Flood Risk Assessment and Drainage Strategy

Denham's Corner, Horton Heath

Southern Strategic Land Two LLP

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1.0 Introduction

1.1 Background

SLR Consulting Ltd has been appointed by Southern Strategic Land Two LLP to prepare a Flood Risk Assessment (FRA) and preliminary drainage strategy to support an outline planning application for land at Denham's Corner, Horton Heath ("the site").

According to the Environment Agency (EA) Flood Map for Planning, the site is almost entirely located within Flood Zone 1 (low risk). Areas within Flood Zone 1 are deemed to have less than a 1 in 1000 (0.1%) annual probability of flooding in any given year. However, a very small part of the site clips Flood Zone 2 (medium risk; areas within Flood Zone 2 have between a 1 in 1000 (0.1%) and 1 in 100 (1%) annual probability of flooding in any given year) and Flood Zone 3 (high risk; areas within Flood Zone 3 have a 1 in 100 (1%) or greater annual probability of flooding in any given year).

Given the flood zone status of the site, and its size (i.e., greater than 1 hectare (ha)), in accordance with the National Planning Policy Framework[1] (NPPF), an FRA is required to support the forthcoming planning submission.

This FRA has been prepared under the direction of a Technical Director of Hydrology at SLR who specialises in flood risk and associated planning matters. Reporting has been completed in accordance with guidance presented within the NPPF and its associated Planning Practice Guidance[2] (PPG), taking due account of current best practice documents relating to the assessment of flood risk published by the British Standards Institution BS8533[3] and local planning policies.

1.2 Development Proposal

Construction of up to 150 dwellings including 40% affordable housing, sustainable travel hub including parcel lockers and electric vehicle charging points for visitors, with associated vehicular access off Snakemoor Lane, a shared pedestrian and cycle access off Snakemoor Lane, a shared pedestrian and cycle access off Botley Road, associated infrastructure, public open space and play area, hard and soft landscaping, boundary treatments, sustainable urban drainage systems and provision for biodiversity net gain. The Proposed Site Layout is enclosed in Appendix A.

1.3 Aims and Objectives

The aim of this FRA is to demonstrate that the site can be developed safely for residential purposes, without exposing it to an unacceptable degree of flood risk and/or increasing the flood risk to third parties. The objectives of this FRA are to:

- Review the relevant planning policy documents to ensure that the development proposals are in accordance with this and other regional and local guidance.
- Undertake a desk-based review of the available flood risk information to assess current and future flood risk issues, taking into consideration the anticipated impacts of climate change.
- Identify flood mitigation requirements, if any, to ensure the development is safe from flooding, without impacting third parties.
- Assess whether the development will result in an increase of surface water runoff and how this can be mitigated through the incorporation of Sustainable Drainage Systems (SuDS), which are informed through Lead Local Flood Authority (LLFA) guidance.
- Evaluate a conceptual foul water drainage solution.

1 Revised National Planning Policy Framework: Communities and Local Government

2 Planning Practice Guidance, Flood Risk and Coastal Change: Communities and Local Government

3 BS8533:2017, Assessing and managing flood risk in development: Code of Practice

2.0 Site Description

2.1 Site Location and Description

The site is located to the south of Horton Heath, Hampshire. The approximate grid reference for this location is SU499163 and the site is approximately 9 hectares (ha) in size. The site location is shown in Figure 1.

The site comprises of a large agricultural field and an adjoining area of woodland (to the west). Snakemoor Lane and Botley Road are located to the south and west, respectively. The site is surrounded by residential development, woodland and fields.

