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ENVIRONMENT

Richborough Estates Limited and Lone Star Land
Heyford Park
Upper Heyford, Oxfordshire
Sustainable Drainage Statement

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Sustainable Drainage Statement

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The information presented, and conclusions drawn, are based on statistical data and are for guidance purposes only. The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

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APPENDICES

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 consideration of national and local guidance, 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 Richborough Estates Limited and Lone Star Land, in respect of an outline planning application for the erection of up to 230 dwellings, creation of new vehicular access from Camp Road and all associated work. A proposed site development plan is included as **Appendix 1**.

1.3 A Flood Risk Assessment (FRA) has been produced for the site (reference UHO-BWB-ZZ-XX-RP-YE-0001_FRA) and this SDS accompanies this overarching document.

1.4 The location of the site is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**.

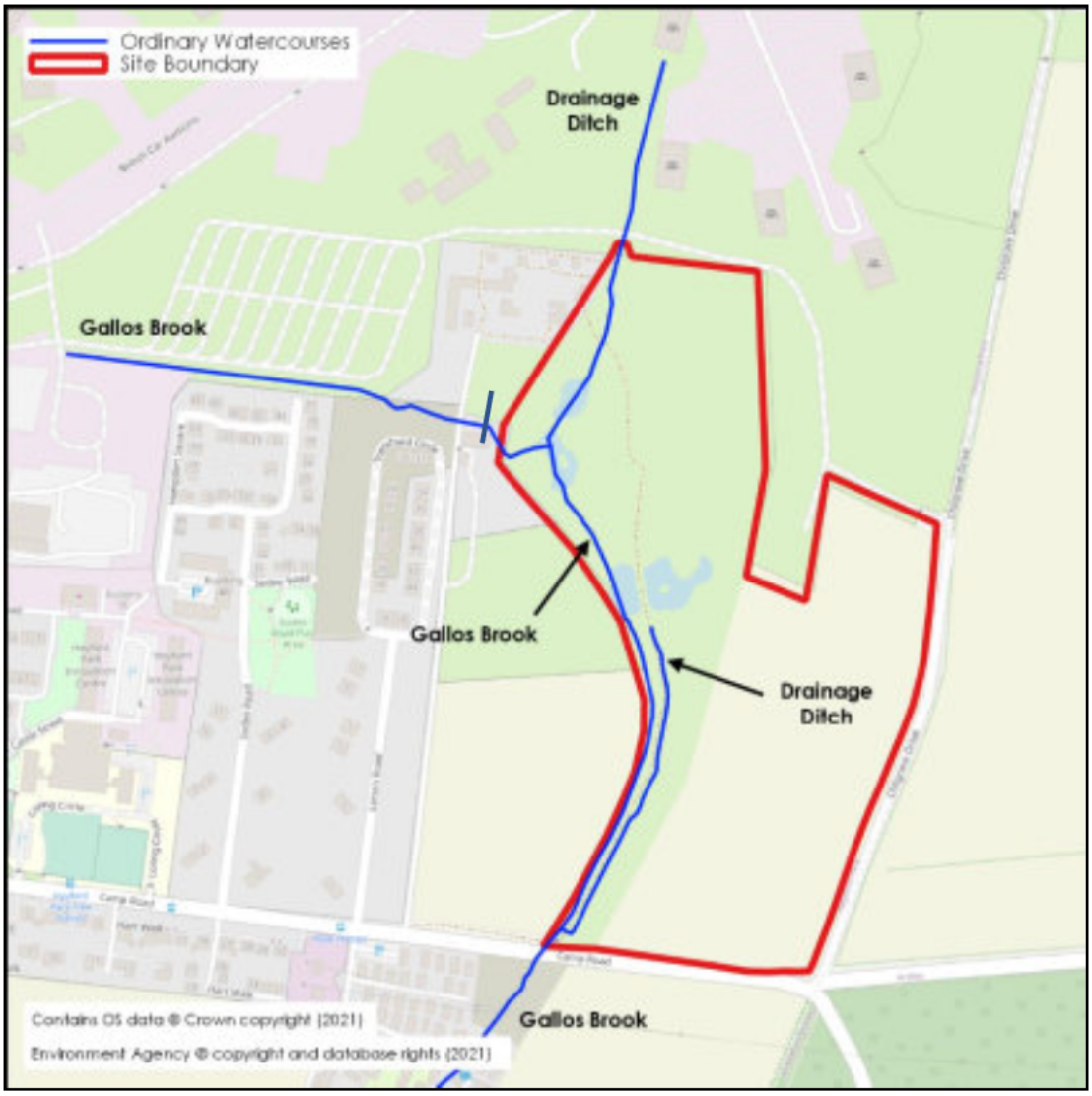

Figure 1.1: Site Location

Table 1.1: Site Details

Site Name	Heyford Park
Location	Upper Heyford, Oxfordshire
NGR (approx.)	SP520259
Application Site Area (ha)	11.6
Development Area (ha)	6.19
Development Type	Residential
Lead Local Flood Authority	Oxfordshire County Council
Local Planning Authority	Cherwell District Council
Environment Agency Area	Thames

Sewerage Undertaker	Thames Water

Sustainable Drainage Guidance

1.5 Sustainable Drainage Systems (SuDS) aim to reduce the impact of development by replicating the natural runoff regime in a sustainable, cost-effective manner whilst protecting water quality and reducing pollution. The four key objectives of SuDS design are to achieve improvements in water quantity, water quality, amenity provision and biodiversity.

1.6 In addition to the Lead Local Flood Authority (LLFA) guidance, as summarised below, the Non-Statutory Technical Standards for Sustainable Drainage Systems[1] as published by DEFRA have been utilised to inform the strategy.

Local Drainage and Planning Policy

1.7 Oxfordshire County Council Local Standards and Guidance[2] has been reviewed in the preparation of this SDS and the following points are considered relevant:

- Runoff from greenfield sites up to and including the 1 in 100 year event (including climate change allowances) is to be restricted to the calculated QBAR rate or 2l/s/ha, whichever is greater, and 1 in 1 year event to the corresponding greenfield event.
- All drainage schemes must suitably demonstrate that flooding will not occur to any habitable building for the worst case 1 in 100yr +40% climate change event.
- All surface water storage features should provide a 300mm freeboard.
- At least one surface feature should be deployed within the drainage system for water quality purposes, or more features for runoff which may contain higher levels of pollutants in accordance with the CIRIA SuDS Manual C753.
- An allowance of 10% to account for urban creep should be applied across all proposed residential developments.

[1] 2015 DEFRA. Non-statutory technical standards for sustainable drainage systems
[2] Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire V1 November 2018.

2. EXISTING CONDITIONS

2.1 The site is located approximately 3.15km from the M40 and approximately 5km from Bicester. The site is bound on the east by Chilgrove Drive, to the south by Camp Road and mixed-use development on the west. To the north of the site is the former Upper Heyford Airfield, now disused.

2.2 The site has remained undeveloped since at least the mid-19th century and is currently comprised of agricultural greenfield land.

2.3 The topographical survey of the site, included as **Appendix 2**, demonstrates that the land generally falls from north to south. Levels are shown to range from approximately 121m Above Ordnance Datum (AOD) in the north east to 115m AOD within the south west corner of the site.

2.4 The Gallos Brook, with minor subsidiary channels, is shown to pass through the site before passing beneath Camp Road via a culvert.

2.5 The site is identified as being in Flood Zone 1, however medium to high pluvial water risk is shown to be association with the Gallos Brook. A watercourse capacity assessment undertaken as part of the FRA has identified the watercourse to have sufficient capacity for the expected flows, based upon the cross section data available.

2.6 Thames Water sewer records, **Appendix 3**, record no public sewers within the immediate vicinity of the site. Private assets are understood to be present to the north and west of the site.

2.7 British Geological Survey (BGS) mapping shows that the site is underlain by White Limestone Formation, which is designated by the Environment Agency (EA) as a Principal Aquifer. Principal Aquifers are 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. There are no superficial deposits recorded at the site.

2.8 A Phase 1 report has been undertaken for the site, reference: HPO-BWB-ZZ-XX-RP-YE-0001_Ph1, along with soakaway tests, reference: UHO-BWB-ZZ-XX-RP-YE-0002. The Phase 1 report identified the general risk posed from the various ground based sources to be low. Ground investigations identified limestone in various forms.

2.9 The ground investigation report shows the underlying geology of the site to comprise of limestone. A total of five trial pits were excavated across the site, as shown in **Figure 3.1**. A summary of the rates across the site are outlined within **Table 2.1.** For soakaway 3, the lowest result has been selected.

Table 2.1: Infiltration Test Results

Test Location	Lowest Infiltration Rate (m/s)
SA01	$3.35x10^{-06}$
SA02	$5.33x10^{-05}$
SA03B	$1.19x10^{-05}$

2.10 Given the greenfield nature of the existing site, it is likely that the existing drainage regime initially consists of infiltration into the ground, followed by rapid surface water runoff which will follow existing topography and flow towards the west into the watercourse when the infiltration potential is exceeded.

Existing Runoff Rates

2.11 An assessment of the equivalent greenfield surface water runoff per hectare has been undertaken and is summarised within **Table 2.2.**

2.12 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[3]. This was undertaken within Micro Drainage, which makes the necessary adjustments for small sites automatically.

2.13 With infiltration rates being identified as being within the region of $3x10^{-6}$m/s and $2x10^{-5}$m/s, it is considered that the Soil value of 0.45 (identified through the ICP SuDS methodology) is not representative of the specific site situation. The soil value has therefore been changed to 0.3 in order to represent the ground conditions and the infiltration rates identified across the site. A summary of the runoff rate per hectare is outlined below as **Table 2.2.** The MicroDrainage calculations are included as **Appendix 4.**

Table 2.2: Equivalent Greenfield Runoff Rates per Hectare

Return Period (Yrs.)	Runoff Rate (l/s/ha)
1	1.5
Mean Annual Flow Rate (QBAR)	1.8
30	3.5
100	4.6

[3] The National SUDS Working Group (2004) Interim Code of Practice for Sustainable Drainage

Existing Runoff Volume

2.14 An assessment of the existing surface water runoff rates from the area proposed for development has been made for a 1 in 100-year, 6 hour storm.

2.15 As the existing site is permeable, the runoff volume has been calculated using the Source Control module within Micro Drainage to be 207m^3, based upon the FEH methodology. The full results are included within **Appendix 4**.

3. SURFACE WATER DRAINAGE STRATEGY

Drainage Hierarchy

3.1 The Planning Policy Guidance[4] and the SuDS Manual[5] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);
ii. to a surface water body;
iii. to a surface water sewer, highway drain, or another drainage system;
iv. to a combined sewer.

3.2 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.

3.3 Groundwater at a depth of 1.2m below ground level (bgl) was identified within trial pit SA03. Traces of hydrocarbons were also identified in this area, with staining of the soil and a mild hydrocarbon sheen on the surface. The other trial pits did not record any groundwater or contamination.

3.4 The infiltration rates calculated are considered suitable for the use of soakaway features, however, the presence of hydrocarbons and shallow groundwater level at SA03B means that infiltration is not viable in this area.

[4] Planning Practice Guidance. http //planningguidance planningportal.gov.uk/.
[5] The SuDS Manual (C753). CIRIA 2015.

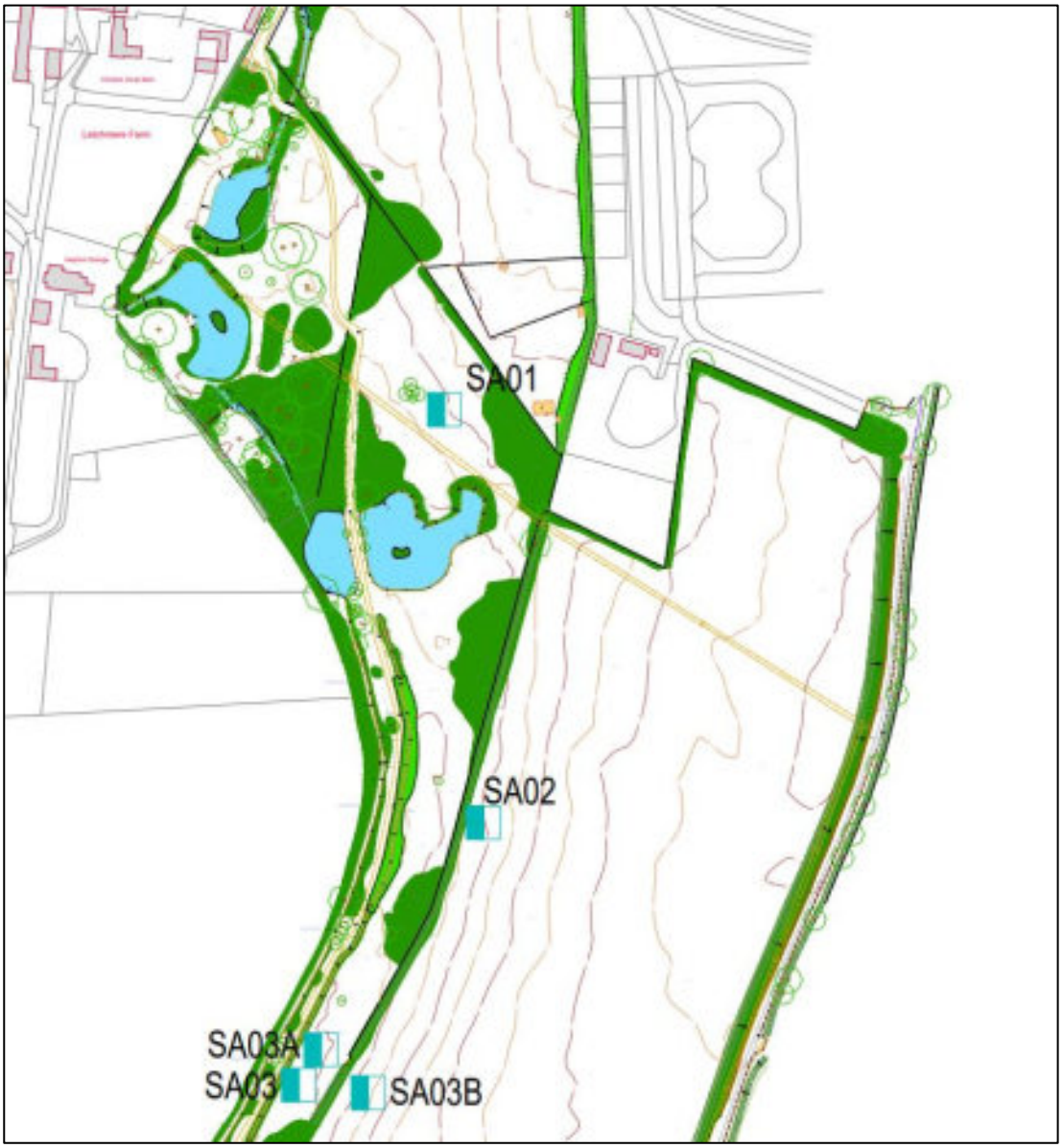

Figure 3.1: Trial Pit Locations

3.5 It is therefore proposed that the northern and central portion of the site will utilise infiltration whilst the southern portion of the site will outfall to the watercourse, in line with the drainage hierarchy. The proposed catchment division is shown in **Figure 3.2**.

Figure 3.2: Proposed Catchments

Storage Requirements

3.6 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 in 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. Further information on flood extents within the site boundary can be found in the accompanying FRA. At this stage all basins have been located outside of the Environment Agency pluvial extents.

3.7 Sufficient storage for events up to the 1 in 100-year storm with a 40% allowance for climate change should be provided, and a 10% allowance should be applied to the current proposed development area to allow for urban creep over the lifetime of the development.

3.8 For the purpose of this outline assessment, it has been assumed that the basins will accommodate all of the necessary storage, but it may be possible to redistribute a portion of the storage within other drainage components during the detailed design of the development (e.g.: in the pipe network, swales, filter drains, etc).

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

Northern and Central Catchments

3.10 The Northern Catchment measures 1.33ha. It is estimated that 65% will be impermeable and a further 10% allowance should be included in the storage calculations to account for urban creep over the lifetime of the development. Therefore, adequate storage should be provided for an impermeable area of 0.95ha.

3.11 The Central Catchment measures 3.71ha and therefore, based upon these same parameters, adequate storage should be provided for an impermeable area of 2.65ha.

