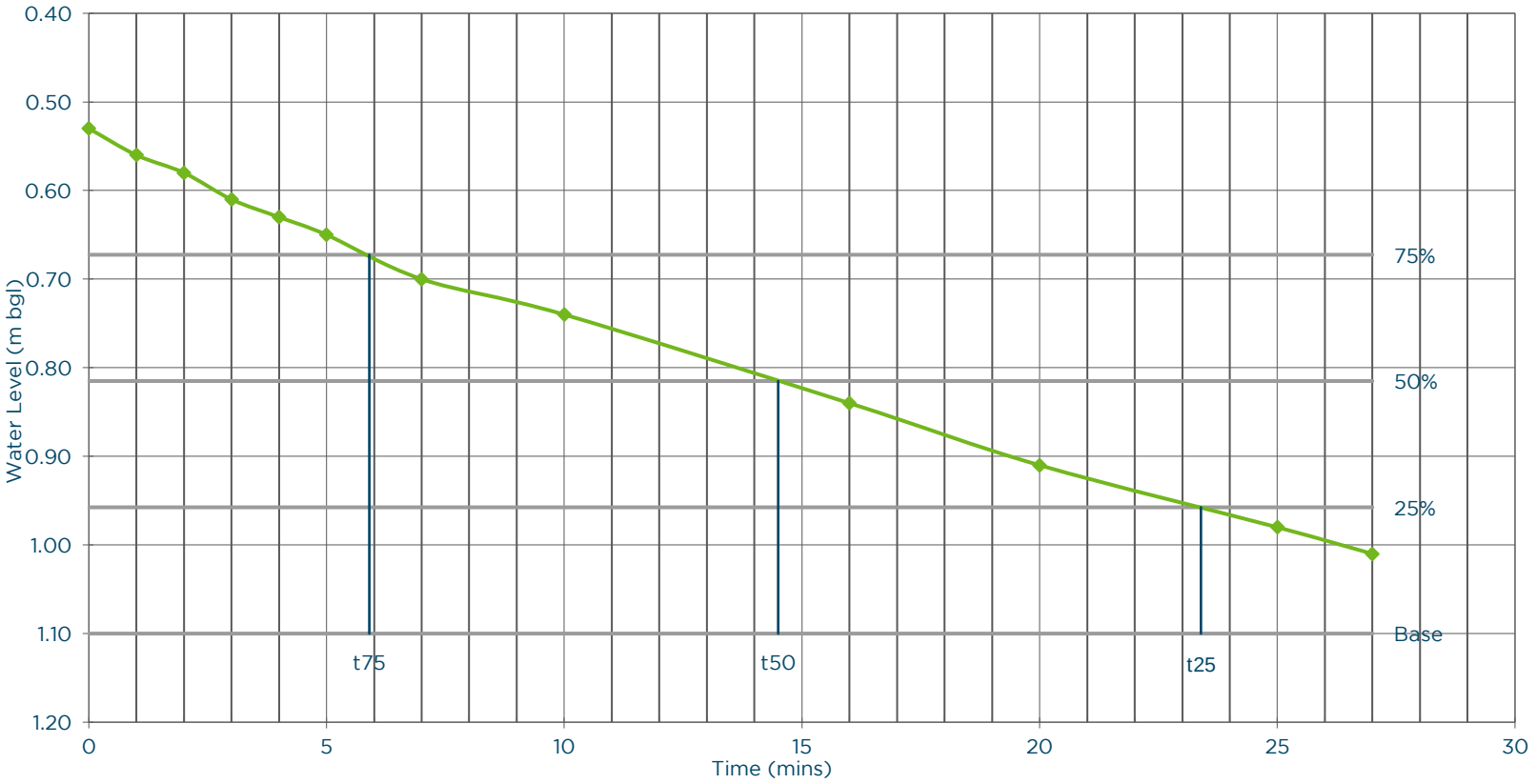
**Comments**

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA04 |
| Depth (m): | 1.10 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.53 |
| 1.0 | 0.56 |
| 2.0 | 0.58 |
| 3.0 | 0.61 |
| 4.0 | 0.63 |
| 5.0 | 0.65 |
| 7.0 | 0.70 |
| 10.0 | 0.74 |
| 16.0 | 0.84 |
| 20.0 | 0.91 |
| 25.0 | 0.98 |
| 27.0 | 1.01 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 3 |
| Test Start Time: | 13:40 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.10 |
| Effective Storage Depth (m) | 0.53 |
| Effective Drop (m) | 0.57 |
| 75% Effective Depth (m) | 0.67 |
| 50% Effective Depth (m) | 0.82 |
| 25% Effective Depth (m) | 0.96 |
| $t_{75}$ (min) | 5.90 |
| $t_{50}$ (min) | 14.50 |
| $t_{25}$ (min) | 23.39 |
| $V_{p75-25}$ | 0.29 |
| Adjusted $V_p$ for Gravel Fill | 0.29 |
| $a_{s50}$ | 2.33 |
| $t_{p75-25}$ | 17.49 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.19E-04 |
| Soil Infiltration Rate (mm/hr) | 4.28E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

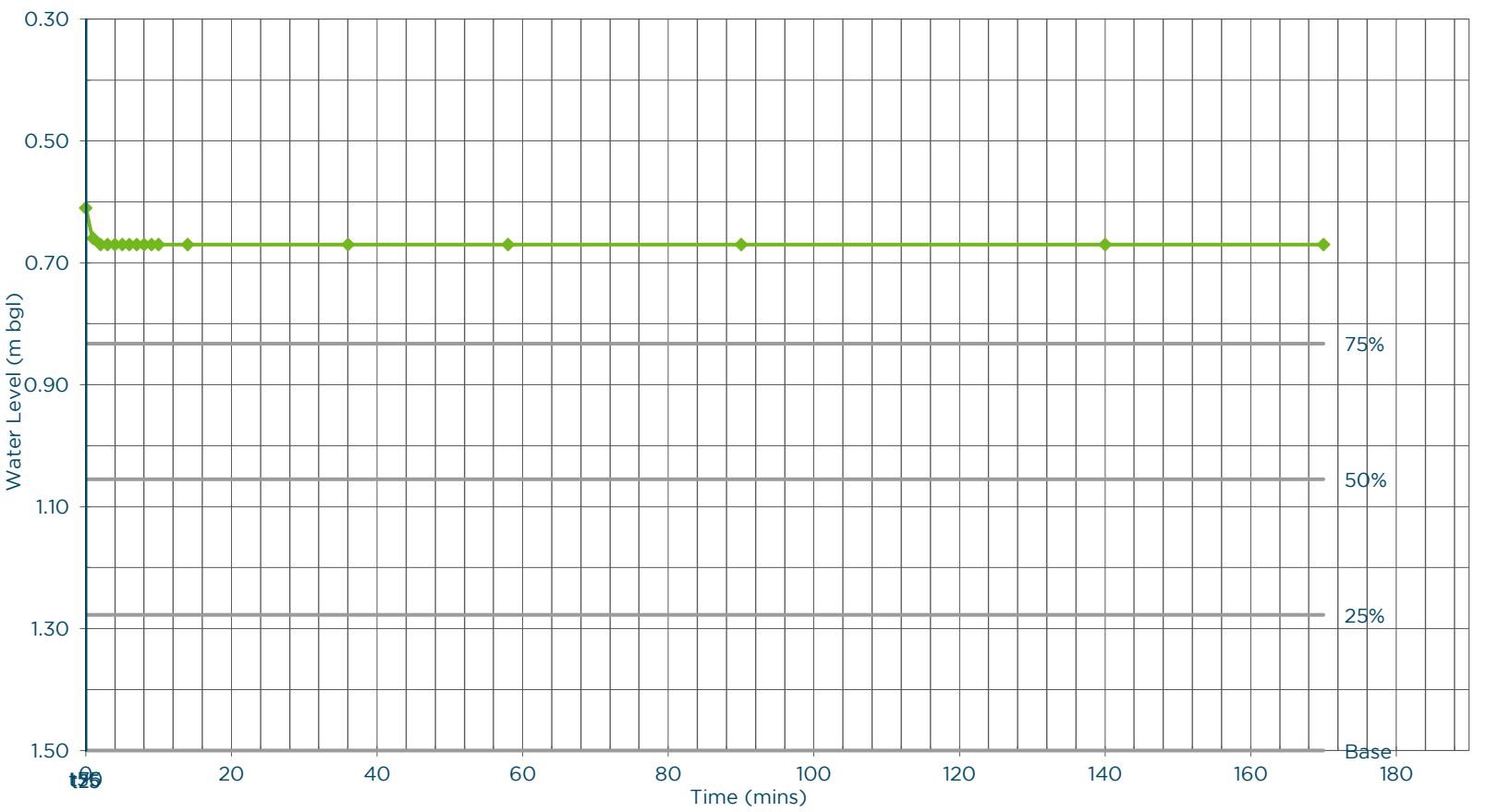
**Comments**

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA05 |
| Depth (m): | 1.50 |
| Width (m): | 0.60 |
| Length (m): | 2.80 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.61 |
| 1 | 0.66 |
| 2 | 0.67 |
| 3 | 0.67 |
| 4 | 0.67 |
| 5 | 0.67 |
| 6 | 0.67 |
| 7 | 0.67 |
| 8 | 0.67 |
| 9 | 0.67 |
| 10 | 0.67 |
| 14 | 0.67 |
| 36 | 0.67 |
| 58 | 0.67 |
| 90 | 0.67 |
| 140 | 0.67 |
| 170 | 0.67 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 09:13 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.50 |
| Effective Storage Depth (m) | 0.61 |
| Effective Drop (m) | 0.89 |
| 75% Effective Depth (m) | 0.83 |
| 50% Effective Depth (m) | 1.06 |
| 25% Effective Depth (m) | 1.28 |
| $t_{75}$ (min) | 0.00 |
| $t_{50}$ (min) | 0.00 |
| $t_{25}$ (min) | 0.00 |
| $V_{p75-25}$ | 0.75 |
| Adjusted $V_p$ for Gravel Fill | 0.75 |
| $a_{s50}$ | 4.71 |
| $t_{p75-25}$ | 0.00 |
| **Results** | |
| Soil Infiltration Rate (m/s) | |
| Soil Infiltration Rate (mm/hr) | |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

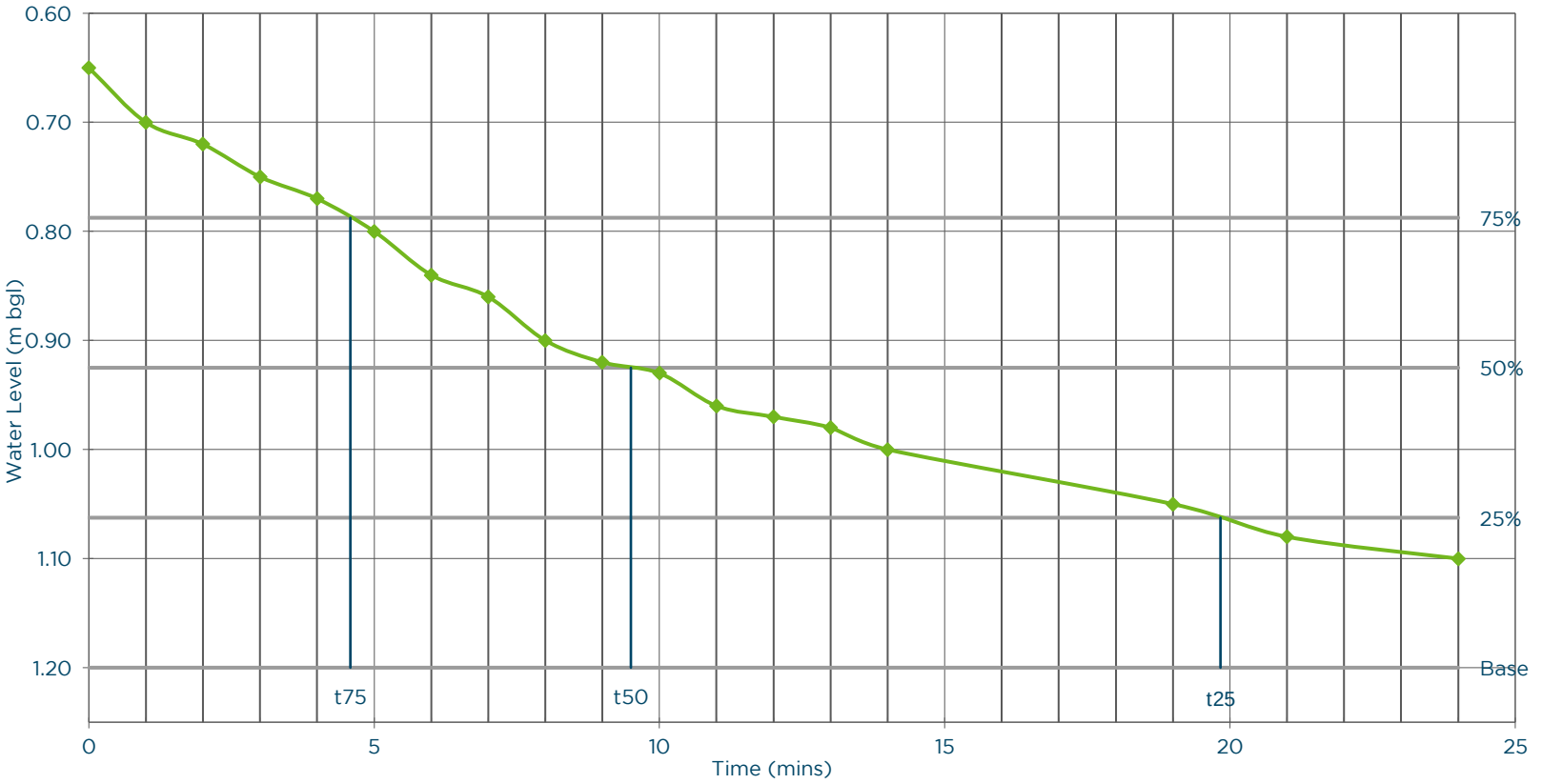
No drainage, test stopped after 3hrs.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA06 |
| Depth (m): | 1.20 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.65 |
| 1.0 | 0.70 |
| 2.0 | 0.72 |
| 3.0 | 0.75 |
| 4.0 | 0.77 |
| 5.0 | 0.80 |
| 6.0 | 0.84 |
| 7.0 | 0.86 |
| 8.0 | 0.90 |
| 9.0 | 0.92 |
| 10.0 | 0.93 |
| 11.0 | 0.96 |
| 12.0 | 0.97 |
| 13.0 | 0.98 |
| 14.0 | 1.00 |
| 19.0 | 1.05 |
| 21.0 | 1.08 |
| 24.0 | 1.10 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 10:30 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.65 |
| Effective Drop (m) | 0.55 |
| 75% Effective Depth (m) | 0.79 |
| 50% Effective Depth (m) | 0.93 |
| 25% Effective Depth (m) | 1.06 |
| $t_{75}$ (min) | 4.58 |
| $t_{50}$ (min) | 9.50 |
| $t_{25}$ (min) | 19.83 |
| $V_{p75-25}$ | 0.28 |
| Adjusted $V_p$ for Gravel Fill | 0.28 |
| $a_{s50}$ | 2.29 |
| $t_{p75-25}$ | 15.25 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.34E-04 |
| Soil Infiltration Rate (mm/hr) | 4.83E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

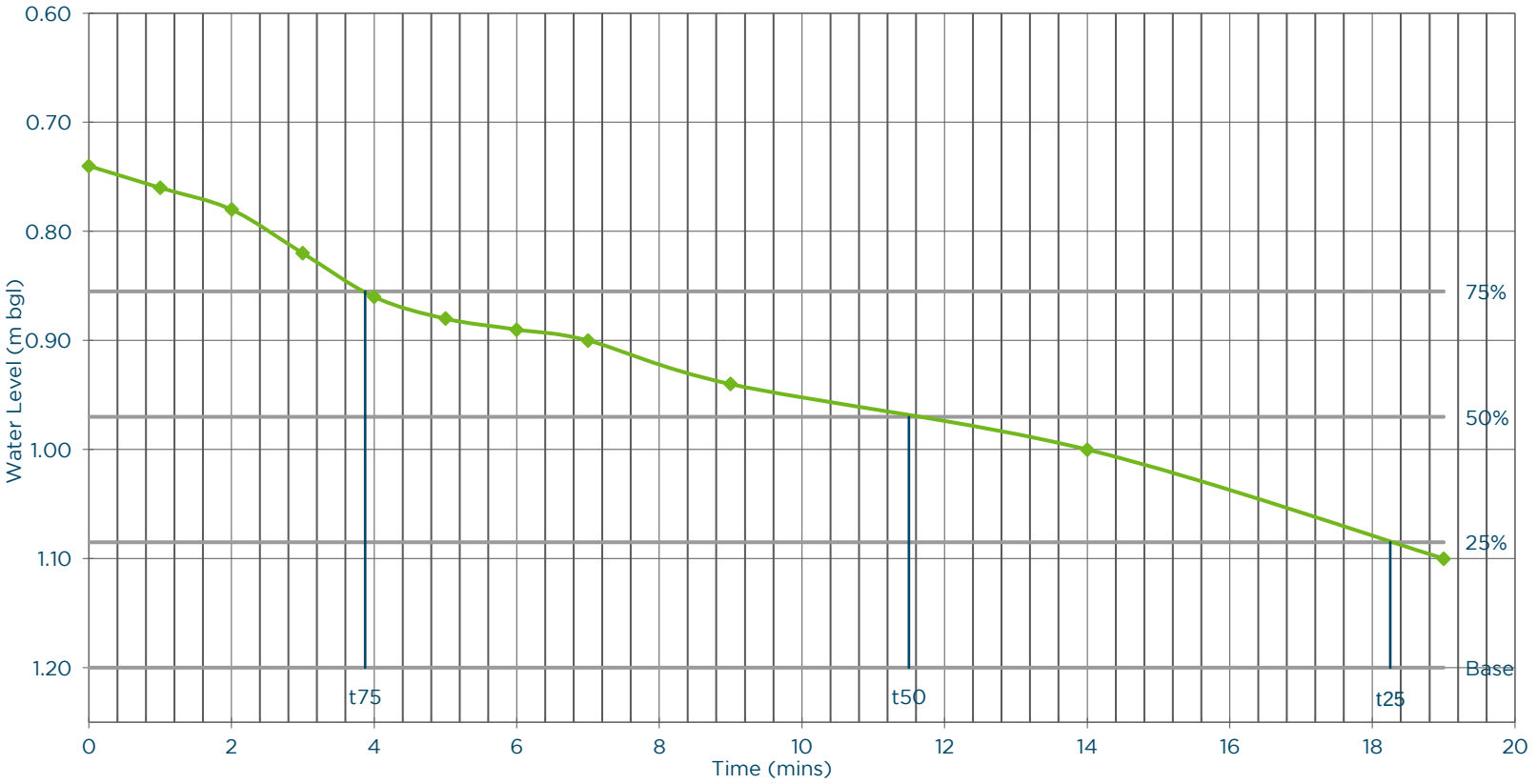
Fully drained at 11:00.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA06 |
| Depth (m): | 1.20 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.74 |
| 1.0 | 0.76 |
| 2.0 | 0.78 |
| 3.0 | 0.82 |
| 4.0 | 0.86 |
| 5.0 | 0.88 |
| 6.0 | 0.89 |
| 7.0 | 0.90 |
| 9.0 | 0.94 |
| 14.0 | 1.00 |
| 19.0 | 1.10 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 11:04 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.74 |
| Effective Drop (m) | 0.46 |
| 75% Effective Depth (m) | 0.86 |
| 50% Effective Depth (m) | 0.97 |
| 25% Effective Depth (m) | 1.09 |
| $t_{75}$ (min) | 3.88 |
| $t_{50}$ (min) | 11.50 |
| $t_{25}$ (min) | 18.25 |
| $V_{p75-25}$ | 0.23 |
| Adjusted $V_p$ for Gravel Fill | 0.23 |
| $a_{s50}$ | 2.08 |
| $t_{p75-25}$ | 14.38 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.31E-04 |
| Soil Infiltration Rate (mm/hr) | 4.71E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