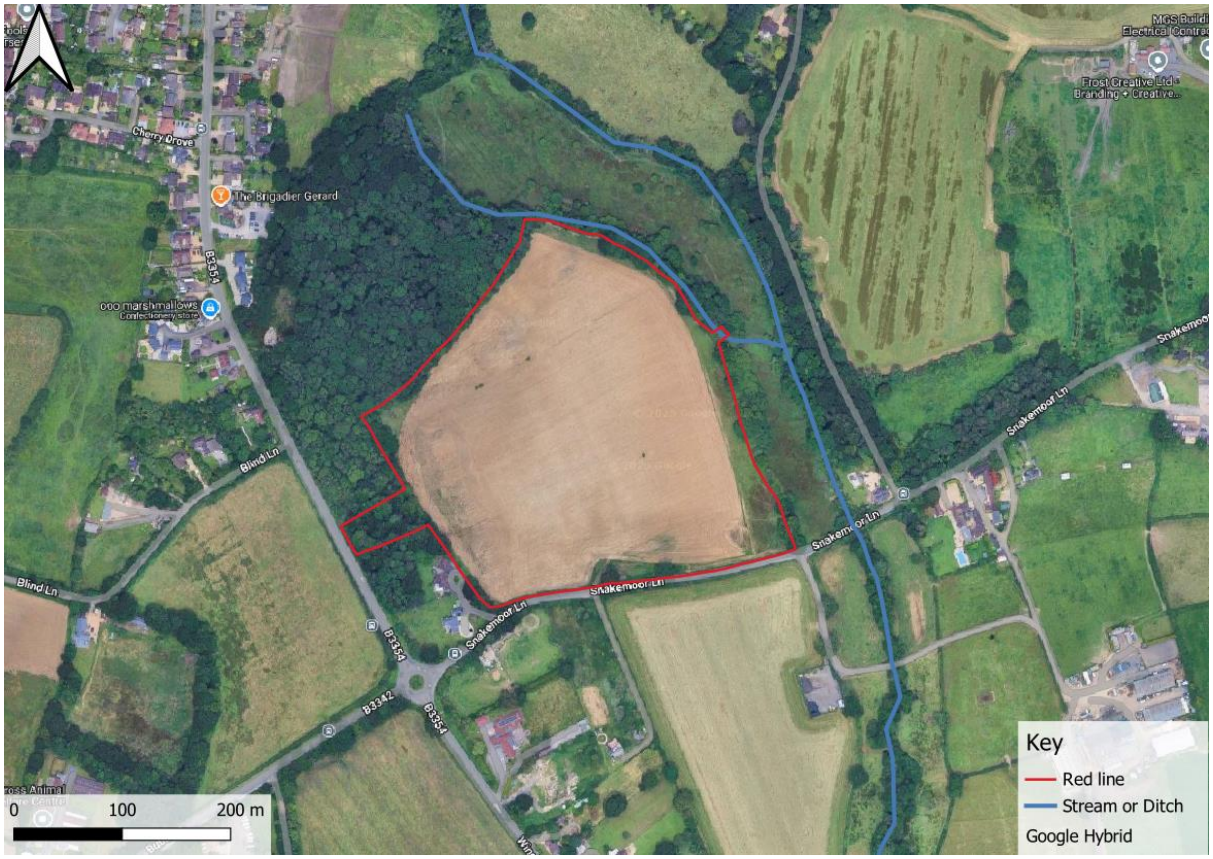


Figure 1: Site Location Plan

2.2 Site Topography

A topographical survey of the site is enclosed in Appendix B. It shows that there is a centrally located high point within the site at approximately 35 m AOD. Ground levels fall in all directions from the high point. However, most of the site drains into a tributary of the River Hamble, which is located alongside the east boundary of the site. Lowest levels on site are approximately 26 m AOD and located in the southeast corner of the site.

2.3 Geology and Hydrogeology

The 1 in 50,000 scale British Geological Survey (BGS) online mapping indicates that the site is underlain by Wittering Formation - sand, silt and clay. No superficial deposits are indicated to be present beneath the site.

Infiltration testing was undertaken by AIS in October 2024, as part of a Ground Investigation. This included three test pits, which identified clay to a depth of at least 1.8 m. All test pits failed to drain sufficiently (refer to Appendix C for further details).

2.4 Hydrology and Existing Drainage

Two tributaries of the River Hamble are located alongside the east boundary of the site, as shown on the topographic survey (Appendix B) and Figure 1. This includes a small ditch which drains the woodland area to the northwest of the site. Towards the northeast corner of the site, the ditch joins a larger watercourse, which flows to the south and beneath Snakemoor Lane. The watercourse meets River Hamble to the southeast of Boorley Green.

Southern Water sewer maps are enclosed in Appendix D, which show that there are no public sewers within the site. There are limited surface water sewers within the wider area, but at 150 mm diameter foul sewer is located to the west of Botley Road (approximately 200 m west of the site). This becomes joins a 225 mm diameter opposite The Brigadier Gerard [public house] approximately 250 m to the northwest of the site.

3.0 Planning Policy and Guidance

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's national policies for flood risk management in a land use planning context within England and how these are expected to be applied. It states the requirement for a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impact of climate change – so as to avoid, where possible, flood risk to people and property.

The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the development in areas with a lower risk of flooding.

If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the Exception Test may have to be applied. The need for the Exception Test will depend on the potential vulnerability of the site and of the development proposed.

In accordance with Annex 3: Flood risk vulnerability classification of the Planning Practice Guidance (PPG), the proposed residential development is classified as More Vulnerable.

Table 2 of the PPG sets out the 'incompatibility' of the flood risk vulnerability classification with the identified flood zones. The site is mostly in Flood Zone 1, with a small area of Flood Zone 2 and Flood Zone 3; however, all built development including the access road, is in Flood Zone 1. This is compatible with More Vulnerable development. The site is also not susceptible to any other significant sources of flood risk. Consequently, application of the Sequential and Exception Test is not required.

