OXFORDSHIRE
STRATEGIC RAIL FREIGHT INTERCHANGE

DCO Submission

Environmental Statement

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

Document 6.9C (tracked)
Rev P0~~4~~

On behalf of
Oxfordshire Railfreight Limited

Prepared by BWB Consulting Ltd
~~October~~May **2026**

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Oxfordshire Strategic Rail Freight Interchange
Oxfordshire
Sustainable Drainage Statement – Main Site

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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

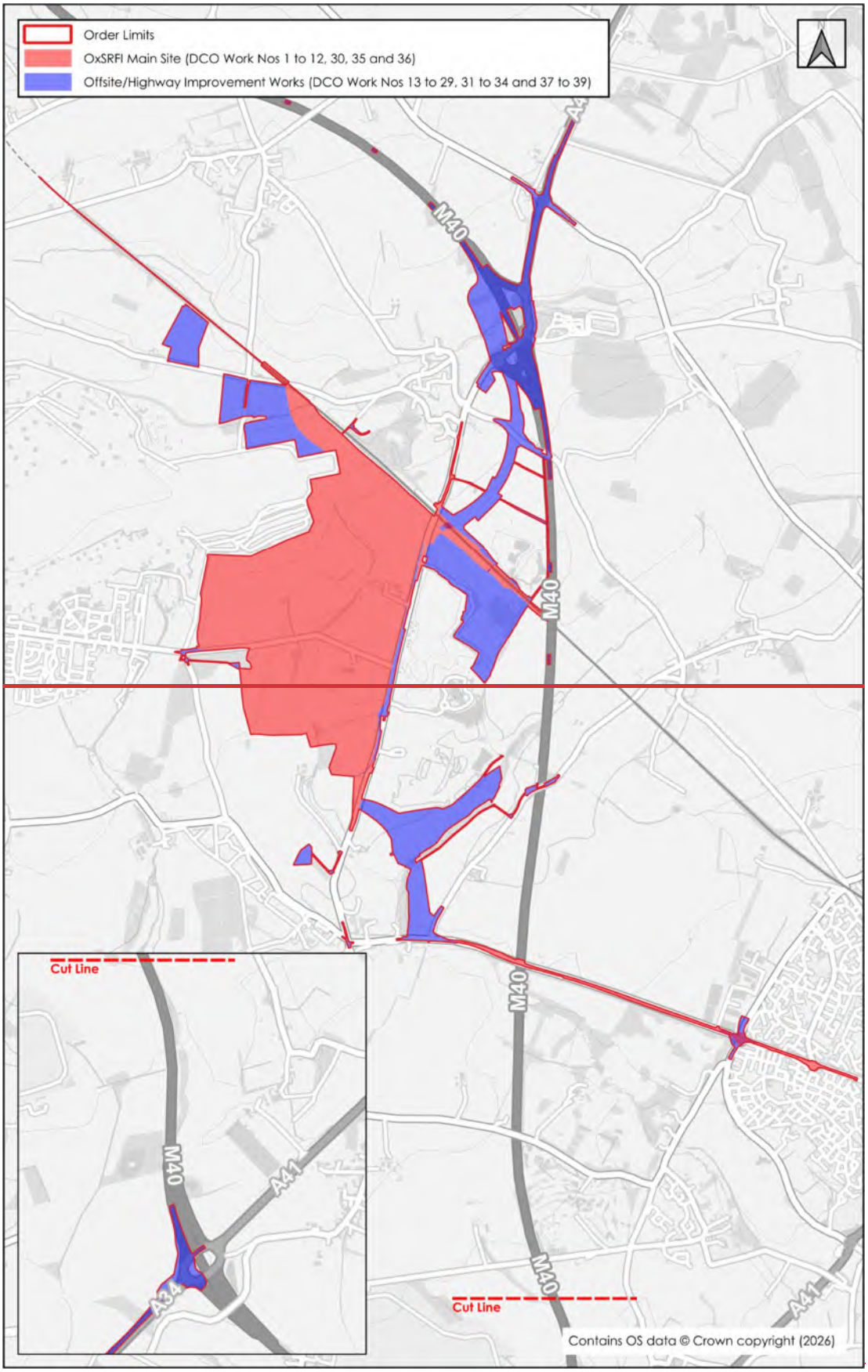
1.8 The proposed development comprises a number of interrelated component parts as follows, and collectively they are the Oxfordshire SRFI:

- **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 Foul drainage outfall to Ardley~~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.


Order Limits
OxSRFI Main Site (DCO Work Nos 1 to 12, 30, 35 and 36)
Offsite/Highway Improvement Works (DCO Work Nos 13 to 29, 31 to 34 and 37 to 39)
M40
M40
M40
M40
A41
A34
A41
Cut Line
Cut Line
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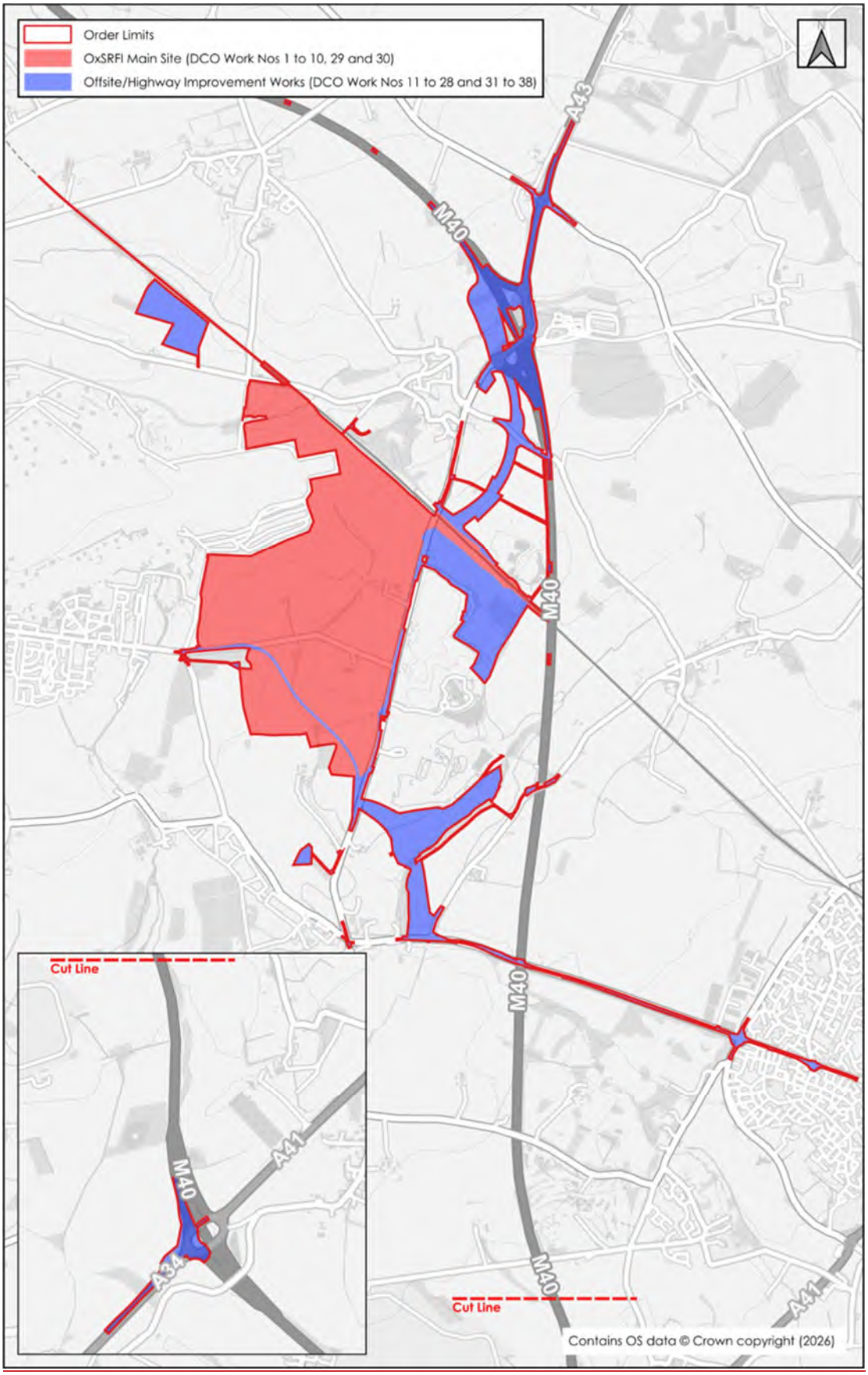


Figure 1.1: Site Location

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

~~1.12~~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%

~~1.13~~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 ~~will be used to assess the impacts of Climate Change (CC) for the proposed surface water.~~. However, in order to provide a conservative drainage ~~strategy. Sensitivity testing has~~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.

~~1.14~~1.15 Based on the above guidance, an allowance of ~~25~~40% will be applied to the 1 in 100-year return period within the drainage design calculations~~, with sensitivity testing using a 40% allowance to the 1 in 100-year return period.~~. During the detailed design stage a ~~25~~35% climate change allowance~~, with a 35% sensitivity test,~~ 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.

~~1.15~~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.

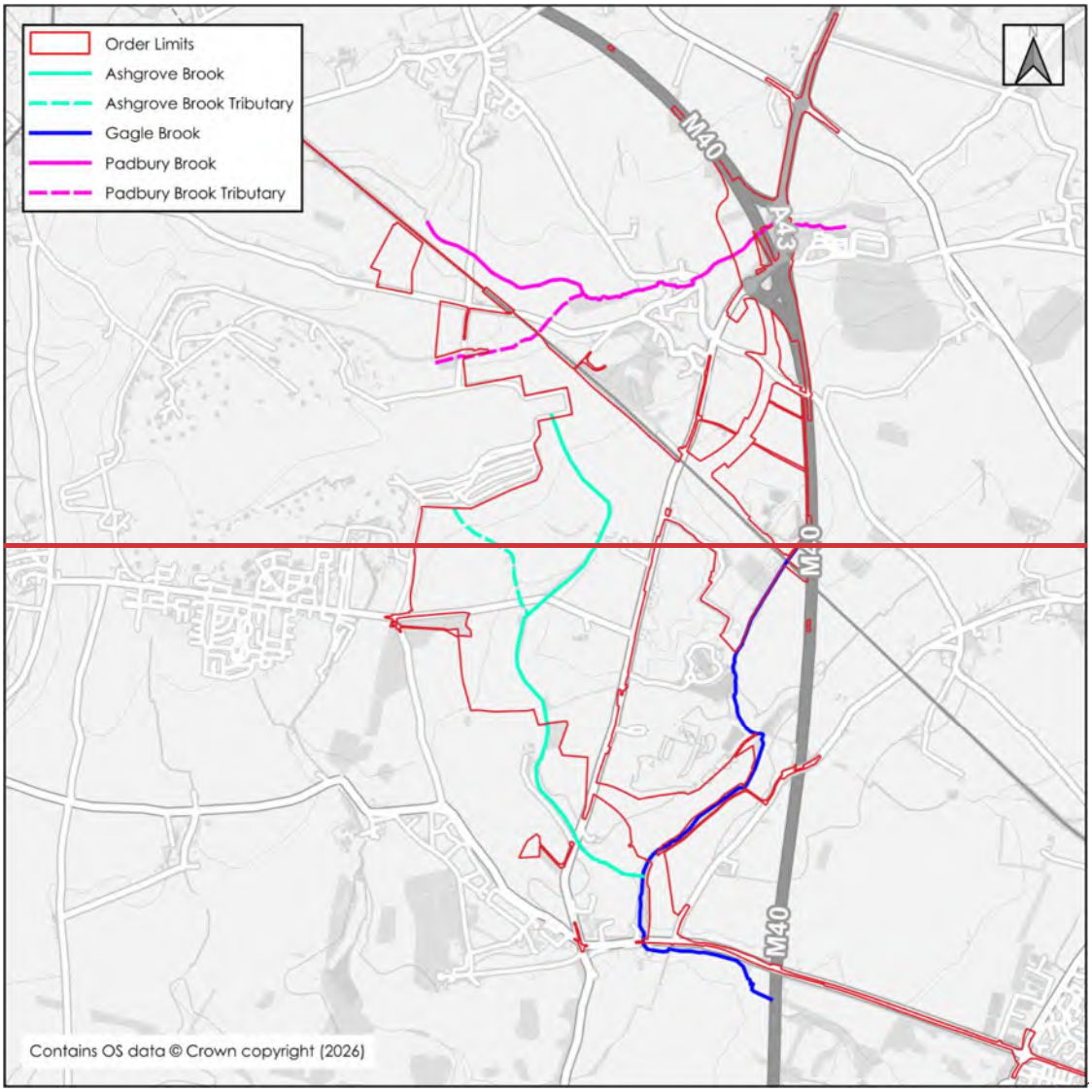
2.3 A tributary of the Ashgrove Brook also flows from Upper Heyford Airfield, through the site, in a south-easterly direction. The tributary is culverted beneath Camp Road where it then outfalls to the Ashgrove Brook.

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**.


Order Limits
Ashgrove Brook
Ashgrove Brook Tributary
Gagle Brook
Padbury Brook
Padbury Brook Tributary
M40
A34
M40
M40
Contains OS data © Crown copyright (2026)

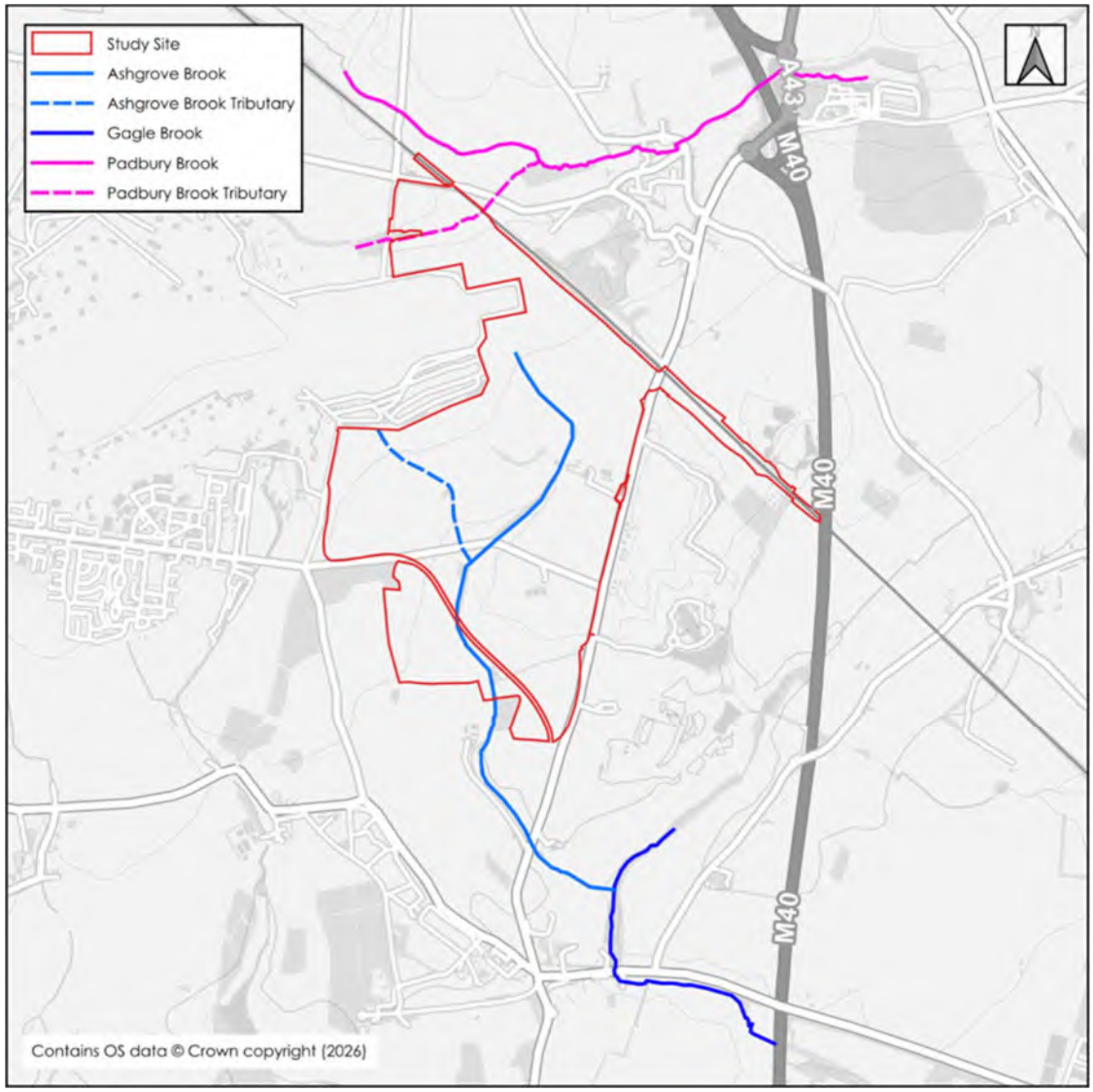
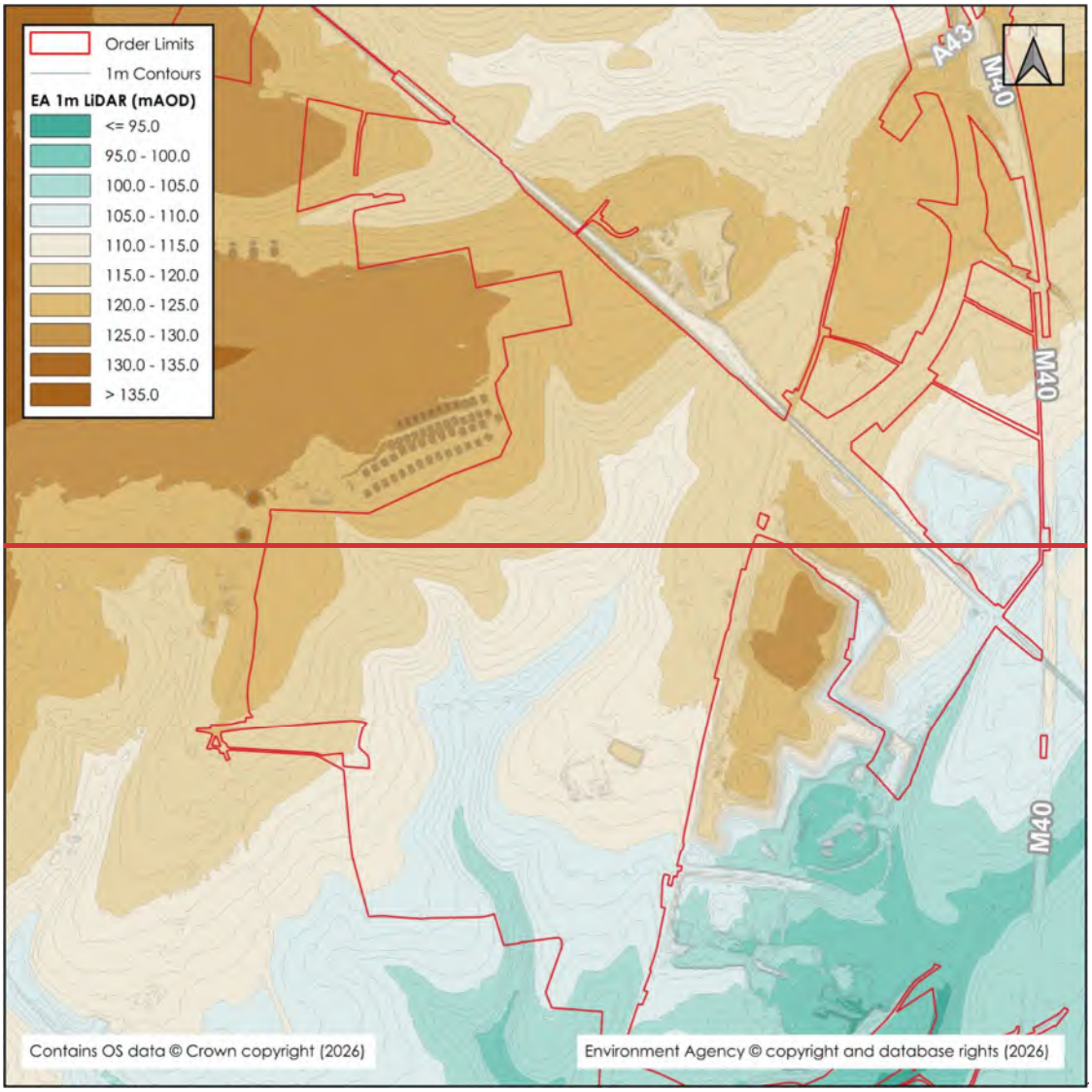


Figure 2.1: Site Location and Watercourse Network

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.