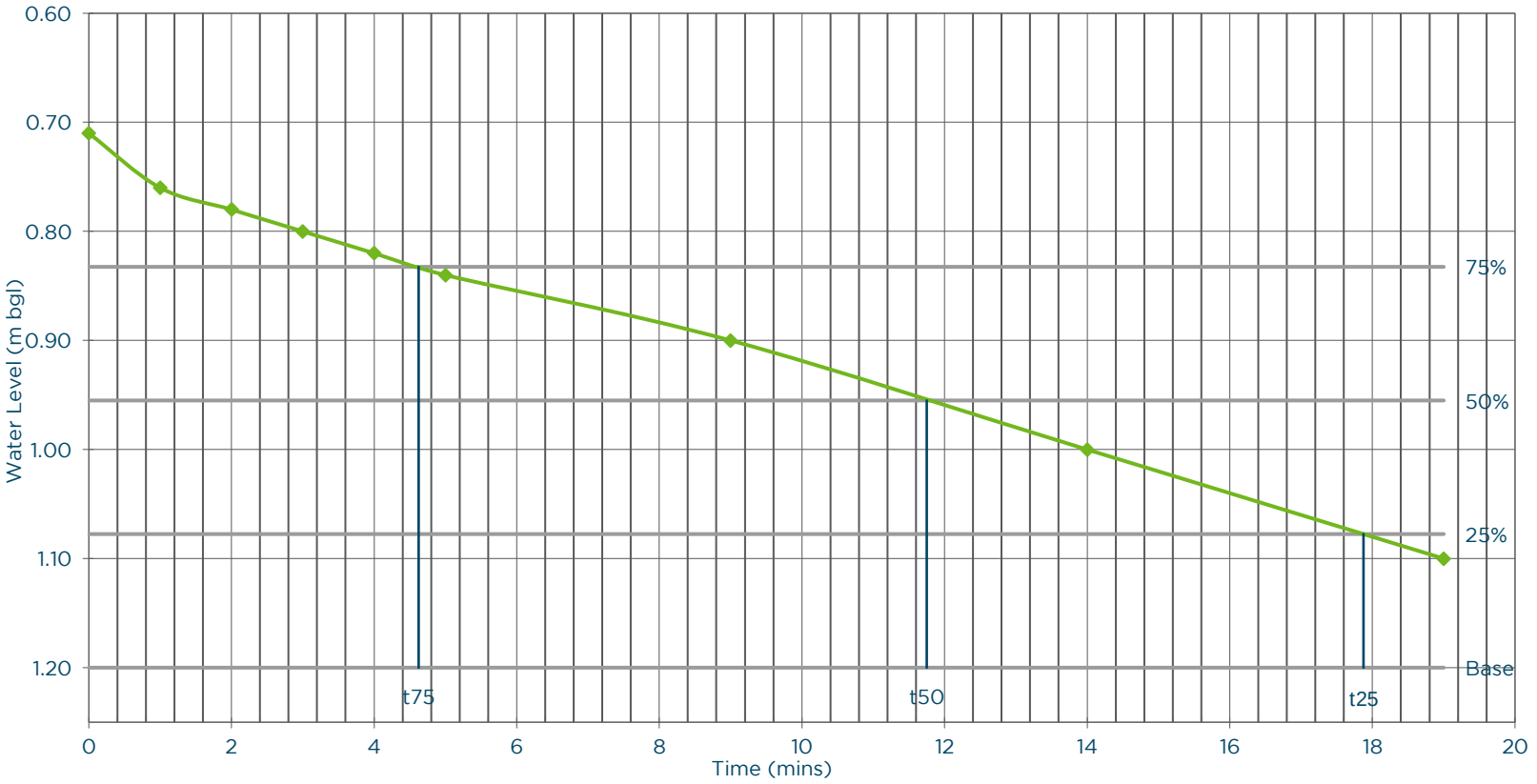
Fully drained at 11:20.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA06 |
| Depth (m): | 1.20 |
| Width (m): | 0.60 |
| Length (m): | 1.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.71 |
| 1.0 | 0.76 |
| 2.0 | 0.78 |
| 3.0 | 0.80 |
| 4.0 | 0.82 |
| 5.0 | 0.84 |
| 9.0 | 0.90 |
| 14.0 | 1.00 |
| 19.0 | 1.10 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 3 |
| Test Start Time: | 11:25 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.71 |
| Effective Drop (m) | 0.49 |
| 75% Effective Depth (m) | 0.83 |
| 50% Effective Depth (m) | 0.96 |
| 25% Effective Depth (m) | 1.08 |
| $t_{75}$ (min) | 4.63 |
| $t_{50}$ (min) | 11.75 |
| $t_{25}$ (min) | 17.88 |
| $V_{p75-25}$ | 0.25 |
| Adjusted $V_p$ for Gravel Fill | 0.25 |
| $a_{s50}$ | 2.15 |
| $t_{p75-25}$ | 13.25 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.46E-04 |
| Soil Infiltration Rate (mm/hr) | 5.27E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

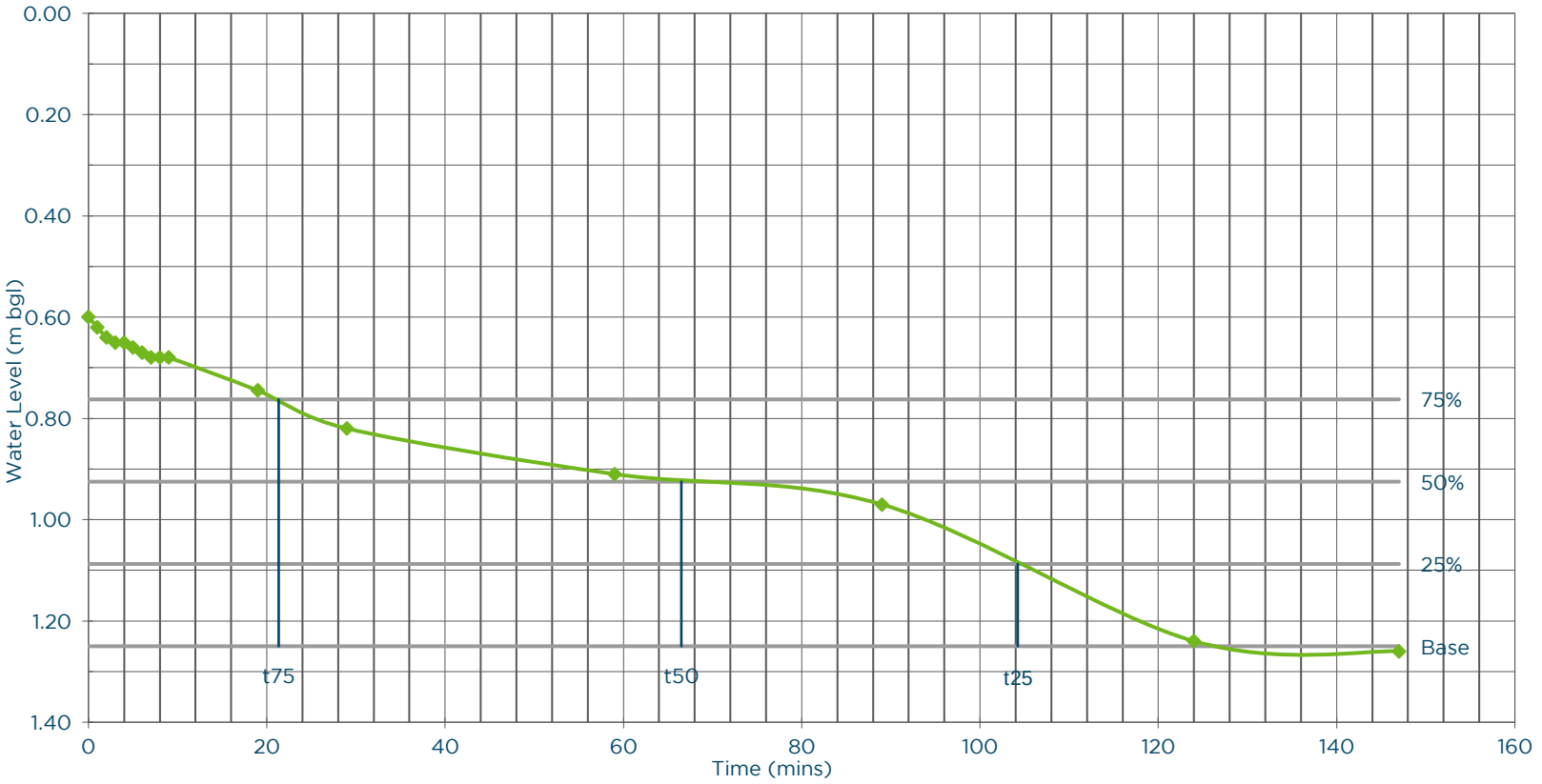
Fully drained at 11:45. Test pit backfilled.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA07 |
| Depth (m): | 1.25 |
| Width (m): | 0.70 |
| Length (m): | 2.60 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.60 |
| 1 | 0.62 |
| 2 | 0.64 |
| 3 | 0.65 |
| 4 | 0.65 |
| 5 | 0.66 |
| 6 | 0.67 |
| 7 | 0.68 |
| 8 | 0.68 |
| 9 | 0.68 |
| 19 | 0.75 |
| 29.0 | 0.82 |
| 59.0 | 0.91 |
| 89.0 | 0.97 |
| 124.0 | 1.24 |
| 147.0 | 1.26 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 11:42 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.25 |
| Effective Storage Depth (m) | 0.60 |
| Effective Drop (m) | 0.65 |
| 75% Effective Depth (m) | 0.76 |
| 50% Effective Depth (m) | 0.93 |
| 25% Effective Depth (m) | 1.09 |
| $t_{75}$ (min) | 21.33 |
| $t_{50}$ (min) | 66.50 |
| $t_{25}$ (min) | 104.23 |
| $V_{p75\text{-}25}$ | 0.59 |
| Adjusted $V_p$ for Gravel Fill | 0.59 |
| $a_{s50}$ | 3.97 |
| $t_{p75\text{-}25}$ | 82.90 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 3.00E-05 |
| Soil Infiltration Rate (mm/hr) | 1.08E+02 |

**References**


BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

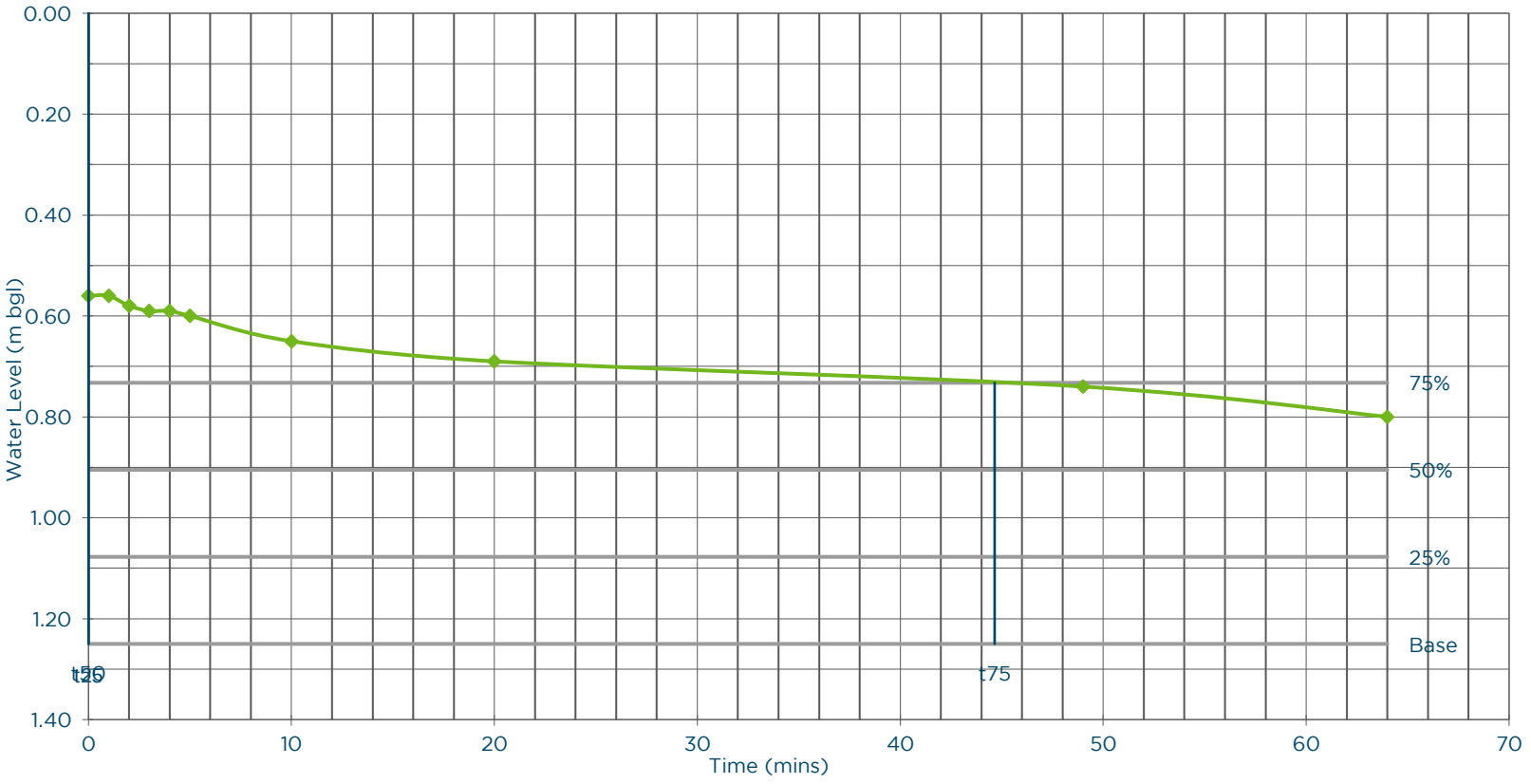

**Comments**

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA07 |
| Depth (m): | 1.25 |
| Width (m): | 0.70 |
| Length (m): | 2.60 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.56 |
| 1.0 | 0.56 |
| 2.0 | 0.58 |
| 3.0 | 0.59 |
| 4.0 | 0.59 |
| 5.0 | 0.60 |
| 10.0 | 0.65 |
| 20.0 | 0.69 |
| 49.0 | 0.74 |
| 64.0 | 0.80 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 14:36 |
| Method of Calculation | |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.25 |
| Effective Storage Depth (m) | 0.56 |
| Effective Drop (m) | 0.69 |
| 75% Effective Depth (m) | 0.73 |
| 50% Effective Depth (m) | 0.91 |
| 25% Effective Depth (m) | 1.08 |
| $t_{75}$ (min) | 44.65 |
| $t_{50}$ (min) | |
| $t_{25}$ (min) | |
| $V_{p75-25}$ | 0.63 |
| Adjusted $V_p$ for Gravel Fill | 0.63 |
| $a_{s50}$ | 4.10 |
| $t_{p75-25}$ | |

| Results | |
|---|---|
| Soil Infiltration Rate (m/s) | N/A |
| Soil Infiltration Rate (mm/hr) | N/A |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

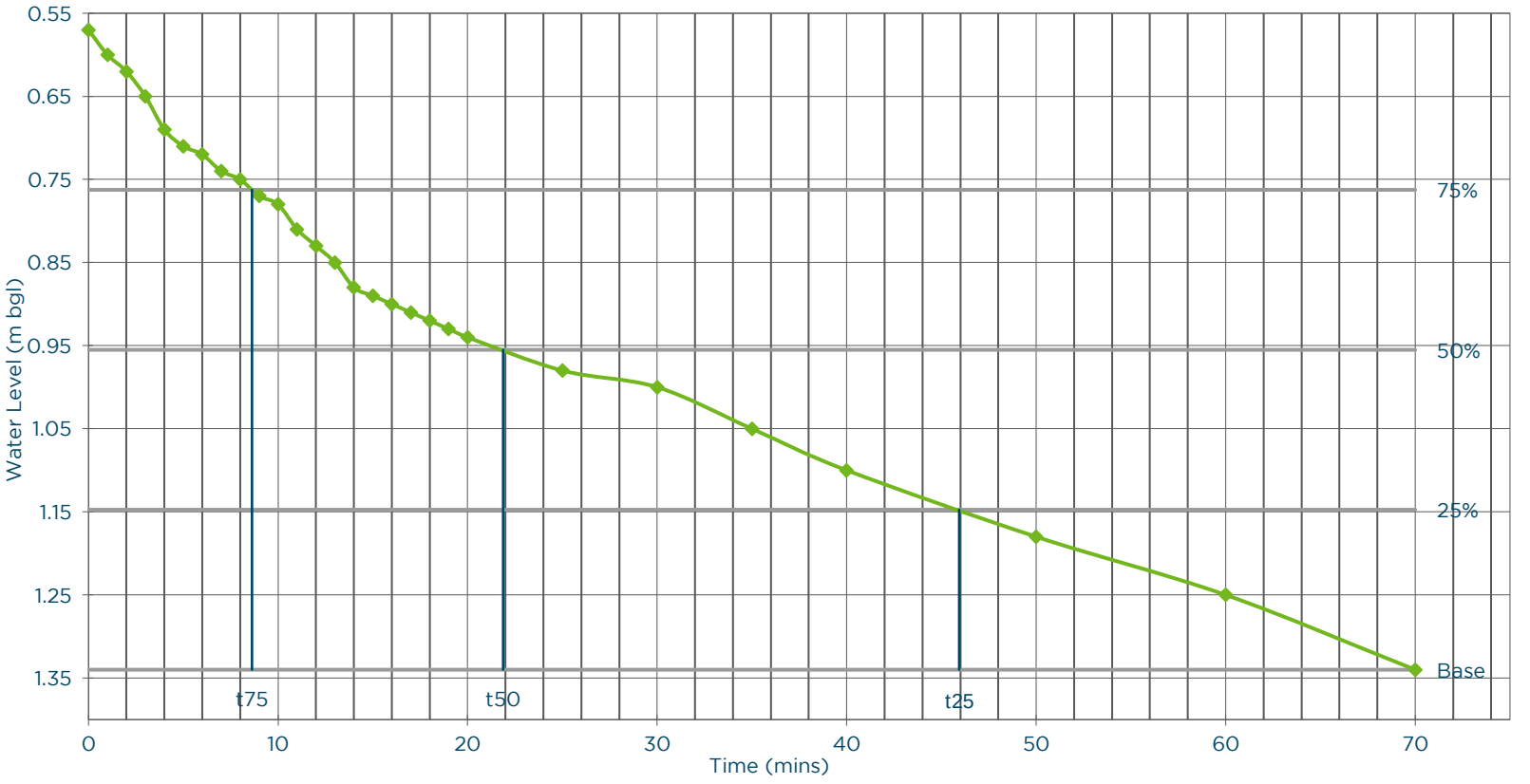
Test could not be completed due to time constraints. Backfilled at 15:55.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA08 |
| Depth (m): | 1.34 |
| Width (m): | 0.70 |
| Length (m): | 2.40 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.57 |
| 1 | 0.60 |
| 2 | 0.62 |
| 3 | 0.65 |
| 4 | 0.69 |
| 5 | 0.71 |
| 6 | 0.72 |
| 7 | 0.74 |
| 8 | 0.75 |
| 9 | 0.77 |
| 10 | 0.78 |
| 11.0 | 0.81 |
| 12.0 | 0.83 |
| 13.0 | 0.85 |
| 14.0 | 0.88 |
| 15.0 | 0.89 |
| 16.0 | 0.90 |
| 17.0 | 0.91 |
| 18.0 | 0.92 |
| 19.0 | 0.93 |
| 20.0 | 0.94 |
| 25.0 | 0.98 |
| 30.0 | 1.00 |
| 35.0 | 1.05 |
| 40.0 | 1.10 |
| 50.0 | 1.18 |
| 60.0 | 1.25 |
| 70.0 | 1.34 |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 09:01 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.34 |
| Effective Storage Depth (m) | 0.57 |
| Effective Drop (m) | 0.77 |
| 75% Effective Depth (m) | 0.76 |
| 50% Effective Depth (m) | 0.96 |
| 25% Effective Depth (m) | 1.15 |
| $t_{75}$ (min) | 8.63 |
| $t_{50}$ (min) | 21.88 |
| $t_{25}$ (min) | 45.94 |
| $V_{p75-25}$ | 0.65 |
| Adjusted $V_p$ for Gravel Fill | 0.65 |
| $a_{s50}$ | 4.07 |
| $t_{p75-25}$ | 37.31 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 7.10E-05 |
| Soil Infiltration Rate (mm/hr) | 2.56E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