3.2 Eastleigh Borough Local Plan

The Eastleigh Borough Local Plan 2016-2036 was adopted on 25 April 2022. It sets out the policies and plans to guide future development to 2036. It will be used to determine planning applications in the Borough and replaces the 'saved' policies in the Adopted Local Plan 2001-2011. It includes Policy DM5 (Managing flood risk) and Policy DM6 (Sustainable surface water management and watercourse management).

Policy DM5 replicates national planning policy – is stipulates the need for the Sequential Test, where appropriate, and promotes the use of SuDS to manage surface water runoff.

Policy DM6 is replicated on the following page. It refers to the need for SuDS to achieve a water quality treatment train. The pre-app response provided similar information and confirmed that "Given the proximity to the tributary of the River Hamble, the drainage strategy for the site would need to incorporate three forms of naturalised filtration to avoid adverse impacts from surface water run-off."

Policy DM6, Sustainable surface water management and watercourse management

1. New development (excluding extensions to dwellings and changes of use), will only be permitted if it incorporates Sustainable Drainage Systems (SuDS). Wherever feasible, naturalised filtration should be included within the treatment train as follows:
   a. On sites of 1 hectare or more, or within 100m of the River Itchen SAC or Solent Maritime SAC, SuDS schemes should include at least three forms of naturalised filtration. On sites within 100m of headwaters and tributaries draining into a SAC, SuDS schemes should include at least three forms of naturalised filtration unless hydrological studies and project-level Habitats Regulations Assessment demonstrate this to be unnecessary to protect the integrity of the SAC and its qualifying features;
   b. On other sites of between 0.5 hectares and 1 hectare, SuDS schemes should include at least two forms of naturalised filtration; and
   c. On other sites of less than 0.5 hectares non-naturalised SuDS e.g. permeable paving will be considered where justified.
2. In order to reduce flooding and maintain water quality (in accordance with DM8) SuDS schemes should:
   a. be designed and monitored in accordance with the CIRIA C753 SuDs Manual or equivalent national or local guidance, noting that all receiving waters in the Borough should be classified as protected waters;
   b. manage surface water runoff as close to its source as possible;
   c. ensure that discharge rates are reduced as far as possible and that on greenfield sites these should at least mirror greenfield rates before development;
   d. be provided as part of any application for outline or full planning permission;
   e. where discharge is to a wetland or wet woodland habitat, flows off site must mirror the natural hydrological pathways;
   f. include clear arrangements for their whole life management and maintenance.
3. Where a watercourse is present on a development site, it should be retained or restored into a natural state and enhanced where possible. The culverting of any watercourse will not generally be permitted, and development should wherever possible remove any existing culverts and increase on-site flood storage. Development should be laid out to enable maintenance of the watercourse.
4. Where development drains into a waterway connected to the Natura 2000 or Ramsar network a site specific Construction Environment Management Plan must be prepared before permission.

3.3 The SuDS Manual (CIRIA C753) 2015

The CIRIA SuDS Manual provides comprehensive guidance for the design and incorporation of SuDS. The manual sets out the process by which appropriate SuDS options may be selected for a site.

The guidance within the CIRIA SuDS Manual (2015) will be used for the planning, design, operation and maintenance of the proposed SuDS.

3.4 Policy Conclusions

The development proposals are consistent with the policies within the NPPF, Local Plan and supporting national, regional and local guidance documents. This is because built development is in

Flood Zone 1 and because surface water will be managed using an extensive network of SuDS. This is discussed in the following chapters.

4.0 Assessment of Flood Risk

4.1 Flood Zone Classification

The definition of EA flood zones is provided in Planning Practice Guidance (PPG), as replicated below:

- *Zone 1 - Low Probability* (Flood Zone 1) is defined as land which could be at risk of flooding from fluvial or tidal flood events with less than 0.1 % annual exceedance probability (AEP) (1 in 1,000 year) i.e., considered to be at 'low probability' of flooding.
- *Zone 2 - Medium Probability* (Flood Zone 2) is defined as land which could be at risk of flooding with an annual exceedance probability between 1 % (1 in 100 year) and 0.1 % (1 in 1,000 year) from fluvial sources and between 0.5 % (1 in 200 year) and 0.1 % (1 in 1,000 year) from tidal sources i.e., considered to be at 'medium probability' of flooding.
- *Zone 3a - High Probability* (Flood Zone 3a) is defined as land which could be at risk of flooding with an annual exceedance probability greater than 1 % (1 in 100 year) from fluvial sources and greater than 0.5 % (1 in 200 year) from tidal sources i.e., considered to be at 'high probability' of flooding.
- *Zone 3b - the Functional Floodplain* (Flood Zone 3b) is defined as land where water has to flow or be stored in times of flood. Local Planning Authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain in agreement with the EA. In the absence of definitive information, it is often defined as land that would flood with an AEP of 3.3 % (1 in 30 year) or greater, with any existing flood risk management infrastructure operating effectively.