Storage Volume

3.12 A simulation has been run using Micro Drainage 'Source Control' to identify the necessary storage provision. Using the corresponding infiltration rate and the impermeable area outlined above, the storage requirement for each catchment has been calculated for storm events up to the 100 year + 40% storm. The results are summarised in **Table 3.1** and **Table 3.2**. Calculations are included as **Appendix 6**.

Table 3.1: Outline Attenuated Storage Requirements- Northern Catchment

Rainfall Method	Critical Storm	Impermeable Area (ha)	Maximum Volume (m^3)
FSR	1440 min Winter	0.95	756
FEH	960 min Winter		747

Table 3.2: Outline Storage Requirements- Central Catchment

Rainfall Method	Critical Storm	Impermeable Area (ha)	Maximum Volume (m^3)
FSR	120 min Winter	2.65	1191
FEH	180 min Winter		1206

3.13 The modelling of the basin associated with the Northern Catchment has identified a half drain down time that exceeds 24hrs, however the basin has capacity to accommodate a subsequent 1 in 10 year 30 minute storm, which is deemed an intense storm event.

Southern Catchment

3.14 The Southern Catchment measures 1.15ha. It is estimated that 65% will be impermeable and a further 10% allowance should be included in the storage calculations to account for urban creep over the lifetime of the development. Therefore, adequate storage should be provided for an impermeable area of 0.82ha.

Peak Flow Control

3.15 In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[6], runoff from greenfield developments should not exceed the equivalent greenfield rates for the 1 and 100-year return period events.

3.16 The local guidance states that runoff from greenfield sites up to and including the 1 in 100 year event (including climate change allowances) is to be restricted to the calculated QBAR rate or 2l/s/ha, whichever is greater, and 1 in 1 year event to the corresponding greenfield event.

3.17 Therefore, where an outfall to the watercourse is utilised in the Southern Catchment, the following restricted rates should be applied:

[6] 2015 DEFRA. Non-statutory technical standards for sustainable drainage systems

Table 3.3: Existing & Proposed Runoff Rates per Hectare

Return Period (Yr.)	Existing Runoff Rate (l/s/ha)	Proposed Discharge Rate (l/s/ha)
1	1.5	1.5
QBAR	1.8	2.0
30	3.5	
100	5.6	
100 + 40%	-	

3.18 This equates to a total maximum runoff rate of 2.3l/s for the 1.15ha Southern Catchment.

Storage Volume

3.19 A simulation has been run using Micro Drainage 'Source Control' to identify the necessary storage provision. Using a restriction of 2.3 l/s and an impermeable area of 0.82ha the volume of attenuated storage required for the catchment has been calculated for storm events up to the 100 year + 40% storm. The results are summarised in **Table 3.4** and calculations are included as **Appendix 6**.

Table 3.4: Outline Attenuated Storage Requirements- Southern Catchment

Rainfall Method	Critical Storm	Impermeable Area (ha)	Maximum Volume (m^3)
FSR	1440 min Winter	0.82	641
FEH	960 min Winter		634

Runoff Volume Control

3.20 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[7] 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,

[7] 2015 DEFRA. Non-statutory technical standards for sustainable drainage systems

iii. All the runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

3.21 An estimate of the post-development runoff volume from the 1 in 100-year 6 hour storm can be derived from the Micro Drainage calculations, as provided within **Appendix 3**. The existing and post-development runoff volumes are compared within **Table 3.5**.

Table 3.5: Runoff Volume Comparison for Southern Catchment

Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3)
207	399	+192

3.22 The 1 in 100-year 6 hour storm runoff volume from the site has been shown to increase as a result of the proposed development. However, as the runoff volume from the development will be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions, the volume control criteria will be met.

Long Term Storage

3.23 It is proposed to discharge the runoff from the development at a rate deemed to be equivalent to the mean annual flow rate (QBAR) rate, as outlined by the criteria set out by the LLFA guidance, when the calculated QBAR rate is less than 2 l/s/ha. Therefore, provision for long term storage is not required.

Sustainable Drainage Systems

3.24 In all catchments, surface water runoff will be captured via a combination of drains, gullies, and downpipes before being conveyed through the site via a beneath ground pipe system into the storage features.

3.25 The basins should be appropriately planted to encourage treatment and biodiversity, as well as being landscaped into the public open space to provide an amenity value. The basin banks should not exceed a 1:4 gradient. It is recommended that forebays are included at the inlets.

3.26 The roof derived runoff is considered clean and therefore requires no additional treatment however the drainage for trafficked areas should be designed to have a minimum two stage treatment train. This could be achieved via methods such as silt traps, permeable paving, swales or bioretention areas (to be confirmed at detailed design).

3.27 The interception value (the first 5mm of runoff in a rainfall event) should be appropriately treated prior to release into the downstream network to prevent contamination from high pollutant concentrations. As the drainage system has been specifically designed for infiltration, the interception value will be delivered, particularly if forebays are provided at the inlets.

3.28 An Outline Surface Water Drainage Strategy is included in **Appendix 7** (reference UHO-BWB-ZZ-XX-DR-CD-0001) and demonstrates how the required storage volume can be achieved within the site boundary.

Residual Risk and Designing for Exceedance

3.29 A 300mm freeboard has been applied to the proposed SuDS features, which will provide an element of additional storage in an extreme event.

3.30 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 storage for events in excess of the capacity of the drainage system.

3.31 If the capacity of the storage is exceeded, ground levels should be profiled to direct overland flows towards car parking and public open space, and away from vulnerable infrastructure.

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

4. FOUL WATER DRAINAGE

4.1 It is proposed to drain used water from the development separately to surface water. As the site is currently undeveloped, a new connection will be required.

4.2 The Thames Water pre-development enquiry, **Appendix 8**, confirms there is sufficient capacity in their existing infrastructure to discharge foul flows from the proposed development; the proposed point of connection (Manhole ref: MH9901) is advised approximately 2.2km west of the proposed site development (at the junction of Camp Road and Station Road).

4.3 Thames Water have recommended further investigation into the privately owned sewers and treatment works shown near the southern boundary may be required as this foul water network may offer a more financially viable option. It is understood this treatment works is owned and maintained by Severn Trent Connect.

4.4 In the event that the two options above are not possible, an onsite treatment works with direct outfall to the Gallos Brook, could be investigated. The implementation of such a proposal would be subject to the necessary consents and approvals from the EA.

4.5 It is expected that the 230 units proposed will generate a peak flow of approximately 10 l/s, based upon the rate of 4,000 l/24hrs/dwelling.

4.6 Further information on foul drainage can be found in the Utilities Assessment, reference: *UHO-BWB-VUT-ZZ-RP-G-002 - Utilities Assessment.*

5. MAINTENANCE

5.1 The drainage network should be designed and constructed in accordance with the Design and Construction Guidance and ideally proposed for adoption by Thames Water. If any parts of the drainage network remain unadopted, or until the point that they are, an appropriate maintenance company should be appointed. Any drainage features within private curtilage will be the responsibility of the homeowner.

5.2 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.

5.3 It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below.

i. All drainage features should be located in open areas which are readily accessible.
ii. Gullies should be inspected and de-silted at least once a year, where necessary.
iii. Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
iv. If permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
v. The surface water attenuation areas will be predominantly dry and the base will be seeded with a wildflower grass seed mix that can tolerate wet ground conditions.
vi. Regular inspections of the basins should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary.
vii. Inlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.
viii. Vegetation/grass with the infiltration basins should be maintained appropriately to allow establishment and promote habitat formation, without impeding the operation of the inlet structures.
ix. Flow controls should be inspected every 6 months, litter/debris and silt build up should be removed as necessary.

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2 This SDS is intended to support an outline planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

6.3 It is proposed that surface water runoff from the proposed development is managed by both infiltration methods and restricted discharge.

6.4 Infiltration basins are proposed within the northern and central catchments following positive BRE365 soakaway tests.

6.5 The traces of hydrocarbons during the excavation of the southern trail pits are such that it proposed to restrict discharge from the southern catchment, based upon a rate of 2l/s/ha. The outfall from the catchment is proposed to be to the Gallos Brook, located on the western boundary of the site.

6.6 The basins should be appropriately planted to encourage treatment and biodiversity, as well as being landscaped into the public open space to provide an amenity value. The basins should be maintained in accordance with the Operation and Maintenance manual for the site, in order to ensure continued effective operation of the features.

6.7 Following consultation with Thames Water it has been identified that there is capacity within their network for foul flows, with the nearest point of connection being *MH9901*, located approximately 2.2km to the west of the site, at the junction of Station Road and Camp Road.

6.8 Thames Water have recommended that further investigation be undertaken into the potential to connect into a privately owned treatment works and network, located to the south, as this may a be a more financially viable option.

6.9 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: Proposed Layout

PLANNING

Site boundary *(11.68ha)*

Hybrid/mixed application for upto 1,235 dwellings; retail; medical centre; employment; schools; community use buildings; indoor sports provision; energy facilities; 30m high observation tower with zip-wire; changes of use and demolition to existing buildings; open space; sports facilities; green infrastructure; and upgrades to Chilgrove Drive and the junction with Camp Road
(18/00825/HYBRID)
Status: Outline Approval

1 Full application for 89 dwellings
(15/01357/F)
Status: Undetermined

2 Outline application application for up to 31 dwellings
(21/03523/OUT)
Status: Undtermined

1. Proposed vehicular and pedestrian access via Camp Road
2. Proposed pedestrian/cycle connection to Camp Road
3. Proposed pedstrian/cycle connection to Chilgrove Drive
4. Primary tree lined street with foot/cycleway
5. Secondary street
6. Shared surface
7. Linked private drive
8. Private drive/lane
9. Proposed footpaths/recreational routes
10. Central green space to act as focal point with playspace (LAP)
11. Playspace (LEAP)
12. 'Wet corridor' public open space to provide ecological enhancement and recreation benefits
13. Attenuation basins
14. Existing ponds
15. Existing vegetation retained and enhanced as necessary with locally characteristic and native species
16. Proposed hedgerow strengthening the field pattern by planting up gappy existing hedges
17. Proposed native wet woodland
18. Proposed native tree belts around airfield to enhance urban fringe and reduce the the visual impact using locally characteristic and native species
19. Proposed scattered clusters of native tree planting to give impression of linear tree belt to enhance urban fringe and softening of built form

Rev.	Date	Description

Land north of Camp Road
HEYFORD PARK

Illustrative Masterplan

Job ref:	Drawing number:	Revision:
374	P06	-

Scale:	Date:
1:2,000 @ A3	December 2021

EDGE URBAN DESIGN

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Appendix 2: Topographical Survey

N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S2	451945.560	225701.642	115.901
S3	451844.195	225721.238	118.552
S4	451854.880	225727.891	118.480
S5	451967.994	225710.494	115.522
S6	452033.803	225827.077	115.882
S7	452050.564	225880.576	116.191
S8	452053.084	225921.209	116.525
S9	452043.998	225956.331	116.679
S10	452030.955	226012.032	117.036
S11	452034.882	226092.736	118.220
S12	452178.587	225685.345	120.402
S14	452323.413	225692.288	119.430
S16	452214.268	225777.461	121.038
S17	452269.790	225913.160	121.668
S18	452284.231	226032.186	121.721

OS Note:

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

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

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

Please refer to Survey Station Table to enable establ shment of the on-site grid and datum.

Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Top of bank, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, R: Ridge Level, E: Eaves Level, F: Flat Roof Level, Gate

Fence types: IW Interwoven, IR Iron Railings, WM Wire Mesh, PR Post & Rail, PW Post & Wire, CL Chain Link, WP Wooden Panels, CB Close Boarded, SP Steel Palisade

Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Bottom of bank

IC Inspection chamber, PInv Pipe invert, Gy Gully, Bg Back gully, Dp Down pipe, Pipe Pipe above ground, MH Manhole, WL Water level, Fl Flood light, Lp Lamp post, Tp Telegraph post, Ep Electricity post, Tl Traffic light, Bus Bus stop, Sv Stop valve, St Stop tap, Er Earth rod, Wm Water meter, Gas Gas valve, Av Air valve, ICU Unidentified inspection, Wo Wash out, Re Rodding eye, BB Belisha beacon, CTV Cable tv, Mkr Marker post, Gmkr Gas marker post, So Soffit, Fh Fire hydrant

Bo Bollard, IB Illuminated bollard, Bin Rubbish bin, Vp Vent pipe, Grl Ground light, Lbox Letter box, Stmp Tree Stump, Sty Stile, IFL Internal floor level, THL Threshold level, Sp Sign post, TH Trialhole, BH Borehole, ELC Electric, BT British Telecom, C'box Control box, TT Tactile, BP Brick paved, CPS Concrete paving slabs, CVR Cover, R/wall Retaining wall, TWL Top of Wall Level, TCL Tree canopy level, G: Girth, MG Multi girth, IC Inspection chamber, CL: Cover level, IL: Invert level, UTR Unable to raise

Rev	Date	Description	Drawn	Q. Ref

greenhatch group

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

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admin@greenhatch-group.co.uk
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St Albans: Unit B, The Courtyard, Alban Park, St Albans, Hertfordshire, AL4 0LA, t. (01727) 854481
Newcastle: 24 Riverside Studios, Amethyst Road, Newcastle Bus. Park, Newcastle-U-Tyne, NE4 7YL, t. (01912) 736391
London: 27, Cornwall Terrace Mews, Regents Park, London, NW1 5LL, t. (02072) 241806

CLIENT
Richborough Estates Ltd

PROJECT
Heyford Park, Cherwell, Oxfordshire, OX25 5AF

TITLE
Topographical Survey

SCALE	DATE
A1@ 1: 1000	16.08.21
DRAWN: ER	QUALITY REF: GH11383

Level datum	See note
Grid orientation	See note
Job number	41240
Drawing No.	Rev.
41240_T	0

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

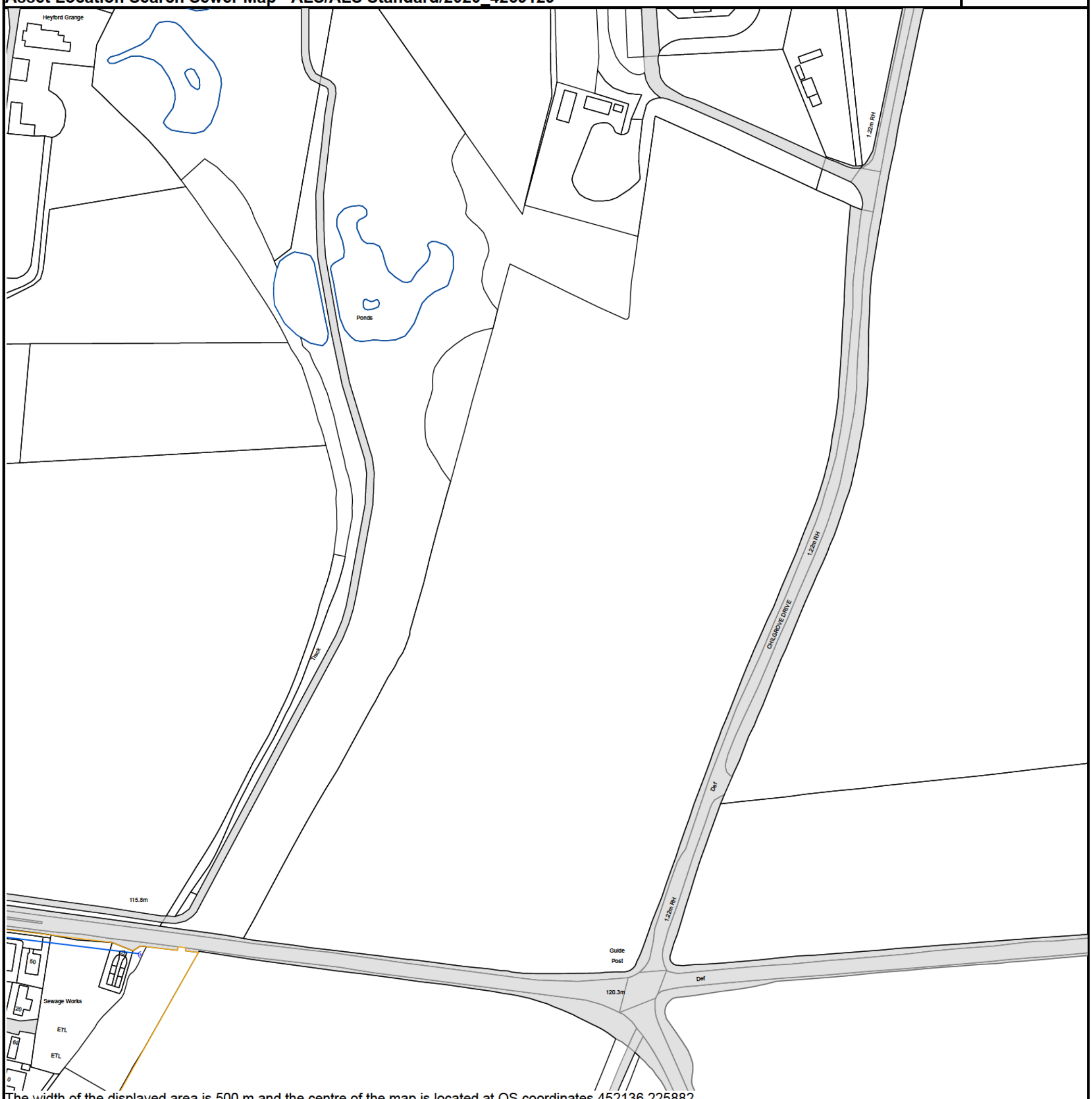
All dimensions should be checked on site prior to design and construction.