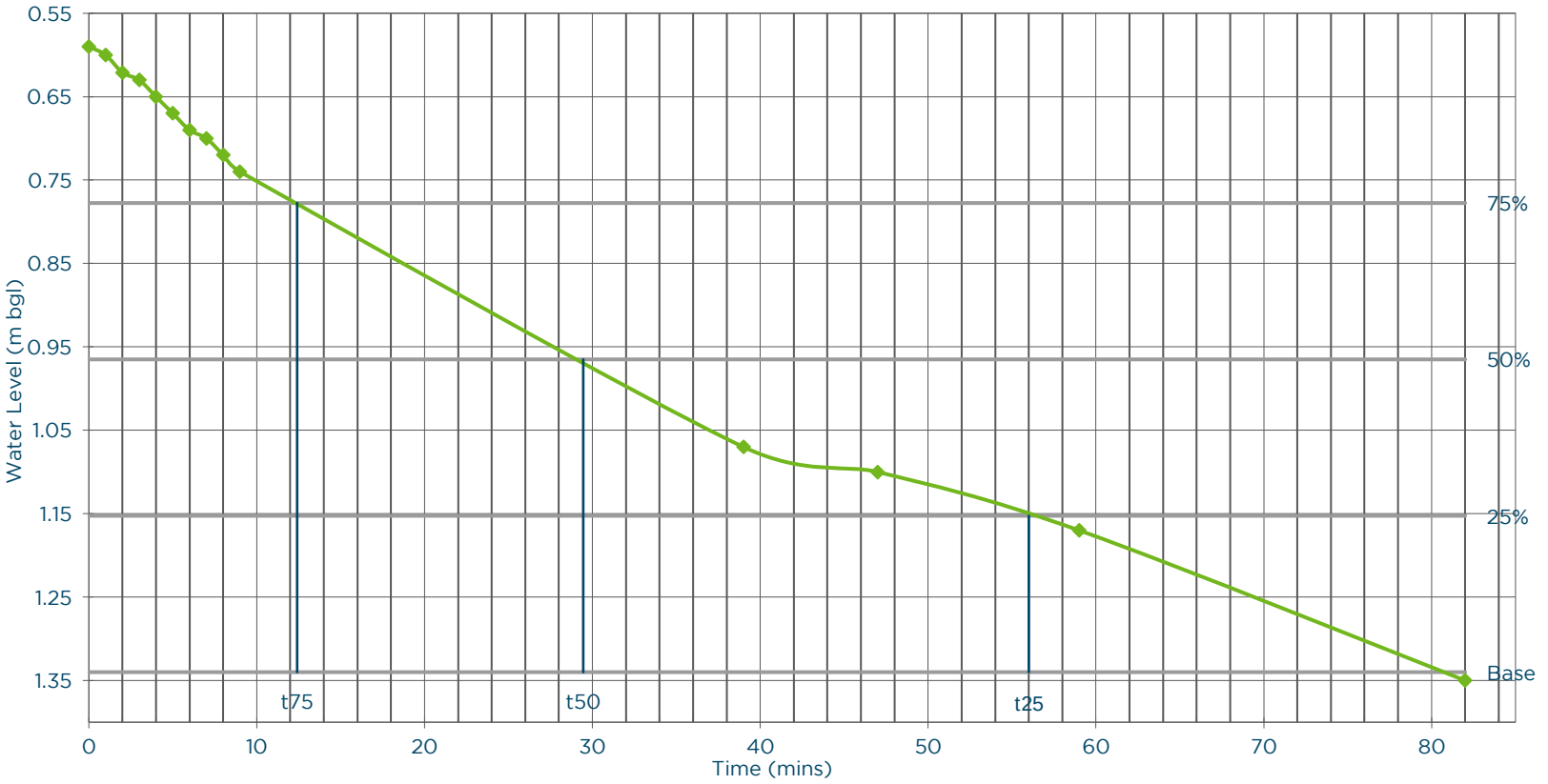
Fully drained at 10:09

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA08 |
| Depth (m): | 1.34 |
| Width (m): | 0.70 |
| Length (m): | 2.40 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.59 |
| 1 | 0.60 |
| 2 | 0.62 |
| 3 | 0.63 |
| 4 | 0.65 |
| 5 | 0.67 |
| 6 | 0.69 |
| 7 | 0.70 |
| 8 | 0.72 |
| 9 | 0.74 |
| 39 | 1.07 |
| 47.0 | 1.10 |
| 59.0 | 1.17 |
| 82.0 | 1.35 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 2 |
| Test Start Time: | 10:12 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.34 |
| Effective Storage Depth (m) | 0.59 |
| Effective Drop (m) | 0.75 |
| 75% Effective Depth (m) | 0.78 |
| 50% Effective Depth (m) | 0.97 |
| 25% Effective Depth (m) | 1.15 |
| $t_{75}$ (min) | 12.41 |
| $t_{50}$ (min) | 29.45 |
| $t_{25}$ (min) | 56.00 |
| $V_{p75-25}$ | 0.63 |
| Adjusted $V_p$ for Gravel Fill | 0.63 |
| $a_{s50}$ | 4.01 |
| $t_{p75-25}$ | 43.59 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 6.01E-05 |
| Soil Infiltration Rate (mm/hr) | 2.17E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

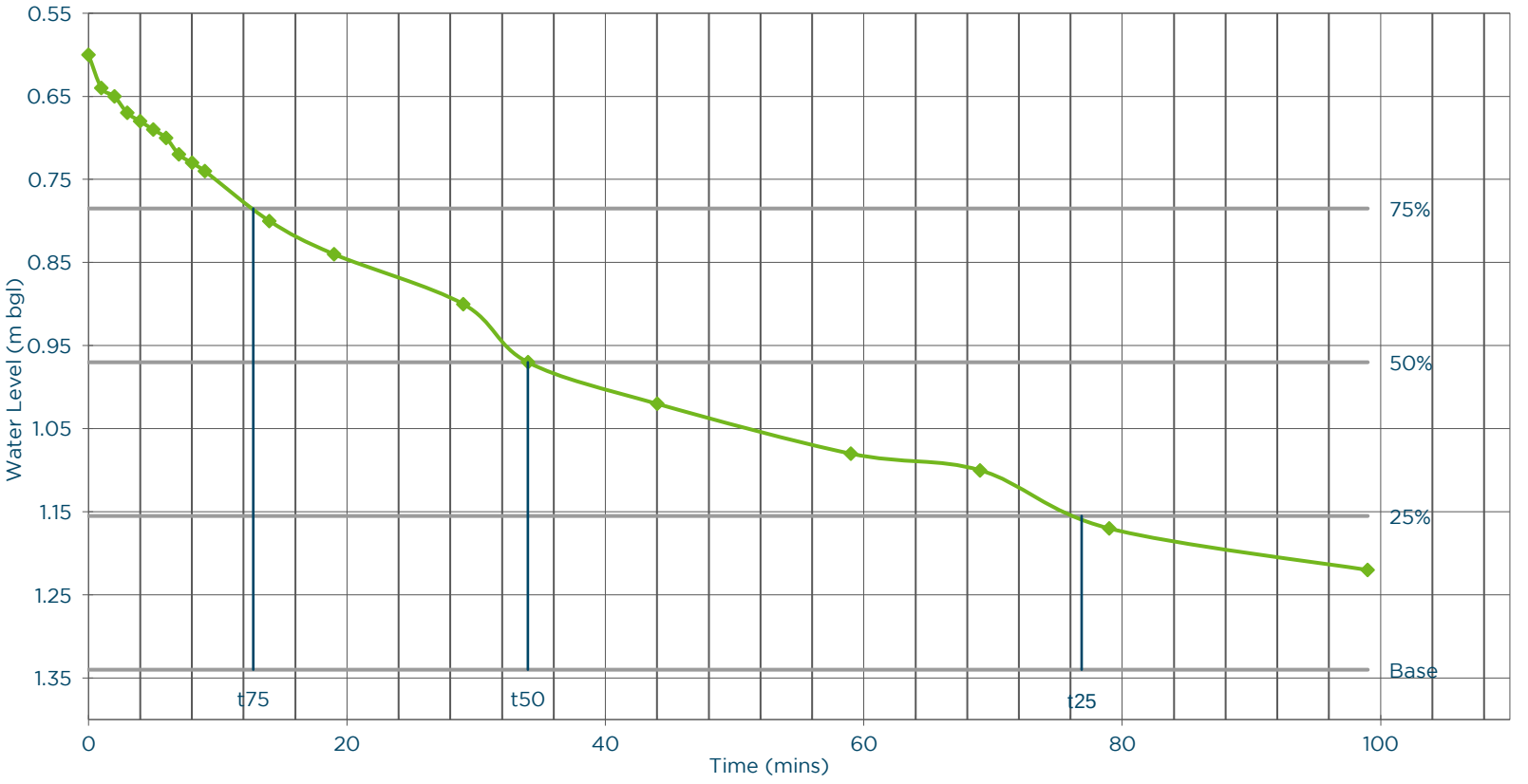
Fully drained at 11:35

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 21/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA08 |
| Depth (m): | 1.34 |
| Width (m): | 0.70 |
| Length (m): | 2.40 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.60 |
| 1 | 0.64 |
| 2 | 0.65 |
| 3 | 0.67 |
| 4 | 0.68 |
| 5 | 0.69 |
| 6 | 0.70 |
| 7 | 0.72 |
| 8 | 0.73 |
| 9 | 0.74 |
| 14 | 0.80 |
| 19.0 | 0.84 |
| 29.0 | 0.90 |
| 34.0 | 0.97 |
| 44.0 | 1.02 |
| 59.0 | 1.08 |
| 69.0 | 1.10 |
| 79.0 | 1.17 |
| 99.0 | 1.22 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 3 |
| Test Start Time: | 11:40 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.34 |
| Effective Storage Depth (m) | 0.60 |
| Effective Drop (m) | 0.74 |
| 75% Effective Depth (m) | 0.79 |
| 50% Effective Depth (m) | 0.97 |
| 25% Effective Depth (m) | 1.16 |
| $t_{75}$ (min) | 12.75 |
| $t_{50}$ (min) | 34.00 |
| $t_{25}$ (min) | 76.86 |
| $V_{p75-25}$ | 0.62 |
| Adjusted $V_p$ for Gravel Fill | 0.62 |
| $a_{s50}$ | 3.97 |
| $t_{p75-25}$ | 64.11 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 4.07E-05 |
| Soil Infiltration Rate (mm/hr) | 1.46E+02 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

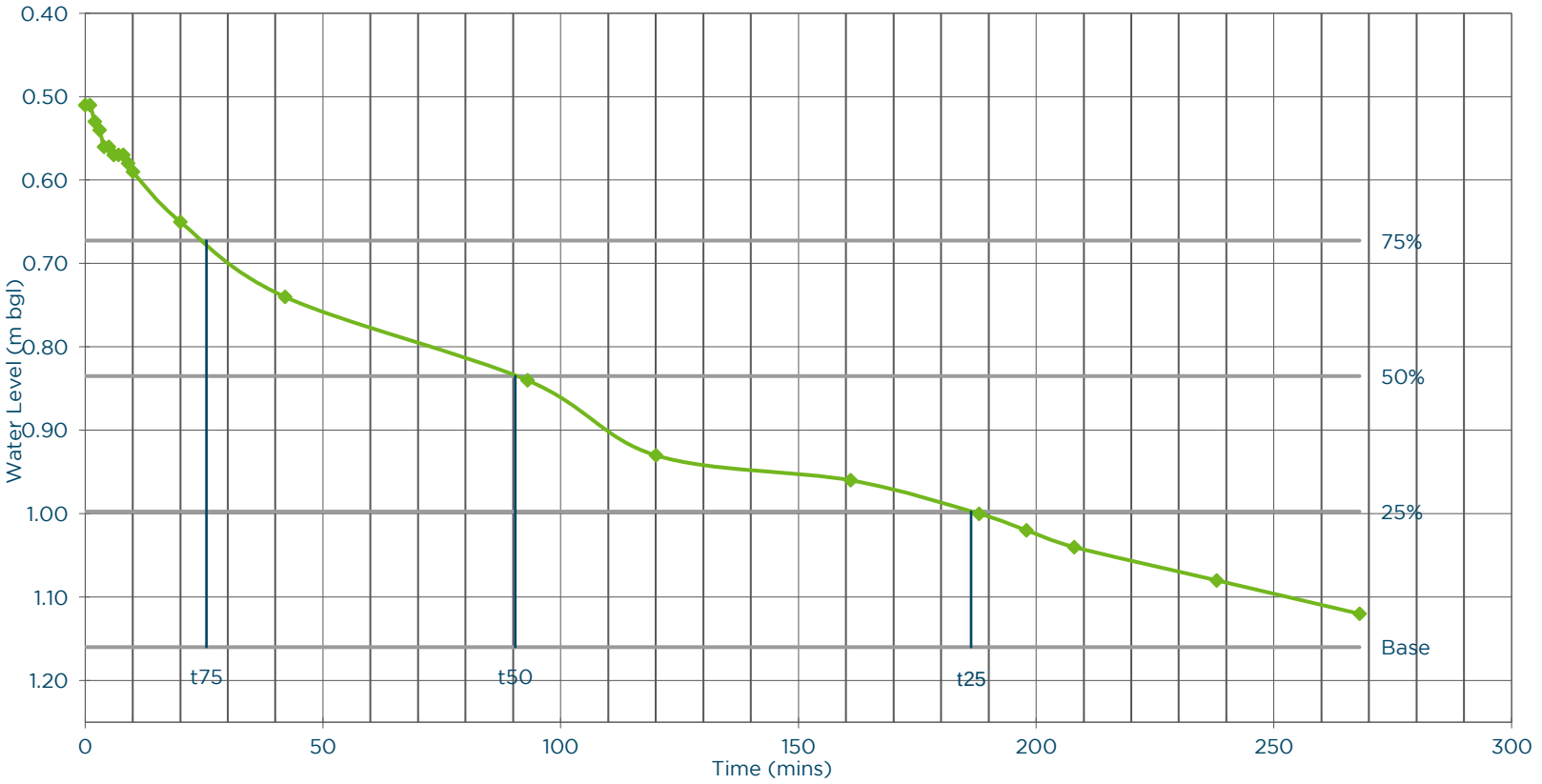
Fully drained at 13:40

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 23/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA09 |
| Depth (m): | 1.16 |
| Width (m): | 0.70 |
| Length (m): | 2.40 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.51 |
| 1.0 | 0.51 |
| 2.0 | 0.53 |
| 3.0 | 0.54 |
| 4.0 | 0.56 |
| 5.0 | 0.56 |
| 6.0 | 0.57 |
| 7.0 | 0.57 |
| 8.0 | 0.57 |
| 9.0 | 0.58 |
| 10.0 | 0.59 |
| 20.0 | 0.65 |
| 42.0 | 0.74 |
| 93.0 | 0.84 |
| 120.0 | 0.93 |
| 161.0 | 0.96 |
| 188.0 | 1.00 |
| 198.0 | 1.02 |
| 208.0 | 1.04 |
| 238.0 | 1.08 |
| 268.0 | 1.12 |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 10:32 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.16 |
| Effective Storage Depth (m) | 0.51 |
| Effective Drop (m) | 0.65 |
| 75% Effective Depth (m) | 0.67 |
| 50% Effective Depth (m) | 0.84 |
| 25% Effective Depth (m) | 1.00 |
| $t_{75}$ (min) | 25.50 |
| $t_{50}$ (min) | 90.45 |
| $t_{25}$ (min) | 186.31 |
| $V_{p75-25}$ | 0.55 |
| Adjusted $V_p$ for Gravel Fill | 0.55 |
| $a_{s50}$ | 3.70 |
| $t_{p75-25}$ | 160.81 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 1.53E-05 |
| Soil Infiltration Rate (mm/hr) | 5.51E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

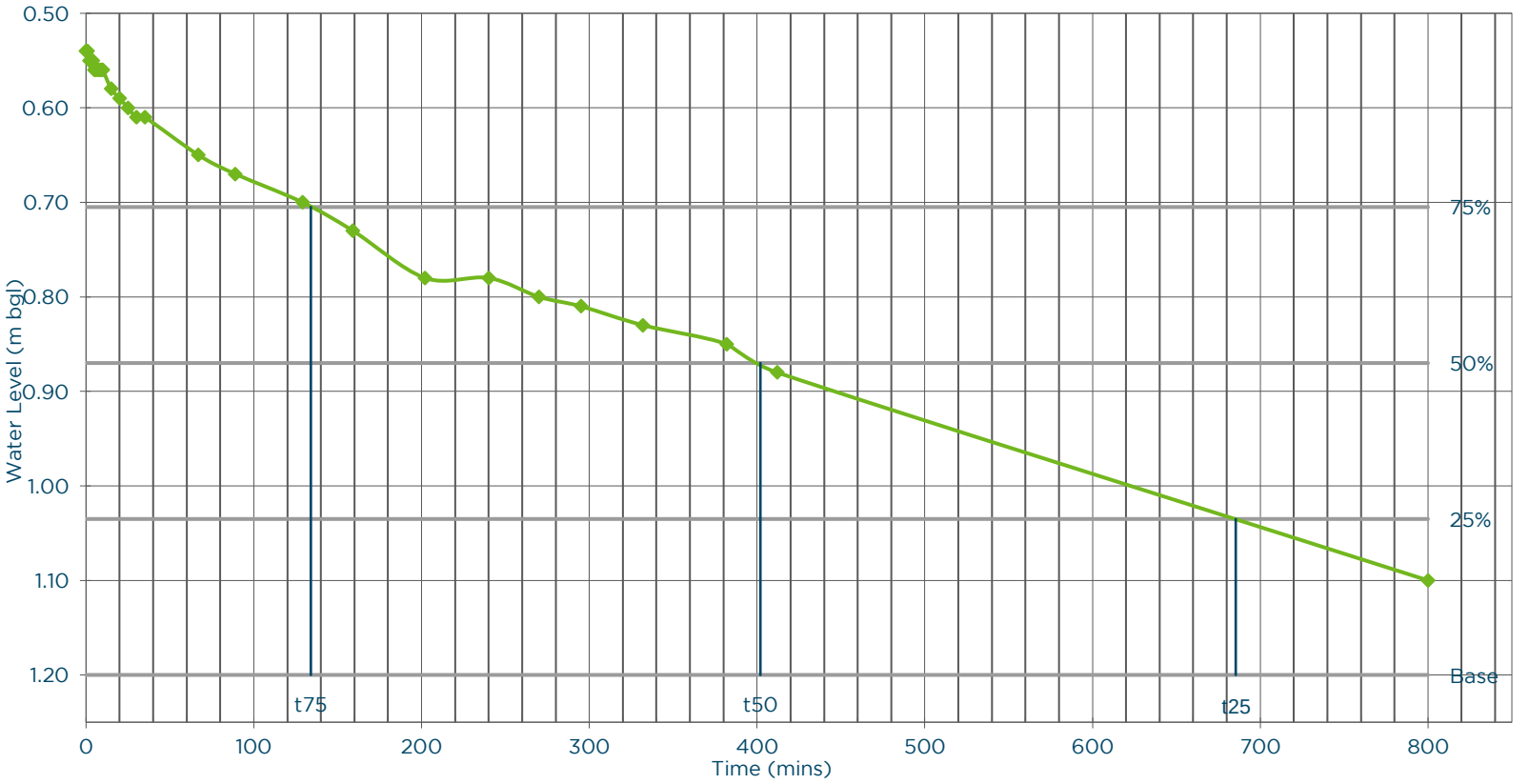
Drained at 15:00, not enough time to start a second test.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 23/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA10 |
| Depth (m): | 1.20 |
| Width (m): | 0.70 |
| Length (m): | 2.70 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0 | 0.54 |
| 1 | 0.54 |
| 2 | 0.55 |
| 3 | 0.55 |
| 4 | 0.55 |
| 5 | 0.56 |
| 6 | 0.56 |
| 7 | 0.56 |
| 8 | 0.56 |
| 9 | 0.56 |
| 10 | 0.56 |
| 15 | 0.58 |
| 20 | 0.59 |
| 25 | 0.60 |
| 30 | 0.61 |
| 35 | 0.61 |
| 67 | 0.65 |
| 89 | 0.67 |
| 129 | 0.70 |
| 159 | 0.73 |
| 202 | 0.78 |
| 240 | 0.78 |
| 270 | 0.80 |
| 295 | 0.81 |
| 332 | 0.83 |
| 382 | 0.85 |
| 412 | 0.88 |
| *800* | *1.10* |

| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 08:38 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.20 |
| Effective Storage Depth (m) | 0.54 |
| Effective Drop (m) | 0.66 |
| 75% Effective Depth (m) | 0.71 |
| 50% Effective Depth (m) | 0.87 |
| 25% Effective Depth (m) | 1.04 |
| $t_{75}$ (min) | 134.00 |
| $t_{50}$ (min) | 402.00 |
| $t_{25}$ (min) | 685.36 |
| $V_{p75-25}$ | 0.62 |
| Adjusted $V_p$ for Gravel Fill | 0.62 |
| $a_{s50}$ | 4.13 |
| $t_{p75-25}$ | 551.36 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 4.56E-06 |
| Soil Infiltration Rate (mm/hr) | 1.64E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

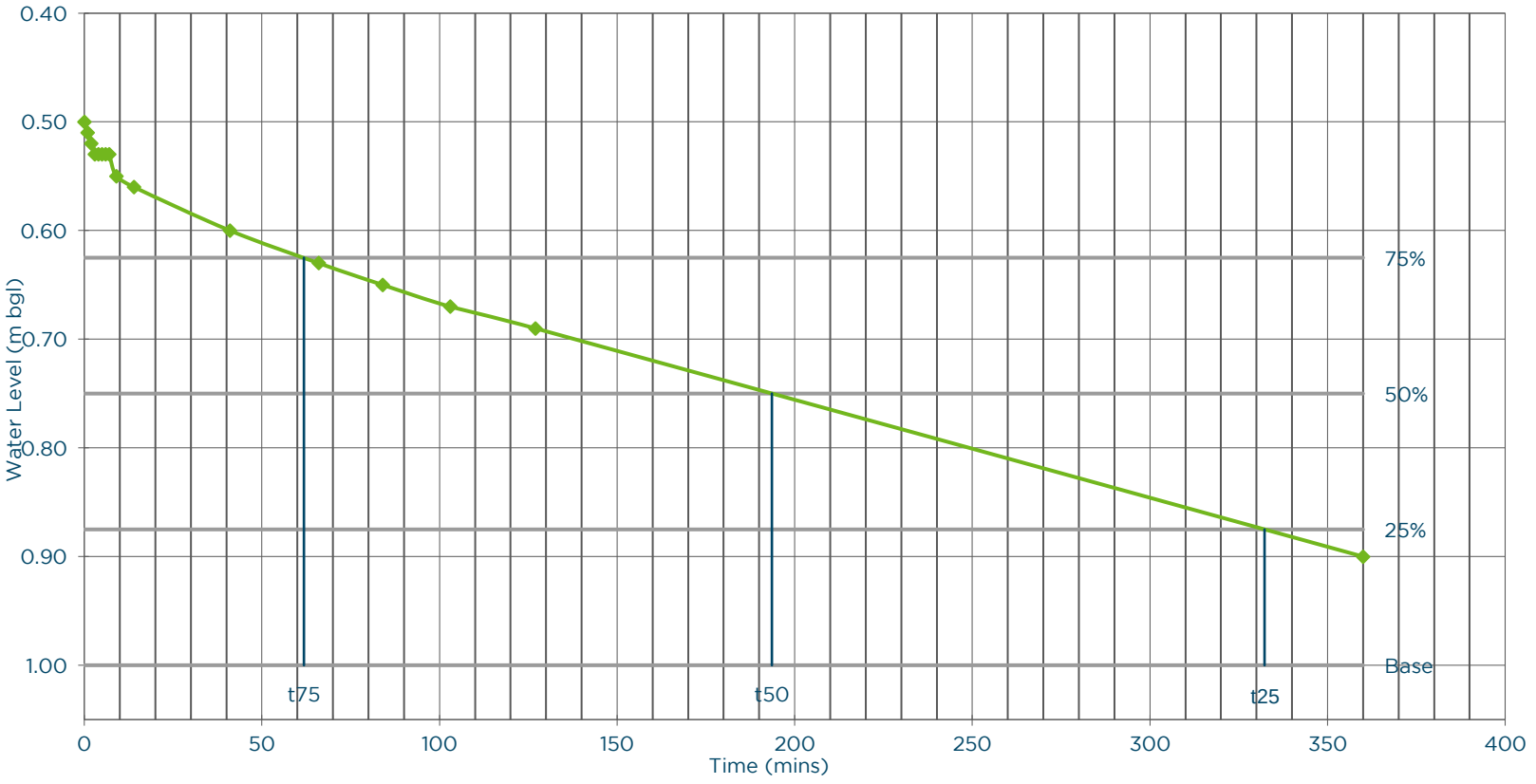
Test stopped and backfilled at at 15:30 due to time constraints. Italicised results are extrapolated values.

# SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

| Contract Information | |
|---|---|
| Contract: | Oxfordshire |
| Contract No: | C10172 |
| Client: | BWB Consulting |
| Date: | 14/09/2021 |

| Pit Information | |
|---|---|
| Location ID: | SA11 |
| Depth (m): | 1.00 |
| Width (m): | 0.60 |
| Length (m): | 1.60 |
| Depth to Standing Water (m) | Dry |




| Time (min) | Depth (m) |
|---|---|
| 0.0 | 0.50 |
| 1.0 | 0.51 |
| 2.0 | 0.52 |
| 3.0 | 0.53 |
| 4.0 | 0.53 |
| 5.0 | 0.53 |
| 6.0 | 0.53 |
| 7.0 | 0.53 |
| 9.0 | 0.55 |
| 14.0 | 0.56 |
| 41.0 | 0.60 |
| 66.0 | 0.63 |
| 84.0 | 0.65 |
| 103.0 | 0.67 |
| 127.0 | 0.69 |
| *360.0* | *0.90* |
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| Test Information and Calculation | |
|---|---|
| Test Reference/Number: | 1 |
| Test Start Time: | 14:05 |
| Method of Calculation | BRE365 |
| Pit Gravel Filled? | No |
| Max. Depth (m) | 1.00 |
| Effective Storage Depth (m) | 0.50 |
| Effective Drop (m) | 0.50 |
| 75% Effective Depth (m) | 0.63 |
| 50% Effective Depth (m) | 0.75 |
| 25% Effective Depth (m) | 0.88 |
| $t_{75}$ (min) | 61.83 |
| $t_{50}$ (min) | 193.57 |
| $t_{25}$ (min) | 332.26 |
| $V_{p75-25}$ | 0.24 |
| Adjusted $V_p$ for Gravel Fill | 0.24 |
| $a_{s50}$ | 2.06 |
| $t_{p75-25}$ | 270.43 |
| **Results** | |
| Soil Infiltration Rate (m/s) | 7.18E-06 |
| Soil Infiltration Rate (mm/hr) | 2.58E+01 |

**References**

BRE 365 *Soakaway design*, 2016, with reference to CIRIA Report 113 *Control of groundwater for temporary works*, 1986.

**Comments**

Test ended at 127 mins, as not enough time to finish test. Italicised results are extrapolated values.

## VARIABLE HEAD PERMEABILITY TEST

**Variable Head (Falling) Permeability Test in Borehole Standpipe**

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO01 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 119.06 m AOD |
| Groundwater Level: | 5.45 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 15 | s | |
| t2= | 70 | s | |
| H1= | 5.45 | m | |
| H2= | 0.65 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 25.82 | s | |
| K= | 7.32E-06 | m/s | From (ii) |
| K= | 7.33E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 5.45 | 1.000 |
| 0.5 | 30 | 3.990 | 1.46 | 0.268 |
| 1.0 | 60 | 4.800 | 0.65 | 0.119 |
| 1.5 | 90 | 5.060 | 0.39 | 0.072 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | |
|---|---|---|---|
| Contract: | Oxfordshire | Location ID: | RO01 |
| Contract No: | C10172 | Depth (m): | 10.00 |
| Date: | 21/10/2021 | Operator: | TY |
| Time: | - | Test Zone (m): | 7.00 |

| Initial Conditions | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 119.06 m AOD |
| Groundwater Level: | 5.45 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 15 | s | |
| t2= | 70 | s | |
| H1= | 5.45 | m | |
| H2= | 0.95 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 29.10 | s | |
| K= | 6.01E-06 | m/s | From (ii) |
| K= | 6.51E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 5.45 | 1.000 |
| 0.5 | 30 | 3.540 | 1.91 | 0.350 |
| 1.0 | 60 | 4.500 | 0.95 | 0.174 |
| 1.5 | 90 | 4.950 | 0.50 | 0.092 |
| 2.0 | 120 | 5.090 | 0.36 | 0.066 |

## VARIABLE HEAD PERMEABILITY TEST

**Variable Head (Falling) Permeability Test in Borehole Standpipe**

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO02 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 11/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 117.24 m AOD |
| Groundwater Level: | 3.96 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 0 | s | |
| t2= | 70 | s | |
| H1= | 3.96 | m | |
| H2= | 0.40 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 42.05 | s | |
| K= | 6.20E-06 | m/s | From (ii) |
| K= | 4.50E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 3.96 | 1.000 |
| 0.5 | 30 | 1.780 | 2.18 | 0.551 |
| 1.0 | 60 | 3.560 | 0.40 | 0.101 |
| 1.5 | 90 | 3.810 | 0.15 | 0.038 |
| 2.0 | 120 | 3.880 | 0.08 | 0.020 |

## VARIABLE HEAD PERMEABILITY TEST

**Variable Head (Falling) Permeability Test in Borehole Standpipe**

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO02 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 117.24 m AOD |
| Groundwater Level: | 4.04 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 0 | s | |
| t2= | 80 | s | |
| H1= | 4.04 | m | |
| H2= | 0.62 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 45.50 | s | |
| K= | 4.44E-06 | m/s | From (ii) |
| K= | 4.16E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 4.04 | 1.000 |
| 0.5 | 30 | 1.610 | 2.43 | 0.601 |
| 1.0 | 60 | 3.420 | 0.62 | 0.153 |
| 1.5 | 90 | 3.720 | 0.32 | 0.079 |
| 2.0 | 120 | 3.790 | 0.25 | 0.062 |
| 2.5 | 150 | 3.870 | 0.17 | 0.042 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO03 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 11/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

| Initial Conditions | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 119.20 m AOD |
| Groundwater Level: | 4.12 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2) \quad \text{(ii)}$$

or

$$K = \frac{a}{F * T} \quad \text{(iii)}$$

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 30 s
t2= 250 s
H1= 2.29 m
H2= 0.31 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 79.47 s
K= 1.72E-06 m/s From (ii)
K= 2.38E-06 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 4.12 | 1.000 |
| 0.5 | 30 | 1.830 | 2.29 | 0.556 |
| 1.0 | 60 | 2.310 | 1.81 | 0.439 |
| 1.5 | 90 | 2.750 | 1.37 | 0.333 |
| 2.0 | 120 | 3.200 | 0.92 | 0.223 |
| 3.0 | 180 | 3.560 | 0.56 | 0.136 |
| 4.0 | 240 | 3.810 | 0.31 | 0.075 |
| 5.0 | 300 | 3.970 | 0.15 | 0.036 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO03 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 119.20 m AOD |
| Groundwater Level: | 4.05 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 30 | s | |
| t2= | 230 | s | |
| H1= | 2.06 | m | |
| H2= | 0.47 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 63.05 | s | |
| K= | 1.40E-06 | m/s | From (ii) |
| K= | 3.00E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 4.05 | 1.000 |
| 0.5 | 30 | 1.990 | 2.06 | 0.509 |
| 1.0 | 60 | 2.520 | 1.53 | 0.378 |
| 1.5 | 90 | 2.830 | 1.22 | 0.301 |
| 2.0 | 120 | 3.250 | 0.80 | 0.198 |
| 3.0 | 180 | 3.580 | 0.47 | 0.116 |
| 4.0 | 240 | 3.770 | 0.28 | 0.069 |
| 5.0 | 300 | 3.940 | 0.11 | 0.027 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO04 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 110.30 m AOD |
| Groundwater Level: | 2.40 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

| | | | |
|---|---|---|---|
| L= | 7.00 | m | |
| D= | 0.110 | m | |
| L/D= | 63.64 | | |
| t1= | 10 | s | |
| t2= | 150 | s | |
| H1= | 2.40 | m | |
| H2= | 0.79 | m | |
| a= | 0.00196 | m^2 | |
| F= | 10.3750 | | From (i) |
| T= | 115.85 | s | |
| K= | 1.50E-06 | m/s | From (ii) |
| K= | 1.63E-06 | m/s | From (iii) |

Remarks

| Elapsed (minutes | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 2.40 | 1.000 |
| 0.5 | 30 | 1.270 | 1.13 | 0.471 |
| 1.0 | 60 | 1.320 | 1.08 | 0.450 |
| 1.5 | 90 | 1.400 | 1.00 | 0.417 |
| 2.0 | 120 | 1.530 | 0.87 | 0.363 |
| 2.5 | 150 | 1.610 | 0.79 | 0.329 |
| 3.0 | 180 | 1.670 | 0.73 | 0.304 |
| 4.0 | 240 | 1.740 | 0.66 | 0.275 |
| 5.0 | 300 | 1.770 | 0.63 | 0.263 |
| 7.0 | 420 | 1.800 | 0.60 | 0.250 |
| 10.0 | 600 | 1.870 | 0.53 | 0.221 |
| 15.0 | 900 | 1.940 | 0.46 | 0.192 |
| 20.0 | 1200 | 2.000 | 0.40 | 0.167 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO04 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

**Initial Conditions**

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 110.30 m AOD |
| Groundwater Level: | 2.40 m BGL |

**TEST CALCULATION**

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 20 s
t2= 220 s
H1= 2.40 m
H2= 0.82 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 164.89 s
K= 1.02E-06 m/s From (ii)
K= 1.15E-06 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 2.40 | 1.000 |
| 0.5 | 30 | 0.740 | 1.66 | 0.692 |
| 1.0 | 60 | 0.970 | 1.43 | 0.596 |
| 1.5 | 90 | 1.180 | 1.22 | 0.508 |
| 2.0 | 120 | 1.310 | 1.09 | 0.454 |
| 3.0 | 180 | 1.580 | 0.82 | 0.342 |
| 4.0 | 240 | 1.690 | 0.71 | 0.296 |
| 5.0 | 300 | 1.750 | 0.65 | 0.271 |
| 7.0 | 420 | 1.770 | 0.63 | 0.263 |
| 10.0 | 600 | 1.860 | 0.54 | 0.225 |
| 15.0 | 900 | 1.950 | 0.45 | 0.188 |
| 20.0 | 1200 | 2.010 | 0.39 | 0.163 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO06 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 11/10/2021 | Operator: | TY |
| | Time: | 10:30 | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 113.64 m AOD |
| Groundwater Level: | 5.55 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 30 s
t2= 840 s
H1= 4.15 m
H2= 0.53 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 295.45 s
K= 4.81E-07 m/s From (ii)
K= 6.41E-07 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 5.55 | 1.000 |
| 0.5 | 30 | 1.400 | 4.15 | 0.748 |
| 1.0 | 60 | 1.800 | 3.75 | 0.676 |
| 1.5 | 90 | 2.100 | 3.45 | 0.622 |
| 2.0 | 120 | 2.340 | 3.21 | 0.578 |
| 2.5 | 150 | 2.540 | 3.01 | 0.542 |
| 3.0 | 180 | 2.810 | 2.74 | 0.494 |
| 4.0 | 240 | 3.210 | 2.34 | 0.422 |
| 5.0 | 300 | 3.520 | 2.03 | 0.366 |
| 6.0 | 360 | 3.800 | 1.75 | 0.315 |
| 7.0 | 420 | 4.050 | 1.50 | 0.270 |
| 8.0 | 480 | 4.280 | 1.27 | 0.229 |
| 9.0 | 540 | 4.440 | 1.11 | 0.200 |
| 10.0 | 600 | 4.610 | 0.94 | 0.169 |
| 12.0 | 720 | 4.850 | 0.70 | 0.126 |
| 14.0 | 840 | 5.020 | 0.53 | 0.095 |
| 16.0 | 960 | 5.160 | 0.39 | 0.070 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO06 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

**Initial Conditions**

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 113.64 m AOD |
| Groundwater Level: | 5.61 m BGL |

**TEST CALCULATION**

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2) \quad \text{(ii)}$$

or

$$K = \frac{a}{F * T} \quad \text{(iii)}$$

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 20 s
t2= 950 s
H1= 5.61 m
H2= 0.61 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 287.68 s
K= 4.52E-07 m/s From (ii)
K= 6.58E-07 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 5.61 | 1.000 |
| 0.5 | 30 | 1.620 | 3.99 | 0.711 |
| 1.0 | 60 | 1.900 | 3.71 | 0.661 |
| 1.5 | 90 | 2.160 | 3.45 | 0.615 |
| 2.0 | 120 | 2.410 | 3.20 | 0.570 |
| 3.0 | 180 | 2.930 | 2.68 | 0.478 |
| 4.0 | 240 | 3.280 | 2.33 | 0.415 |
| 5.0 | 300 | 3.600 | 2.01 | 0.358 |
| 7.0 | 420 | 4.090 | 1.52 | 0.271 |
| 10.0 | 600 | 4.580 | 1.03 | 0.184 |
| 15.0 | 900 | 5.000 | 0.61 | 0.109 |
| 20.0 | 1200 | 5.190 | 0.42 | 0.075 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO07 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

| Initial Conditions | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 97.56 m AOD |
| Groundwater Level: | 3.48 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2) \quad \text{(ii)}$$

or

$$K = \frac{a}{F * T} \quad \text{(iii)}$$

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 15 s
t2= 180 s
H1= 3.48 m
H2= 1.02 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 130.40 s
K= 1.41E-06 m/s From (ii)
K= 1.45E-06 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 3.48 | 1.000 |
| 0.5 | 30 | 1.500 | 1.98 | 0.569 |
| 1.0 | 60 | 1.600 | 1.88 | 0.540 |
| 1.5 | 90 | 1.910 | 1.57 | 0.451 |
| 2.0 | 120 | 2.130 | 1.35 | 0.388 |
| 2.5 | 150 | 2.310 | 1.17 | 0.336 |
| 3.0 | 180 | 2.460 | 1.02 | 0.293 |
| 4.0 | 240 | 2.710 | 0.77 | 0.221 |
| 5.0 | 300 | 2.900 | 0.58 | 0.167 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

| Contract Information | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO07 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

| Initial Conditions | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 97.56 m AOD |
| Groundwater Level: | 3.48 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2) \quad \text{(ii)}$$

or

$$K = \frac{a}{F * T} \quad \text{(iii)}$$

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 20 s
t2= 360 s
H1= 3.48 m
H2= 0.61 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 193.16 s
K= 9.70E-07 m/s From (ii)
K= 9.80E-07 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 3.48 | 1.000 |
| 0.5 | 30 | 1.290 | 2.19 | 0.629 |
| 1.0 | 60 | 1.360 | 2.12 | 0.609 |
| 1.5 | 90 | 1.480 | 2.00 | 0.575 |
| 2.0 | 120 | 1.660 | 1.82 | 0.523 |
| 2.5 | 150 | 1.840 | 1.64 | 0.471 |
| 3.0 | 180 | 2.120 | 1.36 | 0.391 |
| 4.0 | 240 | 2.450 | 1.03 | 0.296 |
| 5.0 | 300 | 2.650 | 0.83 | 0.239 |
| 6.0 | 360 | 2.870 | 0.61 | 0.175 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO08 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 111.74 m AOD |
| Groundwater Level: | 3.59 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2)$ (ii)

or

$K = \frac{a}{F * T}$ (iii)

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 0 s
t2= 40 s
H1= 3.59 m
H2= 0.99 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 26.10 s
K= 6.10E-06 m/s From (ii)
K= 7.25E-06 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 3.59 | 1.000 |
| 0.5 | 30 | 2.600 | 0.99 | 0.276 |
| 1.0 | 60 | 2.850 | 0.74 | 0.206 |
| 1.5 | 90 | 2.970 | 0.62 | 0.173 |
| 2.5 | 150 | 3.020 | 0.57 | 0.159 |
| 3.0 | 180 | 3.050 | 0.54 | 0.150 |
| 4.0 | 240 | 3.120 | 0.47 | 0.131 |
| 5.0 | 300 | 3.170 | 0.42 | 0.117 |
| 7.0 | 420 | 3.270 | 0.32 | 0.089 |
| 10.0 | 600 | 3.280 | 0.31 | 0.086 |
| 15.0 | 900 | 3.340 | 0.25 | 0.070 |

# VARIABLE HEAD PERMEABILITY TEST

## Variable Head (Falling) Permeability Test in Borehole Standpipe

EXPLORATION & TESTING ASSOCIATES

### Contract Information

| | | | | |
|---|---|---|---|---|
| | Contract: | Oxfordshire | Location ID: | RO08 |
| | Contract No: | C10172 | Depth (m): | 10.00 |
| | Date: | 21/10/2021 | Operator: | TY |
| | Time: | - | Test Zone (m): | 7.00 |

### Initial Conditions

| | |
|---|---|
| Base of Response Zone: | 10.00 m BGL |
| Top of Reponse Zone: | 3.00 m BGL |
| Diameter of borehole: | 110 mm |
| Diameter of standpipe: | 50 mm |
| Height of casing: | 0.00 m AGL |
| Elevation of Borehole: | 111.74 m AOD |
| Groundwater Level: | 3.59 m BGL |

### TEST CALCULATION

Intake Factor, F

F= 10.38 (i)

Borehole Case 7
BS 5930: 1999

Permeability, K

$$K = \frac{a}{F * (t2 - t1)} * \ln(H1/H2) \quad \text{(ii)}$$

or

$$K = \frac{a}{F * T} \quad \text{(iii)}$$

1 Where T is the Basic Time Lag Factor
2 corresponding to an H/Ho value of 0.37, and "a" is the cross sectional area of the standpipe.