Order Limits
1m Contours
EA 1m LiDAR (mAOD)
<= 95.0
95.0 - 100.0
100.0 - 105.0
105.0 - 110.0
110.0 - 115.0
115.0 - 120.0
120.0 - 125.0
125.0 - 130.0
130.0 - 135.0
> 135.0
A43
M40
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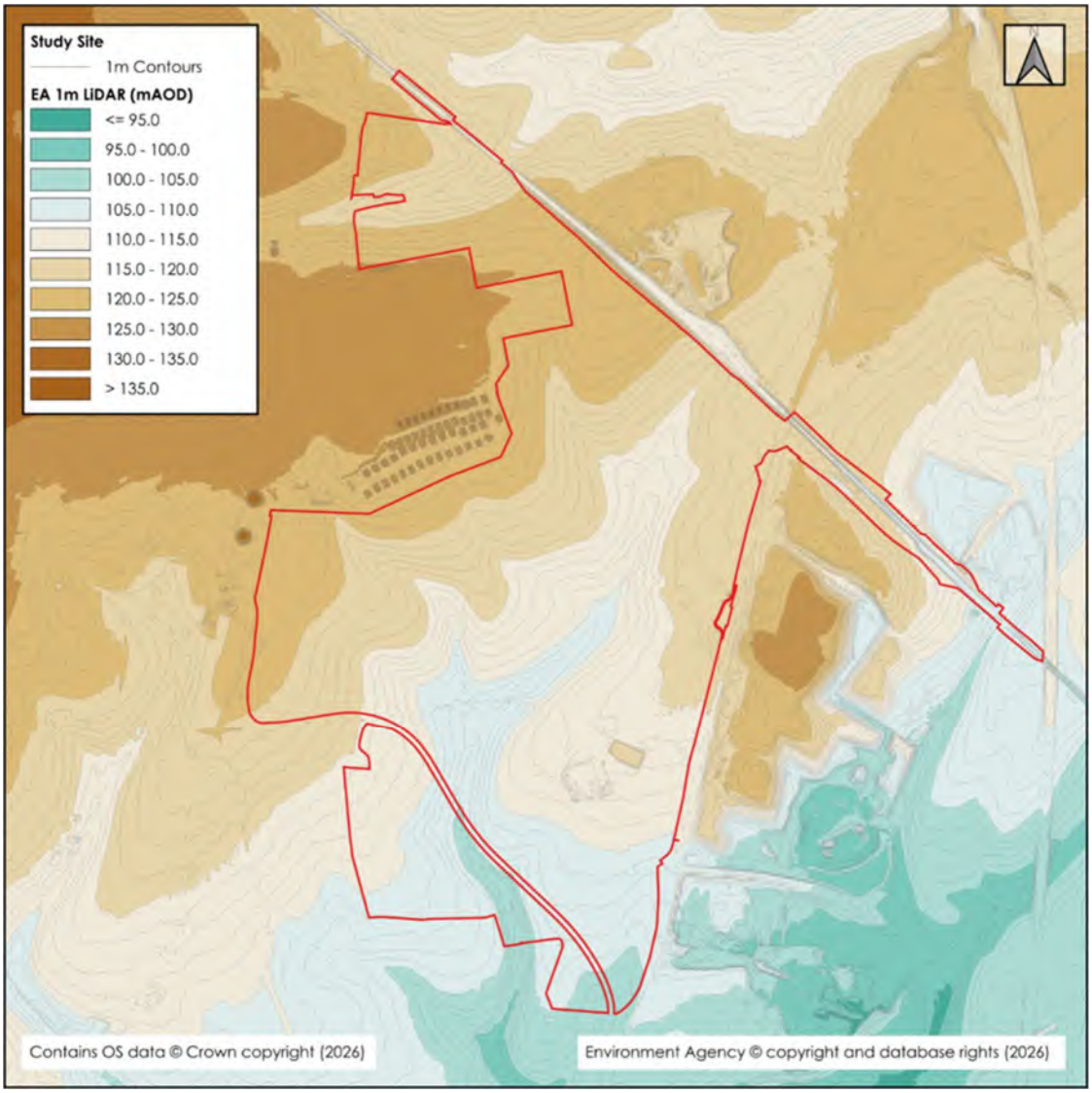


Figure 2.2: Existing Site Topography based on EA 1m LiDAR

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**.

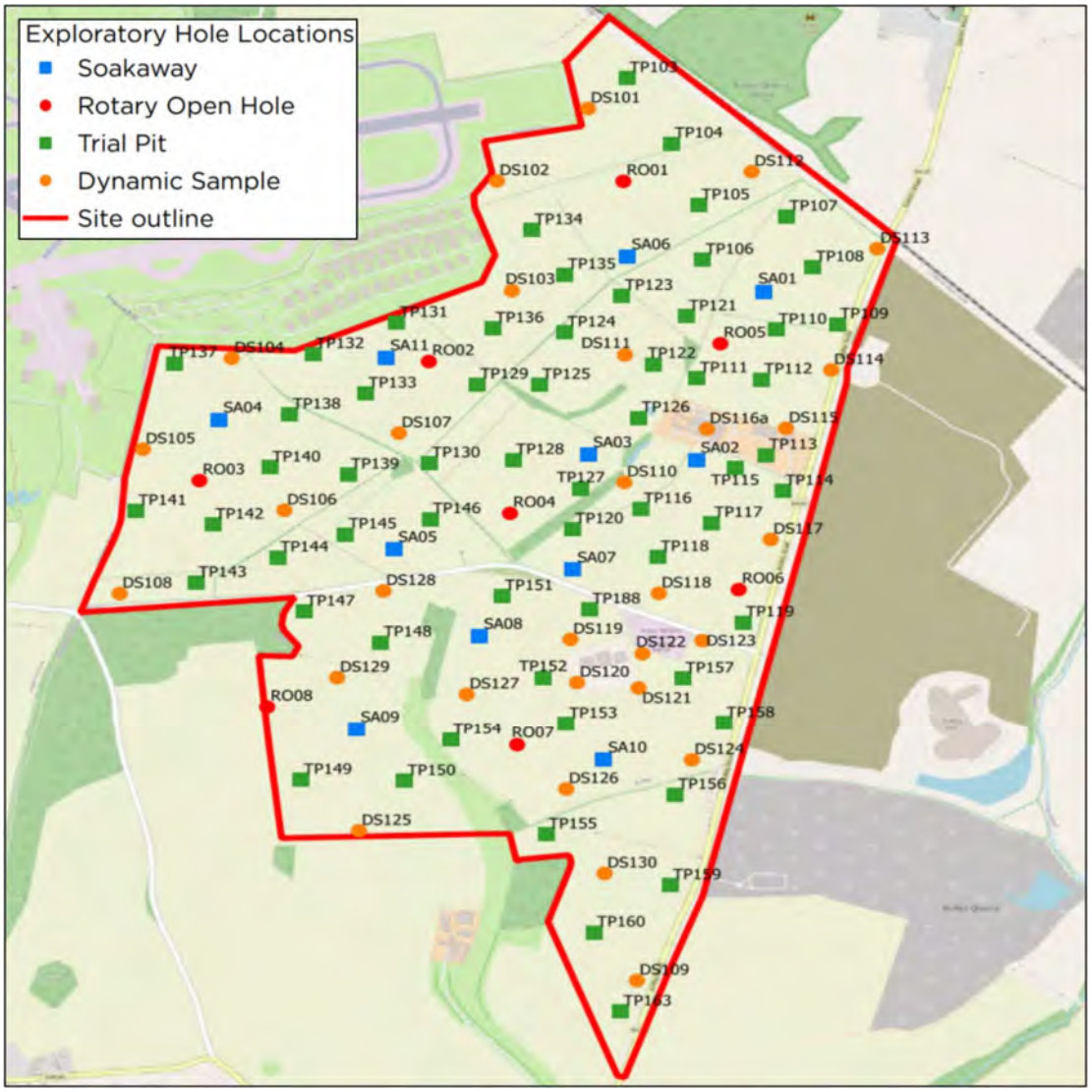


Figure 2.3: Phase 2 Ground Investigation – Exploratory Hole Locations

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;

~~i.~~ii. into the ground (infiltration);

~~ii.~~iii. to a surface water body;

~~iii.~~iv. to a surface water sewer, highway drain, or another drainage system;

~~iv.~~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.

Collection for non-potable use

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

~~3.7~~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.

~~3.8~~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.

~~3.9~~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}.

~~3.10~~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 ~~Furthermore,~~ 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.

~~3.11~~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 ~~soakaway.~~infiltration structure. It is noted that there ~~is a~~are pockets of shallow ~~ground water unit~~groundwater across the main site and this should be considered in the future detailed drainage design works.

~~3.12~~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.

~~3.13~~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

~~3.14~~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.

~~3.15~~3.19 The proposed surface water outfall locations across the site are as follows:

- Ashgrove Brook; and
- Gagle Brook.

~~3.16~~3.20 Ordinary watercourse consent will be required ~~with~~from the LLFA prior to the construction of any ~~outfalls to those~~structures within the channels of ordinary watercourses ~~being made~~.

Peak Flow and Volume Control

~~3.17~~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.

~~3.18~~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.

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

3.193.23 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 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.

3.203.24 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%	-	

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

3.223.26 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

3.233.27 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.

3.243.28 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.

3.253.29 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**	

3.263.30 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.

3.273.31 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

3.283.32 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.

3.293.33 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.

3.303.34 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.

3.313.35 Highway basins have been designed to accommodate the 1 in 100 year + 2540% climate change critical storm event with 400mm300mm of freeboard. Sensitivity testing with a 40% climate change allowance has been undertaken which shows no flooding, although the freeboard is reduced.

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

3.333.37 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.

3.343.38 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 920m³/ha for the 1 in 100-year + 25% critical storm, increasing to 1,050m³/ha when factoring in the 1 in 100-year + 40% ~~sensitivity testing.~~critical storm. The supporting calculation is provided within **Appendix 7**.

3.353.39 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 (m³) – 1 in 100-year + 25%	Maximum Volume (m³) – 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,~~735~~744	3,~~100~~118
Highway Catchment 2	Highway Basin 2	1,~~385~~395	1,~~580~~589
Highway Catchment 3	Highway Basin 3	2,~~415~~425	2,~~740~~754
Highway Catchment 4	Highway Basin 4	1,~~055~~060	1,~~200~~207
Total		**121,~~165~~199**	**137,~~840~~888**

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

~~3.36~~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

~~3.37~~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

~~3.38~~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.

~~3.39~~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).

~~3.40~~3.44 The spine highways should utilise either roadside ditches / swales or silt traps and sump units for any highway gullys.

~~3.41~~3.45 The detention basins will have a low flow channel and the incorporation of any ecological features will be confirmed at detailed design.

~~3.42~~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.

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

3.443.48 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.

3.453.49 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

3.463.50 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.

3.473.51 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.

3.483.52 **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

3.493.53 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)

~~3.50~~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.

~~3.51~~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;

~~3.52~~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

~~3.53~~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	✓✓

~~3.54~~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.

~~3.55~~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

~~3.56~~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.

~~3.57~~3.61 The detention basins have been designed to not flood during the 1 in 100-year + 40% critical storms, with ~~additional~~appropriate freeboard provided ~~above the sensitivity test events~~. 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.

~~3.58~~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.

~~3.59~~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, ~~including~~ vegetation maintenance, trash screen clearing and regular outfall inspections.

~~4.1~~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.

~~4.2~~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.

~~4.3~~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~~**Table 4.1** and ~~Table 4.2~~**Table 4.2**, respectively.

~~4.4~~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; • Remove litter and debris; and • 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; • Relevel uneven surfaces and reinstate design levels; • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface; • Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip; and • 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; • Inspect inlets, outlets and overflows for blockages, and clear if required; and • 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; • Tidy all dead growth before start of growing season; • Manage wetland plants in outlet pool – where provided; and • 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; • Repair erosion and other damage by reseeding or returfing; • Realignment of rip-rap; and • 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 There is a potential alternative outfall for the first phase of the development to the existing Anglian Water foul network to the north within Ardley. Discussions are ongoing with Anglian Water regarding a potential foul connection for an earlier phase whilst the larger Thames Water rising main outfall is constructed.~~

~~5.5~~5.4 ~~The final foul outfall location(s) are to be confirmed; however,~~ A conceptual foul drainage strategy, which identifies the potential outfall ~~locations~~location and connection ~~routes~~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 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. 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: • priority 1: collected for non-potable use • priority 2: infiltrated to ground • priority 3: discharged to an above ground surface water body • priority 4: discharged to a surface water sewer, or another piped surface water drainage system • priority 5: discharged to a combined sewer 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. 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. 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. 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. 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) 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. 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. 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. 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 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: • protect people and property on the development from flooding of the surface water drainage system • mitigate any increased flood risk to people and property adjacent to or downstream of the development • protect the receiving water body from morphological damage or minimise the impact on sewer capacity 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. 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. 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. 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. 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. 3.5 Any flooding from the surface water drainage system for events up to the 1% AEP event shall be managed within the development. 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. 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 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. 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. In addition, penstocks are proposed at strategic locations within the drainage network to enable containment of accidental spillages associated with commercial or industrial operations. 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 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 6.1 A 'SuDS approach' shall be adopted to ensure the surface water drainage system maximises biodiversity benefits throughout the development lifecycle. 6.2 The surface water drainage system shall add biodiversity value by: • creating diverse, self-sustaining, resilient local ecosystems which contribute to net gains in biodiversity • supporting and promoting natural local habitat and species, for example, through local nature recovery strategies (LNRS) • contributing to the delivery of local biodiversity strategies • 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. 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. 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. 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.

~~6.~~7. SUMMARY

~~6.1~~7.1 the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

~~6.2~~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,~~840m³~~888m³
Flow Control Type		-	Vortex
SuDS Features		-	Detention Basins, Swales and Downstream Defender
Maintenance Responsibility		-	Management Company

~~6.3~~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
Kennel Copse
Sandyhill Clump
Timberyard Clump
Middleton Stoney
Ardley Wood
Ardley Quarry
Swann Farm Quarry
Quarry (disused)
RAILWAY LAND
NO VISIBILITY FROM
SURROUNDING AREA
EXISTING ACCESS ARRANGEMENTS
Motorway Service Area
Recycling Centre
Sewage Works
Caravan Park
Cricket Ground
Pedigree Plantation
Old Nursery
Park Farm
Manor Farm Cottages
Needles Farm
Allington Farm
Hazelmere Farm
Woodfield Farm
Sycamore Grove
Kilby's Barn
Kilby's Copse
The Plantation
Clipping Copse
Meol
Gorse
Wint
Track
Path
Ditch
Fence
Hedge
Wall
Tree
Trees
Wood
Scrub
Grass
Rough
Mast
Tank
Pond
Pylon
Gate
Steps
Ramp
Kerb
Edge
Fence
Bank
Ditch

Appendix 2: Thames Water Sewer Asset Plans and Correspondence

Asset location search

Thames Water 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

searchcode

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.

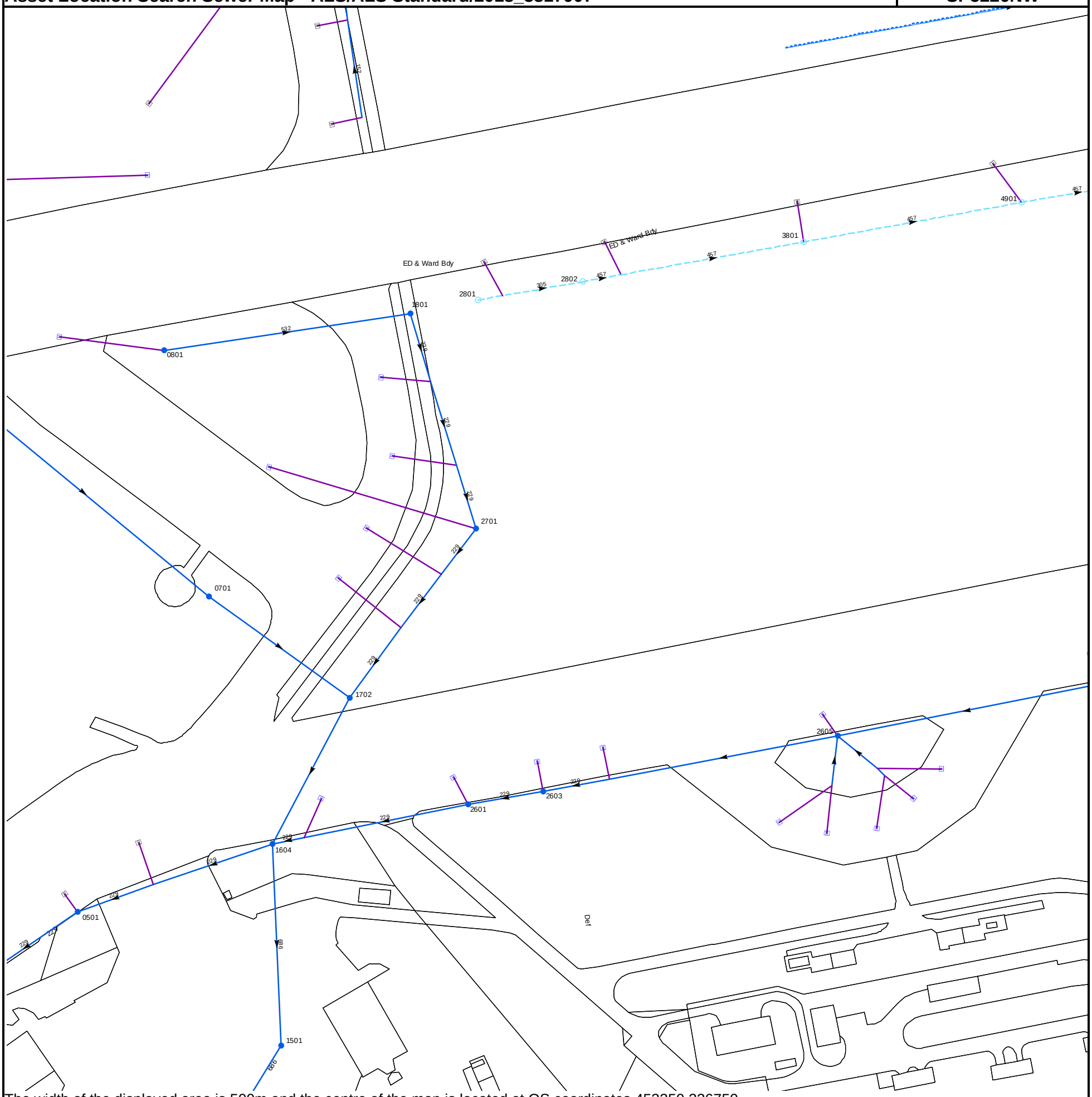
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

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

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

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

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	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

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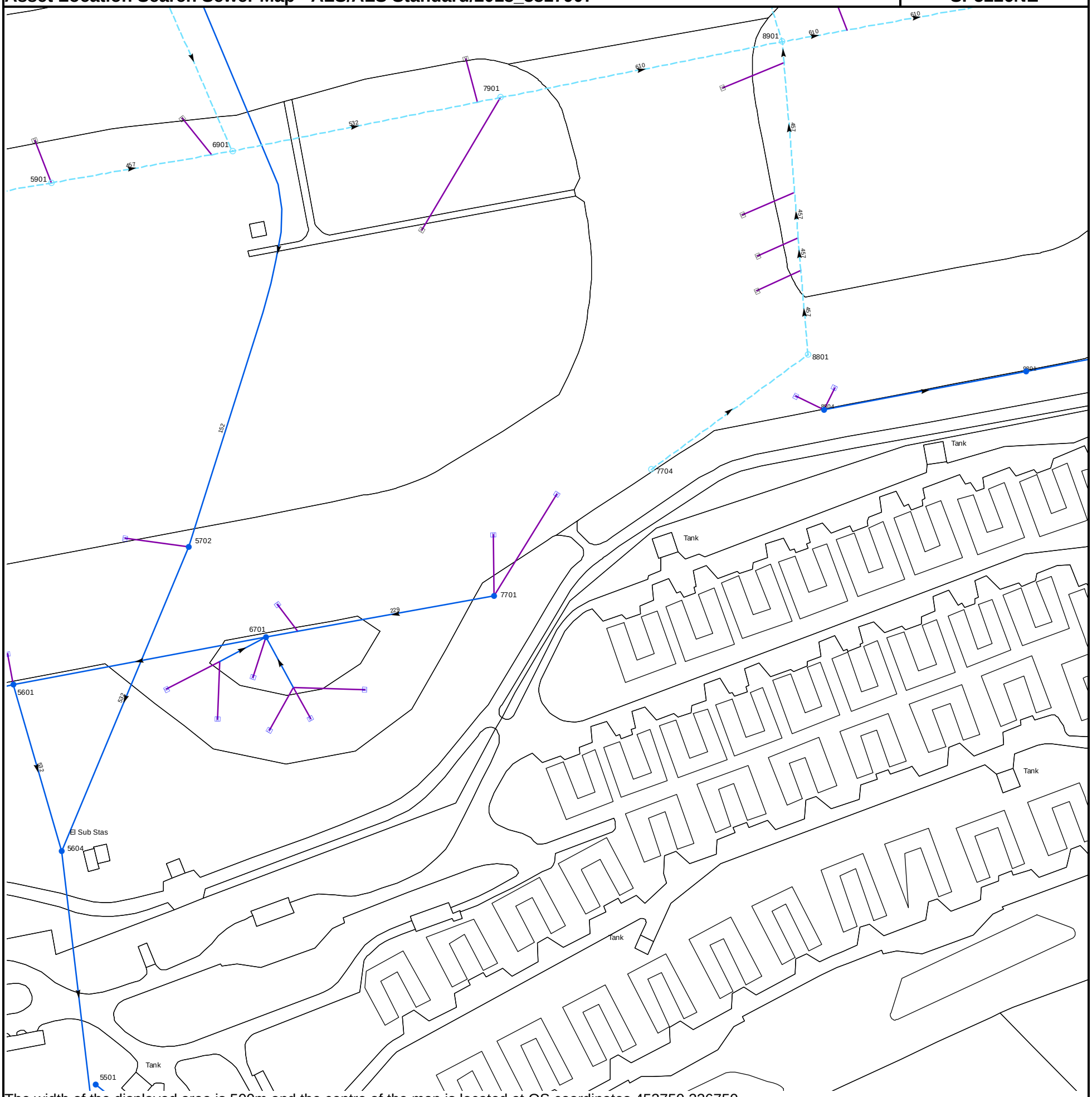
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
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