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

Notes:

Appendix 3: Thames water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2020_4269129



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 452136,225882

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

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

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

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

Appendix 4: Greenfield Runoff Rate and Volume

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.300
Area (ha)	1.000	Urban	0.000
SAAR (mm)	693	Region Number	Region 4

Results l/s

QBAR Rural	1.8
QBAR Urban	1.8
Q2 years	1.6
Q1 year	1.5
Q30 years	3.5
Q100 years	4.6

Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 451900 225600 SP 51900 25600
Data Type	Catchment
Areal Reduction Factor	1.00
Area (ha)	6.190
SAAR (mm)	675
CWI	100.500
SPR Host	5.580
URBEXT (1990)	0.0412

Results

Percentage Runoff (%)	5.26
Greenfield Runoff Volume (m^3)	207.561

Appendix 5: Soakaway Results

A CAF GROUP COMPANY

Richborough Estates Ltd
Sixth Floor
Waterloo House
Waterloo Street
Birmingham
B2 5TB

Our Ref: UHO-BWB-ZZ-XX-RP-YE-0002
Contact: Olivier Sanga
Direct Dial: 07867 474576

Date: 26th November 2021

Dear Sir/Madam

SOAKAWAY TEST INVESTIGATION – UPPER HEYFORD

BWB were instructed by Richborough Estates Ltd (the Client) to undertake permeability tests at the site known as Upper Heyford. The testing was required to determine the suitability of the underlying geology at the site to support soakaway drainage for a proposed residential development.

The site comprises two agricultural fields divided by a north to south hedgerow and wire fence. The western area has a track that runs through the site to the north parallel to a minor watercourse, leading to a recently landscaped area with ponds, various trees, vegetation, recreational facilities, and an open field to the north with livestock. The eastern parcel of land consists of grassland.

Scope of Works

The investigation was undertaken on 28th October 2021 and comprised of the completion of soakaway testing at three locations in accordance with 'BRE365: Soakaway Design 2007' to assess the permeability characteristics of the soils present on site. The locations, named SA01, SA02 and SA03B are depicted on the exploratory hole location plan presented within **Drawing 1**.

SA03B was previously attempted twice (SA03 and SA03A), but on both occasions visual and /or olfactory evidence of hydrocarbon contamination was observed, and the tests relocated. Grab samples of the impacted soils were obtained from SA03 and SA03A and chemical analysis (TPH CWG) was undertaken to determine the magnitude of the hydrocarbon contamination at these locations. The locations of SA03 and SA03A are presented within **Drawing 1**.

5th Floor
Waterfront House
Station Street
Nottingham
NG2 3DQ
Tel: 0115 924 1100
nottingham@bwbconsulting.com
www.bwbconsulting.com

Encountered Ground Conditions

Ground conditions were found to comprise of firm brown sandy clay with occasional rootlets (topsoil) to a maximum depth of 0.35m below ground level (bgl). Gravelly, sandy clay was recorded in the topsoil in two locations (SA02 and SA03B). The topsoil directly overlay the White Limestone Formation encountered initially as a cohesive layer described as firm light brown very sandy clay to a maximum depth of 0.75m. This cohesive layer overlay granular material described as white and light brown/orangish brown clayey sandy gravel of limestone.

Groundwater was detected at 1.20m bgl in SA03. Groundwater was not encountered in any of the other exploratory hole locations during the investigation.

A mild hydrocarbon odour was detected below 0.95m bgl in borehole SA03A and below 1.15m bgl in borehole SA03. Rare black staining was also detected in SA03 and a mild hydrocarbon sheen on the water surface was detected below 1.20m bgl.

The exploratory hole logs are presented within the factual ground investigation report presented as **Appendix 1**.

Soakaway Test Results

Results of the soakaway tests are presented within the factual ground investigation report presented as **Appendix 1** and a summary of the results are presented below in **Table 1**.

The test was terminated at location SA01 due to time constraints. Test 1 at location SA03B was terminated due to a collapse of the pit. In both these instances the final data point was extrapolated to provide an infiltration calculation.

Table 1: Summary of Soakaway Test Results

Location	Test No.	Permeability Rate (m/s)	Drainage Characteristic	Permeability Classification
SA01	1	$3.35x10^{-06*}$	Good to poor	Low
SA02	1	$5.49x10^{-05}$	Good	Medium to low
SA02	2	$5.33x10^{-05}$	Good	Medium to low
SA02	3	$5.37x10^{-05}$	Good	Medium to low
SA03B	1	$1.19x10^{-05*}$	Good	Medium to low
SA03B	2	$2.0x10^{-05}$	Good	Medium to low

* Data extrapolated to provide an infiltration calculation.

The soakaway test results have identified good drainage characteristics and a medium to low permeability classification for the tests undertaken at locations SA02 and SA03B.

Good to poor drainage characteristics and a low permeability classification has been identified for the test undertaken at location SA01.

Chemical Analysis

Samples from the White Limestone Formation at locations SA03 and SA03A have been analysed to assess the significance of the hydrocarbon contamination at these locations. The soil chemical laboratory results are presented within the factual ground investigation report presented as **Appendix 1**.

The concentrations of BTEXs were recorded below the limits of detection in all samples. Marginally elevated concentrations of TPH were recorded within both soil samples. At SA03, very low concentrations of long chain Aromatic hydrocarbons were recorded (22mg/kg EC21-35). At SA03A, very low concentrations of medium chain Aliphatic hydrocarbons were recorded (0.23mg/kg EC8-10, 3.1mg/kg EC10-12, and 20mg/kg EC12-16).

Whilst the reported hydrocarbon impact is not considered to represent a significant risk to controlled waters or human health, the observed staining suggests that there is possibly a wider issue within the area. It is hypothesised that, given that the depth of the impact correlates with the localised groundwater strike, the impact has originated from the watercourse (which is feeding the local groundwater at this location).

Further investigation is required to delineate the area of impact and inform where the source is. Until this is undertaken, it is considered that soakaway drainage in the vicinity of SA03/3A is not viable as it could further mobilise contaminants within the underlying aquifer.

Conclusions

The drainage characteristics of the White Limestone Formation are indicated to be good in the south and the centre of the site, and good to poor in the north-east of the site.

The hydrocarbon concentrations reported within the soils at locations SA03 and SA03A are very low, however, until the area of impact is delineated, soakaway drainage in this area is not recommended.

I trust that the above provides you with a suitable summary of the BRE365 Soakaway Assessment.

Yours sincerely,

[redacted]

Olivier Sanga
Graduate Environmental Consultant

Enc.

Drawing 1	–	Exploratory Hole Location Plan
Appendix 1	–	Factual Ground Investigation Report

DRAWING 1

EXPLORATORY HOLE LOCATION PLAN

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.

Key Plan

Legend

Rev	Date	Details of issue / revision	Drw	Rev
P1	01.01.00	PRELIMINARY ISSUE	AJ	JB

Issues & Revisions

BWB
A GHP GROUP COMPANY
Birmingham | 0121 233 3322
Leeds | 0113 233 8000
London | 020 7234 9122
Manchester | 0161 233 4260
Nottingham | 0115 924 1100
www.bwbconsulting.com

Client
Richborough Estates

Project Title
Upper Heyford

Drawing Title
Exploratory Hole Location Plan

Drawn	CR		Reviewed	OS	
BWB Ref	BMW3171	Date	21/10/21	Scale@A3	NTS

Drawing Status
Final

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
	S2	V1

X:\BMW\BMW3171_Upper Heyford, Oxfordshire\02. Project Delivery\01. W P\Drawings\GS\EHLP.dwg

APPENDIX 1

FACTUAL GROUND INVESTIGATION REPORT

EXPLORATION
& TESTING ASSOCIATES

Factual Ground Investigation Report

Upper Heyford, Oxfordshire

BWB Consulting Limited

November 2021

EXPLORATION
& TESTING ASSOCIATES

Factual Ground Investigation Report

Upper Heyford,
Oxfordshire

Contract: C10194
Reference: C10194-FGIR-01

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

Exploration & Testing Associates Limited
'number three' Siskin Drive, Middlemarch Business Park
Coventry, CV3 4FJ
T: 024 7688 0452, E: enquiries@explorationtesting.uk

Prepared by:	Checked by:	Approved by:
Andrew Howells BSc(Hons), PG Dip, FGS	Laura Westoby MGeol(Hons), CGeol, FGS,	Anthony Owen MESci(Hons), MRes, FGS

[redacted]

Issue:	Date:	Description:
01	22/11/21	First issue

EXPLORATION
& TESTING ASSOCIATES

EXECUTIVE SUMMARY

Site Address	The site is located to the north of Camp Road, Upper Heyford, Oxfordshire and is centred at National Grid co-ordinates 452066, 225896.
Proposed Development	Information on the proposed development has not been provided by the Client.
Current Site Use	The site comprises a mix of undeveloped grassland and agricultural land. Several ponds were present within the grassland.
Published Geology	The published geology for the site indicates the site to be underlain directly by bedrock of the White Limestone Formation, comprising pale grey to off-white or yellowish limestone. Superficial deposits are not recorded on or in the vicinity of the site. There are no faults on or in the vicinity of the site. Made Ground is unlikely to be widespread across the site, however may be encountered locally in the vicinity of the track.
Intrusive Works	Intrusive works comprised service clearance of all locations, five machine excavated trial pits with chemical sampling of soil with visual or olfactory evidence of contamination, soakaway testing at three locations, Unexploded Ordnance (UXO) supervision and chemical laboratory testing.
Sampling and Testing	Chemical laboratory testing was carried out on selected samples as scheduled by the Client.
Disclaimer. This Executive Summary should be read in conjunction with Exploration & Testing Associates Limited's Factual Ground Investigation Report, reference C10194-FGIR-01, of which it forms part.	

[redacted]

EXPLORATION
& TESTING ASSOCIATES

TABLE OF CONTENTS

APPENDICES

[redacted]

1.0 INTRODUCTION

1.1 Introduction

Exploration & Testing Associates Limited (Exploration) were instructed by BWB Consulting Limited (the Client), to undertake an investigation to establish ground conditions and drainage characteristics of the site at Camp Road, Upper Heyford. Proposed development plans have not been provided to Exploration at the time of writing.

This report has been prepared for the sole use of the Client for the purposes set out above. No third-party duty of care or reliance on this document is offered and the use of information within this report by any third party is at their own risk. This document shall not be reproduced in any form without the prior written permission of Exploration.

The information contained within this report is based on conditions at the time of investigation and there may be site factors which have not been disclosed within this document. It should be noted that groundwater levels may vary due to seasonal or other conditions.

1.2 Scope of Work

The scope of work was set out by the Client at tender stage and comprised the following:

- Three machine excavated trial pits;
- Soakaway testing at each location; and
- Unexploded Ordnance (UXO) supervision.

This document is intended to provide a factual account of the work undertaken and present the data obtained during the ground investigation.

[redacted]

2.0 SITE DESCRIPTION

2.1 Site Location

The site is located to the east of the village of Upper Heyford, Oxfordshire and is centred at National Grid co-ordinates 452066, 225896. A Site Location Plan, reference C10194.SLP_1, is presented in Appendix 1.

2.2 Site Description

The site is irregular in shape with generally flat topography and covers an areas of approximately 10 hectares.

At the time of the investigation the site comprised an agricultural field and undeveloped land comprising grass and mature trees, with several ponds present in the north. The two areas were separated by a hedge.

The site was bounded by a field to the north, fields to the east beyond Chilgrove Drive, fields and residential properties to the south beyond Camp Road and fields to the west beyond which was Larsen Road. The site was accessed via a track off Camp Road.

2.3 Published Geology

The published geology for the site, based on records provided by the British Geological Survey (BGS), indicates the site to be underlain directly by bedrock of the White Limestone Formation, comprising pale grey to off-white or yellowish limestone. Superficial deposits are not recorded on or in the vicinity of the site. There are no faults on or in the vicinity of the site.

Made Ground is unlikely to be widespread across the site, however may be encountered locally in the vicinity of the track.

Historical boreholes, located within 200m of the site, generally indicate localised Made Ground of between 0.15m and 0.80m bgl underlain by weathered limestone gravel overlying bedrock of the Great Oolite Limestone from approximately 1.50m bgl.

3.0 GROUND INVESTIGATION

3.1 Intrusive Investigation

The intrusive investigation was carried out on 28th October 2021 and was undertaken in general accordance with published guidance BS 5930:2015+A1:2020 and BS 10175:2011+A2:2017. The work comprised the following:

- Service clearance of all locations;
- Five machine excavated trial pits with chemical sampling of soil with visual or olfactory evidence of contamination;
- Soakaway testing at three locations (SA01, SA03 and SA03B);
- Unexploded Ordnance (UXO) supervision; and
- Chemical laboratory testing.

SA03 was moved to SA03A and subsequently to SA03B due to visual and olfactory evidence of hydrocarbon contamination. Although not originally part of the scope of works, chemical testing was undertaken on samples identified during the ground investigation to be impacted by hydrocarbons. Samples for contamination testing were collected in appropriate containers and retained in cool boxes prior to dispatch to the laboratory.

The exploratory hole locations were set out based on an indicative plan issued in advance by the Client. An Exploratory Hole Location Plan is provided in Appendix 1 as drawing reference C10194.EHLP_1.

The depths of the exploratory holes, descriptions of strata encountered and comments on groundwater conditions are provided in Appendix 2. The soakaway results are presented in Appendix 3.

3.2 Sampling Strategy

Samples were obtained from SA03 and SA03A where visual and olfactory evidence of hydrocarbon contamination was noted by the site engineer.

[redacted]

4.0 LABORATORY TESTING

4.1 Testing Strategy

The chemical laboratory testing was scheduled by the Client.

4.2 Chemical Laboratory Testing

The soil testing was carried out by a UKAS accredited laboratory, in accordance with the MCERTS performance standard, with representative sub-samples taken for testing as necessary.

The following tests were carried out:

- Two total petroleum hydrocarbon tests to the Criteria Working Group, including BTEX.

The results are provided in Appendix 4 as test report 21-20596.

REFERENCES

BRE 365 *'Soakaway Design'* British Research Establishment, 2016.

BS 5930:2015+A1:2020 'Code of practice for ground investigations.' British Standards Institute, 2020.

BS 10175:2011+A2:2017 'Investigation of potentially contaminated sites. Code of practice', British Standards Institute, 2017.

BS 1377-1:2016, '*Methods of test for soils for civil engineering purposes — Part 1: General requirements and sample preparation*', British Standards Institute, 2016.