According to the EA Flood Map for Planning the site is designated as mostly Flood Zone 1, with a very small part in Flood Zone 2 and Flood Zone 3.

4.2 Flooding from the Sea

The site is located inland and is elevated at least 26 m AOD. It is therefore not susceptible to flooding from the sea.

4.3 Flooding from Rivers

According to the EA Flood Map for Planning (Figure 2), the site is almost entirely located within Flood Zone 1 (low risk). However, a very small part of the site clips Flood Zone 2 (medium risk) and Flood Zone 3 (high risk).

Data provided by the EA (see Appendix E) confirms that these flood zones were generated by strategic scale flood models.

All built development is in Flood Zone 1 and therefore the risk of flooding to the development from rivers is low.



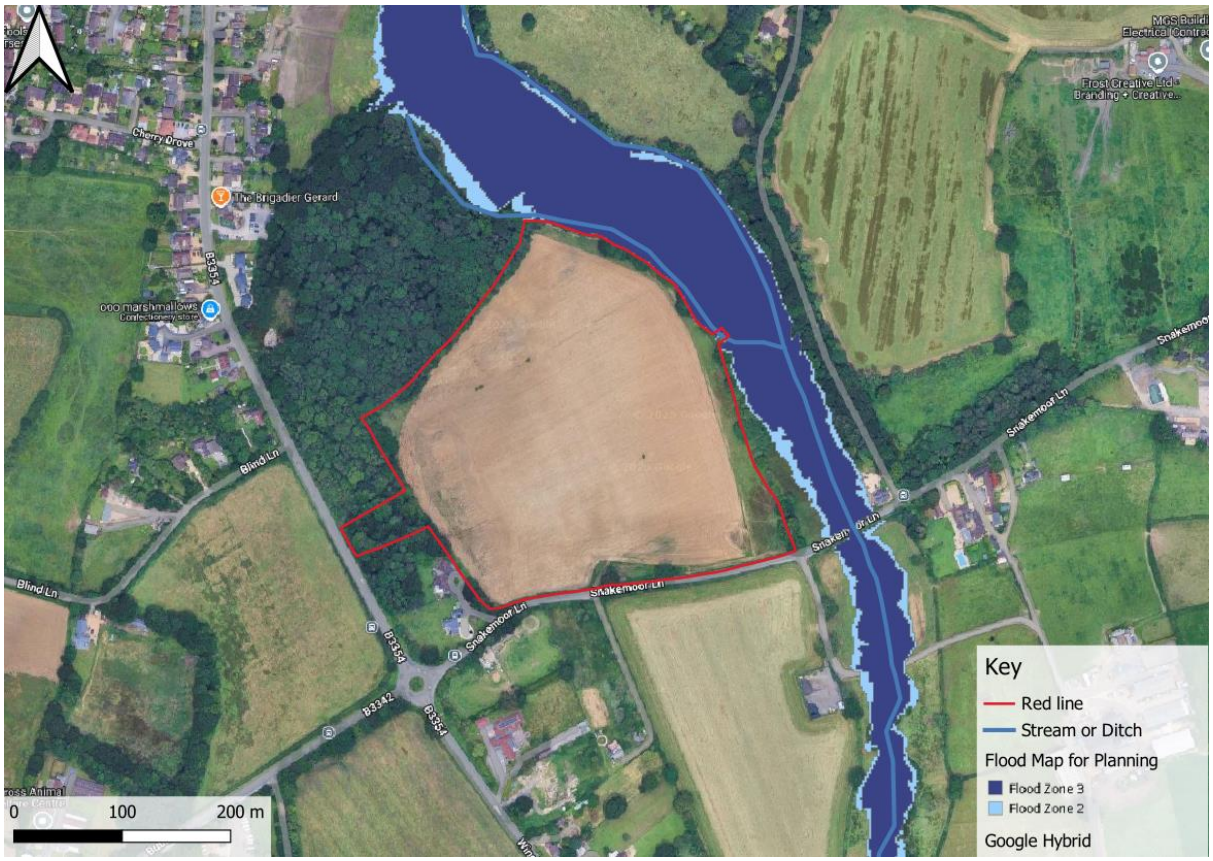


Figure 2: EA Flood Map for Planning

4.4 Flooding from Surface Water

Surface water flooding is a result of overland flow and ponding of water that can follow a rainfall event, from local catchment areas, hillsides and associated with minor ditches or streams. The Risk of Flooding from Surface Water map for the site is provided in Figure 3.