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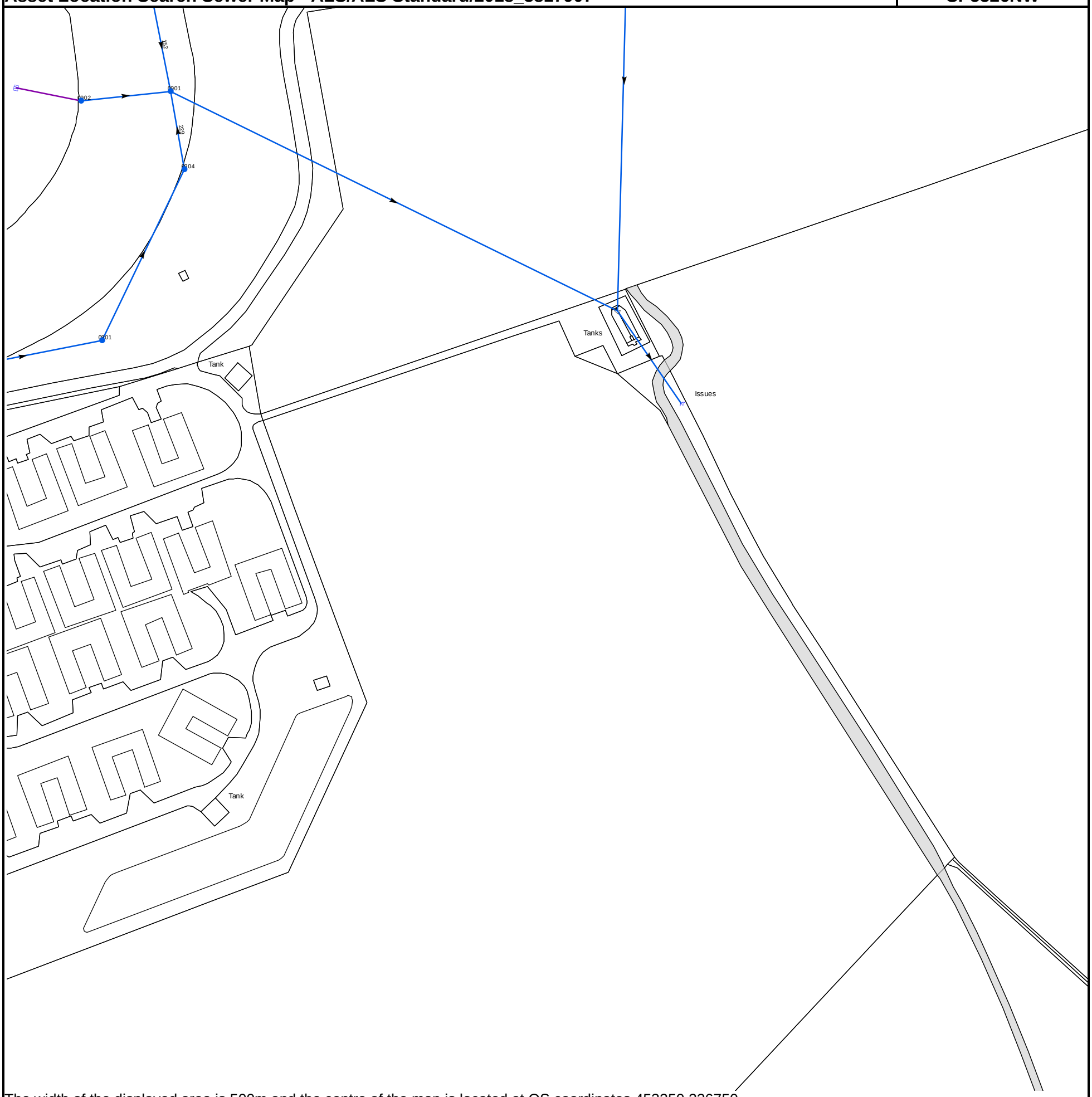
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

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

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
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: [redacted]
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

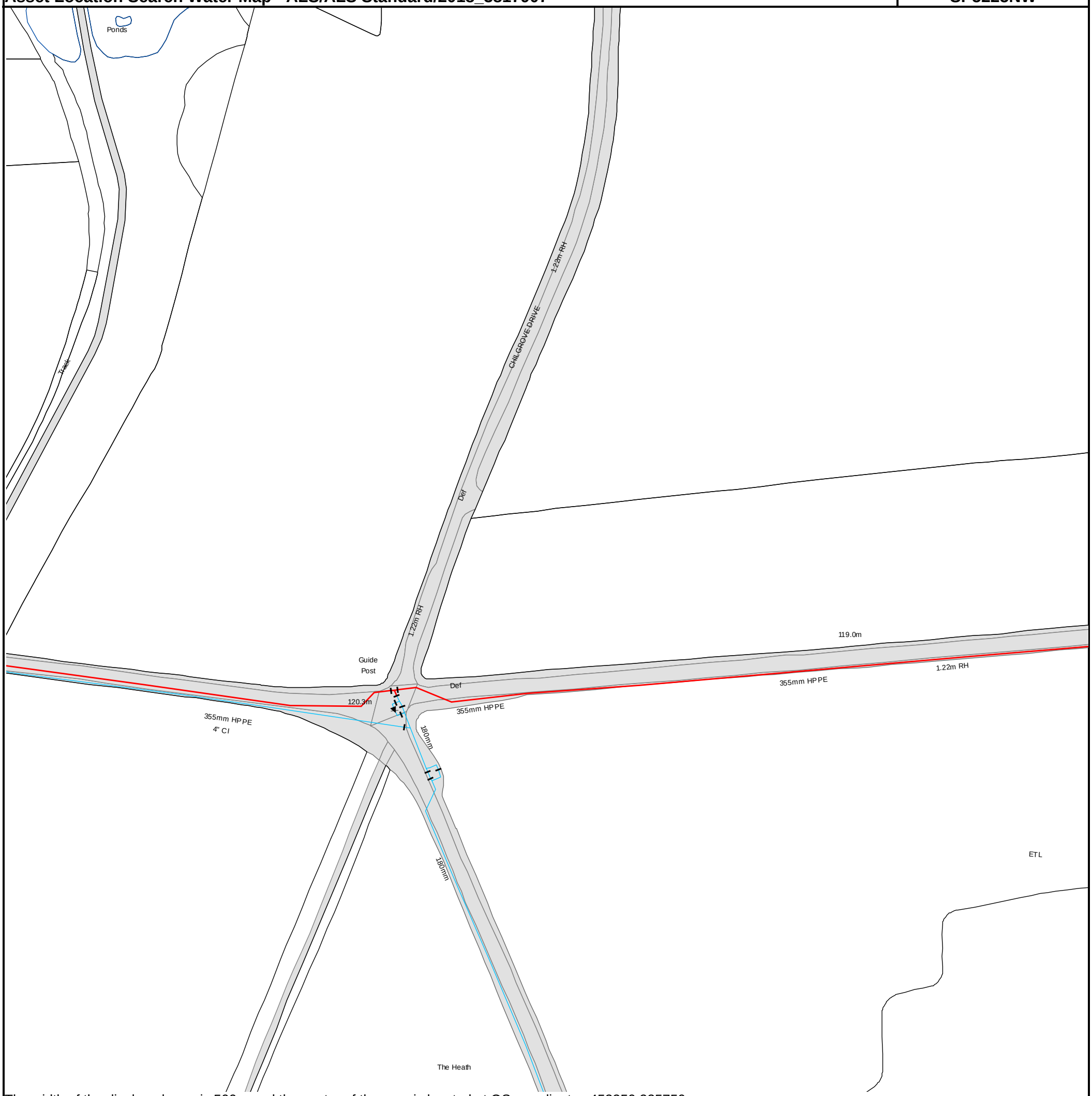
Other Sewer Types (Not Operated or Maintained by Thames Water)

- 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.

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

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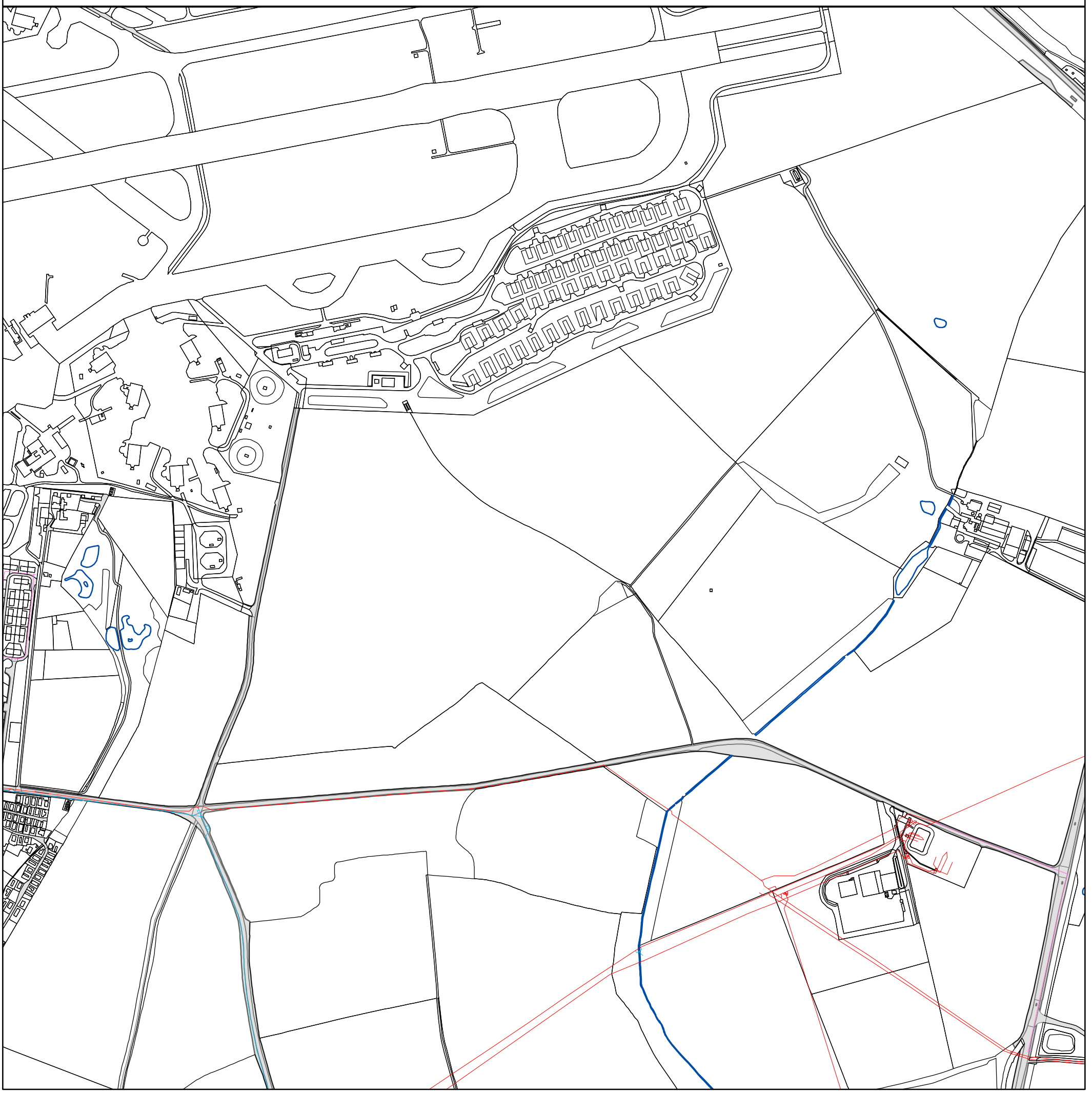
Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2018_3817907



0 45 90 180 270 360
Meters

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Scale: 1:7165
Width: 2001m
Printed By: [redacted]
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

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

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

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

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

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

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

Ways to pay your bill



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

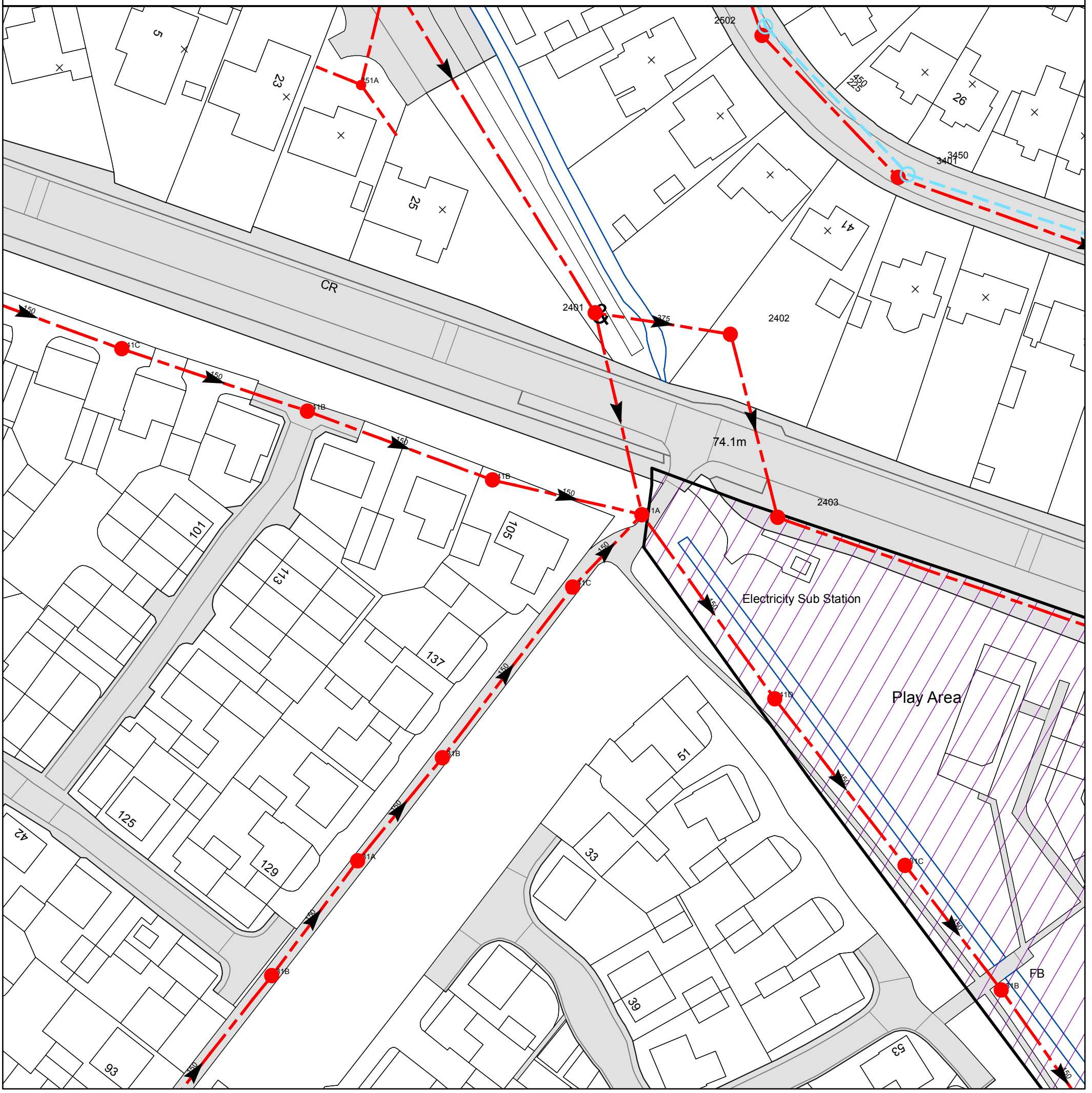
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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

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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:

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

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

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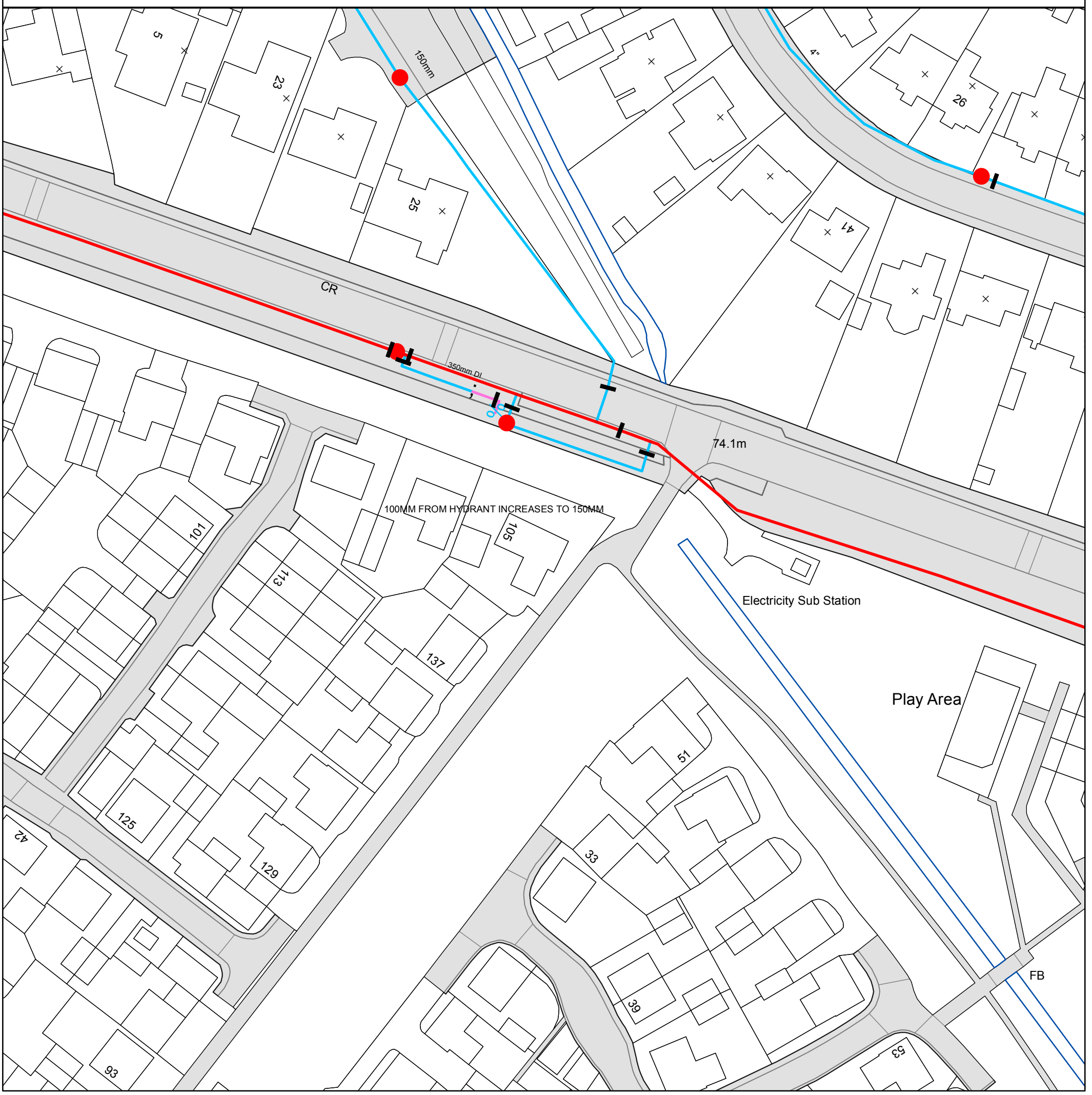
ALS/ALS Standard/2022_4672882



0 4.5 9 18 27 36 Meters

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Printed By:	G1KANAGA
Print Date:	15/07/2022
Map Centre:	457235,222429
Grid Reference:	SP5722SW

Comments:

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

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

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

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

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

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

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

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

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

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

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

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

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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
Dan

[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.