L= 7.00 m
D= 0.110 m
L/D= 63.64

t1= 0 s
t2= 60 s
H1= 3.59 m
H2= 0.92 m

a= 0.00196 m^2
F= 10.3750 From (i)
T= 40.24 s
K= 4.30E-06 m/s From (ii)
K= 4.70E-06 m/s From (iii)

Remarks

| Elapsed (minutes) | Total Seconds | Water Depth | Head (metres) | H/Ho |
|---|---|---|---|---|
| 0.0 | 0 | 0.000 | 3.59 | 1.000 |
| 0.5 | 30 | 2.050 | 1.54 | 0.429 |
| 1.0 | 60 | 2.670 | 0.92 | 0.256 |
| 1.5 | 90 | 2.860 | 0.73 | 0.203 |
| 2.0 | 120 | 2.940 | 0.65 | 0.181 |
| 3.0 | 180 | 3.000 | 0.59 | 0.164 |
| 4.0 | 240 | 3.060 | 0.53 | 0.148 |
| 5.0 | 300 | 3.150 | 0.44 | 0.123 |
| 7.0 | 420 | 3.270 | 0.32 | 0.089 |
| 10.0 | 600 | 3.360 | 0.23 | 0.064 |
| 15.0 | 900 | 3.410 | 0.18 | 0.050 |

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 28/09/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.3 | $CO_2$% v/v : | 0.1 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Overcast, windy, with heavy rain in afteroon, 13°C | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Rising | Ground Conditions : | Dry, damp in the afternoon. | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS123 | 08:55 | 1008 | -0.04 | 19.2 | 19.2 | 1.2 | 1.2 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.0 | - | DRY | - | 1.75 |
| DS122 | 09:14 | 1008 | -0.05 | 19.5 | 20.8 | 0.9 | 0.9 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 | 0.0 | - | DRY | - | 0.87 |
| DS130 | 09:42 | 1009 | -0.03 | 20.5 | 20.6 | 1.3 | 1.2 | 0.0 | 0.0 | 0 | 0 | -0.1 | -0.1 | 0.0 | - | DRY | - | 0.96 |
| DS125 | 09:54 | 1008 | 0.02 | 20.9 | 20.9 | 1.2 | 1.2 | 0.0 | 0.0 | 0 | 0 | -0.2 | -0.2 | 0.0 | - | DRY | - | 0.98 |
| RO08 | 10:06 | 1008 | 0.07 | 20.7 | 20.7 | 0.1 | 0.1 | 0.0 | 0.0 | 1 | 0 | -0.1 | -0.1 | 0.0 | - | 3.70 | - | 10.00 |
| DS128 | 10:54 | 1006 | -0.03 | 21.5 | 20.9 | 1.0 | 0.1 | 0.0 | 0.0 | 0 | 0 | -0.4 | -0.3 | 0.0 | - | DRY | - | 1.61 |
| DS121 | 11:05 | 1008 | -0.03 | 20.8 | 21.0 | 1.4 | 1.4 | 0.0 | 0.0 | 0 | 0 | -0.2 | -0.2 | 0.0 | - | DRY | - | 1.01 |
| DS120 | 11:15 | 1007 | 0.03 | 20.9 | 20.9 | 1.0 | 0.9 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.0 | - | DRY | - | 0.90 |
| RO07 | 11:25 | 1007 | -0.02 | 17.8 | 21.6 | 1.4 | 0.2 | 0.0 | 0.0 | 1 | 0 | -0.3 | -0.2 | 0.0 | - | 3.90 | - | 10.00 |
| DS106 | 11:57 | 1006 | 0.05 | 21.1 | 21.1 | 0.6 | 0.6 | 0.0 | 0.0 | 1 | 0 | -0.3 | -0.3 | 0.0 | - | DRY | - | 0.95 |
| DS108 | 12:08 | 1003 | 0.05 | 20.9 | 20.9 | 0.7 | 0.7 | 0.0 | 0.0 | 1 | 0 | 0.0 | 0.0 | 0.0 | - | DRY | - | 1.00 |
| RO03 | 12:20 | 1004 | 0.03 | 20.9 | 21.1 | 0.7 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.0 | - | 4.15 | - | 10.00 |
| DS105 | 12:54 | 1005 | 0.07 | 21.2 | 21.4 | 0.7 | 0.6 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | DRY | - | 1.05 |
| DS104 | 13:03 | 1004 | 0.07 | 21.4 | 21.5 | 0.8 | 0.7 | 0.0 | 0.0 | 1 | 0 | 0.0 | 0.0 | 0.0 | - | DRY | - | 0.90 |
| DS107 | 13:23 | 1005 | 0.07 | 21.6 | 21.7 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.0 | 0.0 | - | DRY | - | 0.99 |
| RO02 | 13:34 | 1005 | 0.07 | 21.2 | 21.1 | 0.4 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.0 | 0.0 | - | 4.65 | - | 10.04 |
| DS111 | 14:20 | 1000 | 0.00 | 21.7 | 21.7 | 0.6 | 0.6 | 0.0 | 0.0 | 1 | 0 | 0.0 | 0.0 | 0.0 | - | DRY | - | 0.86 |
| DS103 | 14:30 | 1003 | 0.07 | 21.6 | 21.6 | 0.5 | 0.5 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.2 | 0.0 | - | DRY | - | 1.10 |
| DS102 | 14:45 | 1002 | 0.05 | 20.0 | 20.0 | 1.6 | 1.6 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | DRY | - | 1.10 |
| DS101 | 14:53 | 1002 | 0.03 | 20.6 | 20.6 | 1.1 | 1.1 | 0.0 | 0.0 | 1 | 0 | 0.4 | 0.4 | 0.0 | - | DRY | - | 1.00 |
| RO01 | 15:10 | 1002 | 0.03 | 20.8 | 20.8 | 0.7 | 0.7 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | 5.75 | - | 10.00 |
| DS112 | 15:28 | 1003 | 0.09 | 21.3 | 21.3 | 0.6 | 0.6 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | DRY | - | 0.95 |

**Remarks :** Water sampling - RO08. W.L. 3.70mbgs, purged recharging at 7.6mbgs (W1-7.5mbgs). RO07 W.L. 3.9mbgs, purged, recharging at 6.8mbgs (W1-6.4m), RO03 W.L. 4.15m, purged, recharging at 8.0mbgs (W1-8.0m), RO02 W.L. 4.65m, manually purged recharging at 6.0m, (W1-6.0m)

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 28/09/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.3 | $CO_2$% v/v : | 0.1 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Overcast, windy, with heavy rain in afteroon, 13°c | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Rising | Ground Conditions : | Dry, damp in the afternoon. | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS113 | 15:38 | 1003 | 0.03 | 21.3 | 21.3 | 0.7 | 0.7 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | DRY | - | 1.10 |
| RO05* | 15:46 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | - | 3.65 | - | 10.00 |
| DS114 | 16:00 | 1002 | 0.03 | 21.3 | 21.4 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 0 | 0.2 | 0.2 | 0.0 | - | DRY | - | 1.10 |
| DS115* | 16:08 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | - | DRY | - | 1.00 |
| DS117 | 16:15 | 1003 | 0.07 | 21.7 | 21.8 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 1 | 0.2 | 0.2 | 0.0 | - | DRY | - | 0.80 |
| RO06 | 16:20 | 1002 | 0.07 | 21.4 | 21.4 | 0 | 0 | 0.0 | 0.0 | 1 | 1 | 0.4 | 0.4 | 0.0 | - | 5.80 | - | 10.00 |
| DS118 | 16:35 | 1003 | 0.03 | 21.6 | 21.6 | 0.6 | 0.6 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | DRY | - | 1.00 |
| DS110 | 16:45 | 1003 | -1.05 | 21.8 | 21.9 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 1 | 6.1 | 6.1 | 0.0 | - | 0.60 | - | 3.00 |
| RO04 | 17:00 | 1002 | -0.21 | 21.5 | 21.7 | 0.2 | 0.2 | 0.0 | 0.0 | 2 | 1 | 0.2 | 0.2 | 0.0 | - | 3.00 | - | 10.15 |

**Remarks :** *could not gas monitor due to RO05 gas tap blocked, analyser pump flow stop working, DS115 gas tap open.

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 04/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.1 | $CO_2$% v/v : | 0.1 | $CH_4$% v/v : | 0.4 | Weather Conditions : | Clear, sunny, windy, 10°c | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS123 | 08:25 | 998 | -0.10 | 18.8 | 18.8 | 4.5 | 4.5 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.2 | - | Dry | - | 1.75 |
| DS122 | 08:32 | 999 | -0.09 | 19.9 | 20.1 | 1.2 | 1.0 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 0.87 |
| DS130 | 08:44 | 1000 | -0.07 | 19.9 | 20.0 | 1.2 | 1.1 | 0.3 | 0.3 | 0 | 0 | 0.2 | 0.2 | 0.1 | - | Dry | - | 0.96 |
| DS125 | 09:35 | 999 | -0.10 | 20.5 | 20.5 | 1.1 | 1.1 | 0.3 | 0.3 | 0 | 0 | 0.5 | 0.5 | 0.1 | - | Dry | - | 0.98 |
| RO08 | 09:10 | 999 | -0.03 | 20.1 | 20.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0 | 0 | 0.4 | 0.4 | 0.1 | - | 3.95 | - | 10.00 |
| DS128 | 08:55 | 999 | -0.10 | 20.3 | 20.3 | 1.0 | 1.0 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 1.61 |
| DS121 | 09:52 | 999 | -0.12 | 20.3 | 20.4 | 1.5 | 1.5 | 0.3 | 0.3 | 0 | 0 | 0.4 | 0.4 | 0.1 | - | Dry | - | 1.01 |
| DS120 | 10:00 | 999 | -0.02 | 20.4 | 20.4 | 1.0 | 1.0 | 0.3 | 0.3 | 0 | 0 | 0.4 | 0.4 | 0.0 | - | Dry | - | 0.90 |
| RO07 | 09:42 | 999 | -0.05 | 17.8 | 17.8 | 1.4 | 1.4 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.1 | - | 3.90 | - | 10.00 |
| DS106 | 10:18 | 999 | 0.05 | 20.9 | 20.9 | 0.6 | 0.6 | 0.3 | 0.3 | 1 | 0 | 0.4 | 0.4 | 0.1 | - | Dry | - | 0.95 |
| DS108 | 10:10 | 998 | 0.02 | 19.7 | 19.7 | 0.9 | 0.9 | 0.3 | 0.3 | 0 | 0 | 0.4 | 0.4 | 0.0 | - | Dry | - | 1.00 |
| RO03 | 10:27 | 998 | 0.02 | 21.0 | 21.1 | 0.7 | 0.6 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.1 | - | 4.15 | - | 10.00 |
| DS105 | 10:33 | 998 | 0.00 | 20.9 | 21.0 | 0.4 | 0.4 | 0.3 | 0.3 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 1.05 |
| DS104 | 10:42 | 999 | 0.09 | 20.6 | 20.7 | 0.8 | 0.7 | 0.3 | 0.3 | 0 | 0 | 0.3 | 0.3 | 0.1 | - | Dry | - | 0.90 |
| DS107 | 10:48 | 999 | 0.02 | 20.4 | 20.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0 | 0 | 0.4 | 0.4 | 0.1 | - | Dry | - | 0.99 |
| RO02 | 11:40 | 999 | 0.05 | 20.8 | 21.2 | 0.2 | 0.1 | 0.3 | 0.3 | 1 | 0 | 0.2 | 0.2 | 0.0 | - | 4.00 | - | 10.04 |
| DS111 | 11:55 | 996 | 0.03 | 20.4 | 20.4 | 0.7 | 0.7 | 0.3 | 0.3 | 1 | 0 | 0.0 | 0.0 | 0.0 | - | Dry | - | 0.86 |
| DS103 | 12:02 | 999 | 0.07 | 20.9 | 21.0 | 0.4 | 0.4 | 0.3 | 0.3 | 1 | 0 | -0.1 | -0.1 | 0.1 | - | Dry | - | 1.10 |
| DS102 | 12:10 | 999 | 0.05 | 18.2 | 18.2 | 1.3 | 1.3 | 0.3 | 0.3 | 1 | 0 | 0.3 | 0.3 | 0.1 | - | Dry | - | 1.10 |
| DS101 | 12:16 | 999 | 0.12 | 19.5 | 19.5 | 1.0 | 1.0 | 0.3 | 0.3 | 1 | 0 | 0.4 | 0.4 | 0.0 | - | Dry | - | 1.00 |
| RO01 | 12:24 | 998 | 0.07 | 20.5 | 20.5 | 0.0 | 0.0 | 0.3 | 0.3 | 2 | 1 | 0.4 | 0.4 | 0.1 | - | 5.90 | - | 10.00 |
| DS112 | 12:46 | 999 | 0.07 | 21.2 | 21.3 | 0.4 | 0.4 | 0.3 | 0.3 | 1 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 0.95 |

**Remarks :** RO01 W1 7.6 mbgs

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 04/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.1 | $CO_2$% v/v : | 0.1 | $CH_4$% v/v : | 0.4 | Weather Conditions : | Clear, sunny, windy, 10oc | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS113 | 13:15 | 999 | 0.07 | 20.8 | 20.9 | 0.6 | 0.6 | 0.4 | 0.3 | 1 | 0 | 0.2 | 0.2 | 0.0 | - | Dry | - | 1.10 |
| RO05 | 12:53 | 999 | 0.09 | 21.7 | 21.8 | 0.0 | 0.0 | 0.3 | 0.3 | 2 | 0.0 | 0.0 | 0.0 | 0.1 | - | 3.10 | - | 10.00 |
| DS114 | 13:23 | 999 | 0.09 | 20.7 | 20.8 | 0.7 | 0.7 | 0.4 | 0.4 | 2 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 1.10 |
| DS115 | 13:28 | 999 | 0.12 | 19.9 | 19.9 | 1.0 | 1.0 | 0.3 | 0.3 | 2 | 0 | 0.2 | 0.2 | 0.1 | - | Dry | - | 1.00 |
| DS117 | 13:45 | 999 | 0.07 | 21.4 | 21.5 | 0.3 | 0.3 | 0.3 | 0.3 | 2 | 0 | 0.3 | 0.3 | 0.2 | - | Dry | - | 0.80 |
| RO06 | 13:52 | 999 | 0.10 | 20.9 | 20.9 | 0.0 | 0.0 | 0.3 | 0.3 | 2 | 1 | 0.3 | 0.3 | 0.1 | - | 5.70 | - | 10.00 |
| DS118 | 14:14 | 999 | 0.03 | 21.2 | 21.2 | 0.5 | 0.5 | 0.3 | 0.3 | 2 | 0 | 0.5 | 0.5 | 0.1 | - | Dry | - | 1.00 |
| DS110 | 13:35 | 1000 | 0.05 | 21.5 | 21.8 | 0.2 | 0.1 | 0.4 | 0.4 | 2 | 0 | 0.2 | 0.2 | 0.2 | - | 0.35 | - | 3.00 |
| RO04 | 10:57 | 1000 | -0.02 | 20.8 | 21.2 | 0.3 | 0.2 | 0.3 | 0.3 | 1 | 0 | 0.4 | 0.4 | 0.0 | - | 3.00 | - | 10.15 |

**Remarks :** RO04 W1 sample 5.0mbgs, RO06 W1 3.0mbgs, RO06 W1 8.0mbgs

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 11/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.1 | $CO_2$% v/v : | 0.3 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Dry | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | HBW |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS123 | 16:00 | 1020 | -0.02 | 20.0 | 20.0 | 1.4 | 1.4 | 0.0 | 0.0 | 1 | 0 | -0.1 | -0.1 | 0.8 | - | Dry | - | 1.75 |
| DS122 | 15:55 | 1020 | -0.03 | 20.0 | 20.0 | 1.4 | 1.4 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.7 | - | Dry | - | 0.87 |
| DS130 | 15:40 | 1020 | -0.02 | 20.8 | 20.8 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.6 | - | Dry | - | 0.96 |
| DS125 | 15:15 | 1020 | 0.03 | 21.1 | 21.1 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.3 | - | Dry | - | 0.98 |
| RO08 | 15:30 | 1020 | -0.02 | 20.3 | 20.3 | 0.7 | 0.7 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.5 | - | 3.69 | - | 10.00 |
| DS128 | 15:20 | 1020 | 0.03 | 20.8 | 20.8 | 1.3 | 1.3 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.7 | - | 1.43 | - | 1.61 |
| DS121 | 16:04 | 1020 | 0.02 | 20.1 | 20.1 | 1.4 | 1.4 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.8 | - | Dry | - | 1.01 |
| DS120 | 16:10 | 1020 | 0.03 | 20.2 | 20.2 | 1.3 | 1.3 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.8 | - | Dry | - | 0.90 |
| RO07 | 15:46 | 1020 | 0.03 | 12.9 | 12.9 | 2.0 | 2.0 | 0.0 | 0.0 | 2 | 0 | -0.2 | -0.2 | 0.6 | - | 3.68 | - | 10.00 |
| DS106 | 14:59 | 1020 | 0.02 | 20.8 | 20.8 | 0.9 | 0.9 | 0.0 | 0.0 | 1 | 0 | -0.1 | -0.1 | 0.3 | - | Dry | - | 0.95 |
| DS108 | 15:05 | 1020 | -0.02 | 20.7 | 20.7 | 0.9 | 0.9 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.2 | - | Dry | - | 1.00 |
| RO03 | 14:59 | 1020 | 0.02 | 20.8 | 20.8 | 0.9 | 0.9 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.2 | - | 4.10 | - | 10.00 |
| DS105 | 14:52 | 1020 | -0.02 | 20.5 | 20.5 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 2 | -0.1 | -0.1 | 0.5 | - | Dry | - | 1.05 |
| DS104 | 14:40 | 1020 | -0.02 | 21.1 | 21.1 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.2 | - | Dry | - | 0.90 |
| DS107 | 14:25 | 1020 | -0.02 | 21.1 | 21.1 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.2 | - | Dry | - | 0.99 |
| RO02 | 14:06 | 1020 | -0.02 | 21.2 | 21.2 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.1 | - | 3.96 | - | 10.04 |
| DS111 | 14:10 | 1020 | -0.02 | 20.2 | 20.2 | 0.3 | 0.3 | 0.0 | 0.0 | 0 | 0 | -0.2 | -0.2 | 0.1 | - | Dry | - | 0.86 |
| DS103 | 13:17 | 1020 | 0.00 | 20.2 | 20.2 | 0.7 | 0.7 | 0.0 | 0.0 | 0 | 0 | -0.1 | -0.1 | 0.2 | - | Dry | - | 1.10 |
| DS102 | 13:06 | 1020 | -0.02 | 20.3 | 20.3 | 0.7 | 0.7 | 0.0 | 0.0 | 0 | 1 | -0.1 | -0.1 | 0.2 | - | Dry | - | 1.10 |
| DS101 | 12:59 | 1020 | -0.02 | 18.9 | 18.9 | 1.5 | 1.5 | 0.0 | 0.0 | 0 | 0 | -0.1 | -0.1 | 0.1 | - | Dry | - | 1.00 |
| RO01 | 12:37 | 1020 | -0.02 | 19.2 | 19.2 | 0.2 | 0.2 | 0.0 | 0.0 | 0 | 1 | 0.0 | 0.0 | 0.8 | - | 5.45 | - | 10.00 |
| DS112 | 12:28 | 1020 | -0.02 | 18.8 | 18.8 | 1.4 | 1.4 | 0.0 | 0.0 | 0 | 0 | -0.1 | -0.1 | 0.3 | - | Dry | - | 0.95 |

**Remarks :**

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 11/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.1 | $CO_2$% v/v : | 0.3 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Dry | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | HBW |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS113 | 12:16 | 1020 | -0.02 | 20.5 | 20.8 | 0.2 | 0.2 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.0 | - | Dry | - | 1.75 |
| RO05 | 11:07 | 1020 | -0.10 | 20.9 | 20.9 | 0.2 | 0.2 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.0 | - | 3.01 | - | 0.87 |
| DS114 | 10:59 | 1020 | -0.09 | 19.8 | 19.8 | 1.2 | 1.2 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.0 | - | Dry | - | 0.96 |
| DS115 | 10:49 | 1020 | -0.09 | 19.6 | 19.6 | 1.7 | 1.7 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.0 | - | Dry | - | 1.00 |
| DS117 | 16:27 | 1020 | -0.02 | 20.7 | 20.7 | 0.9 | 0.9 | 0.0 | 0.0 | 1 | 0 | -0.2 | -0.2 | 0.8 | - | Dry | - | 0.80 |
| RO06 | 16:33 | 1020 | -0.02 | 19.9 | 19.9 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 1 | -0.1 | -0.1 | 0.1 | - | 5.50 | - | 10.00 |
| DS118 | 16:44 | 1020 | -0.02 | 21.0 | 21.0 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 1 | -0.1 | -0.1 | 0.1 | - | Dry | - | 1.00 |
| DS110 | 17:00 | 1020 | -0.02 | 20.9 | 20.9 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 1 | -0.1 | -0.1 | 0.9 | - | 0.39 | - | 3.00 |
| RO04 | 13:37 | 1020 | -0.02 | 20.4 | 20.4 | 0.5 | 0.5 | 0.0 | 0.0 | 1 | 1 | -0.2 | -0.2 | 0.1 | - | 2.75 | - | 10.15 |