The Risk of Flooding from Surface Water map shows that most of the site is not at risk of surface water flooding (i.e. very low risk; defined as an area with less than 1 in 1,000 chance of flooding each year). Some peripheral parts of the site are subject to more elevated flood risk, but these areas are not subject to development. Therefore, the risk of flooding to the development from surface water is low.

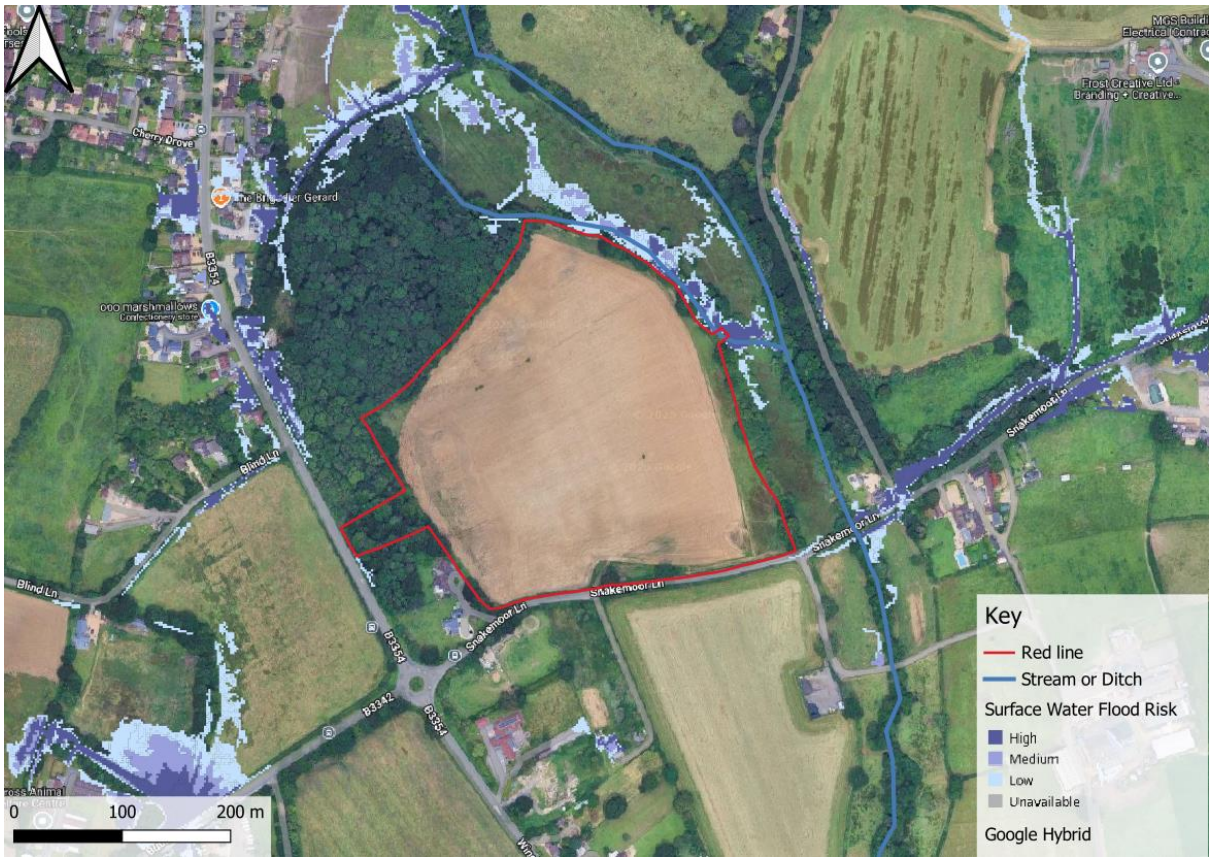


Figure 3: EA Flood Map for Surface Water

4.5 Flooding from Groundwater

Groundwater flooding typically occurs in low-lying areas, close to hills which are underlain by permeable rocks. This source of flooding generally only becomes a problem in these areas after long periods of extensive and significant rainfall, resulting in a rise in groundwater level.

No groundwater was encountered during the Ground Investigation (see Appendix C). Furthermore, the ground conditions were clay, which would minimise the risk of groundwater flooding. Therefore, groundwater flood risk is considered to be low.

4.6 Flooding from Sewers

Drainage and infrastructure flooding occurs when sewerage systems are overwhelmed and result in flooding, which may occur alone or be combined with other flood sources (e.g. fluvial or surface water).

There are no sewers on site or in the immediate vicinity. Therefore, the flood risk from this source is considered to be low.