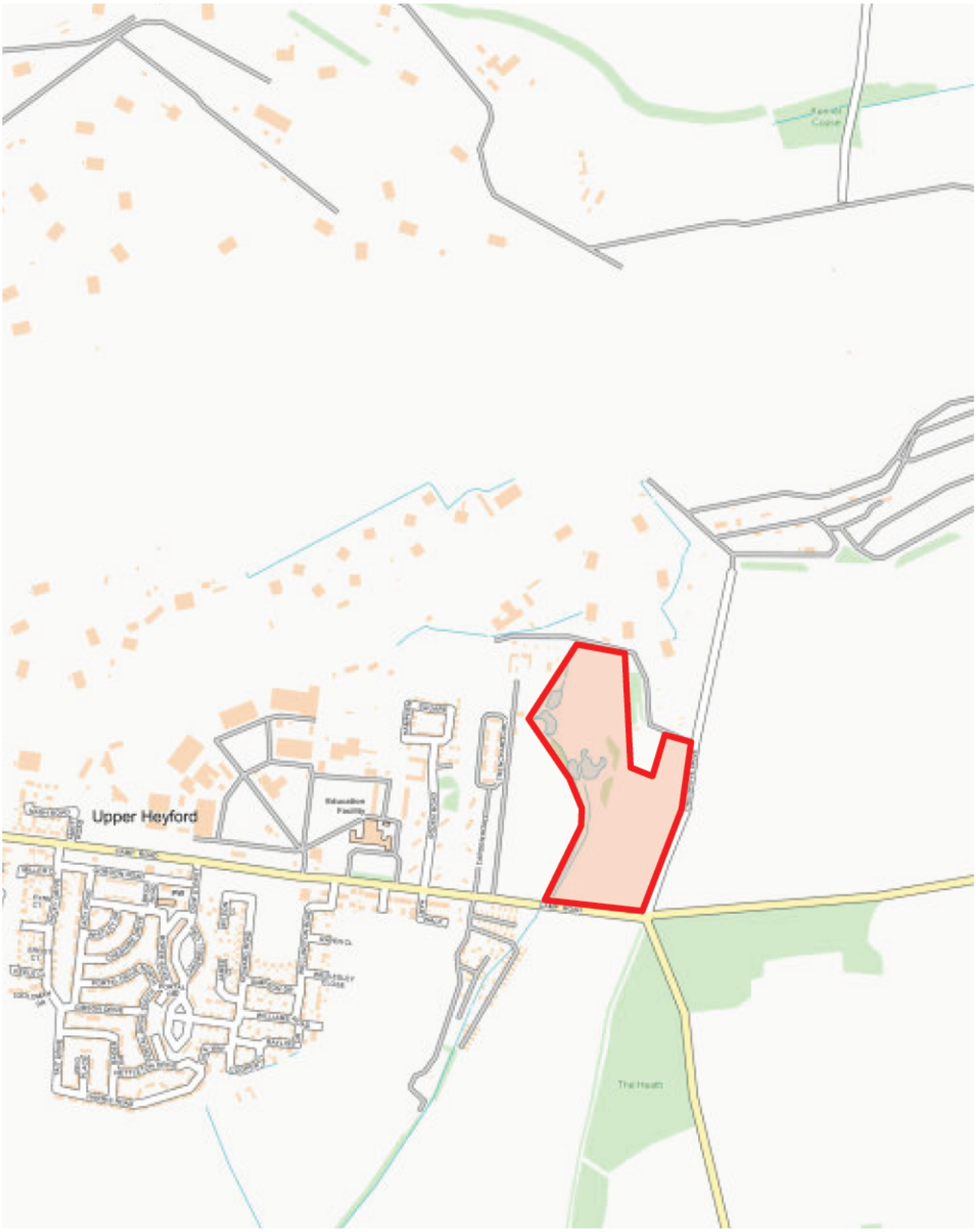
British Geological Survey, Sheet No. 218, 'Chipping Norton', solid, 1:63,600 scale, published 1968.

[redacted]

EXPLORATION
& TESTING ASSOCIATES

APPENDIX 1: DRAWINGS

[redacted]



Client:	BWB Consulting Ltd
Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Title:	Site Location Plan
Drawing:	C10194.SLP_1
Date:	18/11/21

EXPLORATION
& TESTING ASSOCIATES

Contract No.: C10194

Contract Name: Upper Heyford, Oxfordshire

Client: BWB Consulting Ltd

Notes:

Legend

Trial Pit

Soakaway Test

Drawn by: AH

Date: 18/11/21

Title: Exploratory Hole Location Plan

Drawing No.: C10194.EHLP_1

EXPLORATION & TESTING ASSOCIATES

EXPLORATION
& TESTING ASSOCIATES

APPENDIX 2: ENGINEERING RECORDS

[redacted]

EXPLORATION & TESTING ASSOCIATES

Trial Pit Log

Project Name: Upper Heyford	Client: BWB Consulting Ltd	Date: 28/10/2021
Location: Oxfordshire	Contractor: Exploration & Testing	Co-ords: E452073.42 N226057.96
Project No. : C10194	Crew Name: T&A Cox	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Status
SA01	TP	118.55m AoD	TY	1:25	FINAL

Backfill	Water Str kes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Firm brown very sandy CLAY with occasional rootlets.
					0.25	118.30		Firm light brown very sandy CLAY.
					0.60	117.95		White and orangish brown clayey sandy angular and subangular fine to coarse GRAVEL of limestone with a low cobble content. Cobbles are subangular limestone.
								Below 0.95m bgl: Slightly clayey.
					1.50	117.05		End of Trial Pit at 1.50m

1
2
3
4
5

Dimensions		Trench Support and Comment			Water Stike General	
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Depth Strike	Date Time
2.50	0.55	Stable	No			

Remarks

1. No groundwater encountered.
2. Terminated at target depth.
3. Soakaway undertaken within location, refer to C10194_SA_01.

Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

Project Name: Upper Heyford	Client: BWB Consulting Ltd	Date: 28/10/2021
Location: Oxfordshire	Contractor: Exploration & Testing	Co-ords: E452090.90 N225872.87
Project No. : C10194	Crew Name: T&A Cox	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Status
SA02	TP	117.39m AoD	TY	1:25	FINAL

Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Firm brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is subangular and subrounded fine to coarse quartzite.
					0.35	117.04		Firm light brown very sandy CLAY.
					0.70	116.69		White and light brown slightly clayey sandy angular and subangular fine to coarse GRAVEL of limestone with a moderate cobble content. Cobbles are subangular limestone.
					1.75	115.64		End of Trial Pit at 1.75m

1 2 3 4 5

Dimensions		Trench Support and Comment			Water Strike General	
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Depth Strike	Date Time
2.45	0.55	Stable	No			

Remarks

1. No groundwater encountered.
2. Terminated at target depth.
3. Soakaway undertaken within location, refer to C10194_SA_01.

EXPLORATION & TESTING ASSOCIATES

Trial Pit Log

Project Name: Upper Heyford	Client: BWB Consulting Ltd	Date: 28/10/2021
Location: Oxfordshire	Contractor: Exploration & Testing	Co-ords: E452008.11 N225755.20
Project No. : C10194	Crew Name: T&A Cox	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Status
SA03	TP	115.48m AoD	TY	1:25	FINAL

Backfill	Water Str kes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	115.28		TOPSOIL: Firm brown very sandy CLAY with occasional rootlets.
								Firm light brown very sandy CLAY.
					0.65	114.83		White and orangish brown clayey sandy angular and subangular fine to coarse GRAVEL of limestone.
	▼	1.20	ES1					*Below 1.15m bgl: Medium grey with a mild hydrocarbon odour and rare black staining up to 3mm in size.* *Below 1.20m bgl: Mild hydrocarbon sheen on water surface.*
					1.30	114.18		End of Trial Pit at 1.30m

1 2 3 4 5

Dimensions		Trench Support and Comment			Water Stike General	
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Depth Strike	Date Time
2.50	0.55	Stable	No		1 20	28/10/2021 09:00 00

Remarks

1. Slow rate of water ingress at 1.20m bgl.
2. Terminated due to presence of hydrocarbon contamination.

EXPLORATION & TESTING ASSOCIATES

Trial Pit Log

Project Name: Upper Heyford	Client: BWB Consulting Ltd	Date: 28/10/2021
Location: Oxfordshire	Contractor: Exploration & Testing	Co-ords: E452018.16 N225770.94
Project No. : C10194	Crew Name: T&A Cox	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Status
SA03A	TP	115.60m AoD	TY	1:25	FINAL

Backfill	Water Str kes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	115.40		TOPSOIL: Firm brown very sandy CLAY with occasional rootlets.
								Firm light brown very sandy CLAY.
					0.65	114.95		White and orangish brown clayey sandy angular and subangular fine to coarse GRAVEL of limestone.
		1.05	ES1		1.05	114.55		*Below 0.95m bgl: Medium grey with a mild hydrocarbon odour.*
								End of Trial Pit at 1.05m

1 2 3 4 5

Dimensions		Trench Support and Comment			Water Stike General	
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Depth Strike	Date Time
2.50	0.55	Stable	No			

Remarks

1. No groundwater encountered.
2. Terminated due to presence of hydrocarbon contamination.

Trial Pit Log

EXPLORATION & TESTING ASSOCIATES

Project Name: Upper Heyford	Client: BWB Consulting Ltd	Date: 28/10/2021
Location: Oxfordshire	Contractor: Exploration & Testing	Co-ords: E452039.24 N225751.66
Project No. : C10194	Crew Name: T&A Cox	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Status
SA03B	TP	116.82m AoD	TY	1:25	FINAL

Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Firm brown gravelly sandy CLAY with a low cobble content and occasional rootlets. Gravel is subangular fine to coarse limestone. Cobble is subangular limestone.
					0.35	116.47		Firm light brown sandy gravelly CLAY. Gravel is subangular fine to coarse limestone.
					0.75	116.07		White and light brown slightly clayey sandy angular and subangular fine to coarse GRAVEL of limestone with a moderate cobble content. Cobbles are subangular limestone.
					1.90	114.92		End of Trial Pit at 1.90m

1 2 3 4 5

Dimensions		Trench Support and Comment			Water Strike General	
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Depth Strike	Date Time
2.80	0.55	Unstable below 1.50m bgl.	No			

Remarks

1. No groundwater encountered.
2. Terminated at target depth.
3. Soakaway undertaken within location, refer to C10194_SA_01.

Photo 1: SA01 downhole view.

Photo 2: SA01 arisings.

Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Client:	BWB Consulting Ltd

Title:	Site Photographs
Drawing:	C10194.SP_1
Date:	18/11/21

EXPLORATION & TESTING ASSOCIATES

Photo 3: SA02 downhole view.

Photo 4: SA02 arisings.

Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Client:	BWB Consulting Ltd
Title:	Site Photographs
Drawing:	C10194.SP_1
Date:	18/11/21

EXPLORATION
& TESTING ASSOCIATES

Photo 5: SA03 downhole view.

Photo 6: SA03 arisings.

Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Client:	BWB Consulting Ltd
Title:	Site Photographs
Drawing:	C10194.SP_1
Date:	18/11/21

EXPLORATION & TESTING ASSOCIATES

Photo 7: SA03A downhole view.

Photo 8: SA03A arisings.

Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Client:	BWB Consulting Ltd
Title:	Site Photographs
Drawing:	C10194.SP_1
Date:	18/11/21

EXPLORATION
& TESTING ASSOCIATES

Photo 9: SA03B downhole view.

Photo 10: SA03B arisings.

Contract:	Upper Heyford, Oxfordshire
Contract No.:	C10194
Client:	BWB Consulting Ltd
Title:	Site Photographs
Drawing:	C10194.SP_1
Date:	18/11/21

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& TESTING ASSOCIATES

APPENDIX 3: SOAKAWAY RESULTS

[redacted]

SOAKAWAY TESTING

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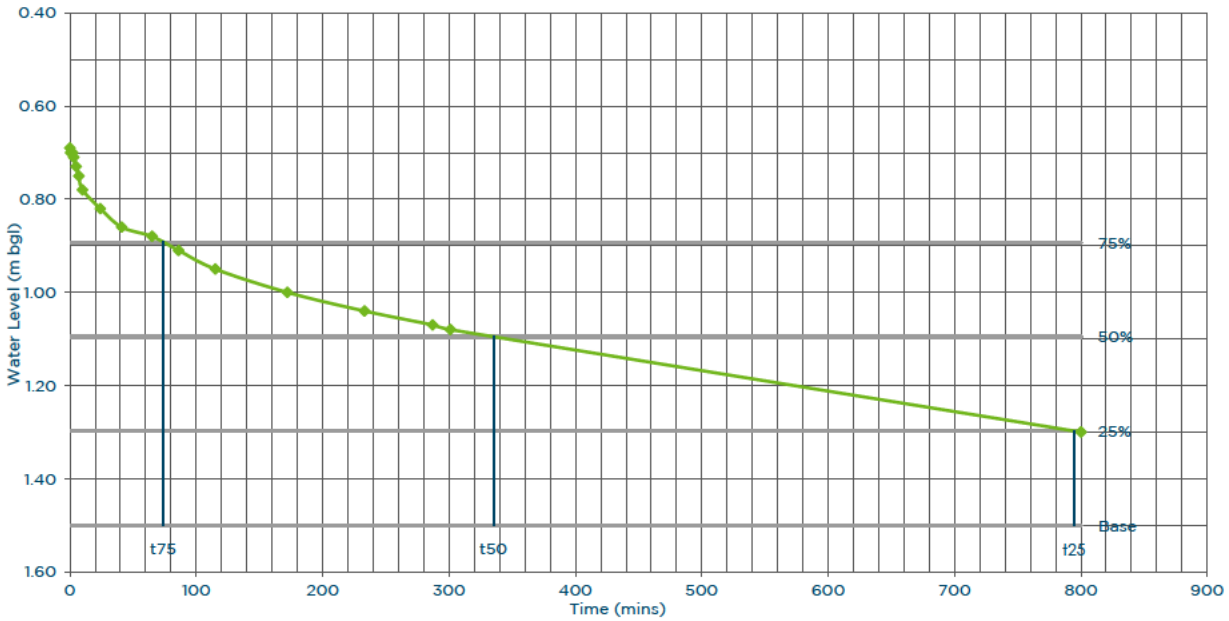
Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting
Date:	28/10/2021

Pit Information	
Location ID:	SA01
Depth (m):	1 50
Width (m):	0.55
Length (m):	2.50
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	0.69
0 5	0.70
1.0	0.70
1.5	0.70
2.0	0.70
3.0	0.71
5.0	0.73
7.0	0.75
10.0	0.78
24.0	0.82
41.0	0.86
65.0	0.88
86.0	0.91
115.0	0.95
172.0	1.00
233.0	1.04
287.0	1.07
301.0	1.08
800.0	1.30

Test Information and Calculation	
Test Reference/Number:	1
Test Start Time:	10:00
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1 50
Effective Storage Depth (m)	0.69
Effective Drop (m)	0.81
75% Effective Depth (m)	0.89
50% Effective Depth (m)	1.10
25% Effective Depth (m)	1 30
t_{75} (min)	73.75
t_{50} (min)	335.02
t_{25} (min)	794.33
V_{p75-25}	0.56
Adjusted V_p for Gravel Fill	0.56
a_{s50}	3.85
t_{p75-25}	720.58

Results	
Soil Infiltration Rate (m/s)	3 35E-06
Soil Infiltration Rate (mm/hr)	1.21E+01

References

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

Comments

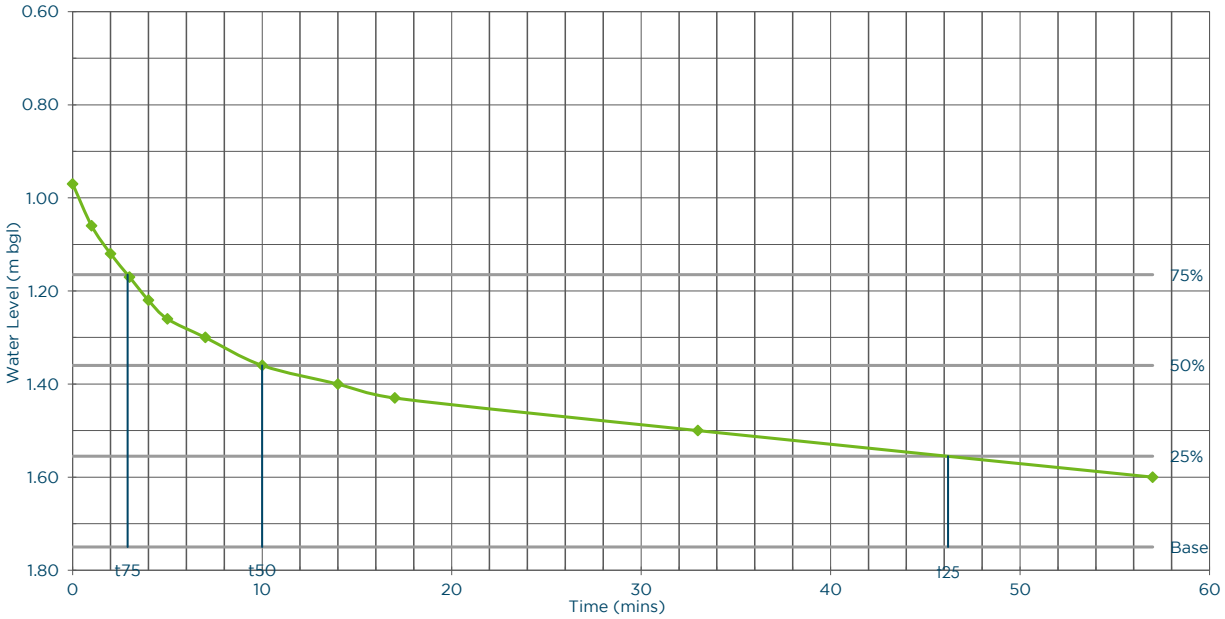
Test terminated due to time constraints. Final data point extrapolated to enable calculation which should be treated with the appropriate caution.

SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting Ltd
Date:	28/10/2021

Pit Information	
Location ID:	SA02
Depth (m):	1.75
Width (m):	0.55
Length (m):	2.45
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	0.97
1.0	1.06
2.0	1.12
3.0	1.17
4.0	1 22
5.0	1.26
7.0	1.30
10.0	1.36
14.0	1.40
17.0	1.43
33.0	1.50
57.0	1.60

Test Information and Calculation	
Test Reference/Number:	1
Test Start Time:	10:45
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1.75
Effective Storage Depth (m)	0.97
Effective Drop (m)	0.78
75% Effective Depth (m)	1.17
50% Effective Depth (m)	1.36
25% Effective Depth (m)	1.56
t_{75} (min)	2.90
t_{50} (min)	10.00
t_{25} (min)	46.20
V_{p75-25}	0.53
Adjusted V_p for Gravel Fill	0.53
a_{s50}	3.69
t_{p75-25}	43.30
Results	
Soil Infiltration Rate (m/s)	5.49E-05
Soil Infiltration Rate (mm/hr)	1.97E+02

References

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

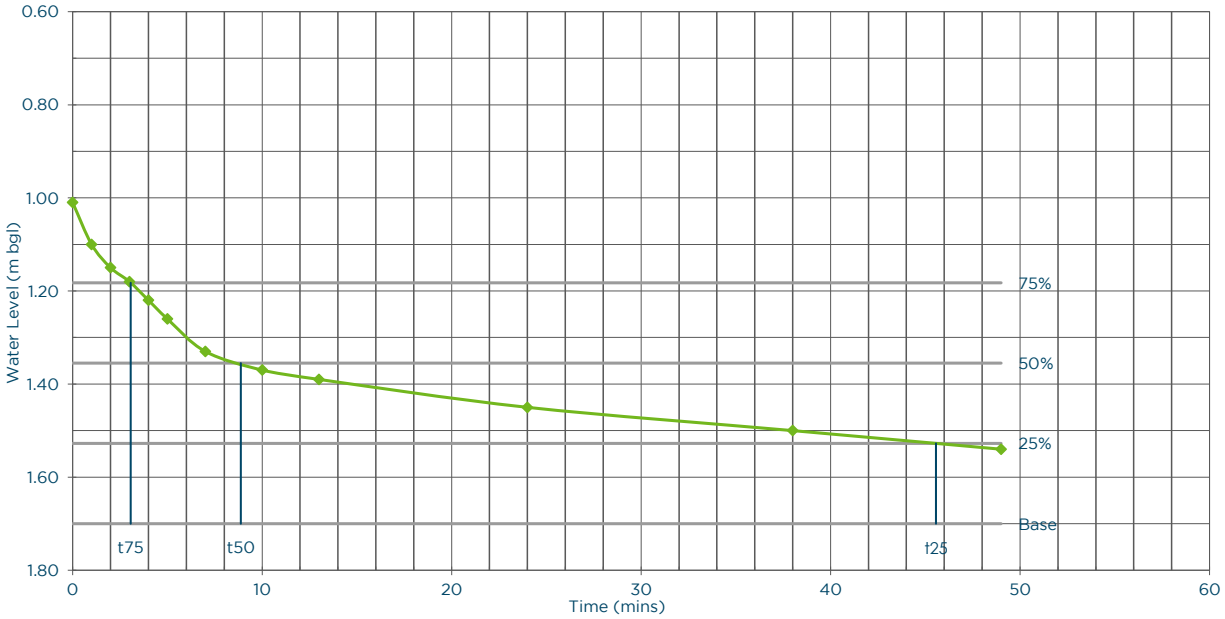
Comments

SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting Ltd
Date:	28/10/2021

Pit Information	
Location ID:	SA02
Depth (m):	1.70
Width (m):	0.55
Length (m):	2.45
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	1.01
1.0	1.10
2.0	1.15
3.0	1.18
4.0	1 22
5.0	1.26
7.0	1.33
10.0	1.37
13.0	1.39
24.0	1.45
38.0	1.50
49.0	1.54

Test Information and Calculation	
Test Reference/Number:	2
Test Start Time:	11:45
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1.70
Effective Storage Depth (m)	1.01
Effective Drop (m)	0.69
75% Effective Depth (m)	1.18
50% Effective Depth (m)	1.36
25% Effective Depth (m)	1.53
t_{75} (min)	3.06
t_{50} (min)	8.87
t_{25} (min)	45.56
V_{p75-25}	0.46
Adjusted V_p for Gravel Fill	0.46
a_{s50}	3.42
t_{p75-25}	42.50
Results	
Soil Infiltration Rate (m/s)	5.33E-05
Soil Infiltration Rate (mm/hr)	1.92E+02

References

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

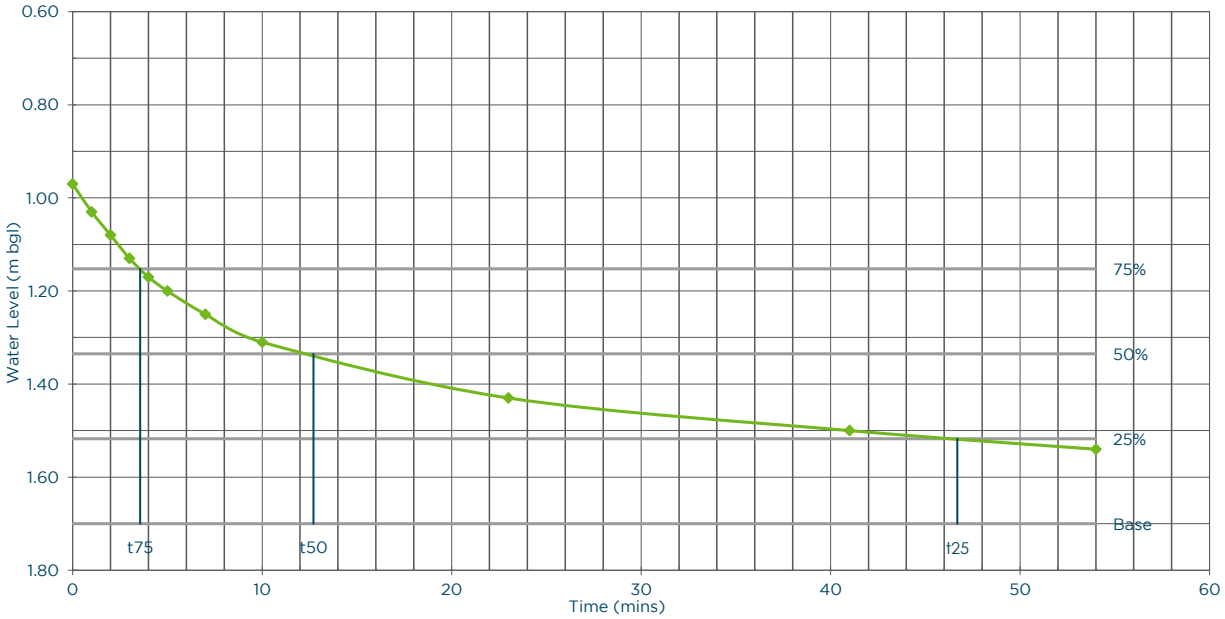
Comments

SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting Ltd
Date:	28/10/2021

Pit Information	
Location ID:	SA02
Depth (m):	1.70
Width (m):	0.55
Length (m):	2.45
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	0.97
1.0	1.03
2.0	1.08
3.0	1.13
4.0	1.17
5.0	1.20
7.0	1.25
10.0	1.31
23.0	1.43
41.0	1.50
54.0	1.54

Test Information and Calculation	
Test Reference/Number:	3
Test Start Time:	12:45
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1.70
Effective Storage Depth (m)	0.97
Effective Drop (m)	0.73
75% Effective Depth (m)	1.15
50% Effective Depth (m)	1.34
25% Effective Depth (m)	1.52
t_{75} (min)	3.56
t_{50} (min)	12.71
t_{25} (min)	46.69
V_{p75-25}	0.49
Adjusted V_p for Gravel Fill	0.49
a_{s50}	3.54
t_{p75-25}	43.13

Results	
Soil Infiltration Rate (m/s)	5.37E-05
Soil Infiltration Rate (mm/hr)	1.93E+02

References

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

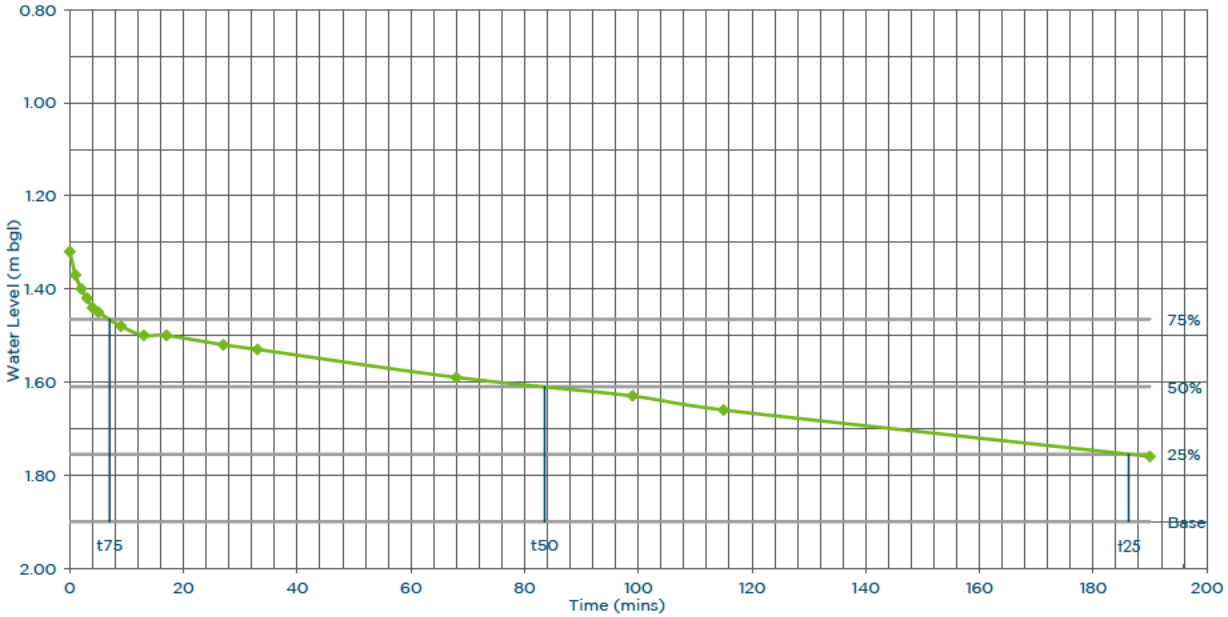
Comments

SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting Ltd
Date:	28/10/2021

Pit Information	
Location ID:	SA03B
Depth (m):	1.90
Width (m):	0.55
Length (m):	2.80
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	1.32
1.0	1.37
2.0	1.40
3.0	1.42
4.0	1.44
5.0	1.45
9.0	1.48
13.0	1.50
17.0	1.50
27.0	1.52
33.0	1.53
68.0	1.59
99.0	1.63
115.0	1.66
190.0	1.76

Test Information and Calculation	
Test Reference/Number:	1
Test Start Time:	11:30
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1.90
Effective Storage Depth (m)	1.32
Effective Drop (m)	0.58
75% Effective Depth (m)	1.47
50% Effective Depth (m)	1.61
25% Effective Depth (m)	1.76
t_{75} (min)	7.00
t_{50} (min)	83.50
t_{25} (min)	186.25
V_{p75-25}	0.45
Adjusted V_p for Gravel Fill	0.45
a_{s50}	3.48
t_{p75-25}	179.25
Results	
Soil Infiltration Rate (m/s)	1.19E-05
Soil Infiltration Rate (mm/hr)	4.29E+01

References

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

Comments

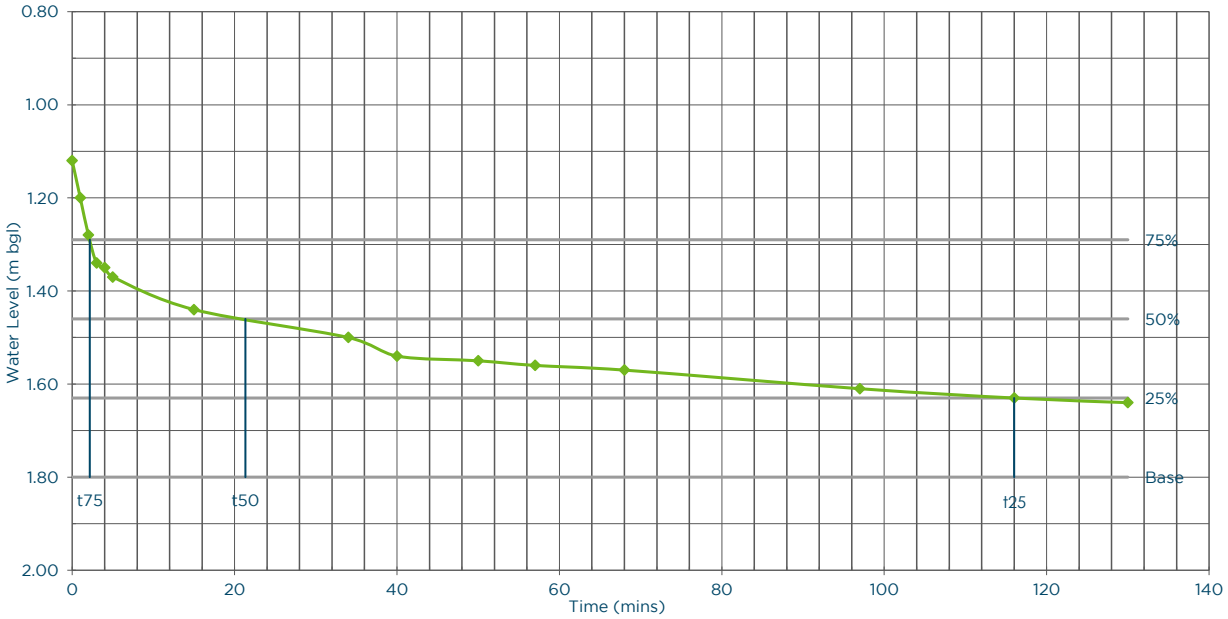
Test terminated due to collapse. Final data point extrapolated to enable calculation which should be treated with the appropriate caution.

SOAKAWAY TESTING

EXPLORATION & TESTING ASSOCIATES

Contract Information	
Contract:	Upper Heyford
Contract No:	C10194
Client:	BWB Consulting Ltd
Date:	28/10/2021

Pit Information	
Location ID:	SA03B
Depth (m):	1.80
Width (m):	0.55
Length (m):	2.80
Depth to Standing Water (m)	Dry



Time (min)	Depth (m)
0.0	1.12
1.0	1.20
2.0	1.28
3.0	1.34
4.0	1.35
5.0	1.37
15.0	1.44
34.0	1.50
40.0	1.54
50.0	1.55
57.0	1.56
68.0	1.57
97.0	1.61
116.0	1.63
130.0	1.64

Test Information and Calculation	
Test Reference/Number:	2
Test Start Time:	14:00
Method of Calculation	BRE365
Pit Gravel Filled?	No
Max. Depth (m)	1.80
Effective Storage Depth (m)	1.12
Effective Drop (m)	0.68
75% Effective Depth (m)	1.29
50% Effective Depth (m)	1.46
25% Effective Depth (m)	1.63
t_{75} (min)	2.17
t_{50} (min)	21.33
t_{25} (min)	116.00
V_{p75-25}	0.52
Adjusted V_p for Gravel Fill	0.52
a_{s50}	3.82
t_{p75-25}	113.83

Results	
Soil Infiltration Rate (m/s)	2.01E-05
Soil Infiltration Rate (mm/hr)	7.23E+01

References

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

Comments

Test terminated due to time constraints. Final data point extrapolated to enable calculation which should be treated with the appropriate caution.