**Remarks :**

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 18/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.0 | $CO_2$% v/v : | 0.2 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Cloudy, slightly windy, 13°C | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS123 | 09:30 | 1006 | -0.12 | 18.4 | 18.4 | 5.1 | 5.1 | 0.0 | 0.0 | 0 | 0 | 0.3 | 0.3 | 0.2 | - | Dry | - | 1.75 |
| DS122 | 09:50 | 1006 | -0.07 | 21.0 | 21.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.0 | - | Dry | - | 0.87 |
| DS130 | 10:00 | 1006 | -0.06 | 20.0 | 20.0 | 1.1 | 1.1 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.4 | - | Dry | - | 0.96 |
| DS125 | 10:15 | 1006 | -0.02 | 19.8 | 19.8 | 1.0 | 1.0 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.1 | - | Dry | - | 0.98 |
| RO08 | 10:20 | 1006 | 0.02 | 20.8 | 20.8 | 0.4 | 0.4 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.4 | - | 3.57 | - | 10.00 |
| DS128 | 10:28 | 1006 | 0.02 | 20.1 | 20.1 | 0.8 | 0.8 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.3 | - | Dry | - | 1.61 |
| DS121 | 10:55 | 1006 | 0.03 | 20.2 | 20.2 | 1.2 | 1.2 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.2 | - | Dry | - | 1.01 |
| DS120 | 11:02 | 1006 | -0.02 | 20.3 | 20.3 | 1.0 | 1.0 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.1 | - | Dry | - | 0.90 |
| RO07 | 10:38 | 1006 | 0.02 | 17.4 | 17.4 | 1.4 | 1.4 | 0.0 | 0.0 | 0 | 0 | 0.3 | 0.3 | 0.3 | - | 3.50 | - | 10.00 |
| DS106 | 11:23 | 1006 | 0.03 | 21.0 | 21.0 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.4 | - | Dry | - | 0.95 |
| DS108 | 11:15 | 1006 | 0.02 | 19.6 | 19.6 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.1 | - | Dry | - | 1.00 |
| RO03 | 11:34 | 1006 | 0.05 | 20.9 | 20.9 | 0.5 | 0.5 | 0.0 | 0.0 | 1 | 0 | 0.4 | 0.3 | 0.2 | - | 4.15 | - | 10.00 |
| DS105 | 11:42 | 1006 | 0.07 | 21.1 | 21.1 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 2 | 0.1 | 0.1 | 0.1 | - | Dry | - | 1.05 |
| DS104 | 11:50 | 1006 | 0.03 | 21.4 | 21.4 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.3 | - | Dry | - | 0.90 |
| DS107 | 11:57 | 1006 | 0.03 | 21.1 | 21.1 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.1 | - | Dry | - | 0.99 |
| RO02 | 12:06 | 1006 | 0.01 | 20.8 | 20.8 | 0.1 | 0.1 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.1 | - | 4.75 | - | 10.04 |
| DS111 | 12:15 | 1006 | 0.03 | 20.5 | 20.5 | 0.4 | 0.4 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.4 | - | Dry | - | 0.86 |
| DS103 | 12:25 | 1006 | 0.04 | 20.7 | 20.7 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.3 | - | Dry | - | 1.10 |
| DS102 | 12:35 | 1006 | 0.08 | 20.2 | 20.2 | 0.6 | 0.6 | 0.0 | 0.0 | 0 | 0 | 0.1 | 0.1 | 0.1 | - | Dry | - | 1.10 |
| DS101 | 12:40 | 1006 | 0.09 | 19.9 | 19.9 | 1.0 | 1.0 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.0 | - | Dry | - | 1.00 |
| RO01 | 12:45 | 1006 | 0.07 | 21.1 | 21.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2 | 1 | 0.3 | 0.3 | 0.7 | - | 5.45 | - | 10.00 |
| DS112 | 12:55 | 1006 | 0.04 | 20.9 | 20.9 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.2 | - | Dry | - | 0.95 |

**Remarks :**

NR -Not recorded

EXPLORATION & TESTING ASSOCIATES

# GAS AND GROUNDWATER MONITORING RESULTS

| | |
|---|---|
| **Contract Name :** | Oxfordshire |
| **Contract No :** | C10172 |
| **Date :** | 18/10/2021 |

| **Background Readings:** | $O_2$% v/v : | 21.0 | $CO_2$% v/v : | 0.2 | $CH_4$% v/v : | 0.0 | Weather Conditions : | Cloudy, slightly windy, 13°C | Equipment Used: | Technician: |
|---|---|---|---|---|---|---|---|---|---|---|
| | $H_2S$ ppm : | 0 | CO ppm : | 0 | Pressure Trend : | Falling | Ground Conditions : | Damp | GA5000 | JM |

| Location | Time | Atmospheric Pressure (mb) | Differential Pressure (mb) | $O_2$(% v/v) | | $CO_2$ (% v/v) | | $CH_4$ (% v/v) | | $H_2S$ (ppm) | CO (ppm) | Gas Flow Rate (l/hr) | | VOC (ppm) | Depth to LNAPL | Water Depth | Depth to DNAPL | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Low | Steady | High | Steady | High | Steady | Peak | Peak | Peak | Steady | Peak | (mbgl) | (mbgl) | (mbgl) | (mbgl) |
| DS113 | 13:10 | 1006 | 0.06 | 20.7 | 20.7 | 0.4 | 0.4 | 0.0 | 0.0 | 1 | 0 | 0.1 | 0.1 | 0.2 | - | Dry | - | 1.75 |
| RO05 | 13:00 | 1006 | 0.08 | 21.1 | 21.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.1 | - | 3.05 | - | 0.87 |
| DS114 | 13:20 | 1006 | 0.08 | 19.8 | 19.8 | 0.9 | 0.9 | 0.0 | 0.0 | 0 | 0 | 0.3 | 0.3 | 0.0 | - | Dry | - | 0.96 |
| DS115 | 13:30 | 1006 | 0.10 | 19.9 | 19.9 | 1.1 | 1.1 | 0.0 | 0.0 | 0 | 0 | 0.2 | 0.2 | 0.0 | - | Dry | - | 1.00 |
| DS117 | 13:40 | 1006 | 0.06 | 20.1 | 20.1 | 0.6 | 0.6 | 0.0 | 0.0 | 1 | 0 | 0.3 | 0.3 | 0.4 | - | Dry | - | 0.80 |
| RO06 | 13:48 | 1006 | 0.10 | 20.9 | 21.0 | 0.2 | 0.2 | 0.0 | 0.0 | 1 | 1 | 0.3 | 0.3 | 0.1 | - | 5.35 | - | 10.00 |
| DS118 | 13:55 | 1006 | 0.03 | 20.7 | 20.7 | 0.8 | 0.8 | 0.0 | 0.0 | 1 | 1 | 0.2 | 0.2 | 0.1 | - | Dry | - | 1.00 |
| DS110 | 14:05 | 1006 | 0.04 | 21.4 | 21.4 | 0.3 | 0.3 | 0.0 | 0.0 | 1 | 1 | 0.2 | 0.2 | 0.5 | - | 0.40 | - | 3.00 |
| RO04 | 14:10 | 1006 | -0.02 | 20.8 | 20.8 | 0.4 | 0.4 | 0.0 | 0.0 | 1 | 1 | 0.2 | 0.2 | 0.1 | - | 2.62 | - | 10.15 |

**Remarks :**

NR -Not recorded

# Appendix 5: Greenfield Runoff Rate and Volume Calculations

# Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

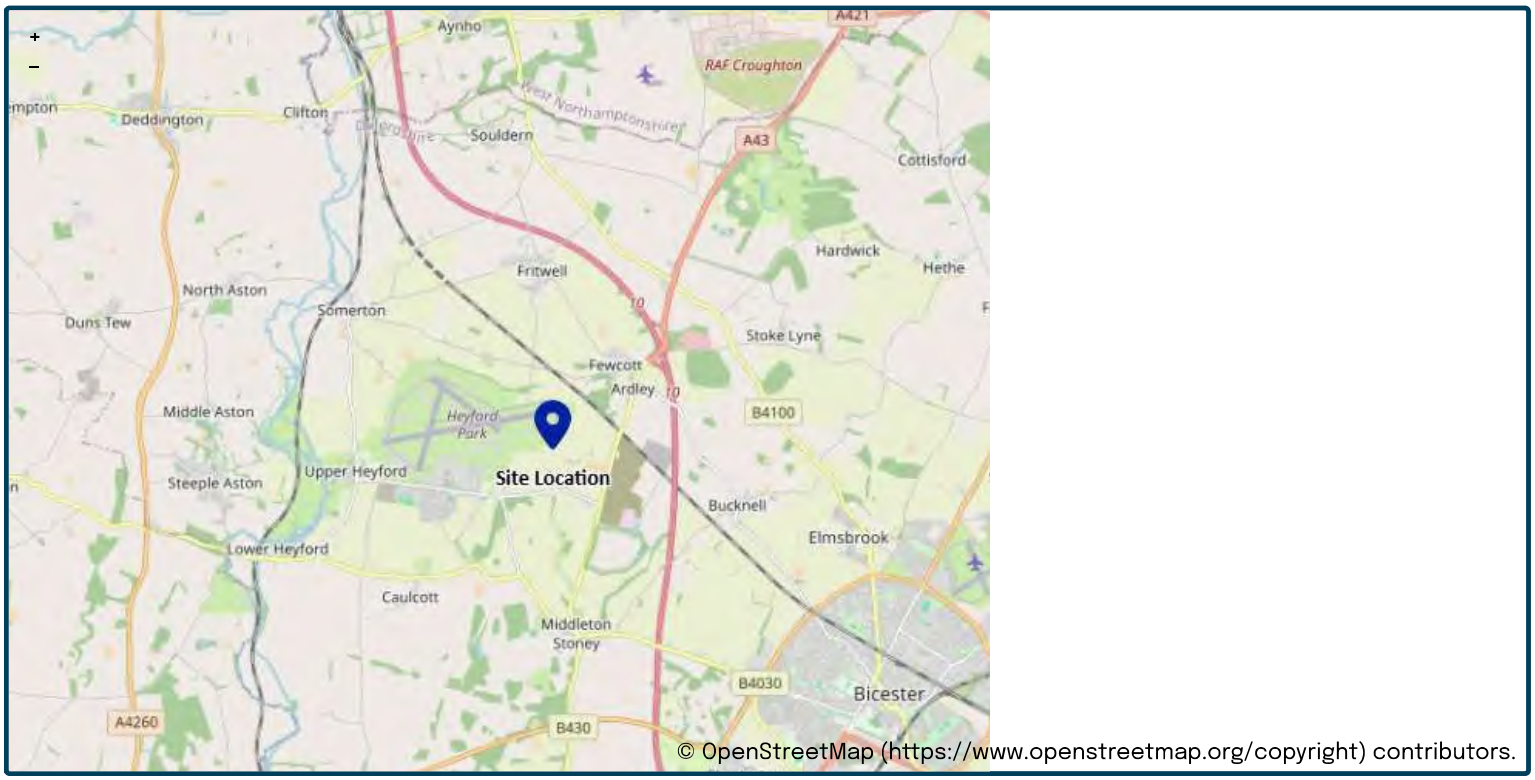
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

## Project details

| | |
|---|---|
| **Date** | 09/12/2025 |
| **Calculated by** | M. Bailey |
| **Reference** | OxSRFI - IH124 |
| **Model version** | 2.2.2 |

## Location

| | |
|---|---|
| **Site name** | OxSRFI |
| **Site location** | Oxfordshire |




| | |
|---|---|
| **Site easting (British National Grid)** | 453018 |
| **Site northing (British National Grid)** | 226084 |

## Site details

| | |
|---|---|
| **Total site area (ha)** | 1 ha |

# Greenfield runoff

## Method

| | |
|---|---|
| **Method** | IH124 |

## IH124

| | My value | | Map value |
|---|---|---|---|
| **SAAR (mm)** | 659 mm | | 659 |
| **How should SPR be derived?** | WRAP soil type | | |
| **WRAP soil type** | 1 | | 1 |
| **SPR** | 0.1 | | |
| **QBar (IH124) (l/s)** | 0.2 l/s | | |

## Growth curve factors

| | My value | | Map value |
|---|---|---|---|
| **Hydrological region** | 6 | | 6 |
| **1 year growth factor** | 0.85 | | |
| **2 year growth factor** | 0.88 | | |
| **10 year growth factor** | 1.62 | | |
| **30 year growth factor** | 2.3 | | |
| **100 year growth factor** | 3.19 | | |
| **200 year growth factor** | 3.74 | | |

## Results

| | |
|---|---|
| **Method** | IH124 |
| **Flow rate 1 year (l/s)** | 0.1 l/s |
| **Flow rate 2 year (l/s)** | 0.1 l/s |
| **Flow rate 10 years (l/s)** | 0.3 l/s |
| **Flow rate 30 years (l/s)** | 0.4 l/s |
| **Flow rate 100 years (l/s)** | 0.5 l/s |
| **Flow rate 200 years (l/s)** | 0.6 l/s |

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

### Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

## Simulation Settings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Winter CV | 0.840 | Drain Down Time (mins) | 240 | Check Discharge Rate(s) | x |
| Rainfall Events | Singular | Analysis Speed | Normal | Additional Storage (m³/ha) | 20.0 | Check Discharge Volume | ✓ |
| Summer CV | 0.750 | Skip Steady State | x | Starting Level (m) | | 100 year 360 minute (m³) | 48 |

### Storm Durations

| 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 |
|---|---|---|---|---|---|---|---|---|---|---|---|

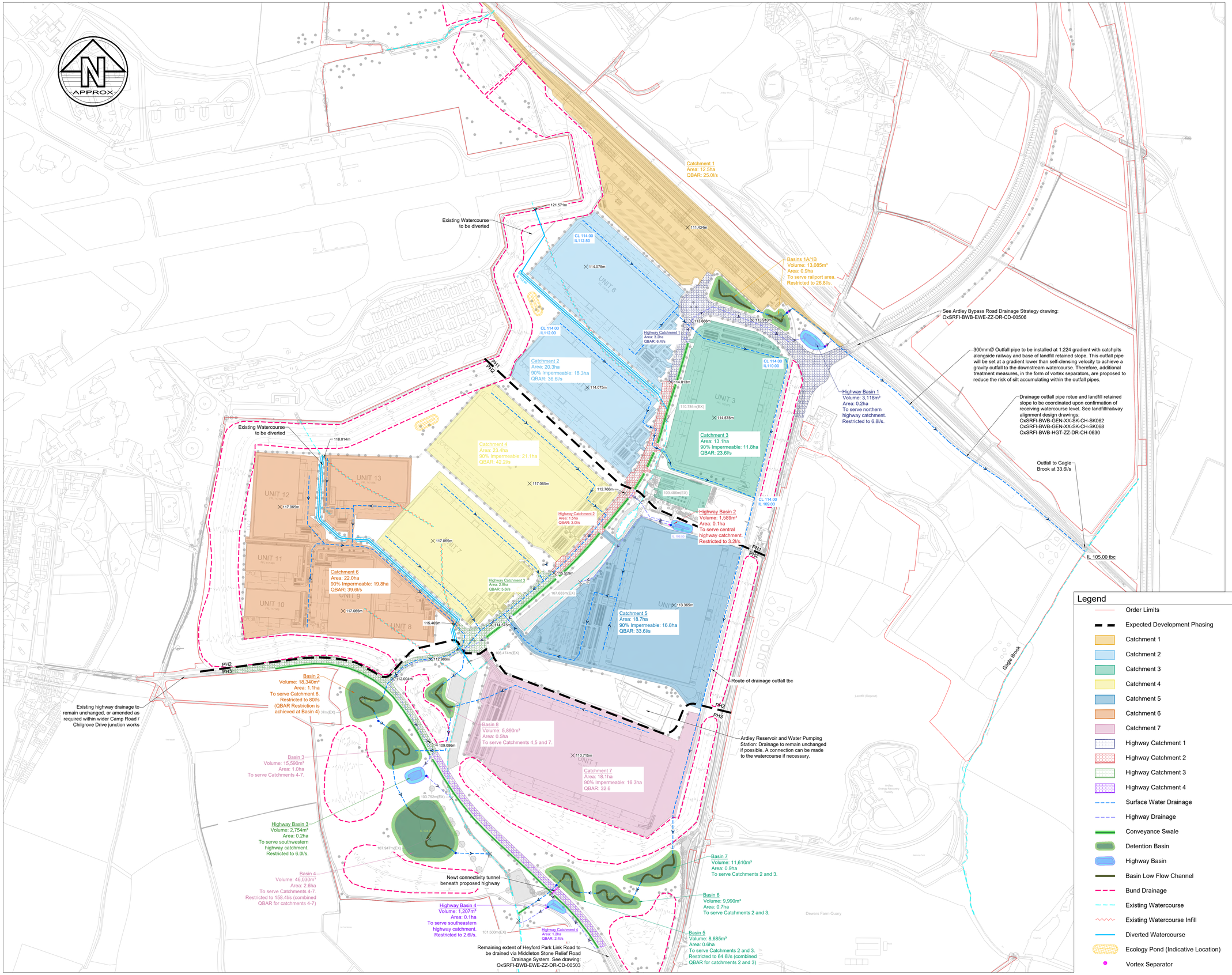
| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 100 | 40 | 0 | 0 |

## Pre-development Discharge Volume

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Site Makeup | Greenfield | Soil Index | 1 | Return Period (years) | 100 | Betterment (%) | 0 |
| Greenfield Method | FSR/FEH | SPR | 0.10 | Climate Change (%) | 0 | PR | 0.078 |
| Positively Drained Area (ha) | 1.000 | CWI | 100.444 | Storm Duration (mins) | 360 | Runoff Volume (m³) | 48 |

Flow+ v14.0 Copyright © 1988-2025 Causeway Technologies Ltd

## Appendix 6: Illustrative Surface Water Drainage Strategy




## Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
6. Enclosed Topographical Survey based on greenhatch group drawing '36646_T' dated 03/04/23.
7. Enclosed Masterplan based on Michael Spaks Associates drawing 'OXSRFI-MSA-MP-L1-DR-A-10020' dated 24/12/25.
8. Do not construct or cost from this drawing.
9. The maximum catchment discharge rates are based on 2.0l/s/ha, multiplied by the measured total catchment areas.
10. All plot drainage basins have been designed to accommodate the 1 in 100-year + 40% critical storm event with a 400mm freeboard. A Cv value of 0.95 has been used and plot areas are assumed to be 90% impermeable.
11. All Highway basins have been designed to accommodate the 1 in 100 year + 40% climate change critical storm with 300mm of freeboard. A Cv value of 0.9 has been used for highways.
12. The attenuation calculations has been undertaken using Flood Estimation Handbook (FEH) rainfall data.
13. All detention basins include a low flow channel. Depths and alignments to be confirmed at the detailed design stage with consultation from the appointed ecological consultant.
14. This strategy is a proof of concept only and all details are to be confirmed at the detailed design stage in agreement with all relevant statutory consultees.
15. Penstocks will be included within the drainage network to allow sections of the system to be isolated in the event of a pollution spill.
16. This drawing should be read in conjunction with BWB Report "OXSRFI-BWB-ZZ-XX-T-W-1050" and BWB Drawings:
    - OxSRFI-BWB-EWE-ZZ-DR-CD-00503
    - OxSRFI-BWB-EWE-ZZ-DR-CD-00506
    - OxSRFI-BWB-GEN-XX-SK-CH-SK072

## Legend

- Order Limits
- Expected Development Phasing
- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4
- Catchment 5
- Catchment 6
- Catchment 7
- Highway Catchment 1
- Highway Catchment 2
- Highway Catchment 3
- Highway Catchment 4
- Surface Water Drainage
- Highway Drainage
- Conveyance Swale
- Detention Basin
- Highway Basin
- Basin Low Flow Channel
- Bund Drainage
- Existing Watercourse
- Existing Watercourse Infill
- Diverted Watercourse
- Ecology Pond (Indicative Location)
- Vortex Separator
- Newt Connectivity Tunnel

## Issues & Revisions

| Rev | Date | Details of issue / revision | Drw | Rev |
|---|---|---|---|---|
| P09 | 09.10.26 | Updated in line with SDS (Deadline 2) | TLB | RJ |
| P08 | 15.05.26 | Updated Order Limits | MPB | RJ |
| P07 | 13.02.26 | Basins and notes updated for revised Cv values | TLB | MPB |
| P06 | 16.12.25 | Added Vortex Separators. Highway Drainage Basins Amended | MPB | RJ |
| P05 | 11.11.25 | Basins revised, bund drainage updated | TLB | CD |
| P04 | 15.10.25 | Revised low flow channels | NMG | TLB |
| P03 | 19.09.25 | Added low flow channels and revised outfall route | NMG | MPB |
| P02 | 26.03.25 | Updated Drainage | LDR | CD |
| P01 | 26.03.25 | **Preliminary Issue** | LDR | CD |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Client

**Oxfordshire Railfreight Ltd.**

Project Title

**Oxfordshire SRFI**

Drawing Title

**Illustrative Surface Water Drainage Strategy**

| Drawn: | L. Ream | | Reviewed: | C. Dodd | |
|---|---|---|---|---|---|
| BWB Ref: | NTH2479 | Date: | 26.03.25 | Scale@A1: | 1:5000 |

Drawing Status

**PRELIMINARY**

| Project - Originator - Zone - Level - Type - Role - Number | Status | Rev |
|---|---|---|
| **OxSRFI-BWB-ZZ-XX-SK-DR-SK117** | **S2** | **P09** |

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## Appendix 7: Outline Attenuation Calculations

## Design Settings

| | | | |
|---|---|---|---|
| Rainfall Methodology | FEH-22 | Minimum Velocity (m/s) | 1.00 |
| Return Period (years) | 100 | Connection Type | Level Soffits |
| Additional Flow (%) | 0 | Minimum Backdrop Height (m) | 0.200 |
| CV | 0.950 | Preferred Cover Depth (m) | 1.200 |
| Time of Entry (mins) | 5.00 | Include Intermediate Ground | ✓ |
| Maximum Time of Concentration (mins) | 30.00 | Enforce best practice design rules | x |
| Maximum Rainfall (mm/hr) | 50.0 | | |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|---|---|---|---|---|---|---|---|
| Basin 1 | 13.400 | 5.00 | 111.400 | | 160.661 | 54.812 | 2.400 |
| Basin 2 | 20.900 | 5.00 | 111.000 | | 23.827 | -153.386 | 2.400 |
| Basin 3 | 1.000 | 5.00 | 106.500 | | 33.775 | -180.772 | 2.400 |
| Basin 4 | 2.600 | | 106.400 | | 48.540 | -206.808 | 2.400 |
| Basin 5 | 0.600 | | 105.000 | | 100.563 | -216.097 | 2.400 |
| Basin 6 | 0.700 | 5.00 | 105.100 | | 128.383 | -227.777 | 2.400 |
| Basin 7 | 0.900 | 5.00 | 105.200 | | 148.544 | -217.918 | 2.400 |
| 5 | 16.800 | 5.00 | 113.000 | 2100 | 106.668 | -109.675 | 2.400 |
| Basin 8 | 0.500 | 5.00 | 107.400 | | 51.875 | -147.226 | 2.400 |
| 2 | 30.100 | 15.00 | 114.000 | 2600 | 184.397 | -44.878 | 3.000 |
| 4 | 21.100 | 10.00 | 117.000 | 2400 | 59.122 | -86.816 | 2.000 |
| 7 | 16.300 | 10.00 | 110.000 | 2400 | 103.175 | -174.539 | 2.000 |