4.7 Flooding from Other Sources

According to EA mapping, the site is not shown to be at flood risk from reservoirs. There are no impounded canals within the vicinity of the site that could pose a potential flood risk. Flood risk at the site from these sources is therefore negligible.

4.8 Flood Mitigation

Whilst the various potential sources of flood risk are not considered to represent a development constraint, finished floor levels (FFL) of all dwellings should be elevated above the surrounding

ground levels by at least 150 mm in accordance with building regulations. This will protect against the possibility of shallow ponding of water which is inevitable following heavy or prolonged rainfall.

Whilst areas to the east of the site are subject to fluvial flooding (i.e. Flood Zone 2 and Flood Zone 3), access in and out of the site is available from Snakemoor Lane to the south. Therefore, a safe access route exists for the development, should the wider area be subject to flooding.

5.0 Surface Water Management

5.1 Overview

It is well understood that one of the effects of development is typically to reduce the permeability of the site and consequently to change its response to rainfall. Therefore, a suitable surface water drainage strategy is required to ensure that the surface water runoff regime is managed appropriately so that there will be no increase flood risk to third parties.

The NPPF states that flood risk to land and property must not be increased as a result of development. The associated PPG states that flood risk should not increase for events up to and including a 1 in 100 year return period, with appropriate allowance for climate change. Surface water drainage arrangements for any development site must ensure that volumes and peak discharge rates leaving the site are no greater than those for the site prior to development.

5.2 Proposed Surface Water Discharge Receptor

The drainage hierarchy presented in the PPG states that the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration),
- to a surface water body,
- to a surface water sewer, highway drain, or another drainage system,
- to a combined sewer.

Discharge options were investigated in the order of preference specified in the drainage hierarchy. Infiltration testing was undertaken, as described in Chapter 2. The ground conditions recorded were found to be unsuitable for the use of infiltration as a means of surface water disposal.

A ditch is present on the east site boundary, which currently receives runoff from the site. This existing connectivity will therefore be retained as part of the proposed development.

5.3 Greenfield Runoff Rates

The FEH Method has been used to calculate the existing greenfield runoff rates for the site. The parameters utilised are detailed in Table 1, which shows the calculation was undertaken for an area of 1 ha. The calculated rates are presented in Table 2 and summary sheets are enclosed in Appendix F. The QBAR rate was estimated to be 7.0 l/s/ha.

Table 1: Calculation Parameters

Parameter	Value	Unit
Area	1	ha
SAAR	800	mm
BFI HOST 19	0.343	-
Region	7	-

Table 2: Greenfield Runoff Rates

Return Period	Peak Greenfield Discharge (l/s/ha)
QBAR	7.00
Q1	5.95
Q30	16.11
Q100	22.34

A watershed analysis using LiDAR data has been undertaken to estimate the area of the site that naturally drains to the watercourse adjacent to the east site boundary. However, not all of this is to be developed. The developed area within the catchment consists of 4.637 ha. These catchment areas are illustrated in Figure 4. Table 3 presents the greenfield runoff rates associated with the estimated impermeable area of the site that drains to the watercourse (i.e. 4.637 x 0.6 = 2.782 ha). This area is used to define an appropriate greenfield runoff rate.

The QBAR rate has been adopted to ensure that the long-term storage volume has been accommodated, so that the volume of surface water that is discharged from the site (as well as the rate that it is discharged at) has been managed.