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APPENDIX 4: CHEMICAL TESTING

[redacted]

Results

Exploration & Testing Associates Limited
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Middlemarch Business Park
Coventry
CV3 4FJ

e: results@explorationtesting.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-20596

Project / Site name:	Upper Heyford	**Samples received on:**	03/11/2021
Your job number:	C10194	**Samples instructed on/ Analysis started on:**	03/11/2021
Your order number:	PO 1697	**Analysis completed by:**	10/11/2021
Report Issue Number:	1	**Report issued on:**	10/11/2021
Samples Analysed:	2 soil samples		

Signed [redacted]

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-20596
Project / Site name: Upper Heyford
Your Order No: PO 1697

Lab Sample Number				2070640	2070641
Sample Reference				SA03	SA03A
Sample Number				1	1
Depth (m)				1.20	1.05
Date Sampled				28/10/2021	28/10/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	53	< 0.1
Moisture Content	%	0.01	NONE	10	14
Total mass of sample received	kg	0.001	NONE	1 0	1 0

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1 0	< 1 0
Toluene	µg/kg	1	MCERTS	< 1 0	< 1 0
Ethylbenzene	µg/kg	1	MCERTS	< 1 0	< 1 0
p & m-xylene	µg/kg	1	MCERTS	< 1 0	< 1 0
o-xylene	µg/kg	1	MCERTS	< 1 0	< 1 0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1 0	< 1 0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0 001	< 0 001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0 001	< 0 001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0 001	0.23
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1 0	3.1
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2 0	20
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8 0	< 8 0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8 0	< 8 0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	26

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0 001	< 0 001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0 001	< 0 001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0 001	< 0 001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1 0	< 1 0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2 0	< 2 0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	22	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	31	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction facto determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

EXPLORATION
& TESTING ASSOCIATES

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explorationtesting.uk
Registered in England and Wales No. 11803869. Registered Office. Unit 8B, Bowburn South Industrial Estate, Durham. DH6 5AD

Appendix 6: MicroDrainage Calculations

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

Half Drain Time : 196 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	115.892	0.392	50.5	639.8	O K
30 min Summer	115.995	0.495	53.0	820.0	O K
60 min Summer	116.075	0.575	54.9	962.7	O K
120 min Summer	116.115	0.615	55.9	1034.7	O K
180 min Summer	116.115	0.615	55.9	1035.2	O K
240 min Summer	116.106	0.606	55.7	1019.0	O K
360 min Summer	116.078	0.578	55.0	967.6	O K
480 min Summer	116.046	0.546	54.2	910.9	O K
600 min Summer	116.014	0.514	53.4	853.4	O K
720 min Summer	115.982	0.482	52.7	796.9	O K
960 min Summer	115.920	0.420	51.1	687.9	O K
1440 min Summer	115.810	0.310	48.5	501.0	O K
2160 min Summer	115.686	0.186	45.5	296.1	O K
2880 min Summer	115.606	0.106	43.6	166.6	O K
4320 min Summer	115.547	0.047	39.9	73.7	O K
5760 min Summer	115.538	0.038	31.8	58.9	O K
7200 min Summer	115.532	0.032	27.1	49.9	O K
8640 min Summer	115.528	0.028	23.8	43.6	O K
10080 min Summer	115.525	0.025	21.2	38.9	O K
15 min Winter	115.939	0.439	51.6	722.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	141.680	0.0	28
30 min Summer	92.400	0.0	41
60 min Summer	57.120	0.0	68
120 min Summer	34.230	0.0	122
180 min Summer	25.318	0.0	162
240 min Summer	20.370	0.0	194
360 min Summer	14.863	0.0	260
480 min Summer	11.825	0.0	328
600 min Summer	9.868	0.0	396
720 min Summer	8.493	0.0	464
960 min Summer	6.670	0.0	598
1440 min Summer	4.719	0.0	852
2160 min Summer	3.331	0.0	1212
2880 min Summer	2.608	0.0	1540
4320 min Summer	1.862	0.0	2204
5760 min Summer	1.477	0.0	2936
7200 min Summer	1.244	0.0	3672
8640 min Summer	1.086	0.0	4376
10080 min Summer	0.973	0.0	5056
15 min Winter	141.680	0.0	28

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	116.056	0.556	54.5	927.7	O K
60 min Winter	116.149	0.649	56.7	1096.1	O K
120 min Winter	116.202	0.702	58.0	1193.9	Flood Risk
180 min Winter	116.208	0.708	58.2	1205.8	Flood Risk
240 min Winter	116.195	0.695	57.9	1182.3	O K
360 min Winter	116.160	0.660	57.0	1117.1	O K
480 min Winter	116.117	0.617	56.0	1037.4	O K
600 min Winter	116.070	0.570	54.8	953.8	O K
720 min Winter	116.024	0.524	53.7	871.0	O K
960 min Winter	115.934	0.434	51.5	712.9	O K
1440 min Winter	115.779	0.279	47.7	448.6	O K
2160 min Winter	115.614	0.114	43.8	179.2	O K
2880 min Winter	115.548	0.048	40.8	74.9	O K
4320 min Winter	115.535	0.035	29.3	53.7	O K
5760 min Winter	115.528	0.028	23.3	42.8	O K
7200 min Winter	115.523	0.023	19.5	35.9	O K
8640 min Winter	115.520	0.020	17.0	31.1	O K
10080 min Winter	115.518	0.018	15.3	28.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	92.400	0.0	42
60 min Winter	57.120	0.0	68
120 min Winter	34.230	0.0	122
180 min Winter	25.318	0.0	176
240 min Winter	20.370	0.0	206
360 min Winter	14.863	0.0	278
480 min Winter	11.825	0.0	356
600 min Winter	9.868	0.0	430
720 min Winter	8.493	0.0	502
960 min Winter	6.670	0.0	642
1440 min Winter	4.719	0.0	900
2160 min Winter	3.331	0.0	1236
2880 min Winter	2.607	0.0	1468
4320 min Winter	1.862	0.0	2184
5760 min Winter	1.477	0.0	2896
7200 min Winter	1.244	0.0	3608
8640 min Winter	1.086	0.0	4496
10080 min Winter	0.973	0.0	5000

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 451900 225600 SP 51900 25600
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 2.651

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.662	4	8	0.662	8	12	0.663	12	16	0.664

Model Details

Storage is Online Cover Level (m) 116.500

Infiltration Basin Structure

Invert Level (m) 115.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.19100 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.19100

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1550.0	1.000	1997.0	1.001	1997.4

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

Half Drain Time : 190 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	115.884	0.384	50.3	626.7	O K
30 min Summer	115.987	0.487	52.8	806.4	O K
60 min Summer	116.071	0.571	54.8	954.9	O K
120 min Summer	116.113	0.613	55.9	1031.7	O K
180 min Summer	116.107	0.607	55.7	1021.0	O K
240 min Summer	116.092	0.592	55.4	993.7	O K
360 min Summer	116.060	0.560	54.6	934.8	O K
480 min Summer	116.029	0.529	53.8	879.3	O K
600 min Summer	115.999	0.499	53.1	826.5	O K
720 min Summer	115.970	0.470	52.4	775.7	O K
960 min Summer	115.915	0.415	51.0	680.6	O K
1440 min Summer	115.818	0.318	48.7	515.0	O K
2160 min Summer	115.704	0.204	46.0	324.6	O K
2880 min Summer	115.623	0.123	44.0	194.1	O K
4320 min Summer	115.550	0.050	42.1	77.5	O K
5760 min Summer	115.540	0.040	33.5	61.5	O K
7200 min Summer	115.533	0.033	28.0	51.5	O K
8640 min Summer	115.529	0.029	24.2	44.4	O K
10080 min Summer	115.525	0.025	21.2	39.0	O K
15 min Winter	115.931	0.431	51.4	707.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	28
30 min Summer	90.986	0.0	41
60 min Summer	56.713	0.0	68
120 min Summer	34.148	0.0	122
180 min Summer	25.042	0.0	162
240 min Summer	19.977	0.0	192
360 min Summer	14.486	0.0	258
480 min Summer	11.532	0.0	328
600 min Summer	9.655	0.0	396
720 min Summer	8.347	0.0	464
960 min Summer	6.629	0.0	596
1440 min Summer	4.783	0.0	852
2160 min Summer	3.446	0.0	1216
2880 min Summer	2.728	0.0	1560
4320 min Summer	1.960	0.0	2204
5760 min Summer	1.549	0.0	2912
7200 min Summer	1.289	0.0	3640
8640 min Summer	1.110	0.0	4392
10080 min Summer	0.977	0.0	5088
15 min Winter	138.993	0.0	28

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	116.047	0.547	54.3	912.4	O K
60 min Winter	116.144	0.644	56.6	1087.4	O K
120 min Winter	116.200	0.700	58.0	1190.5	O K
180 min Winter	116.199	0.699	58.0	1189.2	O K
240 min Winter	116.180	0.680	57.5	1152.9	O K
360 min Winter	116.139	0.639	56.5	1078.2	O K
480 min Winter	116.096	0.596	55.4	999.7	O K
600 min Winter	116.052	0.552	54.4	921.5	O K
720 min Winter	116.010	0.510	53.3	845.8	O K
960 min Winter	115.929	0.429	51.4	704.3	O K
1440 min Winter	115.788	0.288	48.0	464.6	O K
2160 min Winter	115.632	0.132	44.2	207.6	O K
2880 min Winter	115.550	0.050	42.3	78.6	O K
4320 min Winter	115.536	0.036	30.5	56.5	O K
5760 min Winter	115.529	0.029	24.2	44.7	O K
7200 min Winter	115.524	0.024	20.4	37.4	O K
8640 min Winter	115.521	0.021	17.4	32.0	O K
10080 min Winter	115.518	0.018	15.3	28.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.986	0.0	42
60 min Winter	56.713	0.0	68
120 min Winter	34.148	0.0	122
180 min Winter	25.042	0.0	176
240 min Winter	19.977	0.0	204
360 min Winter	14.486	0.0	278
480 min Winter	11.532	0.0	354
600 min Winter	9.655	0.0	428
720 min Winter	8.347	0.0	502
960 min Winter	6.629	0.0	640
1440 min Winter	4.783	0.0	902
2160 min Winter	3.446	0.0	1248
2880 min Winter	2.728	0.0	1480
4320 min Winter	1.960	0.0	2208
5760 min Winter	1.549	0.0	2936
7200 min Winter	1.289	0.0	3664
8640 min Winter	1.110	0.0	4304
10080 min Winter	0.977	0.0	4952

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 2.651

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.662	4	8	0.662	8	12	0.663	12	16	0.664

Model Details

Storage is Online Cover Level (m) 116.500

Infiltration Basin Structure

Invert Level (m) 115.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.19100 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.19100

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1550.0	1.000	1997.0	1.001	1997.4

Summary of Results for 10 year Return Period

Half Drain Time : 1323 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	117.114	0.114	1.7	106.5	O K
30 min Summer	117.145	0.145	1.7	136.6	O K
60 min Summer	117.176	0.176	1.8	167.2	O K
120 min Summer	117.207	0.207	1.8	197.6	O K
180 min Summer	117.224	0.224	1.9	214.7	O K
240 min Summer	117.235	0.235	1.9	226.0	O K
360 min Summer	117.249	0.249	1.9	240.3	O K
480 min Summer	117.257	0.257	1.9	248.6	O K
600 min Summer	117.262	0.262	1.9	253.4	O K
720 min Summer	117.265	0.265	1.9	256.0	O K
960 min Summer	117.265	0.265	1.9	256.7	O K
1440 min Summer	117.262	0.262	1.9	253.3	O K
2160 min Summer	117.254	0.254	1.9	245.5	O K
2880 min Summer	117.245	0.245	1.9	236.1	O K
4320 min Summer	117.225	0.225	1.9	215.9	O K
5760 min Summer	117.206	0.206	1.8	196.2	O K
7200 min Summer	117.187	0.187	1.8	177.8	O K
8640 min Summer	117.170	0.170	1.8	160.6	O K
10080 min Summer	117.154	0.154	1.8	144.8	O K
15 min Winter	117.127	0.127	1.7	119.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	60.327	0.0	27
30 min Summer	38.848	0.0	41
60 min Summer	24.003	0.0	70
120 min Summer	14.459	0.0	130
180 min Summer	10.665	0.0	190
240 min Summer	8.570	0.0	248
360 min Summer	6.284	0.0	366
480 min Summer	5.039	0.0	486
600 min Summer	4.244	0.0	604
720 min Summer	3.687	0.0	722
960 min Summer	2.953	0.0	954
1440 min Summer	2.157	0.0	1170
2160 min Summer	1.575	0.0	1556
2880 min Summer	1.260	0.0	1964
4320 min Summer	0.919	0.0	2772
5760 min Summer	0.734	0.0	3584
7200 min Summer	0.617	0.0	4400
8640 min Summer	0.535	0.0	5184
10080 min Summer	0.474	0.0	5944
15 min Winter	60.327	0.0	26

Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	117.162	0.162	1.8	153.3	O K
60 min Winter	117.197	0.197	1.8	187.7	O K
120 min Winter	117.231	0.231	1.9	222.3	O K
180 min Winter	117.251	0.251	1.9	242.0	O K
240 min Winter	117.264	0.264	1.9	255.2	O K
360 min Winter	117.280	0.280	2.0	272.2	O K
480 min Winter	117.290	0.290	2.0	282.6	O K
600 min Winter	117.296	0.296	2.0	289.0	O K
720 min Winter	117.300	0.300	2.0	293.0	O K
960 min Winter	117.303	0.303	2.0	296.1	O K
1440 min Winter	117.299	0.299	2.0	292.0	O K
2160 min Winter	117.289	0.289	2.0	281.1	O K
2880 min Winter	117.276	0.276	1.9	267.8	O K
4320 min Winter	117.247	0.247	1.9	237.8	O K
5760 min Winter	117.217	0.217	1.9	208.0	O K
7200 min Winter	117.189	0.189	1.8	180.2	O K
8640 min Winter	117.164	0.164	1.8	154.7	O K
10080 min Winter	117.140	0.140	1.7	131.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	38.848	0.0	41
60 min Winter	24.003	0.0	70
120 min Winter	14.459	0.0	128
180 min Winter	10.665	0.0	186
240 min Winter	8.570	0.0	244
360 min Winter	6.284	0.0	360
480 min Winter	5.039	0.0	476
600 min Winter	4.244	0.0	590
720 min Winter	3.687	0.0	704
960 min Winter	2.953	0.0	926
1440 min Winter	2.157	0.0	1340
2160 min Winter	1.575	0.0	1668
2880 min Winter	1.260	0.0	2132
4320 min Winter	0.919	0.0	3028
5760 min Winter	0.734	0.0	3872
7200 min Winter	0.617	0.0	4688
8640 min Winter	0.535	0.0	5528
10080 min Winter	0.474	0.0	6256

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.408	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.957

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.300	4	8	0.300	8	12	0.357

Model Details

Storage is Online Cover Level (m) 118.000

Infiltration Basin Structure

Invert Level (m) 117.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01200 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.01200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	910.0	1.000	1388.0	1.001	1388.5