## Links

| Name | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | T of C (mins) | Rain (mm/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 2 | Basin 7 | 900.000 | 0.600 | 111.000 | 102.800 | 8.200 | 109.8 | 1700 | 18.39 | 50.0 |
| 1.001 | Basin 7 | Basin 6 | 22.442 | 0.600 | 102.800 | 102.700 | 0.100 | 224.4 | 1500 | 18.53 | 50.0 |
| 1.002 | Basin 6 | Basin 5 | 30.172 | 0.600 | 102.700 | 102.600 | 0.100 | 301.7 | 1500 | 18.73 | 50.0 |
| 2.000 | 4 | Basin 8 | 150.000 | 0.600 | 115.000 | 105.000 | 10.000 | 15.0 | 1500 | 10.23 | 50.0 |
| 3.000 | 7 | Basin 8 | 150.000 | 0.600 | 108.000 | 105.000 | 3.000 | 50.0 | 1500 | 10.41 | 50.0 |
| 4.000 | 5 | Basin 8 | 66.426 | 0.600 | 110.600 | 105.000 | 5.600 | 11.9 | 1200 | 5.10 | 50.0 |
| 2.001 | Basin 8 | Basin 3 | 150.000 | 0.600 | 105.000 | 104.100 | 0.900 | 166.7 | 1600 | 11.14 | 50.0 |
| 5.000 | Basin 2 | Basin 3 | 29.137 | 0.600 | 108.600 | 104.100 | 4.500 | 6.5 | 675 | 5.05 | 50.0 |
| 2.002 | Basin 3 | Basin 4 | 29.931 | 0.600 | 104.100 | 104.000 | 0.100 | 299.3 | 2400 | 11.29 | 50.0 |

| Name | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) | Σ Add Inflow (l/s) | Pro Depth (mm) | Pro Velocity (m/s) |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 4.419 | 10029.4 | 5167.1 | 1.300 | 0.700 | 30.100 | 0.0 | 865 | 4.449 |
| 1.001 | 2.859 | 10103.8 | 5321.6 | 0.900 | 0.900 | 31.000 | 0.0 | 774 | 2.893 |
| 1.002 | 2.464 | 8707.6 | 5441.8 | 0.900 | 0.900 | 31.700 | 0.0 | 862 | 2.591 |
| 2.000 | 11.096 | 19607.4 | 3622.1 | 0.500 | 0.900 | 21.100 | 0.0 | 432 | 8.607 |
| 3.000 | 6.071 | 10728.8 | 2798.1 | 0.500 | 0.900 | 16.300 | 0.0 | 519 | 5.160 |
| 4.000 | 10.887 | 12313.0 | 2884.0 | 1.200 | 1.200 | 16.800 | 0.0 | 392 | 8.989 |
| 2.001 | 3.453 | 13885.5 | 9390.1 | 0.800 | 0.800 | 54.700 | 0.0 | 968 | 3.691 |
| 5.000 | 10.337 | 3699.2 | 3587.8 | 1.725 | 1.725 | 20.900 | 0.0 | 541 | 11.674 |
| 2.002 | 3.294 | 14903.4 | 13149.5 | 0.000 | 0.000 | 76.600 | 0.0 | 1767 | 3.682 |

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## Simulation Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Skip Steady State | x | 1 year (l/s) | 0.3 |
| Rainfall Events | Singular | Drain Down Time (mins) | 240 | 30 year (l/s) | 0.7 |
| Summer CV | 0.950 | Additional Storage (m³/ha) | 20.0 | Check Discharge Volume | x |
| Winter CV | 0.950 | Starting Level (m) | | | |
| Analysis Speed | Normal | Check Discharge Rate(s) | ✓ | | |

### Storm Durations

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 60 | 180 | 360 | 600 | 960 | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 | |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 100 | 25 | 0 | 0 |
| 100 | 40 | 0 | 0 |

## Pre-development Discharge Rate

| | | | |
|---|---|---|---|
| Site Makeup | Greenfield | Growth Factor 1 year | 0.85 |
| Greenfield Method | FEH | Growth Factor 30 year | 1.95 |
| Positively Drained Area (ha) | 1.000 | Betterment (%) | 0 |
| SAAR (mm) | 668 | QMed | 0.3 |
| Host | 1 | QBar | 0.4 |
| BFIHost | 0.961 | Q 1 year (l/s) | 0.3 |
| Region | 1 | Q 30 year (l/s) | 0.7 |
| QBar/QMed conversion factor | 1.111 | | |

## Node Basin 1 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | x | Sump Available | ✓ |
| Invert Level (m) | 109.000 | Product Number | CTL-SHE-0211-2680-2000-2680 |
| Design Depth (m) | 2.000 | Min Outlet Diameter (m) | 0.225 |
| Design Flow (l/s) | 26.8 | Min Node Diameter (mm) | 2100 |

## Node Basin 2 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | x | Sump Available | ✓ |
| Invert Level (m) | 108.600 | Product Number | CTL-SHE-0347-8000-2000-8000 |
| Design Depth (m) | 2.000 | Min Outlet Diameter (m) | 0.375 |
| Design Flow (l/s) | 80.0 | Min Node Diameter (mm) | 0 |

## Node Basin 4 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | x | Sump Available | ✓ |
| Invert Level (m) | 104.000 | Product Number | CTL-SHE-0466-1584-2000-1584 |
| Design Depth (m) | 2.000 | Min Outlet Diameter (m) | 0.500 |
| Design Flow (l/s) | 158.4 | Min Node Diameter (mm) | 0 |

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## Node Basin 5 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | x | Sump Available | ✓ |
| Invert Level (m) | 102.600 | Product Number | CTL-SHE-0316-6460-2000-6460 |
| Design Depth (m) | 2.000 | Min Outlet Diameter (m) | 0.375 |
| Design Flow (l/s) | 64.6 | Min Node Diameter (mm) | 3000 |

## Node Basin 1 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 109.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 4334.0 | 4334.0 | 2.400 | 9364.0 | 7600.0 |

## Node Basin 2 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 108.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 7773.0 | 7773.0 | 2.400 | 11353.0 | 11447.6 |

## Node Basin 3 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 104.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 6830.0 | 6830.0 | 2.400 | 10334.0 | 10420.6 |

## Node Basin 4 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 104.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 20809.0 | 20809.0 | 2.400 | 26158.0 | 26314.1 |

## Node Basin 5 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 102.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 3100.0 | 3100.0 | 2.400 | 6100.0 | 6153.5 |

## Node Basin 6 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 102.700 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

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| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 4000.0 | 4000.0 | 2.400 | 7200.0 | 7261.4 |

**Node Basin 7 Depth/Area Storage Structure**

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 102.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 5000.0 | 5000.0 | 2.400 | 8900.0 | 8962.7 |

**Node Basin 8 Depth/Area Storage Structure**

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 105.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | 7 |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 2057.0 | 2057.0 | 2.400 | 4863.0 | 4905.4 |

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**Results for 100 year +25% CC Critical Storm Duration. Lowest mass balance: 99.86%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 1440 minute winter | Basin 1 | 1440 | 110.813 | 1.813 | 386.8 | 11502.1900 | 0.0000 | OK |
| 960 minute winter | Basin 2 | 945 | 110.345 | 1.745 | 841.9 | 16137.6700 | 0.0000 | SURCHARGED |
| 10080 minute summer | Basin 3 | 7920 | 105.788 | 1.688 | 1725.4 | 13623.6400 | 0.0000 | OK |
| 10080 minute summer | Basin 4 | 7980 | 105.789 | 1.789 | 1597.0 | 40826.2300 | 0.0000 | OK |
| 1440 minute winter | Basin 5 | 1440 | 104.408 | 1.808 | 1473.9 | 7655.9680 | 0.0000 | OK |
| 1440 minute winter | Basin 6 | 1440 | 104.408 | 1.708 | 1862.6 | 8787.2930 | 0.0000 | SURCHARGED |
| 1440 minute winter | Basin 7 | 1440 | 104.408 | 1.608 | 1690.5 | 10153.2100 | 0.0000 | SURCHARGED |
| 15 minute summer | 5 | 10 | 111.554 | 0.954 | 11037.6 | 136.9144 | 0.0000 | OK |
| 30 minute summer | Basin 8 | 23 | 106.624 | 1.624 | 25070.5 | 4890.7480 | 0.0000 | SURCHARGED |
| 30 minute summer | 2 | 23 | 112.464 | 1.464 | 9901.6 | 301.6007 | 0.0000 | OK |
| 30 minute summer | 4 | 20 | 115.678 | 0.678 | 9014.9 | 146.1797 | 0.0000 | OK |
| 30 minute summer | 7 | 20 | 108.876 | 0.876 | 6964.1 | 146.7541 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|---|---|
| 1440 minute winter | Basin 1 | Hydro-Brake® | | 26.8 | | | | 2168.1 |
| 960 minute winter | Basin 2 | 5.000 | Basin 3 | 79.9 | 0.684 | 0.022 | 5.4656 | |
| 10080 minute summer | Basin 3 | 2.002 | Basin 4 | 1581.8 | 1.584 | 0.106 | 104.6464 | |
| 10080 minute summer | Basin 4 | Hydro-Brake® | | 158.3 | | | | 68919.5 |
| 1440 minute winter | Basin 5 | Hydro-Brake® | | 64.6 | | | | 5132.0 |
| 1440 minute winter | Basin 6 | 1.002 | Basin 5 | 1456.6 | 1.303 | 0.167 | 106.2346 | |
| 1440 minute winter | Basin 7 | 1.001 | Basin 6 | 1842.4 | 1.524 | 0.182 | 79.0175 | |
| 15 minute summer | 5 | 4.000 | Basin 8 | 10950.1 | 11.656 | 0.889 | 69.0704 | |
| 30 minute summer | Basin 8 | 2.001 | Basin 3 | 19556.7 | 6.979 | 1.408 | 539.6119 | |
| 30 minute summer | 2 | 1.000 | Basin 7 | 10049.6 | 7.213 | 1.002 | 1355.3571 | |
| 30 minute summer | 4 | 2.000 | Basin 8 | 8994.1 | 7.243 | 0.459 | 190.0277 | |
| 30 minute summer | 7 | 3.000 | Basin 8 | 6935.1 | 4.769 | 0.646 | 212.1309 | |

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**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.86%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 2160 minute winter | Basin 1 | 2100 | 111.000 | 2.000 | 306.5 | 13085.9500 | 0.0000 | OK |
| 1440 minute winter | Basin 2 | 1410 | 110.551 | 1.951 | 675.7 | 18338.4300 | 0.0000 | SURCHARGED |
| 10080 minute winter | Basin 3 | 8100 | 105.996 | 1.896 | 1869.8 | 15591.7600 | 0.0000 | OK |
| 10080 minute winter | Basin 4 | 8160 | 105.996 | 1.996 | 1534.0 | 46028.9100 | 0.0000 | OK |
| 2160 minute winter | Basin 5 | 2160 | 104.595 | 1.995 | 840.4 | 8682.7280 | 0.0000 | OK |
| 2160 minute winter | Basin 6 | 2160 | 104.595 | 1.895 | 1125.0 | 9987.7410 | 0.0000 | SURCHARGED |
| 2160 minute winter | Basin 7 | 2160 | 104.595 | 1.795 | 1130.4 | 11609.5700 | 0.0000 | SURCHARGED |
| 15 minute summer | 5 | 11 | 111.990 | 1.390 | 12370.7 | 199.4516 | 0.0000 | SURCHARGED |
| 30 minute summer | Basin 8 | 23 | 106.868 | 1.868 | 28081.6 | 5888.4470 | 0.0000 | SURCHARGED |
| 30 minute summer | 2 | 27 | 113.093 | 2.093 | 11089.7 | 431.0756 | 0.0000 | SURCHARGED |
| 30 minute summer | 4 | 20 | 115.724 | 0.724 | 10097.3 | 155.9986 | 0.0000 | OK |
| 30 minute summer | 7 | 21 | 108.976 | 0.976 | 7800.2 | 163.4283 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|---|---|
| 2160 minute winter | Basin 1 | Hydro-Brake® | | 26.8 | | | | 3180.0 |
| 1440 minute winter | Basin 2 | 5.000 | Basin 3 | 79.9 | 0.790 | 0.022 | 5.4674 | |
| 10080 minute winter | Basin 3 | 2.002 | Basin 4 | 1515.2 | 1.642 | 0.102 | 117.1749 | |
| 10080 minute winter | Basin 4 | Hydro-Brake® | | 158.3 | | | | 74106.0 |
| 2160 minute winter | Basin 5 | Hydro-Brake® | | 64.6 | | | | 7641.9 |
| 2160 minute winter | Basin 6 | 1.002 | Basin 5 | 826.7 | 1.199 | 0.095 | 106.2346 | |
| 2160 minute winter | Basin 7 | 1.001 | Basin 6 | 1109.0 | 1.421 | 0.110 | 79.0175 | |
| 15 minute summer | 5 | 4.000 | Basin 8 | 12064.7 | 11.883 | 0.980 | 74.8428 | |
| 30 minute summer | Basin 8 | 2.001 | Basin 3 | 19502.4 | 6.867 | 1.405 | 574.8735 | |
| 30 minute summer | 2 | 1.000 | Basin 7 | 10687.7 | 7.177 | 1.066 | 1566.8372 | |
| 30 minute summer | 4 | 2.000 | Basin 8 | 10074.5 | 7.366 | 0.514 | 195.1217 | |
| 30 minute summer | 7 | 3.000 | Basin 8 | 7721.2 | 4.901 | 0.720 | 222.9760 | |

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## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) | Invert Level (m) |
|---|---|---|---|---|---|---|---|---|
| Highway Basin 1 | 3.400 | | 112.000 | | 197.123 | 18.214 | 2.400 | 109.600 |
| Highway Basin 2 | 1.700 | | 113.000 | 1500 | 141.959 | -71.554 | 2.400 | 110.600 |
| Highway Basin 3 | 3.000 | | 110.000 | 1500 | 33.166 | -159.635 | 2.400 | 107.600 |
| Highway Basin 4 | 1.300 | 5.00 | 106.400 | 1500 | 90.371 | -229.919 | 2.400 | 104.000 |

## Simulation Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Skip Steady State | x | 1 year (l/s) | 0.3 |
| Rainfall Events | Singular | Drain Down Time (mins) | 240 | 30 year (l/s) | 0.7 |
| Summer CV | 0.900 | Additional Storage (m³/ha) | 20.0 | Check Discharge Volume | x |
| Winter CV | 0.900 | Starting Level (m) | | | |
| Analysis Speed | Normal | Check Discharge Rate(s) | ✓ | | |

### Storm Durations

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 60 | 180 | 360 | 600 | 960 | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 | |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 100 | 25 | 0 | 0 |
| 100 | 40 | 0 | 0 |

## Pre-development Discharge Rate

| | | | |
|---|---|---|---|
| Site Makeup | Greenfield | Growth Factor 1 year | 0.85 |
| Greenfield Method | FEH | Growth Factor 30 year | 1.95 |
| Positively Drained Area (ha) | 1.000 | Betterment (%) | 0 |
| SAAR (mm) | 668 | QMed | 0.3 |
| Host | 1 | QBar | 0.4 |
| BFIHost | 0.961 | Q 1 year (l/s) | 0.3 |
| Region | 1 | Q 30 year (l/s) | 0.7 |
| QBar/QMed conversion factor | 1.111 | | |

## Node Highway Basin 1 Online Hydro-Brake® Control

| | |
|---|---|
| Flap Valve | x |
| Replaces Downstream Link | x |
| Invert Level (m) | 109.600 |
| Design Depth (m) | 2.100 |
| Design Flow (l/s) | 6.8 |
| Objective | (HE) Minimise upstream storage |
| Sump Available | ✓ |
| Product Number | CTL-SHE-0106-6800-2100-6800 |
| Min Outlet Diameter (m) | 0.150 |
| Min Node Diameter (mm) | 1200 |

## Node Highway Basin 2 Online Hydro-Brake® Control

| | |
|---|---|
| Flap Valve | x |
| Replaces Downstream Link | x |
| Invert Level (m) | 110.600 |
| Design Depth (m) | 2.100 |
| Design Flow (l/s) | 3.2 |
| Objective | (HE) Minimise upstream storage |
| Sump Available | ✓ |

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## Node Highway Basin 2 Online Hydro-Brake® Control

| | |
|---|---|
| Product Number | CTL-SHE-0072-3200-2100-3200 |
| Min Outlet Diameter (m) | 0.100 |
| Min Node Diameter (mm) | 1200 |

## Node Highway Basin 3 Online Hydro-Brake® Control

| | |
|---|---|
| Flap Valve | x |
| Replaces Downstream Link | x |
| Invert Level (m) | 107.600 |
| Design Depth (m) | 2.100 |
| Design Flow (l/s) | 6.0 |
| Objective | (HE) Minimise upstream storage |
| Sump Available | ✓ |
| Product Number | CTL-SHE-0100-6000-2100-6000 |
| Min Outlet Diameter (m) | 0.150 |
| Min Node Diameter (mm) | 1200 |

## Node Highway Basin 4 Online Hydro-Brake® Control

| | |
|---|---|
| Flap Valve | x |
| Replaces Downstream Link | x |
| Invert Level (m) | 104.000 |
| Design Depth (m) | 2.100 |
| Design Flow (l/s) | 2.5 |
| Objective | (HE) Minimise upstream storage |
| Sump Available | ✓ |
| Product Number | CTL-SHE-0063-2500-2100-2500 |
| Min Outlet Diameter (m) | 0.075 |
| Min Node Diameter (mm) | 1200 |

## Node Highway Basin 1 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 109.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 813.5 | 813.5 | 2.400 | 2331.5 | 2366.3 |

## Node Highway Basin 2 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 110.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 256.0 | 256.0 | 2.400 | 1464.0 | 1485.9 |

## Node Highway Basin 3 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 107.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 738.5 | 738.5 | 2.400 | 2023.0 | 2059.2 |

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## Node Highway Basin 4 Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 104.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 117.0 | 117.0 | 2.400 | 1147.0 | 1164.4 |

## Rainfall

| Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) |
|---|---|---|
| 100 year +25% CC 15 minute summer | 423.974 | 119.970 |
| 100 year +25% CC 15 minute winter | 297.526 | 119.970 |
| 100 year +25% CC 30 minute summer | 275.395 | 77.927 |
| 100 year +25% CC 30 minute winter | 193.259 | 77.927 |
| 100 year +25% CC 60 minute summer | 182.772 | 48.301 |
| 100 year +25% CC 60 minute winter | 121.429 | 48.301 |
| 100 year +25% CC 120 minute summer | 109.722 | 28.996 |
| 100 year +25% CC 120 minute winter | 72.897 | 28.996 |
| 100 year +25% CC 180 minute summer | 83.720 | 21.544 |
| 100 year +25% CC 180 minute winter | 54.420 | 21.544 |
| 100 year +25% CC 240 minute summer | 66.004 | 17.443 |
| 100 year +25% CC 240 minute winter | 43.851 | 17.443 |
| 100 year +25% CC 360 minute summer | 50.208 | 12.920 |
| 100 year +25% CC 360 minute winter | 32.637 | 12.920 |
| 100 year +25% CC 480 minute summer | 39.397 | 10.411 |
| 100 year +25% CC 480 minute winter | 26.174 | 10.411 |
| 100 year +25% CC 600 minute summer | 32.101 | 8.780 |
| 100 year +25% CC 600 minute winter | 21.933 | 8.780 |
| 100 year +25% CC 720 minute summer | 28.443 | 7.623 |
| 100 year +25% CC 720 minute winter | 19.115 | 7.623 |
| 100 year +25% CC 960 minute summer | 23.045 | 6.068 |
| 100 year +25% CC 960 minute winter | 15.265 | 6.068 |
| 100 year +25% CC 1440 minute summer | 16.277 | 4.362 |
| 100 year +25% CC 1440 minute winter | 10.939 | 4.362 |
| 100 year +25% CC 2160 minute summer | 11.231 | 3.104 |
| 100 year +25% CC 2160 minute winter | 7.738 | 3.104 |
| 100 year +25% CC 2880 minute summer | 9.106 | 2.440 |
| 100 year +25% CC 2880 minute winter | 6.120 | 2.440 |
| 100 year +25% CC 4320 minute summer | 6.721 | 1.757 |
| 100 year +25% CC 4320 minute winter | 4.426 | 1.757 |
| 100 year +25% CC 5760 minute summer | 5.496 | 1.407 |
| 100 year +25% CC 5760 minute winter | 3.557 | 1.407 |
| 100 year +25% CC 7200 minute summer | 4.702 | 1.200 |
| 100 year +25% CC 7200 minute winter | 3.035 | 1.200 |
| 100 year +25% CC 8640 minute summer | 4.165 | 1.062 |
| 100 year +25% CC 8640 minute winter | 2.688 | 1.062 |
| 100 year +25% CC 10080 minute summer | 3.787 | 0.966 |
| 100 year +25% CC 10080 minute winter | 2.444 | 0.966 |
| 100 year +40% CC 15 minute summer | 474.851 | 134.367 |
| 100 year +40% CC 15 minute winter | 333.229 | 134.367 |
| 100 year +40% CC 30 minute summer | 308.442 | 87.278 |
| 100 year +40% CC 30 minute winter | 216.451 | 87.278 |
| 100 year +40% CC 60 minute summer | 204.705 | 54.097 |
| 100 year +40% CC 60 minute winter | 136.001 | 54.097 |
| 100 year +40% CC 120 minute summer | 122.888 | 32.476 |
| 100 year +40% CC 120 minute winter | 81.644 | 32.476 |