[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:

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] Wwww.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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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

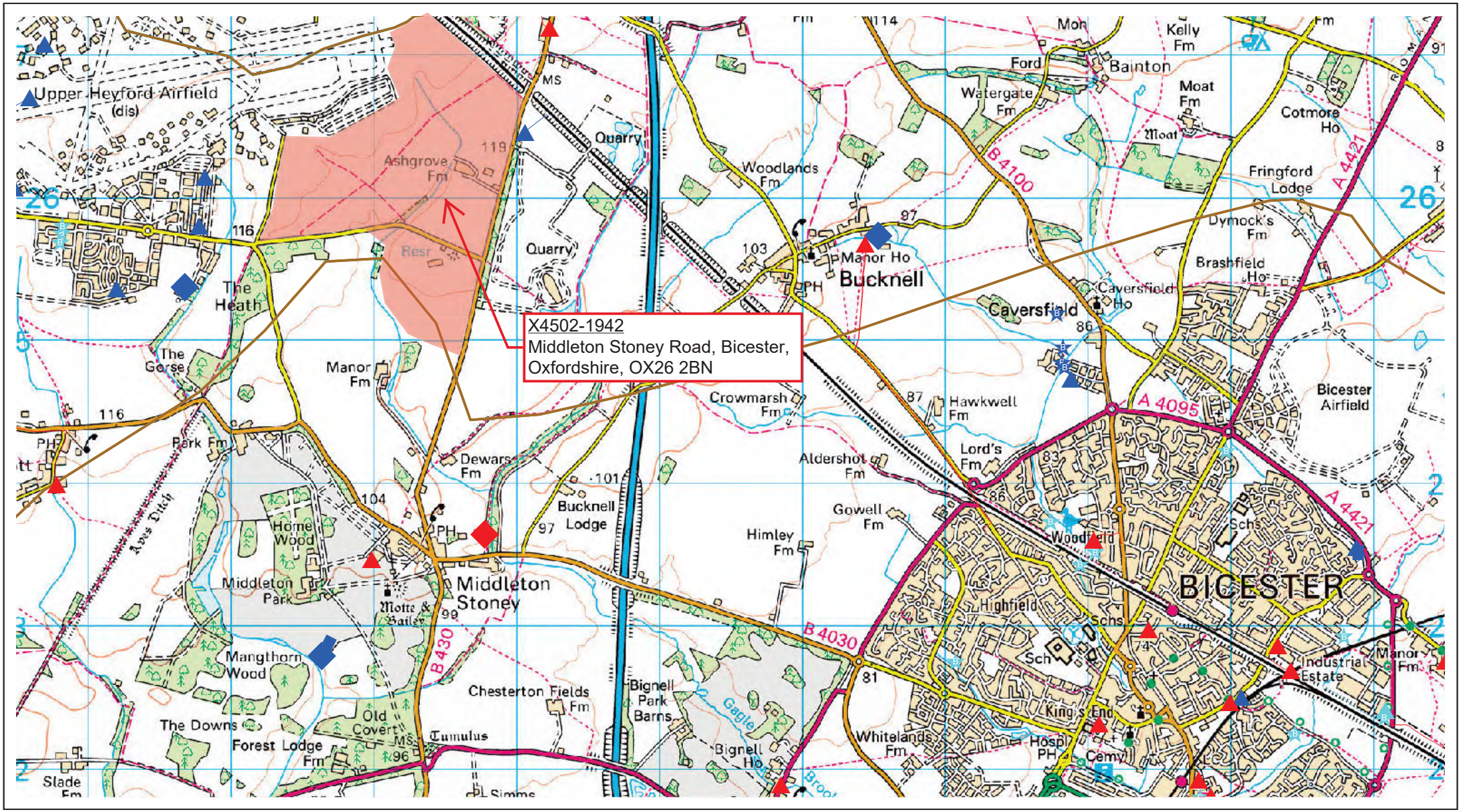
This budget estimate summary has been produced for indicative purposes only and has been constructed using standard budget estimate rates in the absence of detailed site, soil, utility, ecology, heritage, environmental and structural/land/condition surveys as well as information on affected third party 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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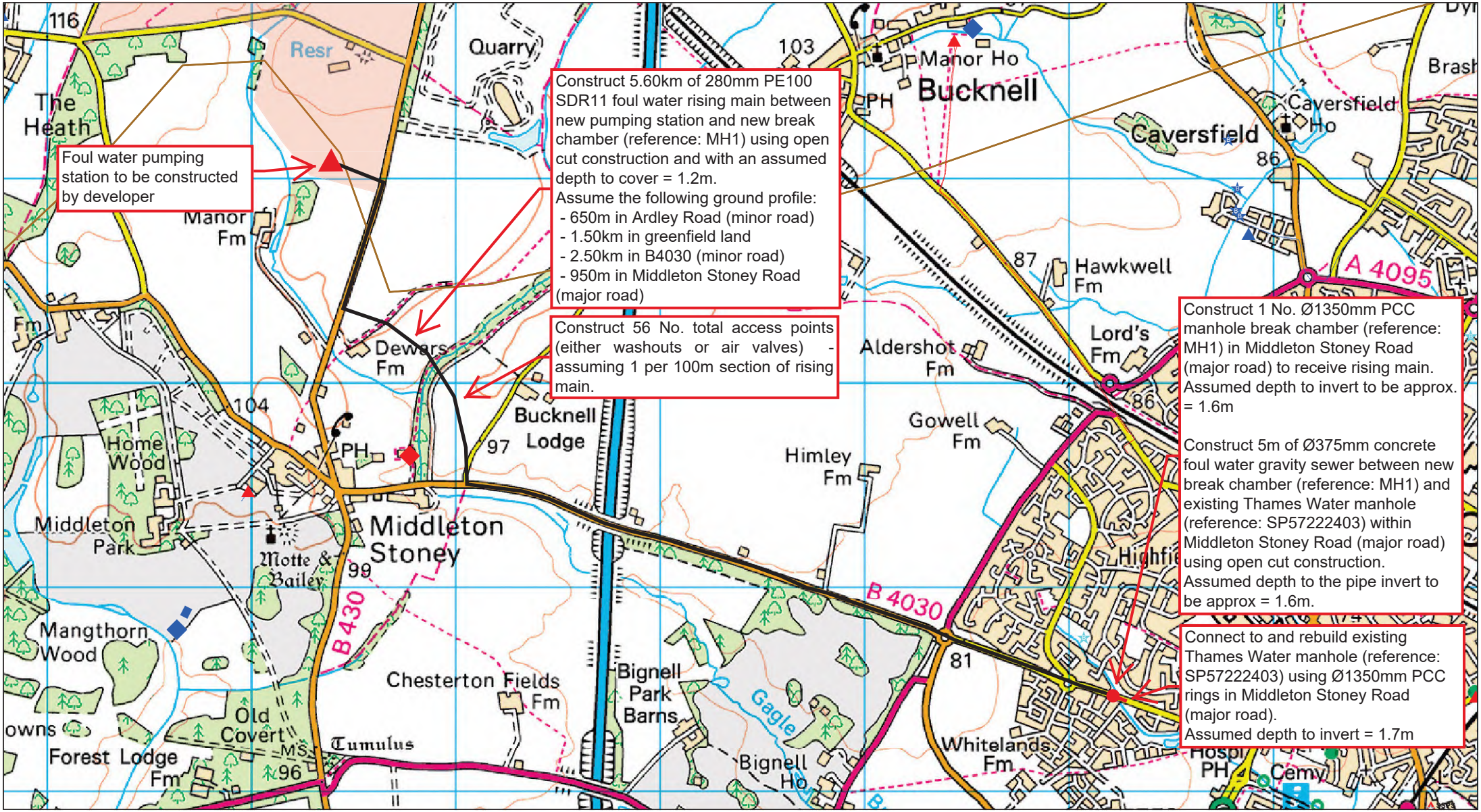
Printed At (A3) :1:25000
Printed By :[redacted]
Print Date :03/10/2022
Map Centered On :455496,224539
Grid Reference :SP5524

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

Middleton Stoney Road



0 280 560 1,120 1,680 2,240

Metres

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

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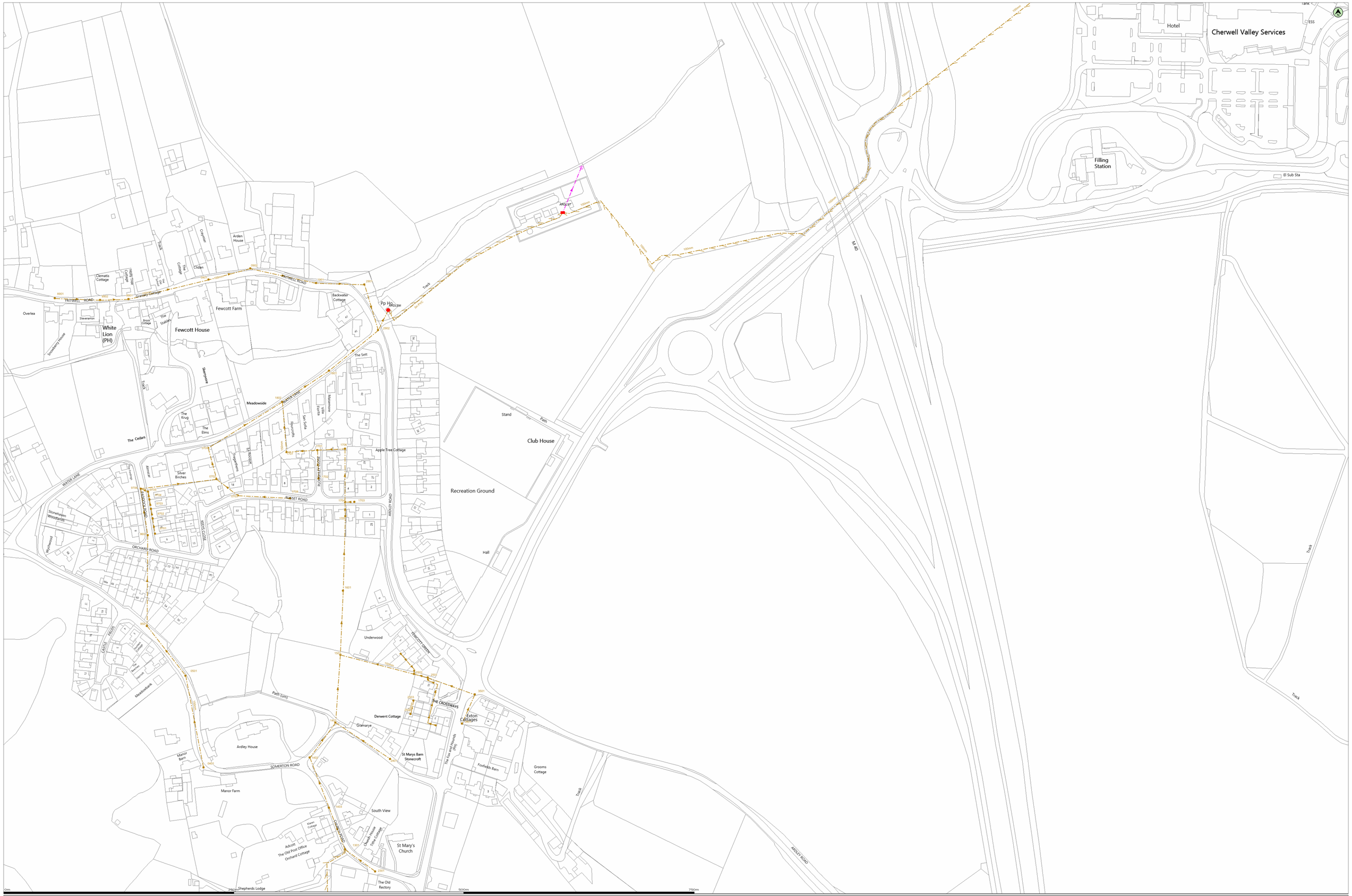
Printed At (A3) :1:25000
Printed By :[redacted]
Print Date :03/10/2022
Map Centered On :455496,224539
Grid Reference :SP5524

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 in respect of any inaccuracy or omission in the information supplied including the failure to accurately record, show or mark the location of any sewer or sewerage apparatus. This information is valid for the date printed. This plan is produced by Anglian Water from own 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	Outfall*	Sewage Treatment Works	
Surface Sewer	Inlet*	Public Pumping Station	
Combined Sewer	Manhole*	Decommissioned Pumping Station	
Final Effluent		*(Colour denotes effluent type)	
Rising Main*			
Private Sewer*			
Decommissioned Sewer*			

[redacted]

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 2.00	D5 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 3.00	D7 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
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 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 0.50	D1 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 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. 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

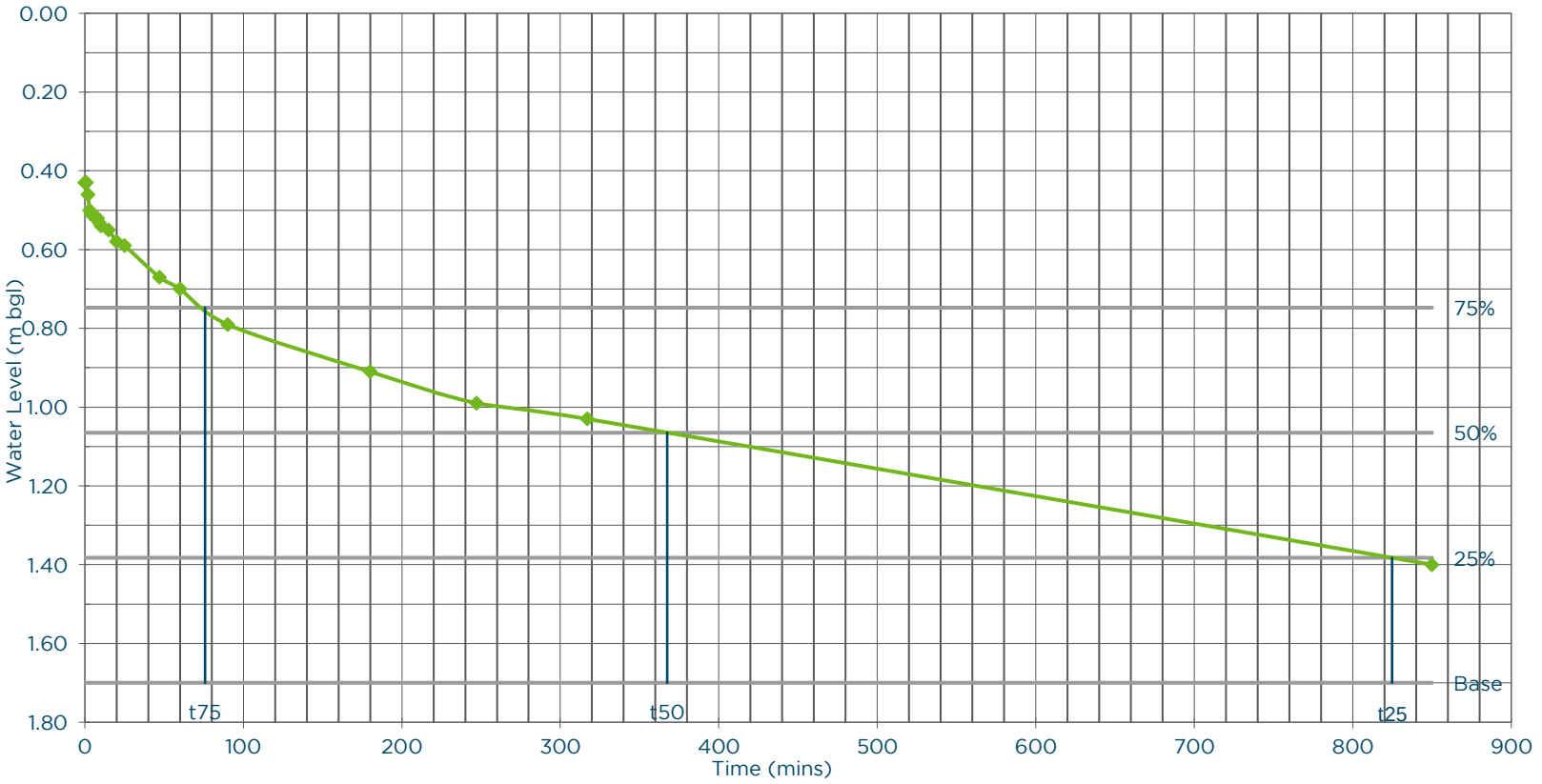
1. Groundwater not encountered. 2. Stable. 3. Backfilled with arisings on completion.

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*

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

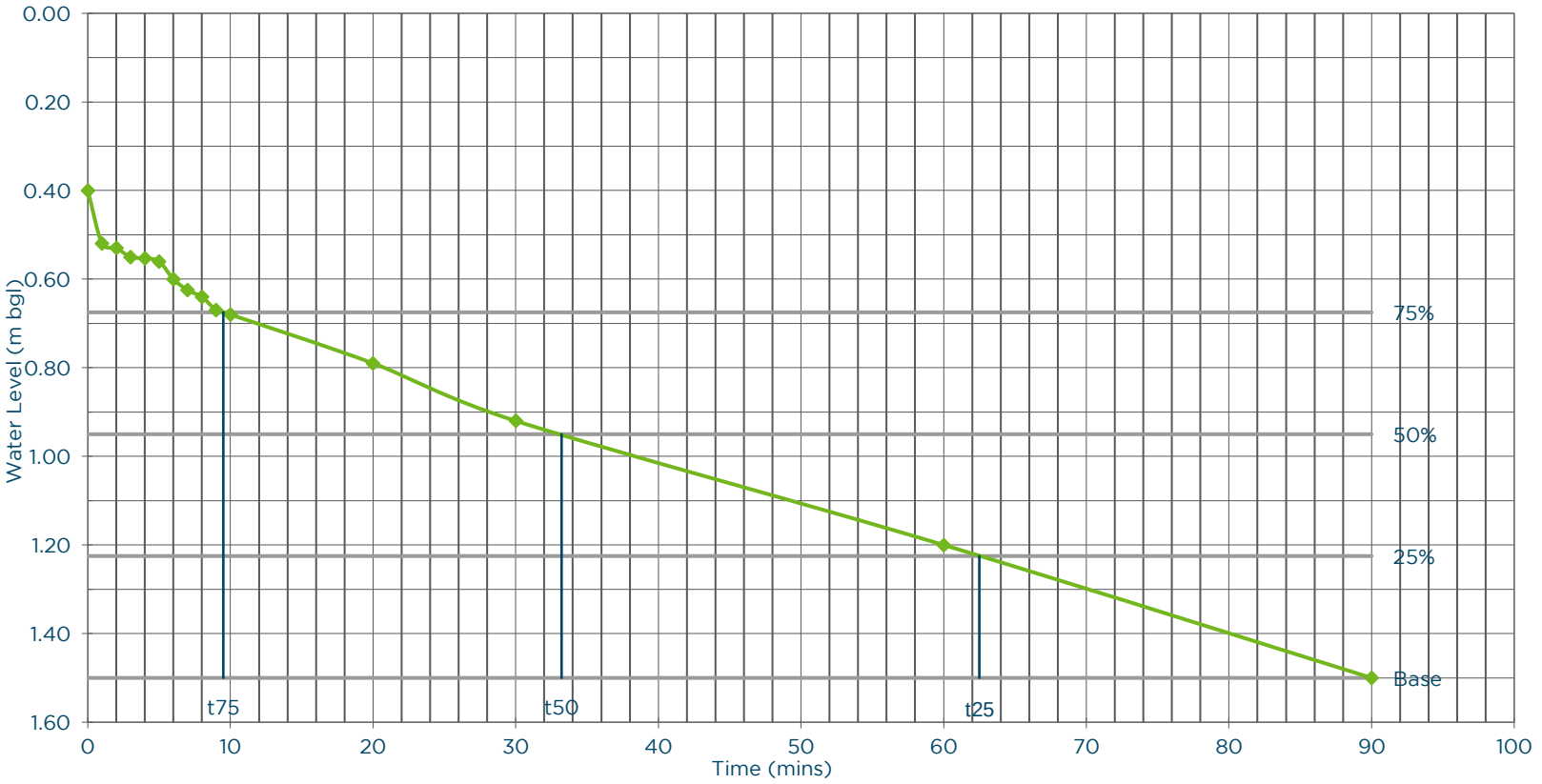
At 7 minutes small pit collapse on the south side. At 20 minutes small central collapse. Extrapolated from 317mins