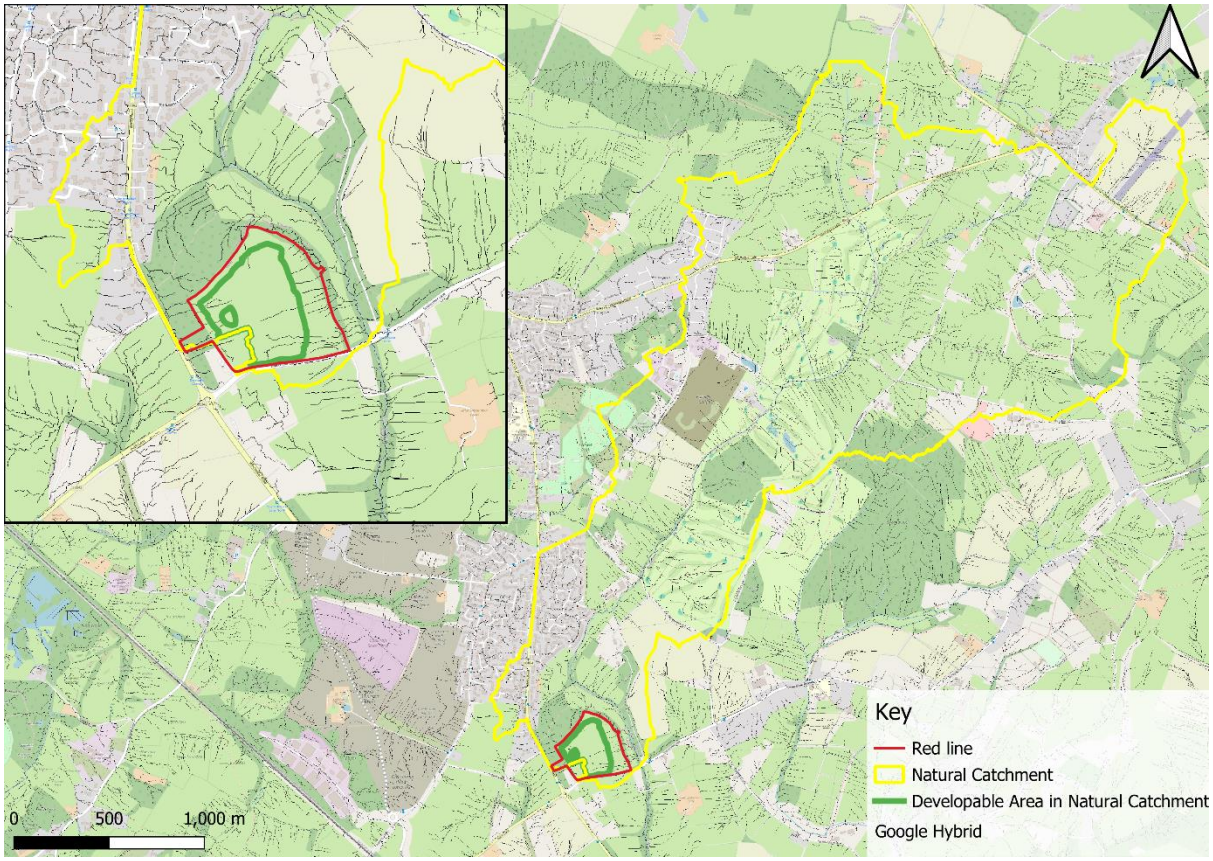


Figure 4: Catchment Area within the Site that drains to the Watercourse

Table 3: Greenfield Runoff Rates – Developable Area within Pond Catchment

Return Period	Peak Greenfield Discharge (l/s)
QBAR	19.5
Q1	16.6
Q30	44.8
Q100	62.1

5.4 Proposed Surface Water Drainage Strategy

Sustainable Drainage Systems (SuDS) will be utilised to manage surface water runoff. The SuDS Manual (CIRIA, 2015) has been considered during the preparation of this drainage strategy. The Preliminary Surface Water Drainage Strategy is enclosed in Appendix G.

Surface water runoff from roof surfaces and paved areas will be collected by a network of pipes and swales and drained towards two attenuation ponds. The final pond will outfall to the ditch via a swale.

The swales and ponds will offer water quality improvement and provide some attenuation storage. These SuDS could be supplemented with permeable paving, rain gardens and/or tree pits at a more detailed stage of design, which can provide further water quality, bio-diversity and aesthetic improvement.

A Causeway Flow model has been constructed inform the volume of attenuation storage required. This has been simulated using Flood Estimation Handbook 22 (FEH22) data and includes a 45% climate change allowance. The calculations are enclosed in Appendix F and the parameters used are outlined in Table 4.

The proposed impermeable area was estimated using a 60% factor of the developable area (i.e. 60% of the developable area accounts for all roof and paved surfaces). A 10% factor for urban creep has been applied to define a future impermeable area. As noted previously, a discharge rate has been established based on impermeable area within the natural catchment of the watercourse. This is illustrated on Figure 4.

Table 4: Causeway Flow Parameters

Parameter	Value	Units
Developable area	5.140	ha
Estimated impermeable area	3.084	ha
Urban creep	10	%
Future impermeable area	3.392	ha
Discharge rate	19.5	l/s
Infiltration rate	-	m/hr
Climate change allowance	45	%
Freeboard	300	mm
Basin side slope	1 in 4	-

The attenuation requirements have been split over two ponds, which require a total volume storage capacity of 2,065 m^3 (excluding freeboard) to manage the 1 in 100 year storm, with a 45% allowance for future climate change.

5.5 Conveyance of Exceedance Surface Water Flooding

The surface water drainage strategy must consider an exceedance scenario, i.e. for flows in excess of the 1 in 100 year plus climate change rainfall event. Exceedance flows must be managed in conveyance routes across a site that minimise the risk to people and property.

The design for exceedance will be addressed further at detailed design stage, when a detailed layout plan is available. However, in an exceedance scenario, roads would be designed to convey any exceedance flows away from people and property and towards the SuDS. Refer to the Preliminary Surface Water Drainage Strategy enclosed in Appendix G for further details.