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## Rainfall

| Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) |
|---|---|---|
| 100 year +40% CC 180 minute summer | 93.767 | 24.129 |
| 100 year +40% CC 180 minute winter | 60.951 | 24.129 |
| 100 year +40% CC 240 minute summer | 73.924 | 19.536 |
| 100 year +40% CC 240 minute winter | 49.114 | 19.536 |
| 100 year +40% CC 360 minute summer | 56.233 | 14.471 |
| 100 year +40% CC 360 minute winter | 36.553 | 14.471 |
| 100 year +40% CC 480 minute summer | 44.124 | 11.661 |
| 100 year +40% CC 480 minute winter | 29.315 | 11.661 |
| 100 year +40% CC 600 minute summer | 35.953 | 9.834 |
| 100 year +40% CC 600 minute winter | 24.565 | 9.834 |
| 100 year +40% CC 720 minute summer | 31.856 | 8.538 |
| 100 year +40% CC 720 minute winter | 21.409 | 8.538 |
| 100 year +40% CC 960 minute summer | 25.810 | 6.797 |
| 100 year +40% CC 960 minute winter | 17.097 | 6.797 |
| 100 year +40% CC 1440 minute summer | 18.230 | 4.886 |
| 100 year +40% CC 1440 minute winter | 12.252 | 4.886 |
| 100 year +40% CC 2160 minute summer | 12.578 | 3.476 |
| 100 year +40% CC 2160 minute winter | 8.667 | 3.476 |
| 100 year +40% CC 2880 minute summer | 10.198 | 2.733 |
| 100 year +40% CC 2880 minute winter | 6.854 | 2.733 |
| 100 year +40% CC 4320 minute summer | 7.528 | 1.968 |
| 100 year +40% CC 4320 minute winter | 4.957 | 1.968 |
| 100 year +40% CC 5760 minute summer | 6.156 | 1.576 |
| 100 year +40% CC 5760 minute winter | 3.984 | 1.576 |
| 100 year +40% CC 7200 minute summer | 5.267 | 1.344 |
| 100 year +40% CC 7200 minute winter | 3.399 | 1.344 |
| 100 year +40% CC 8640 minute summer | 4.664 | 1.190 |
| 100 year +40% CC 8640 minute winter | 3.010 | 1.190 |
| 100 year +40% CC 10080 minute summer | 4.241 | 1.082 |
| 100 year +40% CC 10080 minute winter | 2.737 | 1.082 |

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**Results for 100 year +25% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 1440 minute winter | Highway Basin 1 | 1410 | 111.501 | 1.901 | 93.0 | 2743.7840 | 0.0000 | OK |
| 2160 minute winter | Highway Basin 2 | 2100 | 112.475 | 1.875 | 32.9 | 1394.8180 | 0.0000 | OK |
| 1440 minute winter | Highway Basin 3 | 1410 | 109.503 | 1.903 | 82.0 | 2424.8480 | 0.0000 | OK |
| 1440 minute winter | Highway Basin 4 | 1410 | 105.941 | 1.941 | 35.6 | 1060.1260 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | Outflow (l/s) | Discharge Vol (m³) |
|---|---|---|---|---|
| 1440 minute winter | Highway Basin 1 | Hydro-Brake® | 6.5 | 547.8 |
| 2160 minute winter | Highway Basin 2 | Hydro-Brake® | 3.0 | 353.6 |
| 1440 minute winter | Highway Basin 3 | Hydro-Brake® | 5.7 | 480.1 |
| 1440 minute winter | Highway Basin 4 | Hydro-Brake® | 2.4 | 198.6 |

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**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 2160 minute winter | Highway Basin 1 | 2100 | 111.680 | 2.080 | 73.7 | 3118.3780 | 0.0000 | OK |
| 2160 minute winter | Highway Basin 2 | 2100 | 112.630 | 2.030 | 36.8 | 1588.7640 | 0.0000 | OK |
| 2160 minute winter | Highway Basin 3 | 2100 | 109.682 | 2.082 | 65.0 | 2753.9440 | 0.0000 | OK |
| 2160 minute winter | Highway Basin 4 | 2100 | 106.089 | 2.089 | 28.2 | 1207.1900 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | Outflow (l/s) | Discharge Vol (m³) |
|---|---|---|---|---|
| 2160 minute winter | Highway Basin 1 | Hydro-Brake® | 6.8 | 798.9 |
| 2160 minute winter | Highway Basin 2 | Hydro-Brake® | 3.1 | 364.1 |
| 2160 minute winter | Highway Basin 3 | Hydro-Brake® | 6.0 | 700.2 |
| 2160 minute winter | Highway Basin 4 | Hydro-Brake® | 2.5 | 287.5 |

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## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Easting (m) | Northing (m) | Depth (m) |
|---|---|---|---|---|---|---|
| Detention Basin | 1.000 | 5.00 | 2.400 | 29.216 | 58.037 | 2.400 |

## Simulation Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Analysis Speed | Normal | Starting Level (m) | |
| Rainfall Events | Singular | Skip Steady State | x | Check Discharge Rate(s) | x |
| Summer CV | 1.000 | Drain Down Time (mins) | 240 | Check Discharge Volume | x |
| Winter CV | 1.000 | Additional Storage (m³/ha) | 20.0 | | |

### Storm Durations

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 60 | 180 | 360 | 600 | 960 | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 | |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 100 | 25 | 0 | 0 |
| 100 | 40 | 0 | 0 |

## Node Detention Basin Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | x | Sump Available | ✓ |
| Invert Level (m) | 0.000 | Product Number | CTL-SHE-0057-2000-2000-2000 |
| Design Depth (m) | 2.000 | Min Outlet Diameter (m) | 0.075 |
| Design Flow (l/s) | 2.0 | Min Node Diameter (mm) | 1200 |

## Node Detention Basin Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 0.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 197.0 | 197.0 | 2.400 | 964.0 | 987.6 |

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**Results for 100 year +25% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 2160 minute winter | Detention Basin | 2100 | 1.843 | 1.843 | 21.5 | 921.3341 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | Outflow (l/s) | Discharge Vol (m³) |
|---|---|---|---|---|
| 2160 minute winter | Detention Basin | Hydro-Brake® | 1.9 | 219.2 |

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**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 2160 minute winter | Detention Basin | 2100 | 1.999 | 1.999 | 24.1 | 1049.3110 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | Outflow (l/s) | Discharge Vol (m³) |
|---|---|---|---|---|
| 2160 minute winter | Detention Basin | Hydro-Brake® | 2.0 | 226.1 |

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# Appendix 8: Illustrative Foul Drainage Strategy

Viewport 1
Scale 1:5000

Diverted Heyford Park drainage in pipe/swale

CL 117.450
IL 116.100

Unit 10:
Plateau: 117.065m
FFL: 117.565m

Unit 11:
Plateau: 117.065m
FFL: 117.565m

Unit 12:
Plateau: 117.065m
FFL: 117.565m

Unit 13:
Plateau: 117.065m
FFL: 117.565m

Unit 9:
Plateau: 117.065m
FFL: 117.565m

Unit 8:
Plateau: 117.065m
FFL: 117.565m

CL 117.065
IL 112.380

Unit 7:
Plateau: 117.065m
FFL: 117.565m

CL 116.360
IL 115.010

Unit 4:
Plateau: 117.065m
FFL: 117.565m

CL 116.360
IL 115.010

Unit 5:
Plateau: 114.075m
FFL: 114.575m

Diverted Heyford Park drainage in pipe/swale

CL 113.370
IL 112.020

Unit 6:
Plateau: 114.075m
FFL: 114.575m

RAIL TERMINAL
On plot foul drainage to be pumped to foul stub pipe located off roundabout

Route of rising main from this point onwards to be coordinated with highways alignment as design progresses.

Area in abeyance

CL 114.000
IL 109.950

CL 117.065
IL 111.910

CL 115.500
IL 108.350

CL 112.630
IL 106.000

CL 113.450
IL 107.250

Indicative location of proposed foul water pump station. (not to scale)

CL 114.075
IL 109.250

CL 114.750
IL 108.250

CL 113.000
IL 110.625

UNIT 1
On plot foul drainage to be pumped to foul stub pipe in main spine road

CL 113.500
IL 108.145

Unit 3:
Plateau: 114.575m
FFL: 115.075m

CL 114.900
IL 113.550

Foul connection for Management Centre

CL 113.870
IL 112.520

Unit 1:
Plateau: 110.715m
FFL: 111.215m

CL 113.700
IL 112.350

Unit 2:
Plateau: 113.365m
FFL: 113.865m

CL 112.665
IL 111.315

150mm
225mm

For continuation refer to drawing OxSRFI-BWB-GEN-XX-SK-CH-SK072 Sheet 2, Viewport 3

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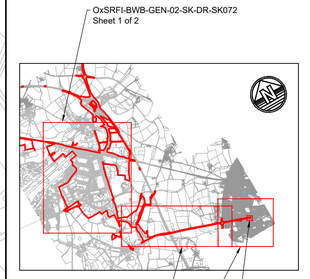
Y:\NTH\NTH2479_Oxfordshire RFI\02. Project Delivery\01. WIP\Sketches\OxSRFI-BWB-GEN-XX-SK-CH-SK072_Main Site Foul Drainage Sketch.dwg

## Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Drainage is based on an assumed finished level - to be reviewed as the layout changes.
6. Pipe sizes are indicative only and are based on:
   - Peak domestic flow @ 3xDWF = 0.3 l/s/ha of developable area
   - Peak trade flow @ 3xDWF = 0.15 l/s/ha of developable area
7. The above method of calculating proposed foul flows to be agreed with Thames Water. The agreed storage volume will impact on the foul pump compound dimensions.

## Key Plan




## Legend

- Main foul water drainage routes
  - 150mm pipes assumed to have 1 in 150 gradient
  - 225mm pipes assumed to have 1 in 175 gradient
- Proposed foul water rising main
- Order Limits

| Rev | Date | Details of issue / revision | Drw | Rev |
|---|---|---|---|---|
| P05 | 04.09.26 | Updated Order Limits | RJ | TLB |
| P04 | 15.05.26 | Updated Order Limits | MPB | RJ |
| P03 | 13.02.26 | Issued for Information | TLB | MB |
| P02 | 21.10.25 | Issued for Information | NG | MB |
| P01 | 30.03.23 | Issued for Information | DG | CD |

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Client
**OXFORDSHIRE RAILFREIGHT LTD.**

Project Title
OxSRFI OXFORDSHIRE STRATEGIC RAIL FREIGHT INTERCHANGE

Drawing Title
# MAIN SITE FOUL WATER DRAINAGE SKETCH SHEET 1 OF 2

| | | | | | |
|---|---|---|---|---|---|
| Drawn: | D. Gray | | Reviewed: | C. Dodd | |
| BWB Ref: | NTH 2479 | Date: | 29.03.23 | Scale@A1: | AS SHOWN |

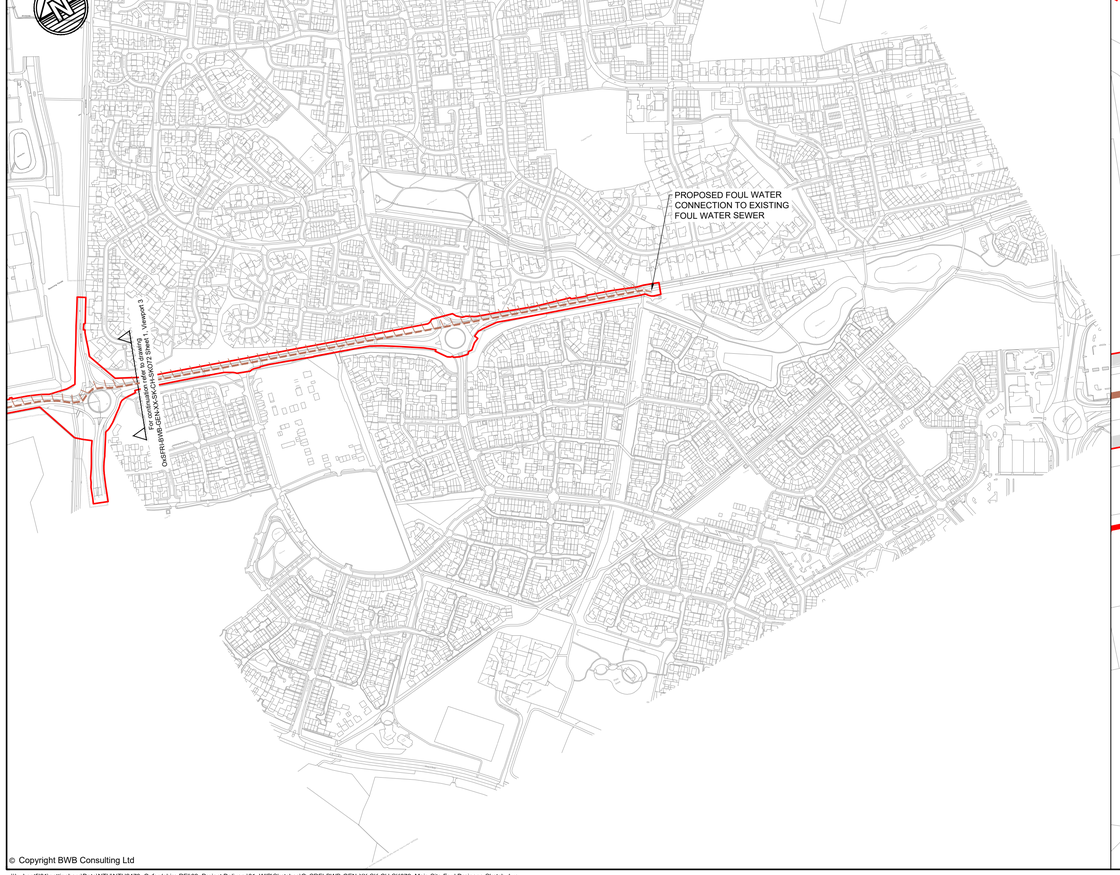
Drawing Status
**PRELIMINARY**

| Project - Originator - Zone - Level - Type - Role - Number | Status | Rev |
|---|---|---|
| OxSRFI-BWB-GEN-01-SK-DR-SK072 | S2 | P05 |

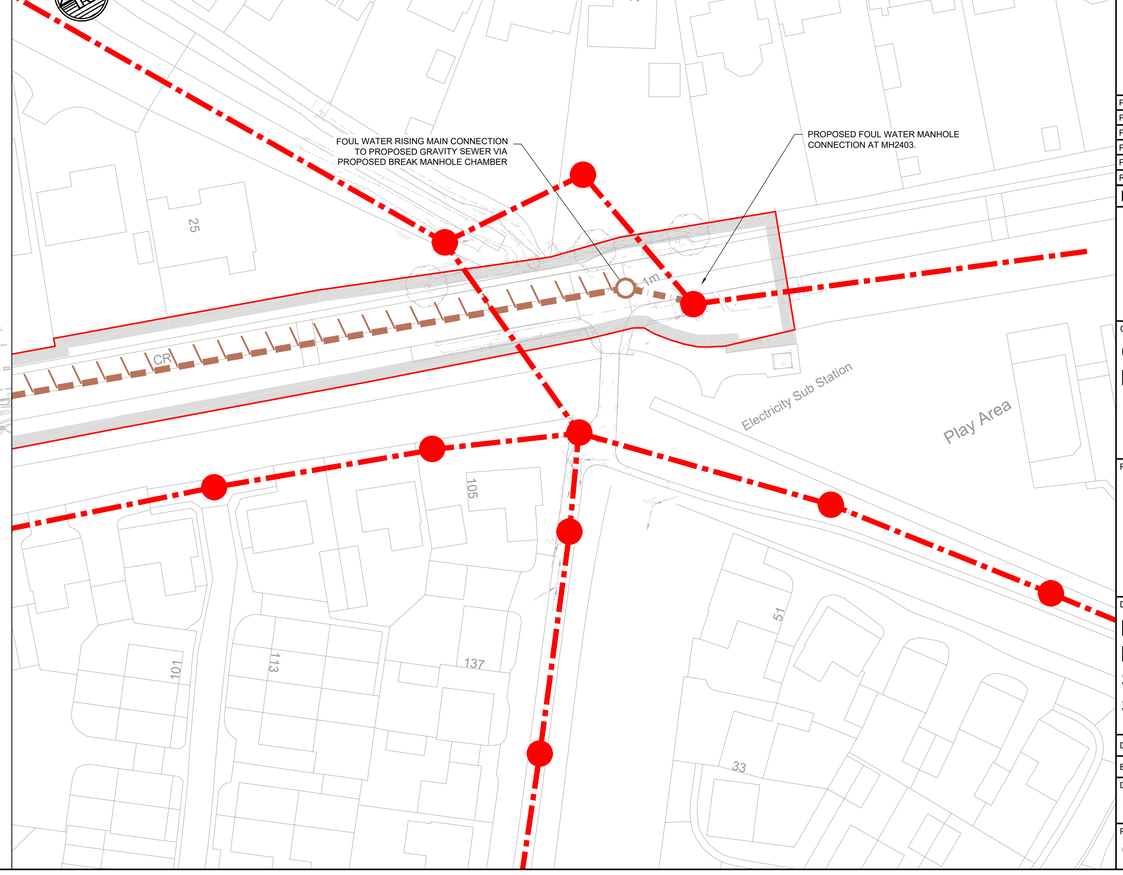
Viewport 3
Scale 1:5000




Viewport 4
Scale 1:5000



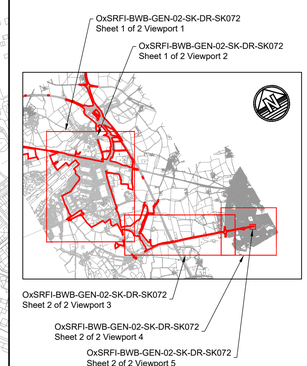

Viewport 5
Scale 1:500




## Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Drainage is based on an assumed finished level - to be reviewed as the layout changes.
6. Pipe sizes are indicative only and are based on:
   - Peak domestic flow @ 3xDWF = 0.3 l/s/ha of developable area
   - Peak trade flow @ 3xDWF = 0.15 l/s/ha of developable area
7. The above method of calculating proposed foul flows to be agreed with Thames Water. Foul pump rates and emergency storage volume to be agreed.
8. Location of existing Thames Water network devised from survey data and asset record drawings. Further CCTV surveys required to confirm exact location and connectivity of existing system. Connection shown in accordance with Thames Water proposals

## Key Plan




## Legend

- Proposed foul water rising main
- Proposed foul water sewer drainage
- Existing Thames Water Foul Water Sewer
- Order Limits

| Rev | Date | Details of issue / revision | Drw | Rev |
|---|---|---|---|---|
| P05 | 14.10.26 | Updated Order Limits | TLB | RJ |
| P04 | 04.09.26 | Existing TW assets updated to survey data | RJ | TLB |
| P03 | 15.05.26 | Updated Order Limits | MPB | RJ |
| P02 | 13.02.26 | Updated Masterplan | TLB | MB |
| P01 | 21.10.25 | Issued for Information | NG | MB |

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**OXFORDSHIRE RAILFREIGHT LTD.**

Project Title

OxSRFI OXFORDSHIRE STRATEGIC RAIL FREIGHT INTERCHANGE

Drawing Title

# MAIN SITE FOUL WATER DRAINAGE SKETCH SHEET 2 OF 2

| | | | | | |
|---|---|---|---|---|---|
| Drawn: | N GARNER | | Reviewed: | M BAILEY | |
| BWB Ref: | NTH 2479 | Date: | 21.10.25 | Scale@A1: | AS SHOWN |

Drawing Status: **PRELIMINARY**

| Project - Originator - Zone - Level - Type - Role - Number | Status | Rev |
|---|---|---|
| OxSRFI-BWB-GEN-02-SK-DR-SK072 | S2 | P05 |

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