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

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

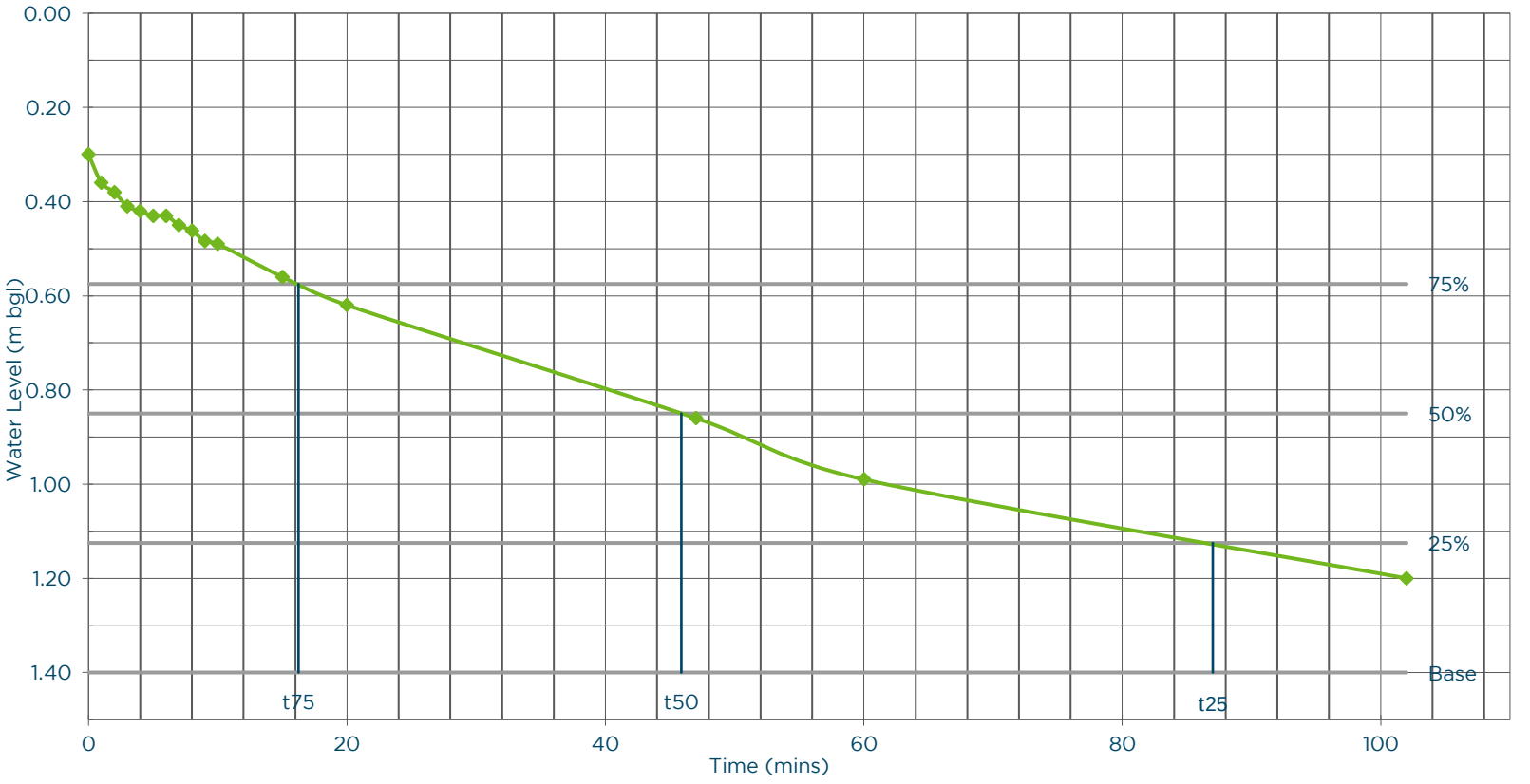
Small side wall collapse at 10 minutes. Fully drained by 90 minutes.

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

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

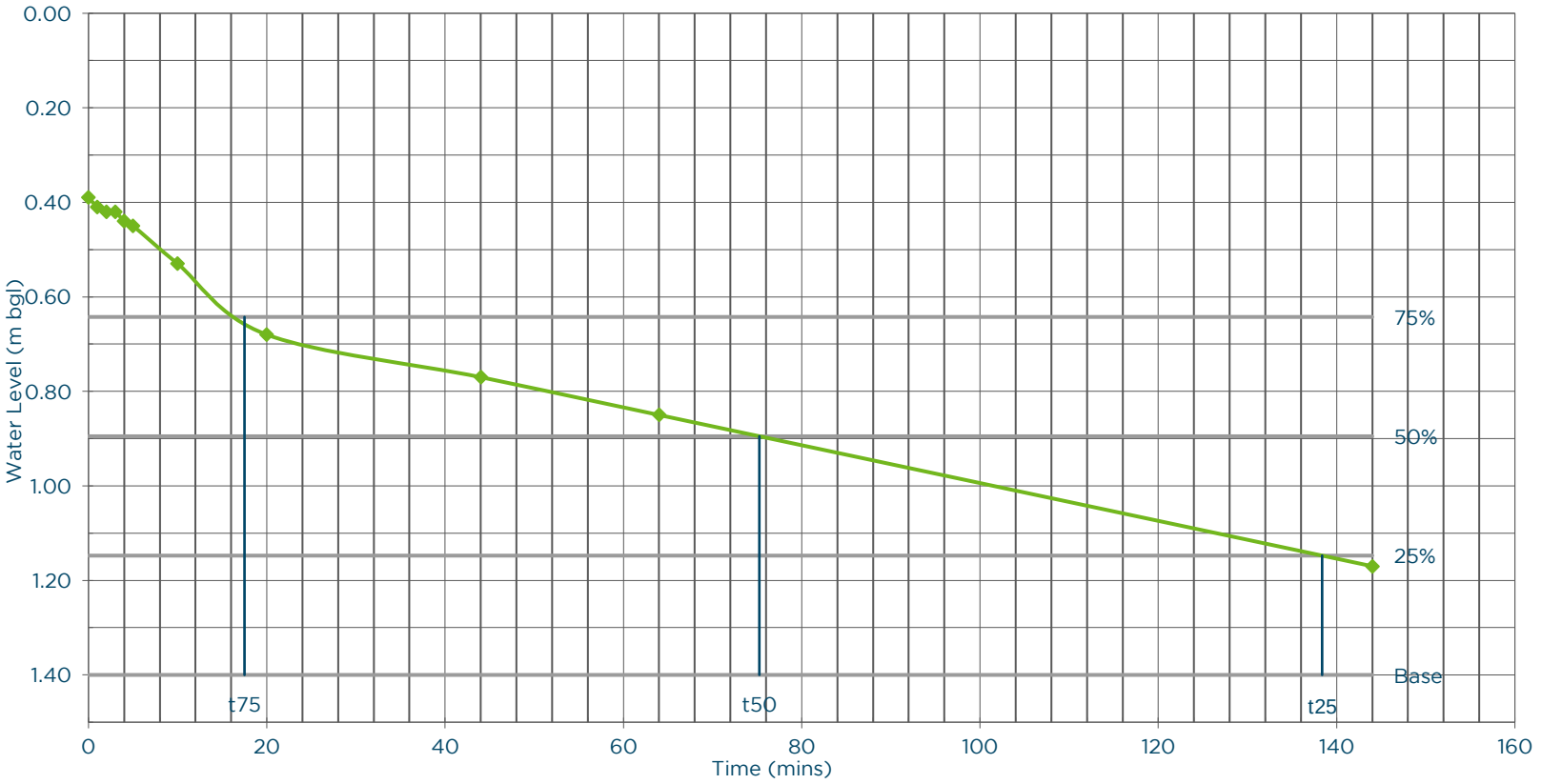
Base depth reduced to 1.4m following collapse during Test 1.

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

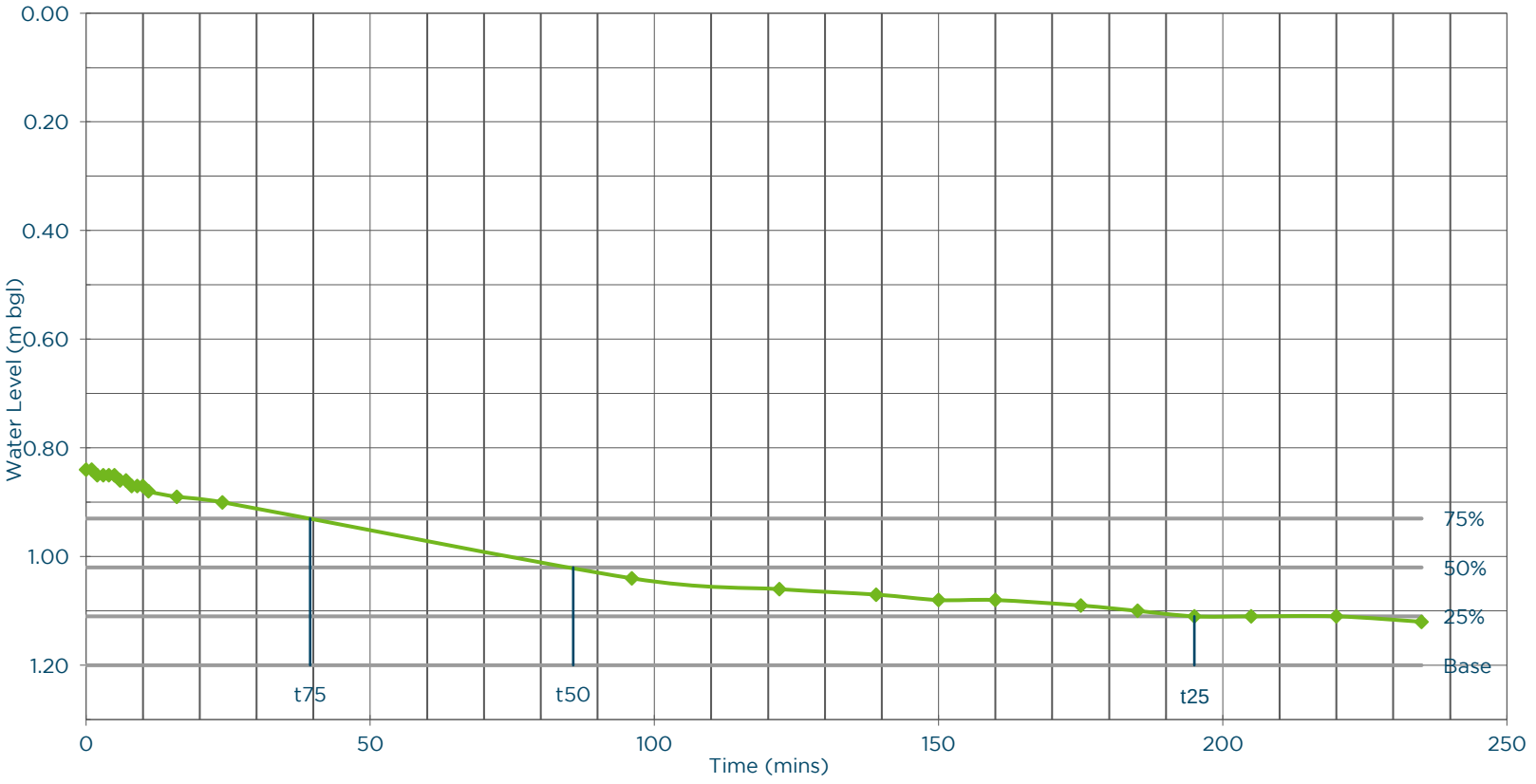
Test not completed due to time constraints. Italicised results are extrapolated values.

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

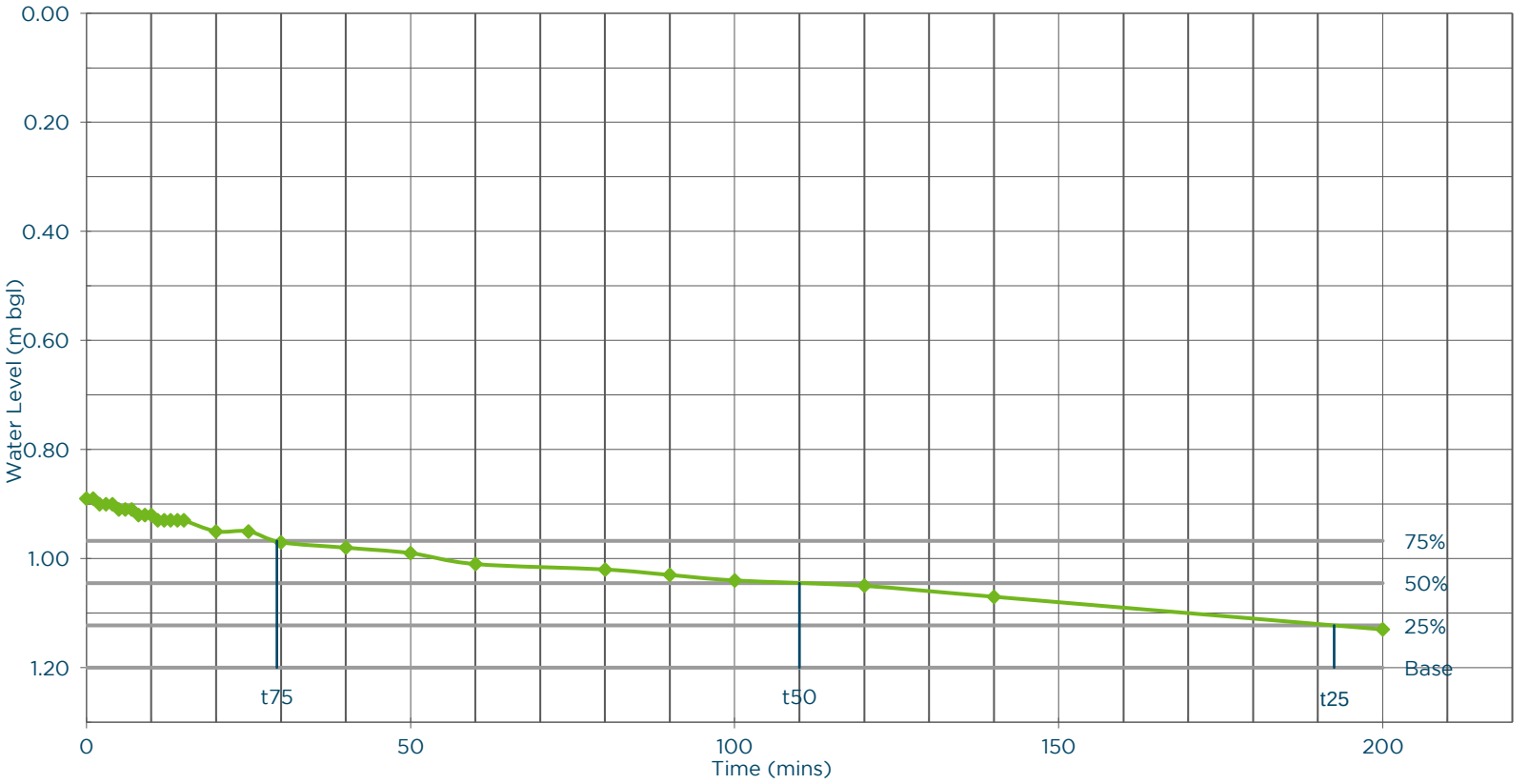
Perched water at 1.20m below ground level.

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

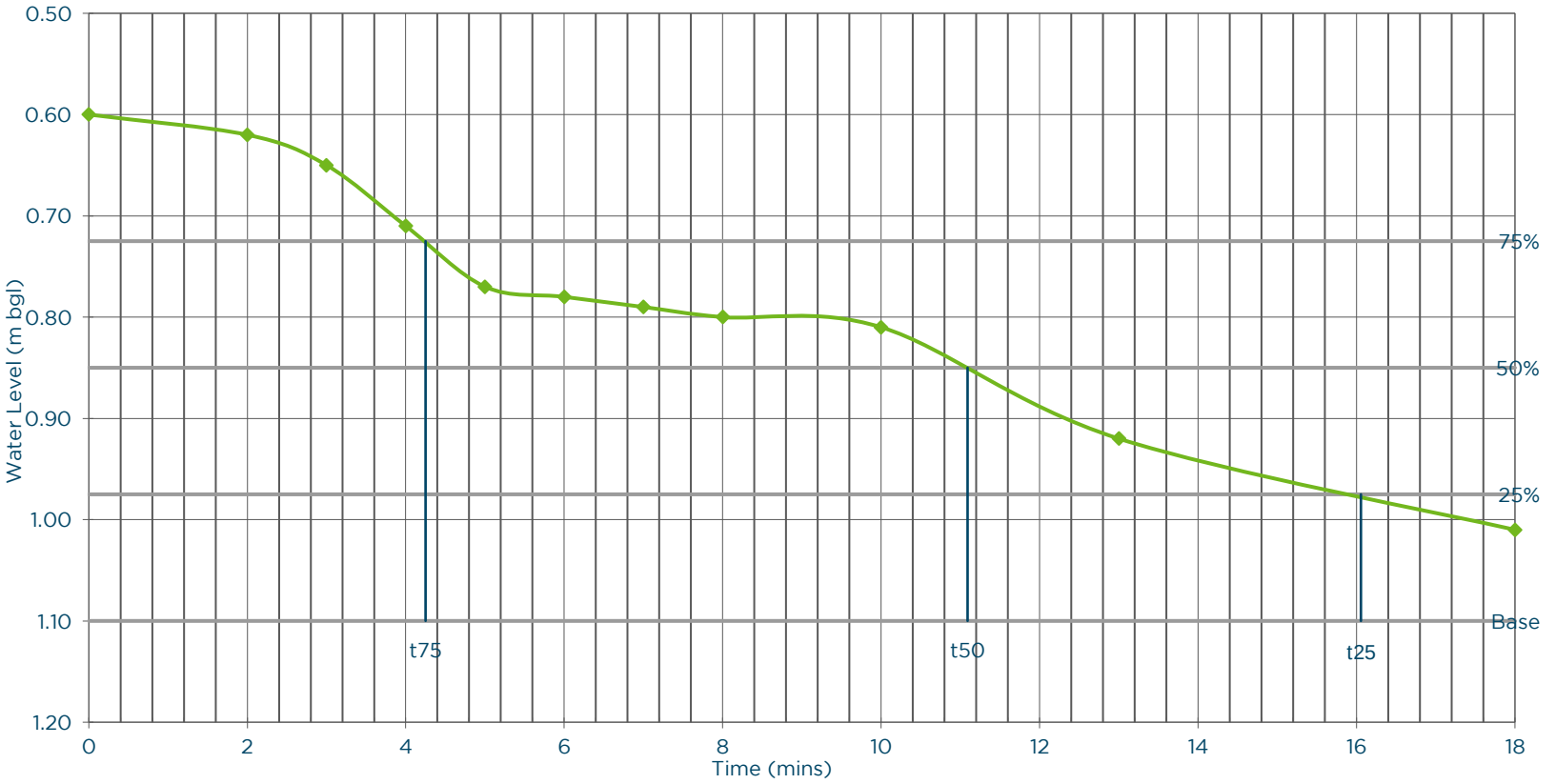
Partial pit collapse at 7 minutes and 20 minutes. Test not completed due to time constraints. Extrapolated values are italicised.

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.