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

Half Drain Time : 2649 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	117.261	0.261	1.9	252.1	O K
30 min Summer	117.334	0.334	2.0	328.1	O K
60 min Summer	117.404	0.404	2.1	403.4	O K
120 min Summer	117.471	0.471	2.3	478.4	O K
180 min Summer	117.513	0.513	2.3	525.6	O K
240 min Summer	117.542	0.542	2.4	558.4	O K
360 min Summer	117.577	0.577	2.4	600.0	O K
480 min Summer	117.599	0.599	2.5	625.0	O K
600 min Summer	117.612	0.612	2.5	640.5	O K
720 min Summer	117.619	0.619	2.5	649.8	O K
960 min Summer	117.625	0.625	2.5	656.7	O K
1440 min Summer	117.619	0.619	2.5	649.2	O K
2160 min Summer	117.594	0.594	2.5	619.8	O K
2880 min Summer	117.573	0.573	2.4	594.6	O K
4320 min Summer	117.540	0.540	2.4	555.9	O K
5760 min Summer	117.514	0.514	2.3	526.4	O K
7200 min Summer	117.494	0.494	2.3	503.9	O K
8640 min Summer	117.478	0.478	2.3	485.7	O K
10080 min Summer	117.465	0.465	2.2	470.5	O K
15 min Winter	117.290	0.290	2.0	282.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	141.680	0.0	27
30 min Summer	92.400	0.0	42
60 min Summer	57.120	0.0	72
120 min Summer	34.230	0.0	130
180 min Summer	25.318	0.0	190
240 min Summer	20.370	0.0	250
360 min Summer	14.863	0.0	370
480 min Summer	11.825	0.0	488
600 min Summer	9.868	0.0	608
720 min Summer	8.493	0.0	726
960 min Summer	6.670	0.0	966
1440 min Summer	4.719	0.0	1442
2160 min Summer	3.331	0.0	1936
2880 min Summer	2.608	0.0	2284
4320 min Summer	1.862	0.0	3068
5760 min Summer	1.477	0.0	3872
7200 min Summer	1.244	0.0	4688
8640 min Summer	1.086	0.0	5536
10080 min Summer	0.973	0.0	6360
15 min Winter	141.680	0.0	27

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	117.371	0.371	2.1	367.8	O K
60 min Winter	117.448	0.448	2.2	452.5	O K
120 min Winter	117.523	0.523	2.3	537.1	O K
180 min Winter	117.569	0.569	2.4	590.7	O K
240 min Winter	117.601	0.601	2.5	628.2	O K
360 min Winter	117.641	0.641	2.5	676.2	O K
480 min Winter	117.666	0.666	2.6	705.7	O K
600 min Winter	117.681	0.681	2.6	724.4	O K
720 min Winter	117.691	0.691	2.6	736.3	O K
960 min Winter	117.699	0.699	2.6	746.9	O K
1440 min Winter	117.698	0.698	2.6	744.5	O K
2160 min Winter	117.677	0.677	2.6	718.9	O K
2880 min Winter	117.650	0.650	2.5	686.6	O K
4320 min Winter	117.611	0.611	2.5	640.2	O K
5760 min Winter	117.578	0.578	2.4	600.3	O K
7200 min Winter	117.549	0.549	2.4	566.7	O K
8640 min Winter	117.524	0.524	2.3	537.7	O K
10080 min Winter	117.502	0.502	2.3	512.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	92.400	0.0	41
60 min Winter	57.120	0.0	70
120 min Winter	34.230	0.0	130
180 min Winter	25.318	0.0	188
240 min Winter	20.370	0.0	246
360 min Winter	14.863	0.0	364
480 min Winter	11.825	0.0	480
600 min Winter	9.868	0.0	598
720 min Winter	8.493	0.0	714
960 min Winter	6.670	0.0	946
1440 min Winter	4.719	0.0	1402
2160 min Winter	3.331	0.0	2056
2880 min Winter	2.607	0.0	2620
4320 min Winter	1.862	0.0	3284
5760 min Winter	1.477	0.0	4208
7200 min Winter	1.244	0.0	5120
8640 min Winter	1.086	0.0	5976
10080 min Winter	0.973	0.0	6864

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 451900 225600 SP 51900 25600
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.957

Time From: (mins)	To:	Area (ha)	Time From: (mins)	To:	Area (ha)	Time From: (mins)	To:	Area (ha)
0	4	0.300	4	8	0.300	8	12	0.357

Model Details

Storage is Online Cover Level (m) 118.000

Infiltration Basin Structure

Invert Level (m) 117.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01200 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.01200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	910.0	1.000	1388.0	1.001	1388.5

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

Half Drain Time : 2665 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	117.256	0.256	1.9	247.3	O K
30 min Summer	117.329	0.329	2.0	323.0	O K
60 min Summer	117.401	0.401	2.1	400.5	O K
120 min Summer	117.470	0.470	2.3	477.2	O K
180 min Summer	117.508	0.508	2.3	519.7	O K
240 min Summer	117.532	0.532	2.4	547.3	O K
360 min Summer	117.564	0.564	2.4	584.1	O K
480 min Summer	117.585	0.585	2.4	608.6	O K
600 min Summer	117.599	0.599	2.5	625.6	O K
720 min Summer	117.609	0.609	2.5	637.7	O K
960 min Summer	117.621	0.621	2.5	652.2	O K
1440 min Summer	117.628	0.628	2.5	659.5	O K
2160 min Summer	117.616	0.616	2.5	645.8	O K
2880 min Summer	117.602	0.602	2.5	628.7	O K
4320 min Summer	117.572	0.572	2.4	593.8	O K
5760 min Summer	117.543	0.543	2.4	560.4	O K
7200 min Summer	117.516	0.516	2.3	529.3	O K
8640 min Summer	117.491	0.491	2.3	500.6	O K
10080 min Summer	117.467	0.467	2.3	473.5	O K
15 min Winter	117.285	0.285	2.0	277.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	27
30 min Summer	90.986	0.0	42
60 min Summer	56.713	0.0	72
120 min Summer	34.148	0.0	130
180 min Summer	25.042	0.0	190
240 min Summer	19.977	0.0	250
360 min Summer	14.486	0.0	370
480 min Summer	11.532	0.0	488
600 min Summer	9.655	0.0	608
720 min Summer	8.347	0.0	726
960 min Summer	6.629	0.0	966
1440 min Summer	4.783	0.0	1442
2160 min Summer	3.446	0.0	1976
2880 min Summer	2.728	0.0	2312
4320 min Summer	1.960	0.0	3076
5760 min Summer	1.549	0.0	3920
7200 min Summer	1.289	0.0	4752
8640 min Summer	1.110	0.0	5536
10080 min Summer	0.977	0.0	6360
15 min Winter	138.993	0.0	27

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	117.366	0.366	2.1	362.1	O K
60 min Winter	117.445	0.445	2.2	449.2	O K
120 min Winter	117.522	0.522	2.3	535.8	O K
180 min Winter	117.564	0.564	2.4	584.1	O K
240 min Winter	117.591	0.591	2.5	615.8	O K
360 min Winter	117.627	0.627	2.5	658.3	O K
480 min Winter	117.651	0.651	2.5	687.3	O K
600 min Winter	117.668	0.668	2.6	707.8	O K
720 min Winter	117.680	0.680	2.6	722.7	O K
960 min Winter	117.695	0.695	2.6	741.8	O K
1440 min Winter	117.707	0.707	2.6	756.0	Flood Risk
2160 min Winter	117.701	0.701	2.6	748.8	Flood Risk
2880 min Winter	117.683	0.683	2.6	726.7	O K
4320 min Winter	117.648	0.648	2.5	684.4	O K
5760 min Winter	117.612	0.612	2.5	640.3	O K
7200 min Winter	117.575	0.575	2.4	596.8	O K
8640 min Winter	117.539	0.539	2.4	555.2	O K
10080 min Winter	117.505	0.505	2.3	516.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.986	0.0	41
60 min Winter	56.713	0.0	70
120 min Winter	34.148	0.0	130
180 min Winter	25.042	0.0	188
240 min Winter	19.977	0.0	246
360 min Winter	14.486	0.0	364
480 min Winter	11.532	0.0	480
600 min Winter	9.655	0.0	598
720 min Winter	8.347	0.0	714
960 min Winter	6.629	0.0	946
1440 min Winter	4.783	0.0	1402
2160 min Winter	3.446	0.0	2060
2880 min Winter	2.728	0.0	2652
4320 min Winter	1.960	0.0	3292
5760 min Winter	1.549	0.0	4216
7200 min Winter	1.289	0.0	5120
8640 min Winter	1.110	0.0	5984
10080 min Winter	0.977	0.0	6864

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.957

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.300	4	8	0.300	8	12	0.357

Model Details

Storage is Online Cover Level (m) 118.000

Infiltration Basin Structure

Invert Level (m) 117.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01200 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.01200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	910.0	1.000	1388.0	1.001	1388.5

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	115.196	0.196	2.2	152.2	O K
30 min Summer	115.251	0.251	2.3	197.9	O K
60 min Summer	115.304	0.304	2.3	242.9	O K
120 min Summer	115.354	0.354	2.3	286.6	O K
180 min Summer	115.384	0.384	2.3	313.5	O K
240 min Summer	115.404	0.404	2.3	331.7	O K
360 min Summer	115.428	0.428	2.3	353.3	O K
480 min Summer	115.441	0.441	2.3	364.9	O K
600 min Summer	115.447	0.447	2.3	370.7	O K
720 min Summer	115.449	0.449	2.3	372.8	O K
960 min Summer	115.446	0.446	2.3	369.8	O K
1440 min Summer	115.428	0.428	2.3	353.0	O K
2160 min Summer	115.402	0.402	2.3	329.7	O K
2880 min Summer	115.380	0.380	2.3	309.6	O K
4320 min Summer	115.341	0.341	2.3	275.7	O K
5760 min Summer	115.309	0.309	2.3	247.8	O K
7200 min Summer	115.283	0.283	2.3	224.9	O K
8640 min Summer	115.260	0.260	2.3	205.8	O K
10080 min Summer	115.241	0.241	2.3	189.7	O K
15 min Winter	115.218	0.218	2.3	170.7	O K
30 min Winter	115.279	0.279	2.3	222.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	101.200	0.0	130.5	30
30 min Summer	66.000	0.0	164.0	45
60 min Summer	40.800	0.0	236.3	74
120 min Summer	24.450	0.0	281.6	134
180 min Summer	18.084	0.0	309.8	192
240 min Summer	14.550	0.0	328.8	252
360 min Summer	10.617	0.0	350.4	370
480 min Summer	8.446	0.0	359.3	488
600 min Summer	7.049	0.0	361.3	606
720 min Summer	6.067	0.0	360.1	726
960 min Summer	4.765	0.0	354.8	962
1440 min Summer	3.371	0.0	339.8	1250
2160 min Summer	2.379	0.0	512.7	1592
2880 min Summer	1.863	0.0	532.7	1984
4320 min Summer	1.330	0.0	558.7	2776
5760 min Summer	1.055	0.0	615.8	3584
7200 min Summer	0.888	0.0	647.6	4392
8640 min Summer	0.776	0.0	677.5	5112
10080 min Summer	0.695	0.0	705.0	5856
15 min Winter	101.200	0.0	144.9	30
30 min Winter	66.000	0.0	176.5	45

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	115.338	0.338	2.3	272.6	O K
120 min Winter	115.394	0.394	2.3	322.3	O K
180 min Winter	115.428	0.428	2.3	353.0	O K
240 min Winter	115.451	0.451	2.3	374.1	O K
360 min Winter	115.478	0.478	2.3	399.7	O K
480 min Winter	115.493	0.493	2.3	414.1	O K
600 min Winter	115.502	0.502	2.3	422.0	O K
720 min Winter	115.506	0.506	2.3	425.8	O K
960 min Winter	115.505	0.505	2.3	425.3	O K
1440 min Winter	115.489	0.489	2.3	410.1	O K
2160 min Winter	115.455	0.455	2.3	378.1	O K
2880 min Winter	115.426	0.426	2.3	351.5	O K
4320 min Winter	115.372	0.372	2.3	302.7	O K
5760 min Winter	115.324	0.324	2.3	260.5	O K
7200 min Winter	115.283	0.283	2.3	225.5	O K
8640 min Winter	115.249	0.249	2.3	196.4	O K
10080 min Winter	115.220	0.220	2.3	172.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	40.800	0.0	264.1	74
120 min Winter	24.450	0.0	312.9	132
180 min Winter	18.084	0.0	341.1	190
240 min Winter	14.550	0.0	357.5	248
360 min Winter	10.617	0.0	369.3	364
480 min Winter	8.446	0.0	369.8	480
600 min Winter	7.049	0.0	367.7	596
720 min Winter	6.067	0.0	364.7	712
960 min Winter	4.765	0.0	357.7	940
1440 min Winter	3.371	0.0	342.7	1376
2160 min Winter	2.379	0.0	572.3	1720
2880 min Winter	1.863	0.0	593.4	2164
4320 min Winter	1.330	0.0	611.8	3036
5760 min Winter	1.055	0.0	689.9	3872
7200 min Winter	0.888	0.0	725.6	4688
8640 min Winter	0.776	0.0	759.5	5448
10080 min Winter	0.695	0.0	790.9	6160

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 451900 225600 SP 51900 25600
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.815

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.200	4	8	0.200	8	12	0.200	12	16	0.215

Model Details

Storage is Online Cover Level (m) 116.000

Tank or Pond Structure

Invert Level (m) 115.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	740.0	1.000	1176.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	115.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3
Flush-Flo™	0.307	2.3
Kick-Flo®	0.625	1.9
Mean Flow over Head Range	-	2.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	115.270	0.270	2.3	213.8	O K
30 min Summer	115.344	0.344	2.3	278.3	O K
60 min Summer	115.416	0.416	2.3	342.1	O K
120 min Summer	115.484	0.484	2.3	405.5	O K
180 min Summer	115.526	0.526	2.3	445.2	O K
240 min Summer	115.555	0.555	2.3	473.0	O K
360 min Summer	115.591	0.591	2.3	508.1	O K
480 min Summer	115.612	0.612	2.3	529.4	O K
600 min Summer	115.626	0.626	2.3	542.7	O K
720 min Summer	115.634	0.634	2.3	550.7	O K
960 min Summer	115.639	0.639	2.3	556.5	O K
1440 min Summer	115.632	0.632	2.3	549.1	O K
2160 min Summer	115.601	0.601	2.3	517.6	O K
2880 min Summer	115.571	0.571	2.3	488.5	O K
4320 min Summer	115.527	0.527	2.3	445.6	O K
5760 min Summer	115.491	0.491	2.3	412.0	O K
7200 min Summer	115.462	0.462	2.3	385.0	O K
8640 min Summer	115.437	0.437	2.3	361.9	O K
10080 min Summer	115.415	0.415	2.3	341.9	O K
15 min Winter	115.300	0.300	2.3	239.7	O K
30 min Winter	115.382	0.382	2.3	312.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.680	0.0	172.5	31
30 min Summer	92.400	0.0	190.3	45
60 min Summer	57.120	0.0	325.1	74
120 min Summer	34.230	0.0	369.0	134
180 min Summer	25.318	0.0	377.5	194
240 min Summer	20.370	0.0	376.8	254
360 min Summer	14.863	0.0	370.0	372
480 min Summer	11.825	0.0	361.9	492
600 min Summer	9.868	0.0	354.2	610
720 min Summer	8.493	0.0	347.7	730
960 min Summer	6.670	0.0	337.3	968
1440 min Summer	4.719	0.0	321.4	1444
2160 min Summer	3.331	0.0	680.1	2060
2880 min Summer	2.608	0.0	672.5	2292
4320 min Summer	1.862	0.0	632.6	3024
5760 min Summer	1.477	0.0	862.1	3808
7200 min Summer	1.244	0.0	906.5	4616
8640 min Summer	1.086	0.0	948.5	5440
10080 min Summer	0.973	0.0	987.7	6168
15 min Winter	141.680	0.0	183.1	30
30 min Winter	92.400	0.0	193.5	45

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	115.461	0.461	2.3	384.0	O K
120 min Winter	115.537	0.537	2.3	455.7	O K
180 min Winter	115.584	0.584	2.3	501.1	O K
240 min Winter	115.616	0.616	2.3	533.1	O K
360 min Winter	115.657	0.657	2.3	574.2	O K
480 min Winter	115.682	0.682	2.3	599.3	O K
600 min Winter	115.697	0.697	2.3	615.1	O K
720 min Winter	115.707	0.707	2.3	625.1	Flood Risk
960 min Winter	115.715	0.715	2.3	633.8	Flood Risk
1440 min Winter	115.712	0.712	2.3	630.7	Flood Risk
2160 min Winter	115.689	0.689	2.3	606.7	O K
2880 min Winter	115.659	0.659	2.3	575.8	O K
4320 min Winter	115.599	0.599	2.3	515.6	O K
5760 min Winter	115.547	0.547	2.3	465.0	O K
7200 min Winter	115.502	0.502	2.3	421.8	O K
8640 min Winter	115.461	0.461	2.3	383.9	O K
10080 min Winter	115.425	0.425	2.3	350.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	57.120	0.0	355.8	74
120 min Winter	34.230	0.0	379.4	132
180 min Winter	25.318	0.0	377.0	190
240 min Winter	20.370	0.0	370.1	250
360 min Winter	14.863	0.0	356.6	366
480 min Winter	11.825	0.0	347.6	484
600 min Winter	9.868	0.0	340.9	600
720 min Winter	8.493	0.0	335.6	718
960 min Winter	6.670	0.0	327.3	950
1440 min Winter	4.719	0.0	314.7	1410
2160 min Winter	3.331	0.0	681.5	2080
2880 min Winter	2.607	0.0	660.9	2712
4320 min Winter	1.862	0.0	627.5	3332
5760 min Winter	1.477	0.0	965.2	4208
7200 min Winter	1.244	0.0	1014.7	5048
8640 min Winter	1.086	0.0	1061.2	5880
10080 min Winter	0.973	0.0	1103.8	6664