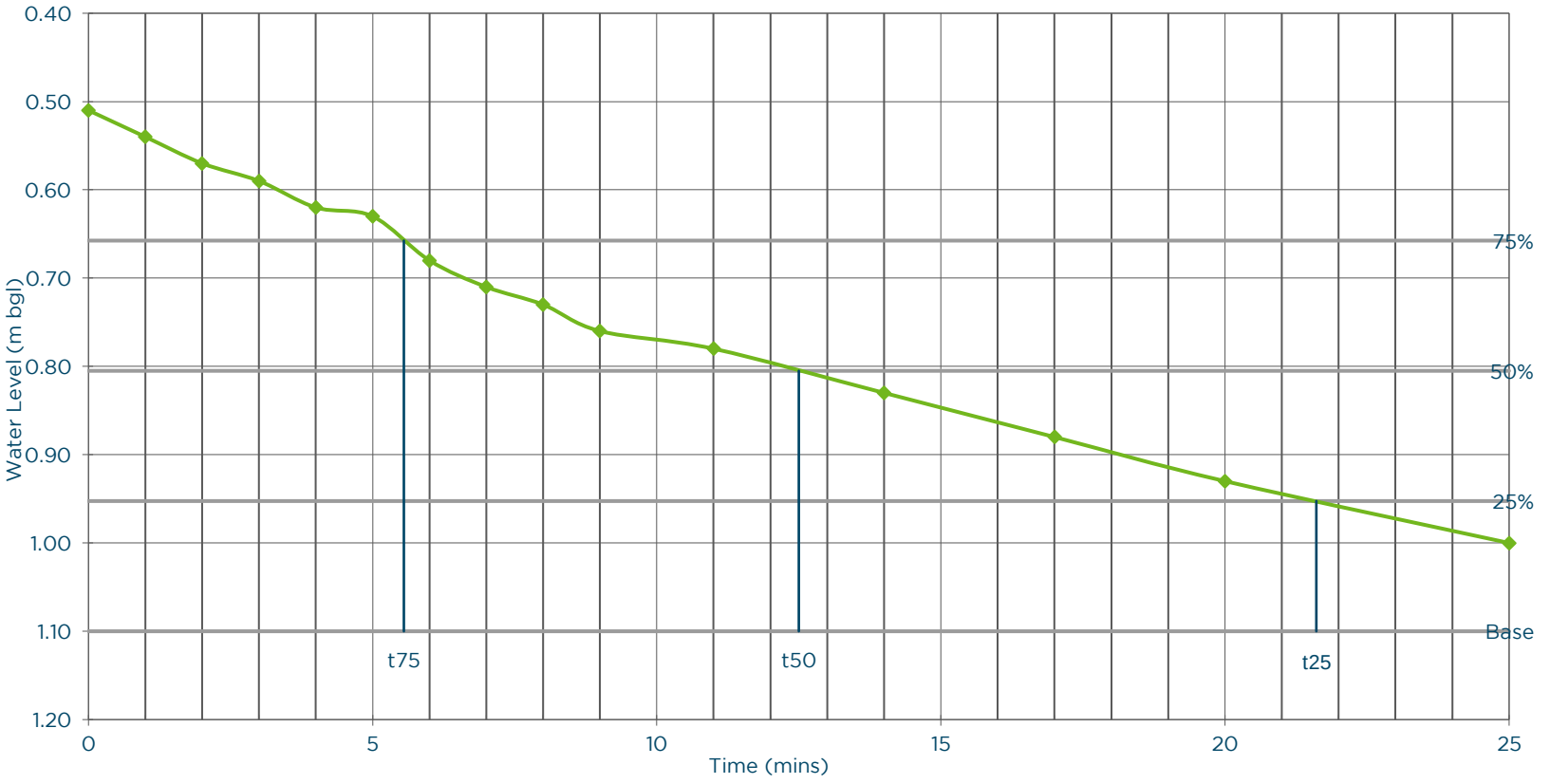
Comments

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.

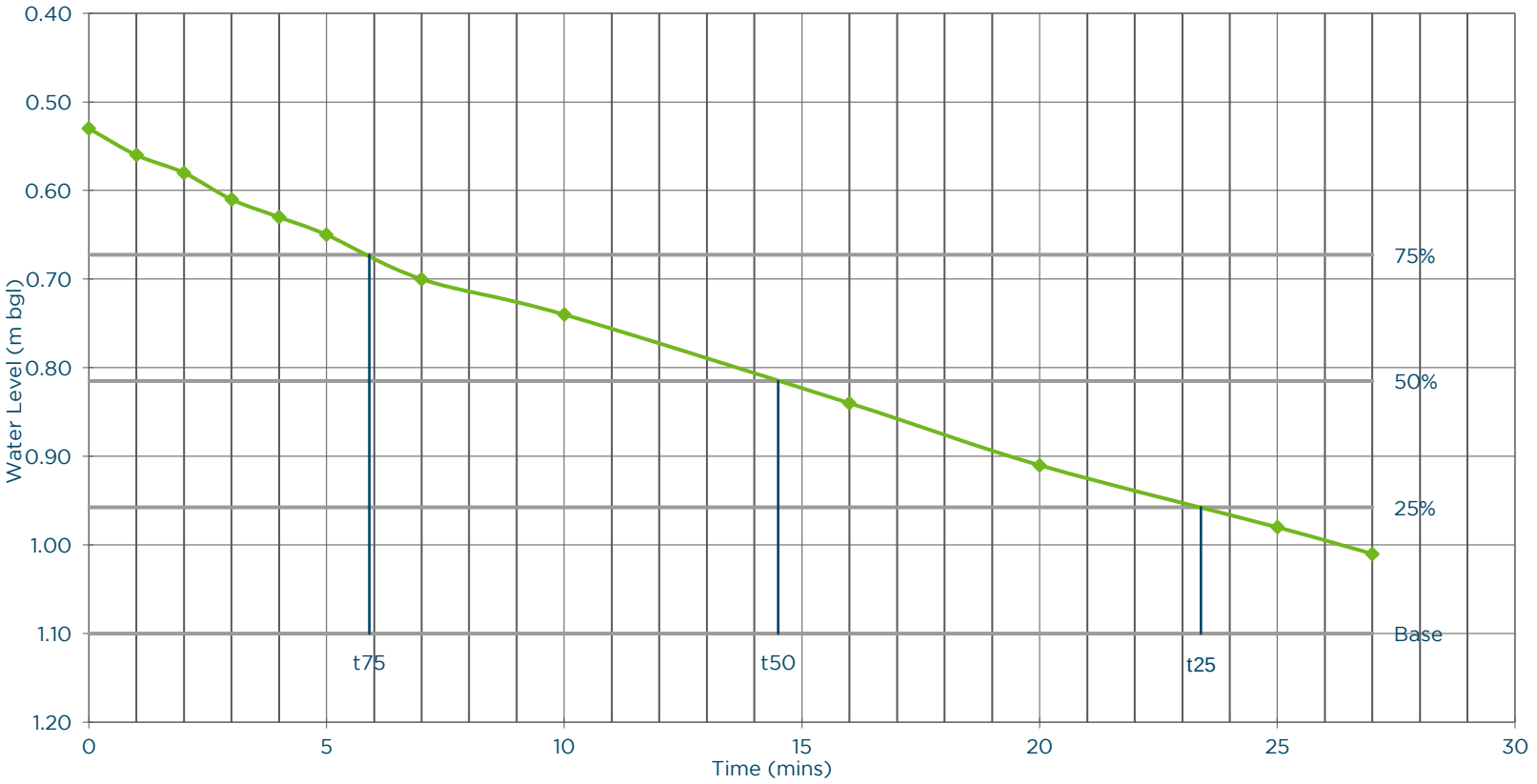
Comments

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.

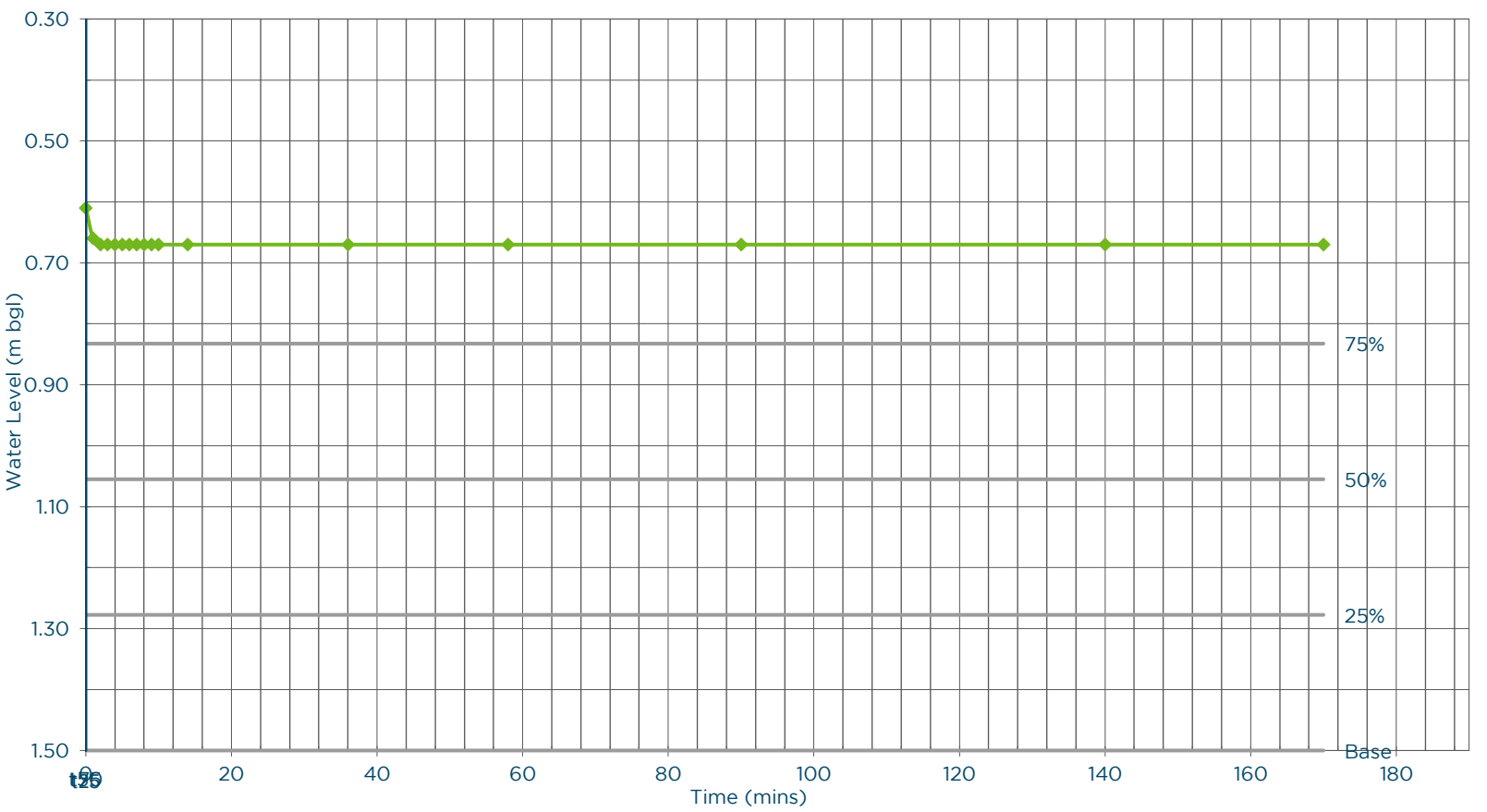
Comments

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

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

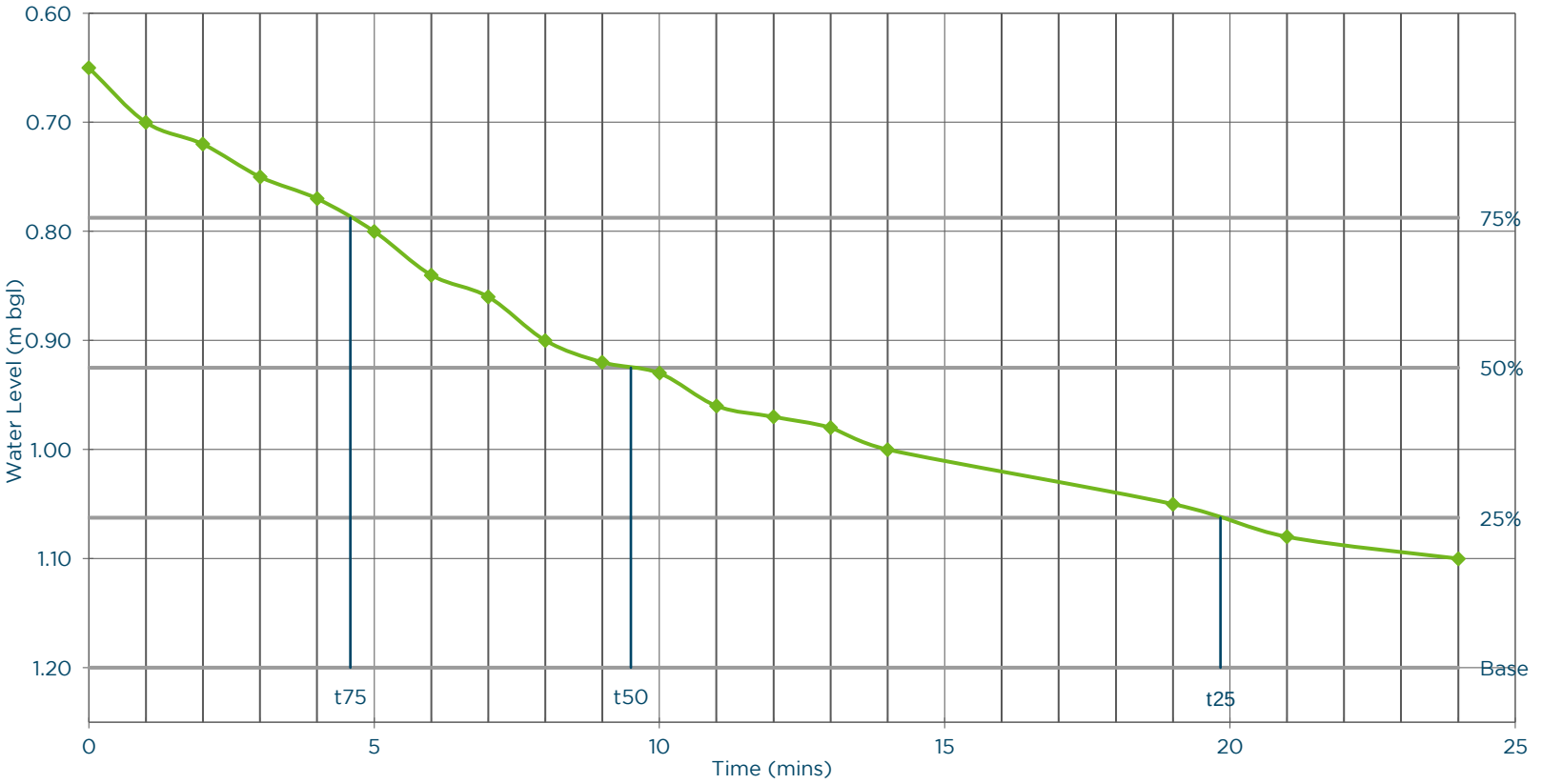
No drainage, test stopped after 3hrs.

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

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

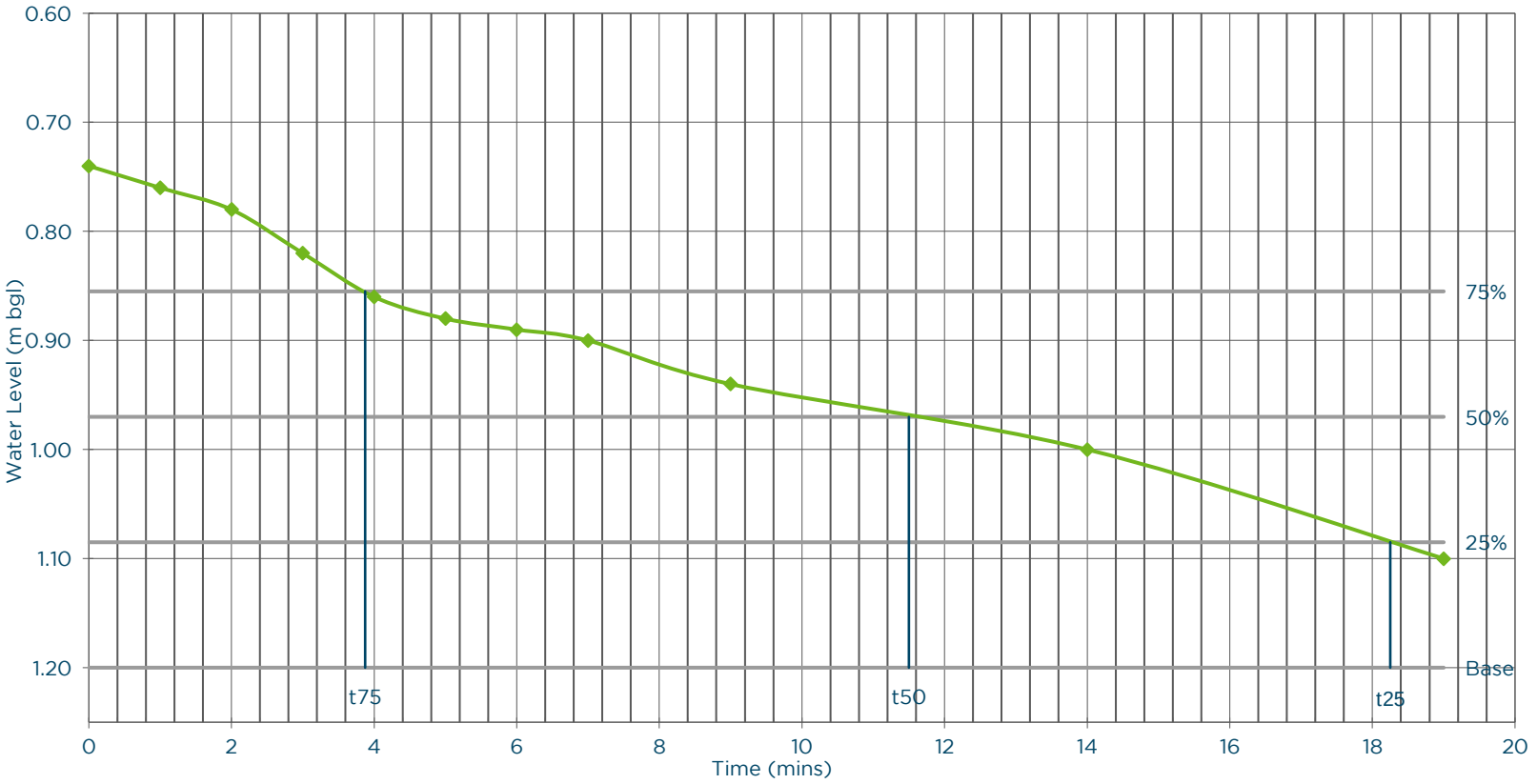
Fully drained at 11:00.

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

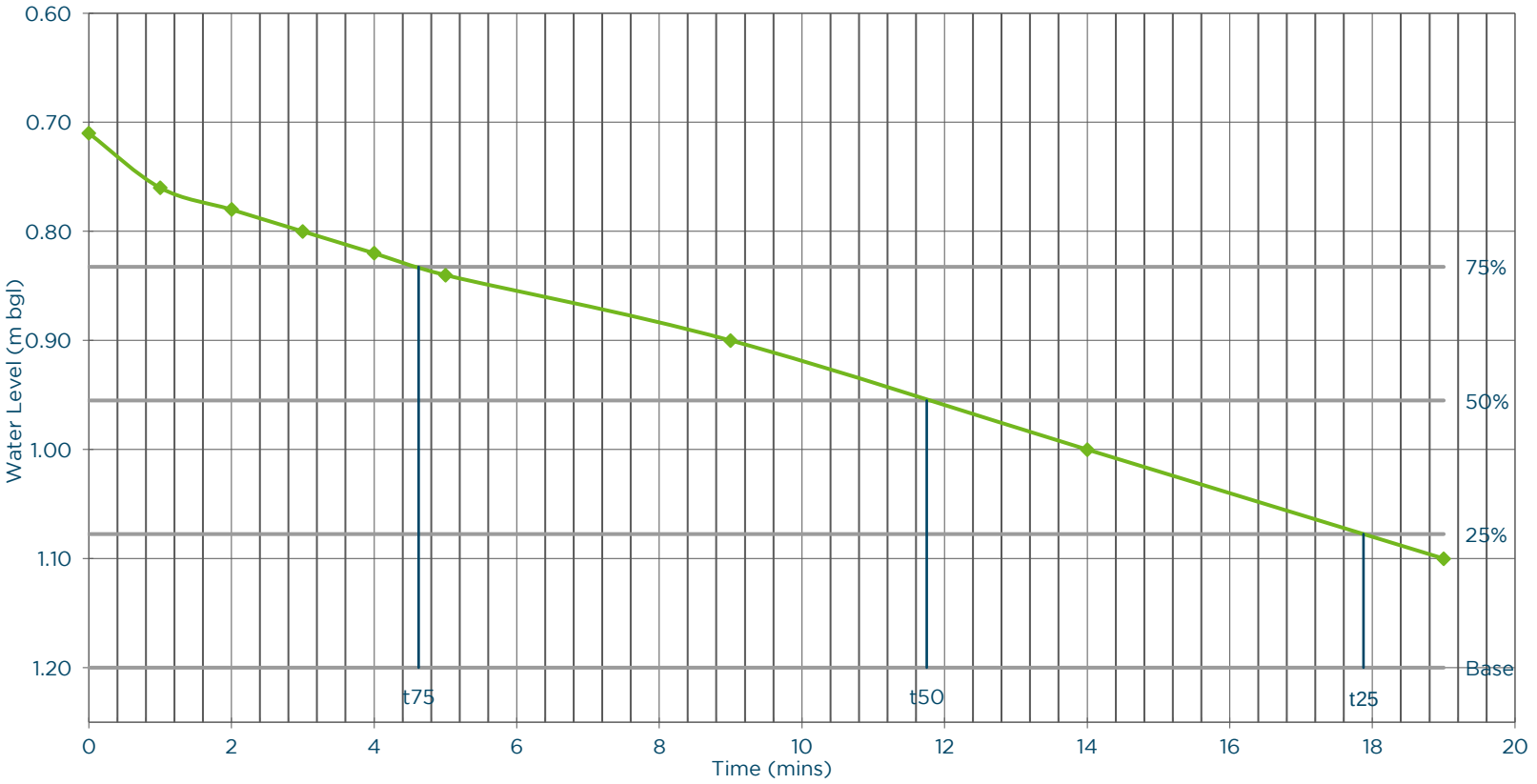
Fully drained at 11:20.

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

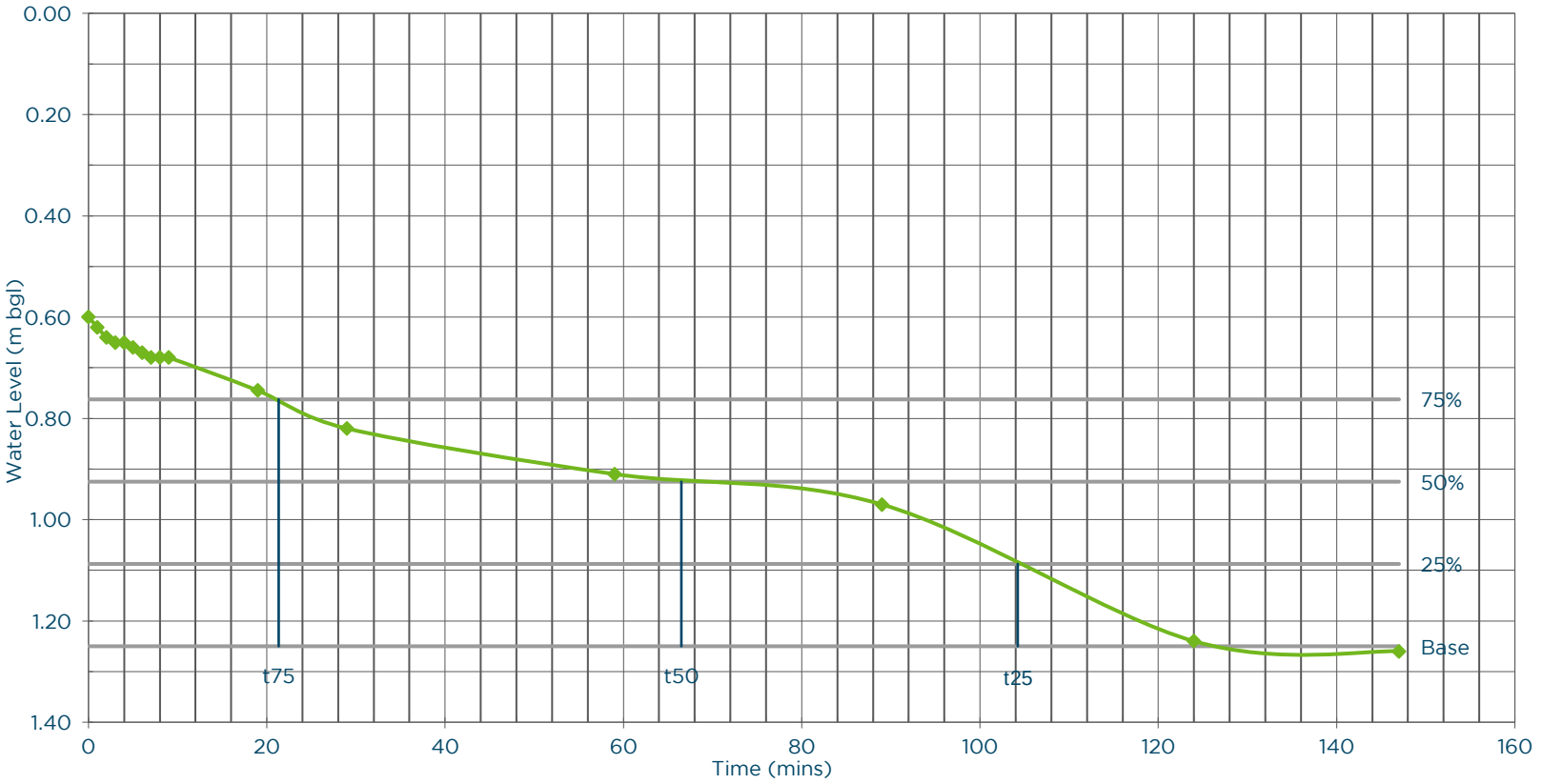
Fully drained at 11:45. Test pit backfilled.

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

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.

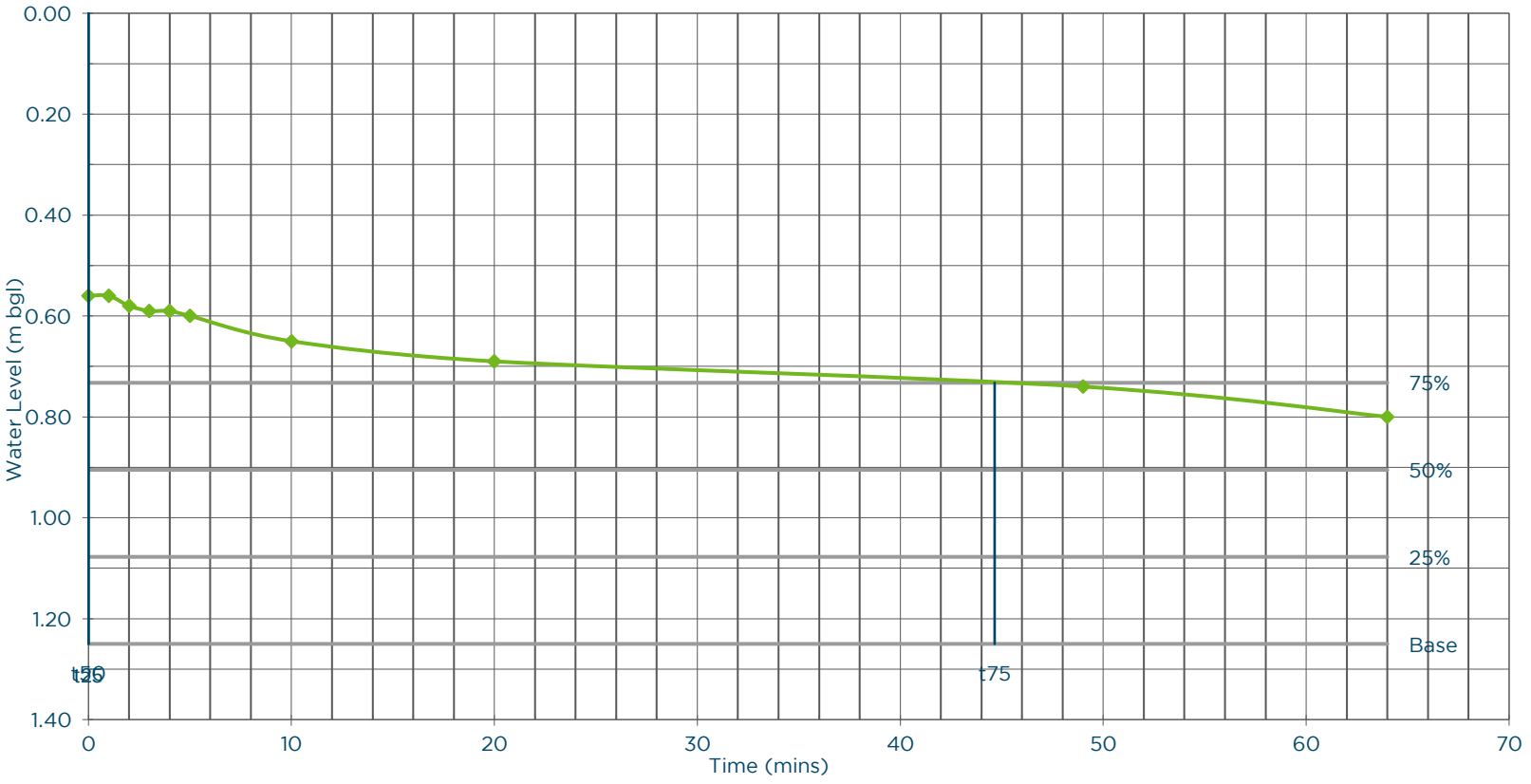
Comments

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

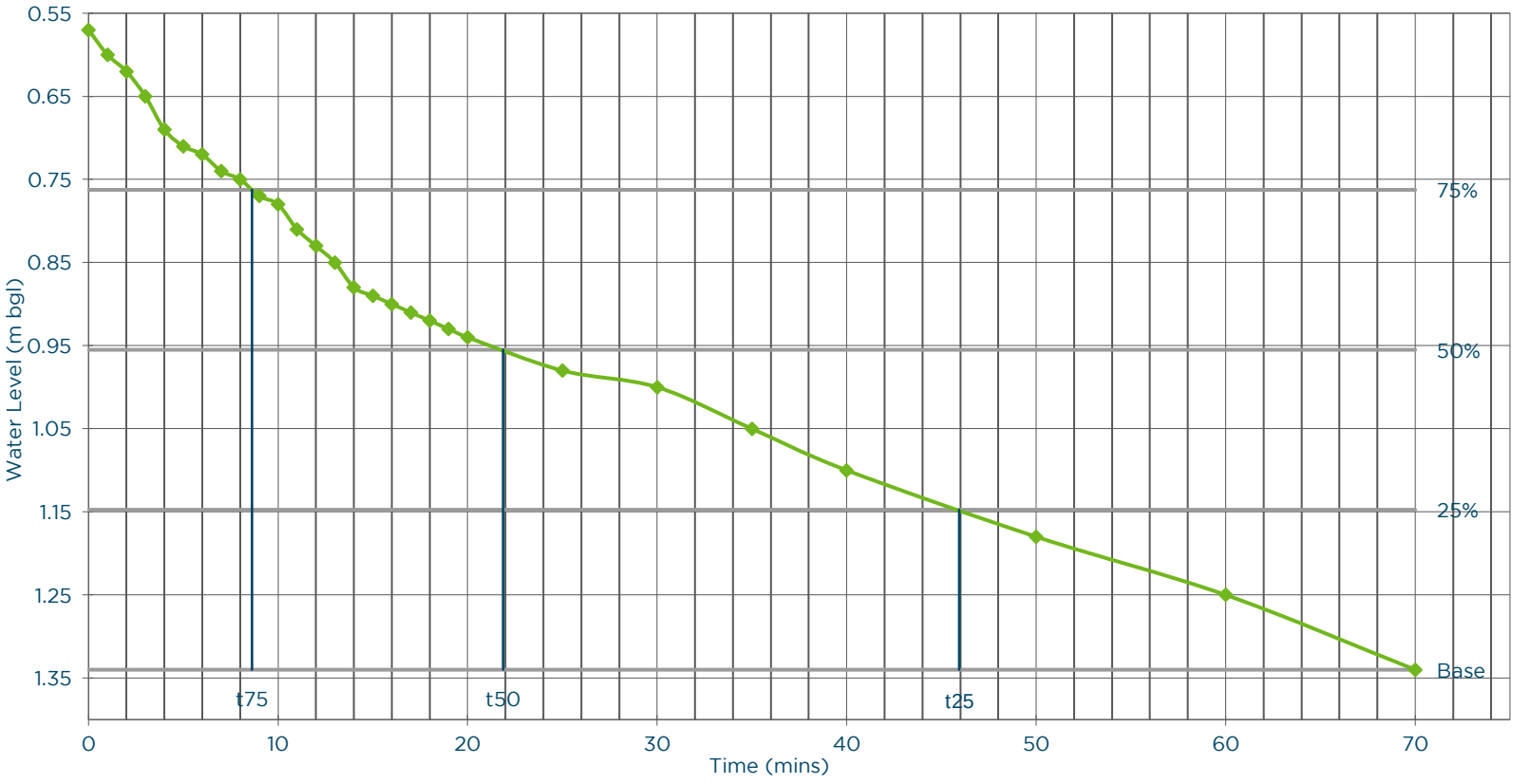
Test could not be completed due to time constraints. Backfilled at 15:55.