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 451900 225600 SP 51900 25600
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.815

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.200	4	8	0.200	8	12	0.200	12	16	0.215

Model Details

Storage is Online Cover Level (m) 116.000

Tank or Pond Structure

Invert Level (m) 115.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	740.0	1.000	1176.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	115.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3
Flush-Flo™	0.307	2.3
Kick-Flo®	0.625	1.9
Mean Flow over Head Range	-	2.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	115.265	0.265	2.3	209.7	O K
30 min Summer	115.339	0.339	2.3	274.0	O K
60 min Summer	115.413	0.413	2.3	339.7	O K
120 min Summer	115.483	0.483	2.3	404.5	O K
180 min Summer	115.521	0.521	2.3	440.2	O K
240 min Summer	115.545	0.545	2.3	463.4	O K
360 min Summer	115.577	0.577	2.3	494.2	O K
480 min Summer	115.598	0.598	2.3	514.9	O K
600 min Summer	115.612	0.612	2.3	529.4	O K
720 min Summer	115.623	0.623	2.3	539.7	O K
960 min Summer	115.635	0.635	2.3	552.4	O K
1440 min Summer	115.642	0.642	2.3	558.7	O K
2160 min Summer	115.628	0.628	2.3	545.1	O K
2880 min Summer	115.605	0.605	2.3	522.0	O K
4320 min Summer	115.563	0.563	2.3	480.6	O K
5760 min Summer	115.524	0.524	2.3	442.9	O K
7200 min Summer	115.487	0.487	2.3	407.8	O K
8640 min Summer	115.452	0.452	2.3	375.2	O K
10080 min Summer	115.418	0.418	2.3	344.5	O K
15 min Winter	115.295	0.295	2.3	235.1	O K
30 min Winter	115.377	0.377	2.3	307.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	170.4	31
30 min Summer	90.986	0.0	189.8	45
60 min Summer	56.713	0.0	323.1	74
120 min Summer	34.148	0.0	368.6	134
180 min Summer	25.042	0.0	377.1	194
240 min Summer	19.977	0.0	377.0	254
360 min Summer	14.486	0.0	371.8	372
480 min Summer	11.532	0.0	364.7	492
600 min Summer	9.655	0.0	357.4	610
720 min Summer	8.347	0.0	350.5	730
960 min Summer	6.629	0.0	338.2	968
1440 min Summer	4.783	0.0	319.4	1444
2160 min Summer	3.446	0.0	680.7	2160
2880 min Summer	2.728	0.0	666.9	2424
4320 min Summer	1.960	0.0	627.9	3080
5760 min Summer	1.549	0.0	903.7	3864
7200 min Summer	1.289	0.0	939.6	4624
8640 min Summer	1.110	0.0	968.7	5448
10080 min Summer	0.977	0.0	991.8	6248
15 min Winter	138.993	0.0	181.6	30
30 min Winter	90.986	0.0	193.2	45

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	115.458	0.458	2.3	381.2	O K
120 min Winter	115.536	0.536	2.3	454.6	O K
180 min Winter	115.578	0.578	2.3	495.4	O K
240 min Winter	115.605	0.605	2.3	522.3	O K
360 min Winter	115.642	0.642	2.3	558.7	O K
480 min Winter	115.666	0.666	2.3	583.4	O K
600 min Winter	115.683	0.683	2.3	600.7	O K
720 min Winter	115.695	0.695	2.3	613.3	O K
960 min Winter	115.711	0.711	2.3	629.3	Flood Risk
1440 min Winter	115.722	0.722	2.3	640.7	Flood Risk
2160 min Winter	115.714	0.714	2.3	633.1	Flood Risk
2880 min Winter	115.694	0.694	2.3	612.0	O K
4320 min Winter	115.644	0.644	2.3	560.7	O K
5760 min Winter	115.588	0.588	2.3	505.4	O K
7200 min Winter	115.532	0.532	2.3	451.1	O K
8640 min Winter	115.479	0.479	2.3	400.4	O K
10080 min Winter	115.428	0.428	2.3	353.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	56.713	0.0	354.0	74
120 min Winter	34.148	0.0	379.4	132
180 min Winter	25.042	0.0	377.5	190
240 min Winter	19.977	0.0	372.1	250
360 min Winter	14.486	0.0	360.0	366
480 min Winter	11.532	0.0	350.4	484
600 min Winter	9.655	0.0	343.1	600
720 min Winter	8.347	0.0	337.1	718
960 min Winter	6.629	0.0	327.7	950
1440 min Winter	4.783	0.0	314.6	1410
2160 min Winter	3.446	0.0	679.8	2080
2880 min Winter	2.728	0.0	657.2	2716
4320 min Winter	1.960	0.0	611.7	3416
5760 min Winter	1.549	0.0	1011.4	4272
7200 min Winter	1.289	0.0	1051.4	5112
8640 min Winter	1.110	0.0	1083.6	5888
10080 min Winter	0.977	0.0	1108.2	6672

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.815

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.200	4	8	0.200	8	12	0.200	12	16	0.215

Model Details

Storage is Online Cover Level (m) 116.000

Tank or Pond Structure

Invert Level (m) 115.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	740.0	1.000	1176.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	115.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3
Flush-Flo™	0.307	2.3
Kick-Flo®	0.625	1.9
Mean Flow over Head Range	-	2.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Appendix 7: Surface Water Drainage Drawing

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.
5. Indicative surface water drainage based upon Parameters Plan produced by Edge, reference: 374_P01.
6. Infiltration rates are based upon investigation undertaken by Exploration & testing Associate, project number: C10194
7. Drainage features outlines are indicative only.
8. The drawing is not to be used for construction with all drainage features and associated levels being confirmed as part of detailed design.
9. Impermeable areas quoted based upon 65% of developable area being impermeable with a further 10% to account for future Urban Creep.
10. This drawing is to be read in conjunction with the Sustainable Drainage Statement, reference: UHO-BWB-ZZ-XX-RP-CD-0001_SDS

Legend

- Northern Catchment
- Central Catchment
- Southern Catchment
- Proposed Outfall
- SuDS Basin
- SuDS Maintenance Buffer

Rev	Date	Details of issue / revision	Drw	Rev
P2	20.01.22	Updated to Reflect Comments	KA	CT
P1	20.12.21	Preliminary Issue	KA	-

Issues & Revisions

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Nottingham | 0115 924 1100
www.bwbconsulting.com

Client

Richborough Estates Ltd

Project Title

Heyford Park, Land North of Camp Road

Drawing Title

Outline Surface Water Drainage

Drawn:	K.Alger		Reviewed:		
BWB Ref:	BMW3171	Date:	16.12.21	Scale@A1:	1:1000

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
UHO-BWB-ZZ-XX-DR-CD-0002	**S2**	**P02**

Appendix 8: Thames water Pre-development Enquiry Response

Leigh Screen

BWB Consulting Ltd
35 Livery Street
Birmingham
B3 2PB

Wastewater pre-planning
Our ref DS6090860

24 December 2021

Pre-planning enquiry: Confirmation of sufficient capacity (Foul Water)

Site: Upper Heyford, Chilgrove Drive, Heyford Park, Cherwell, Oxfordshire, OX25 5LX

Dear Leigh,

Thank you for providing information on your development.

Proposed General Housing (152)
Proposed FW discharge by gravity into FWMH SP49259901
No information on surface water discharge, should follow disposal hierarchy

We have completed the assessment of the foul water flows based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain
6. controlled rainwater discharge to a combined sewer

Where connection to the public sewerage network is still required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Please see the attached 'Planning your wastewater' leaflet for additional information.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

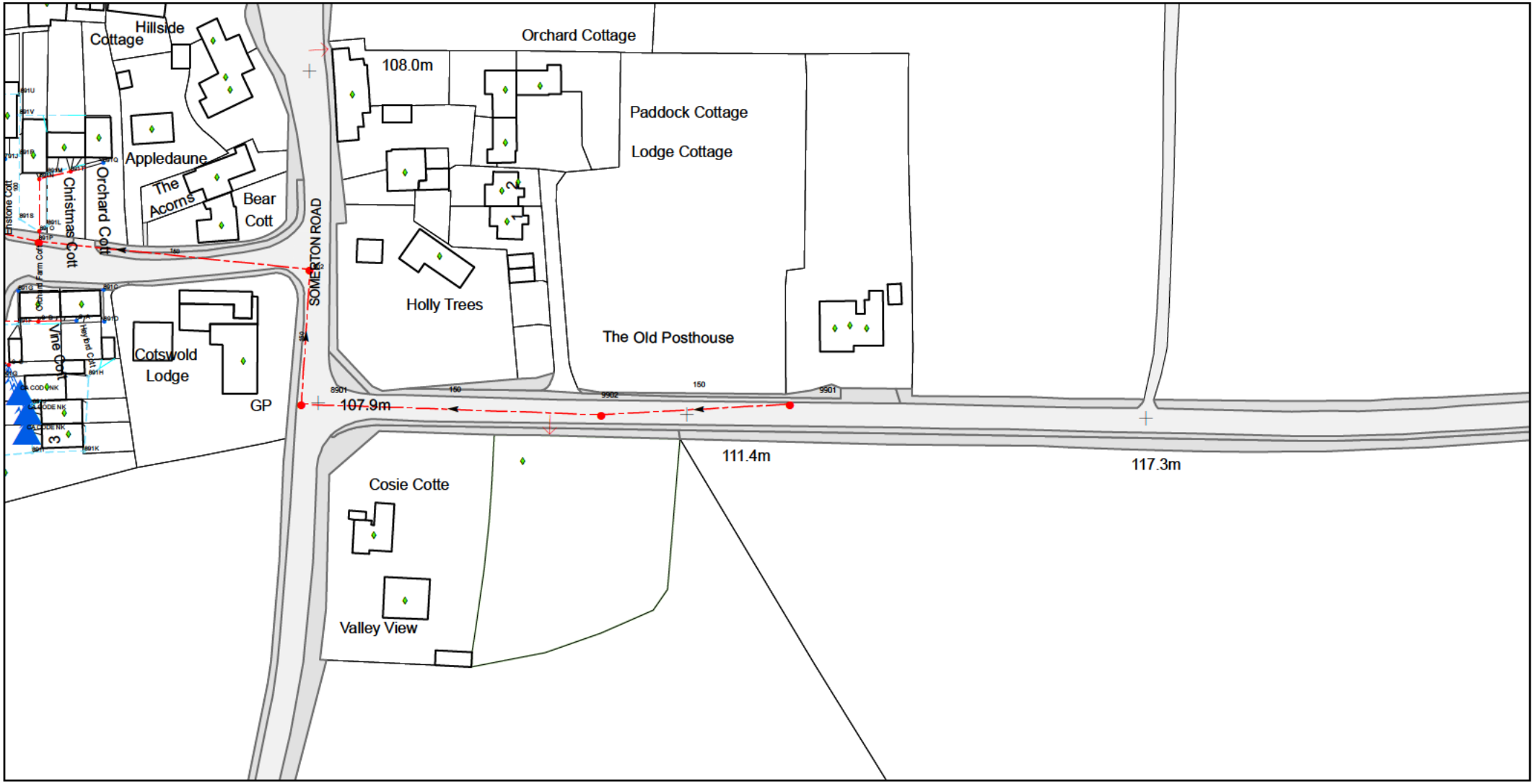
If you have any further questions, please contact me on 0774 764 6498.

Kind Regards,

Long Tran
Developer Services – Adoptions Engineer, Sewer Adoptions Team
Tel: 0800 009 3921
Get advice on making your sewer connection correctly at connectright.org.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

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

Thames Water



The position of any boundary or apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. No liability of any kind whatsoever is accepted by Thames Water for any error or omission.

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Printed By :DREES3
Print Date :29/05/2020
Map Centered On :449972,225928
Grid Reference :SP4925

DS6072974

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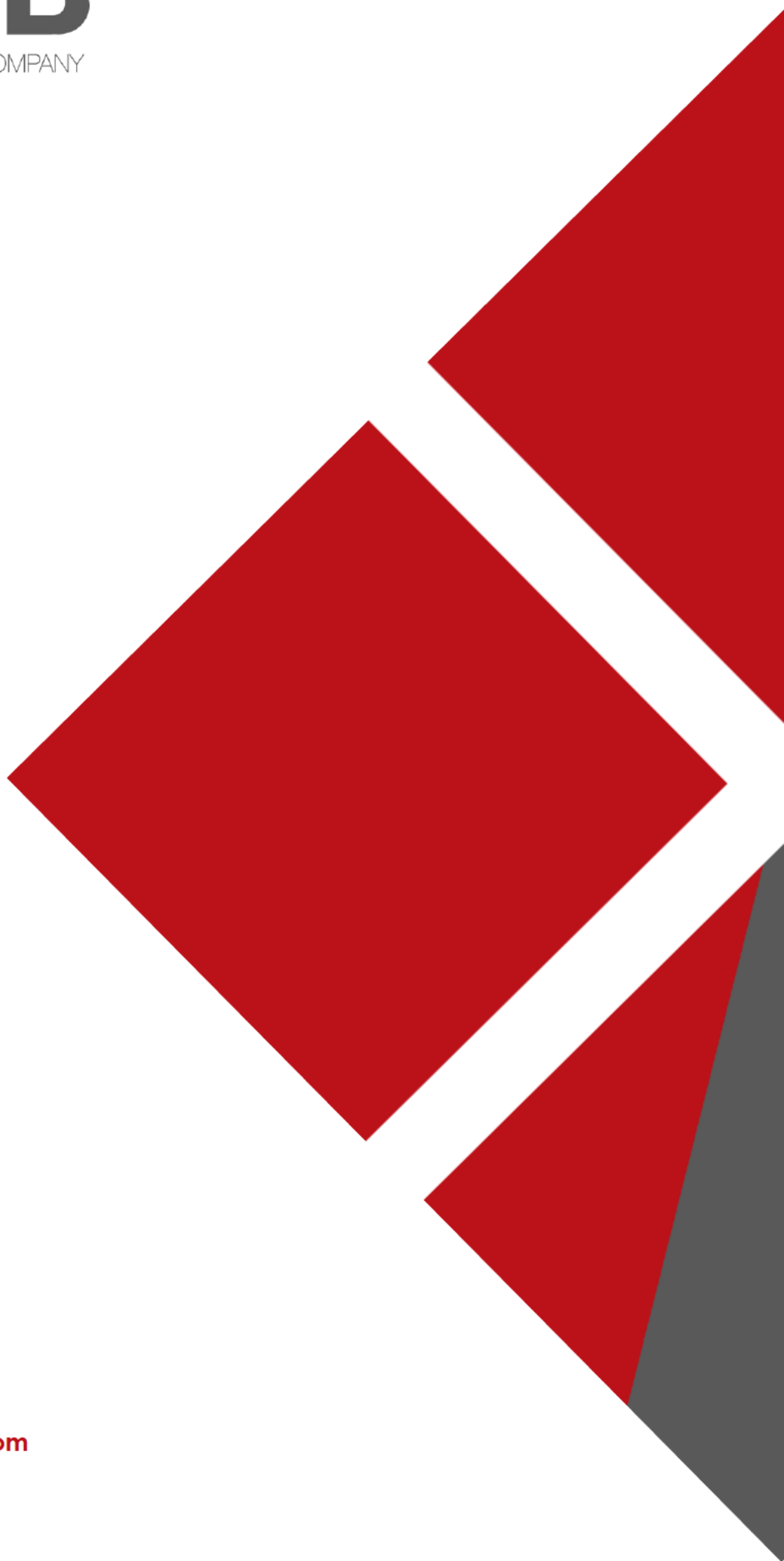

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