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

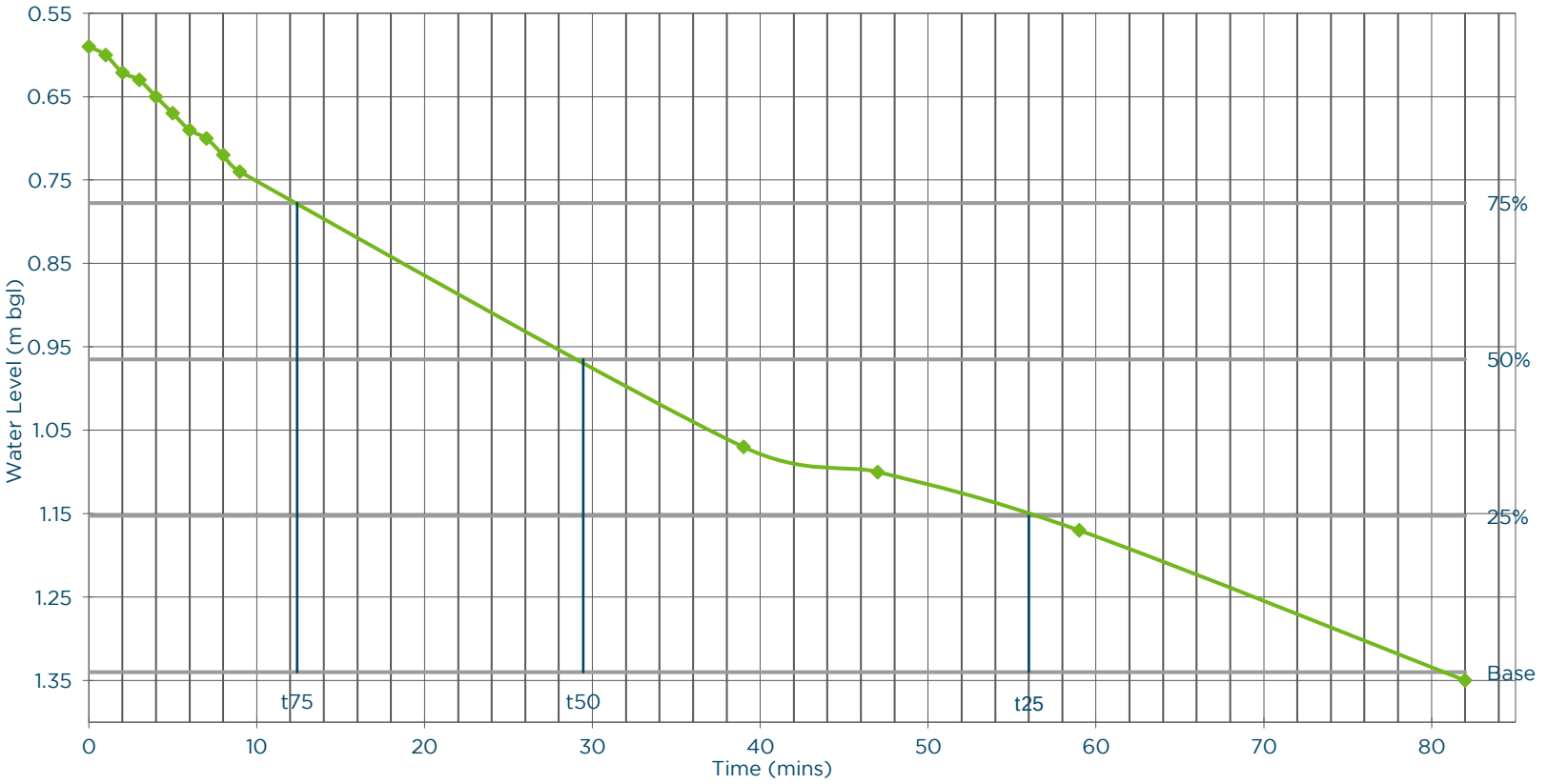
Fully drained at 10:09

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

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

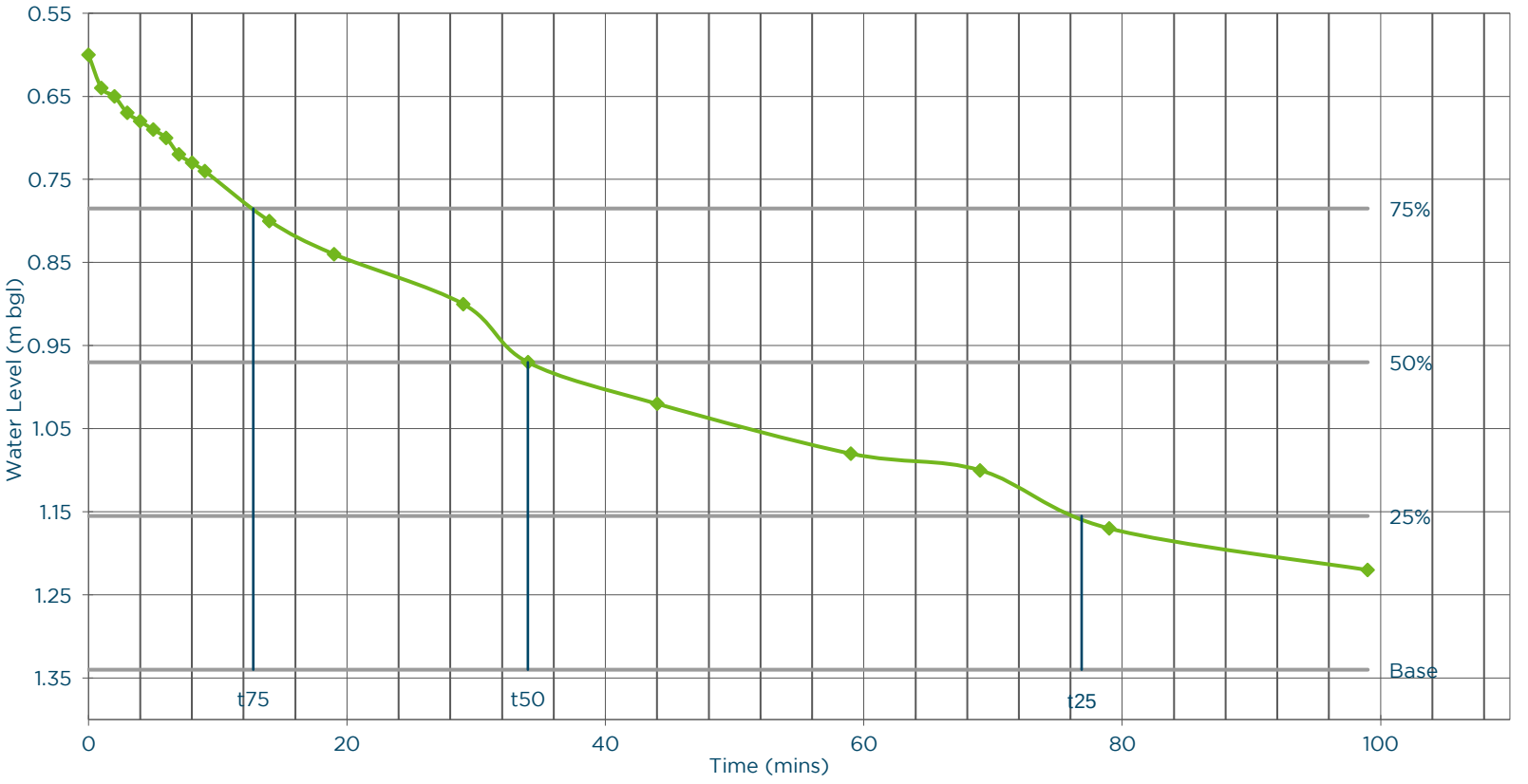
Fully drained at 11:35

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

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

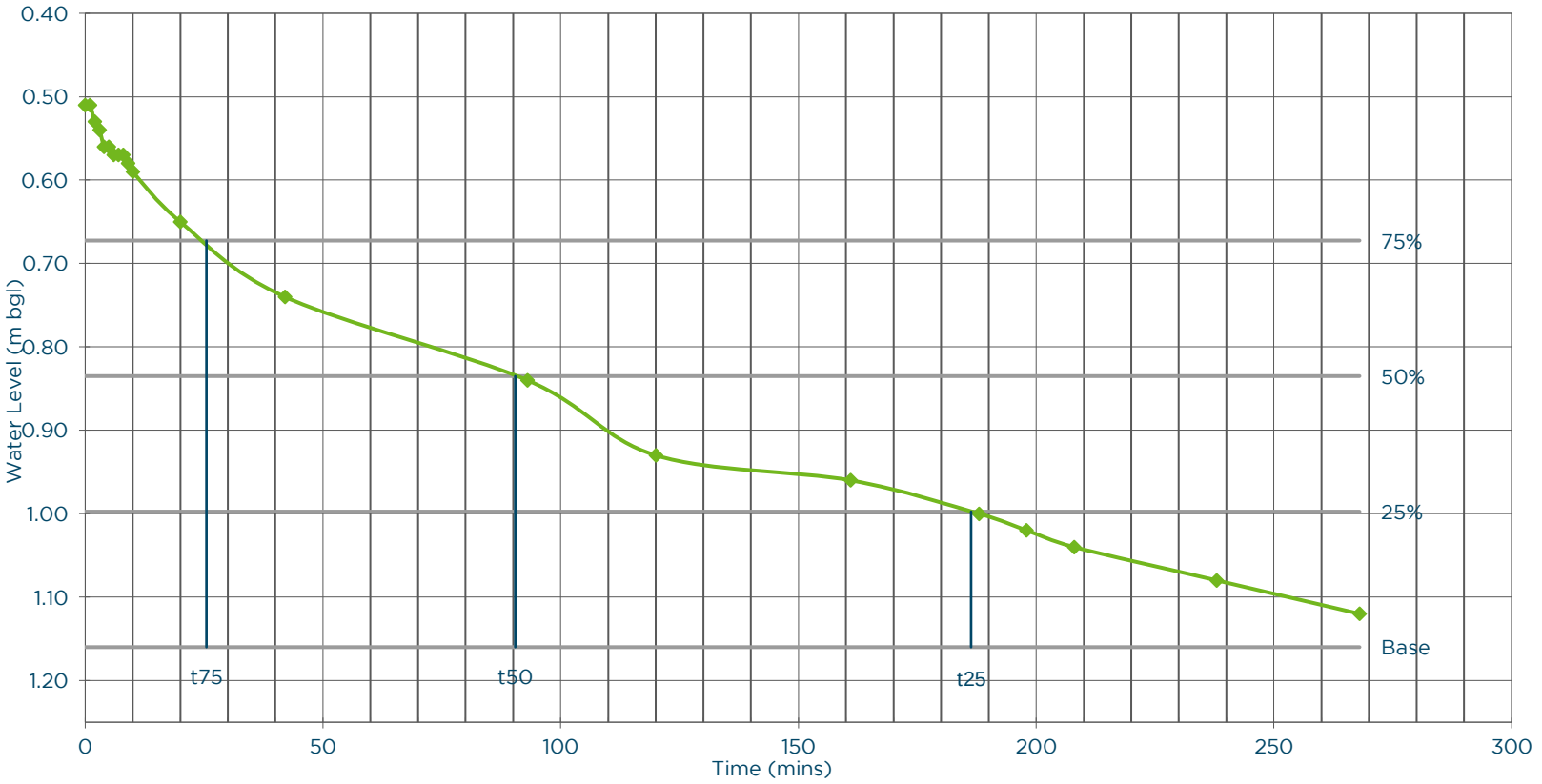
Fully drained at 13:40

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

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

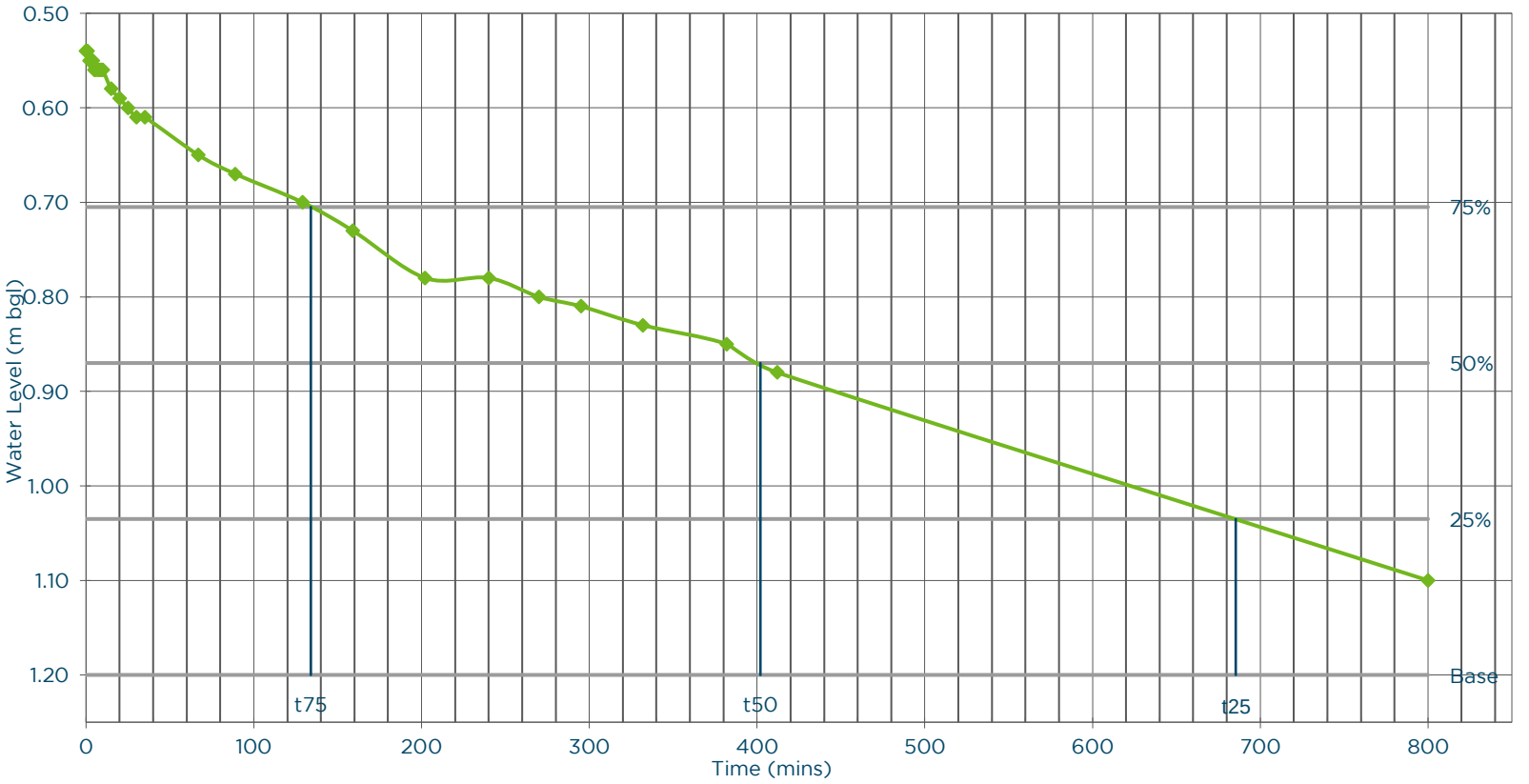
Drained at 15:00, not enough time to start a second test.

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

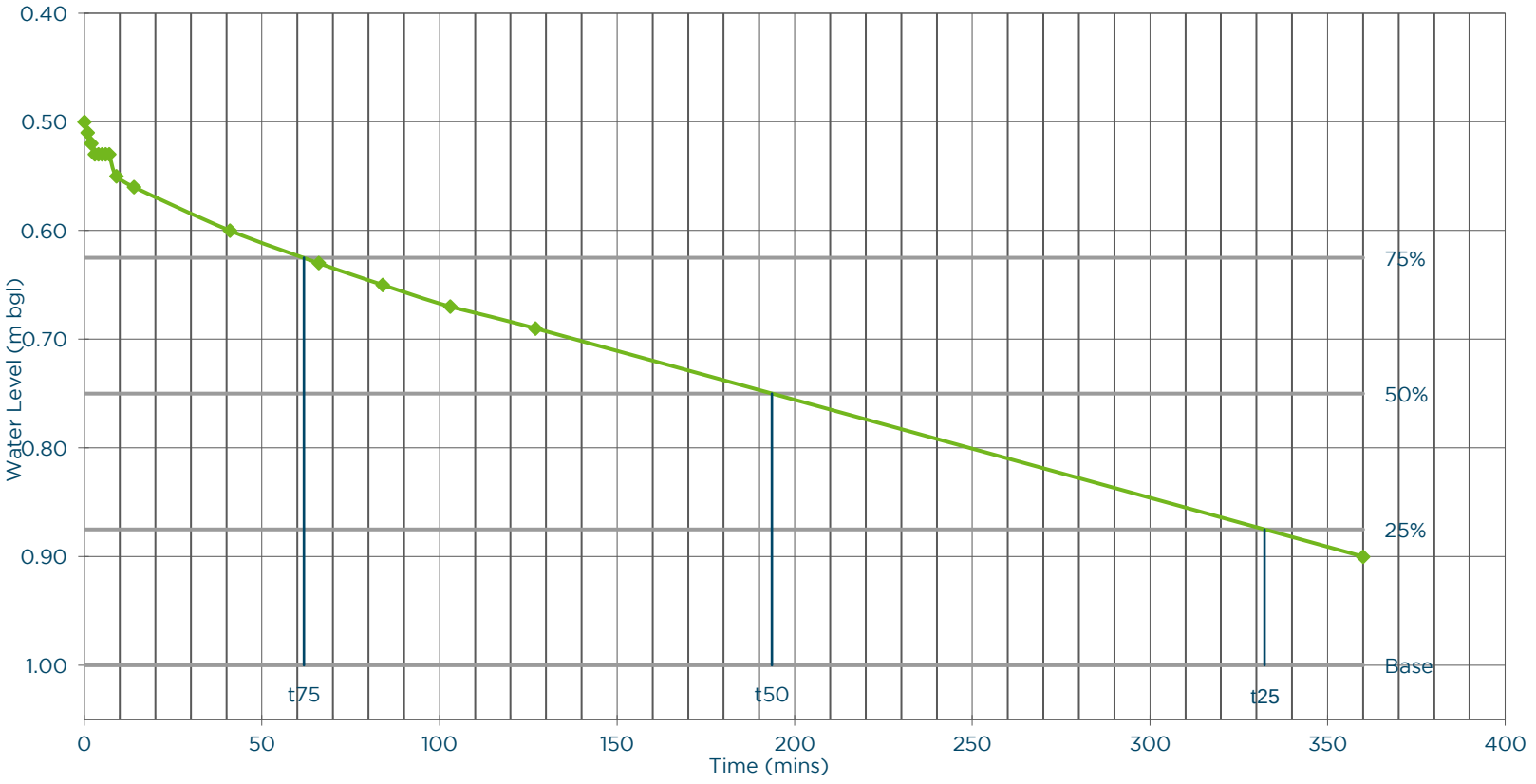
Test stopped and backfilled at at 15:30 due to time constraints. Italicised results are extrapolated values.

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*

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 corresponding to an H/Ho value of 0.37,
2 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

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

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=	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

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

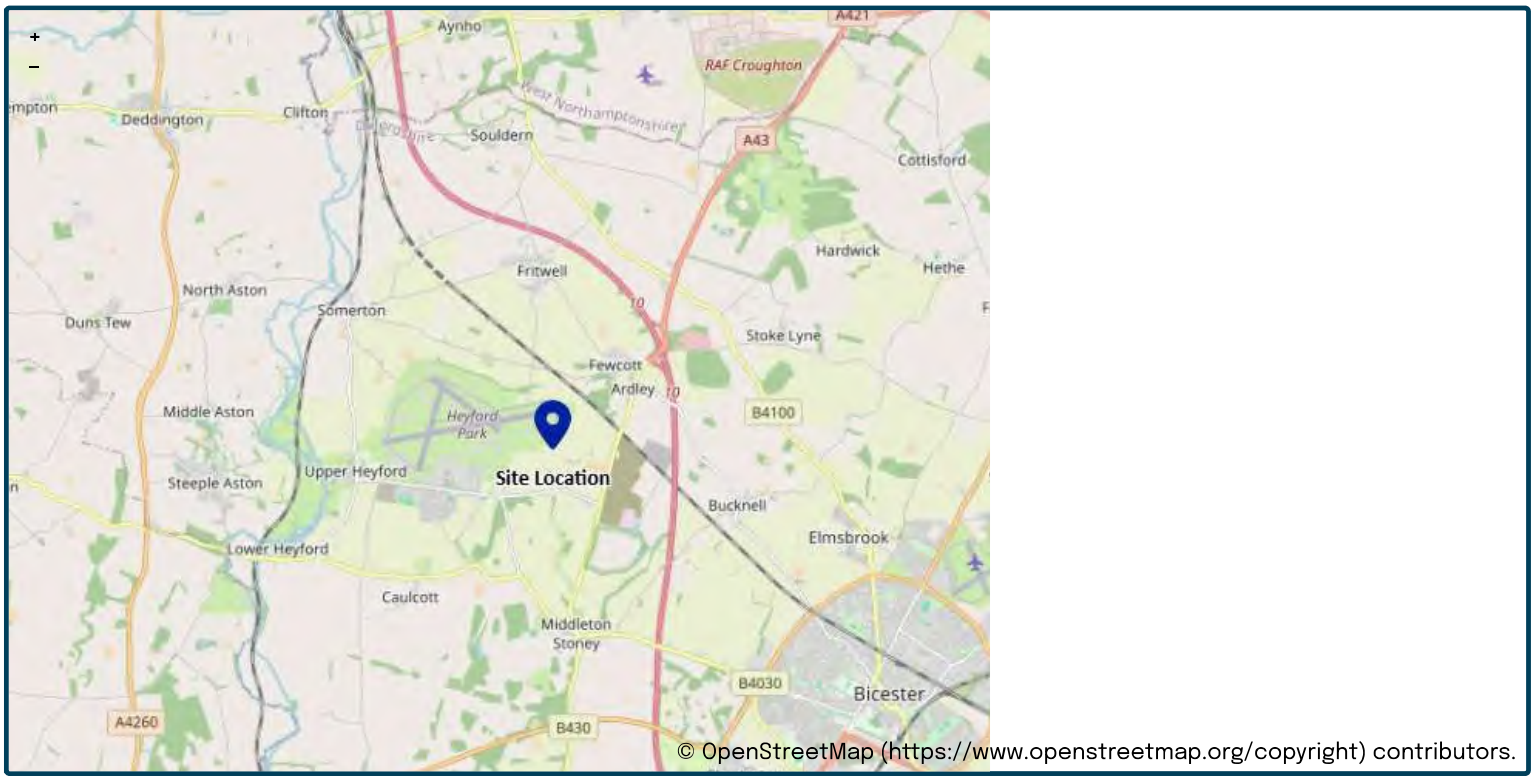
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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

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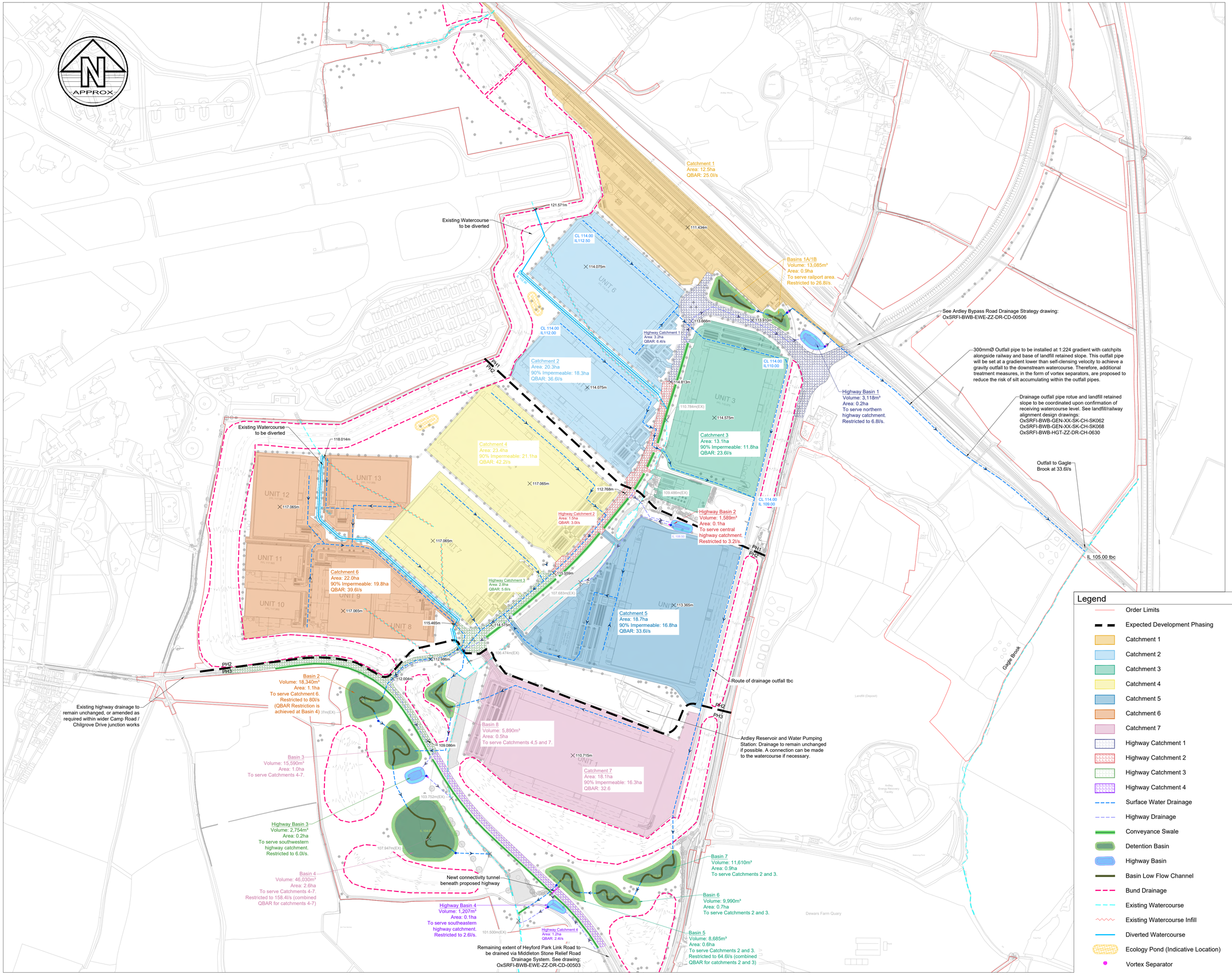
Appendix 6: Illustrative Surface Water Drainage Strategy



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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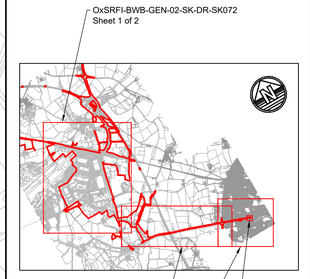
Notes

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

Issues & Revisions

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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

For continuation see Sheet 2 of 2 OxSRFI-BWB-GEN-XX-SK-DR-SK072 Sheet 1 Viewport 1

OxSRFI-BWB-GEN-XX-SK-DR-SK072 Sheet 1 Viewport 2

Middleton Stoney

Viewport 4
Scale 1:5000

PROPOSED FOUL WATER CONNECTION TO EXISTING FOUL WATER SEWER

For continuation see Sheet 2 of 2 OxSRFI-BWB-GEN-XX-SK-DR-SK072 Sheet 1 Viewport 3

OxSRFI-BWB-GEN-02-SK-DR-SK072 Sheet 2 of 2 Viewport 3

Viewport 5
Scale 1:500

FOUL WATER RISING MAIN CONNECTION TO PROPOSED GRAVITY SEWER VIA PROPOSED BREAK MANHOLE CHAMBER

PROPOSED FOUL WATER MANHOLE CONNECTION AT MH2403.

1m

CR

Electricity Sub Station

Play Area

25

105

101

113

137

51

33

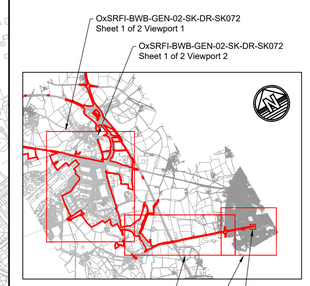
41

31

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

Issues & Revisions

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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 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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