5.6 Water Quality

In accordance with the CIRIA SuDS Manual (2015), SuDS components must have a total pollution index that equals or exceeds the pollution hazard index for different land use classifications. The highest Pollution Hazard Index for the site is Low (individual property driveways and low traffic roads). Refer to Table 5 (as informed by Table 26.2 of the CIRIA SuDS Manual 2015)).

Table 5: Pollution Hazard Indices

Land Use	Pollution Hazard Indices for Different Land Use Classifications			
	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4
Total		0.7	0.6	0.45

The CIRIA SuDS Manual (2015) stipulates that, if two or more SuDS components in series are used, a factor of 0.5 should be used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations. This has been taken into account in Table 6. It is considered that the proposed swale network and attenuation pond would provide sufficient water quality mitigation for the proposed site. Refer to Table 6 (as informed by Table 26.4 of the CIRIA SuDS Manual (2015)).

This will offer the three forms of naturalised filtration to avoid adverse impacts from surface water run-off on the River Hamble.

It should also be noted that parts of the site will drain through two ponds, which will offer further water quality improvement. Additional benefit can be offered by permeable paving, tree pits and / or rain gardens, but is subject to a more detailed stage of design.

Table 6: Mitigation Indices

Type of SuDS	Pollution Mitigation Indices		
	TSS	Metals	Hydrocarbons
Swale	0.50	0.60	0.60
Pond	0.35 (0.70 x 0.50)	0.35 (0.70 x 0.50)	0.25 (0.50 x 0.50)
Swale	0.25 (0.50 x 0.50)	0.30 (0.60 x 0.50)	0.30 (0.60 x 0.50)
Total	1.10	1.25	1.25

5.7 Operation and Maintenance

5.7.1 SuDS

It is anticipated that the proposed SuDS devices will remain private, and would be managed by a private maintenance company acting on behalf of the future property owners. Where privately maintained, the general maintenance requirements should be undertaken in accordance with the recommendations outlined in the CIRIA SuDS Manual (2015), as replicated in Figure 5 and 6.

5.7.2 Other Assets

Various other smaller assets of the surface water drainage strategy consist of gutters, down water pipes, manholes, pipes and drainage channels. These assets should be checked annually and after large storm events, in order to remove debris and inspect the condition.

Jet washing may be required on occasion to remove any blockages within the pipe network. If the condition is found to be poor, replacement or repairs may be required.

5.8 Summary

The surface water drainage strategy has been prepared to demonstrate that the proposed development of the site can meet national and local requirements for the management of surface water runoff. This will be achieved through the principles of SuDS but is subject to more detailed design considerations once a detailed site layout is available and outline planning permission has been approved.

Figure 5: Operation and Maintenance Requirements for Swales

TABLE 17.1 Operation and maintenance requirements for swales

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

Figure 6: Operation and Maintenance Requirements for Attenuation Ponds

TABLE 23.1 Operation and maintenance requirements for ponds and wetlands

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

6.0 Foul Drainage

Developers may connect to the nearest public sewer on a size for size basis at their cost and, in this case, Southern Water will provide capacity in the network to accommodate domestic type flows from granted development which is funded by infrastructure charging arrangements.

As noted in Chapter 2, there is a 150 mm diameter foul sewer approximately 200 m west of the site. The size of the public foul sewer will provide adequate capacity to accommodate the proposed development and thus will offer a suitable connection point. However, further details are discussed in Appendix D. A pumped connection is required.

7.0 Conclusions

This Flood Risk Assessment (FRA) and preliminary drainage strategy has been undertaken to accompany an outline planning application for land at Denham's Corner, Horton Heath.

This report has been prepared by SLR Consulting on behalf of Southern Strategic Land Two LLP in accordance with the guidelines set out in the National Planning Policy Framework, regional and local guidance documents.

The site lies almost entirely within Flood Zone 1 (i.e. land having a less than 1 in 1,000 annual probability of river or sea flooding, with this considered to be low risk). A very small part of the site is in Flood Zone 2 (medium risk) and Flood Zone 3 (high risk), but this is distant from the area proposed for development. No other significant sources of flood risk have been identified that represent a development constraint at the site.

An attenuation led surface water drainage strategy has been proposed to manage the impact of the development on surface water runoff. This has been based on the principles of Sustainable Drainage Systems (SuDS).

Foul water from the proposed development will be discharged to the existing public foul sewer network.

Appendix A Proposed Site Layout



SUMMARY

Site Area: 9.05ha

No. of dwellings: 150

HOUSING MIX

2B Bungalow:	1 no.	(1%)
3B Bungalow:	2 no.	(1%)
2B Semi:	46 no.	(31%)
2B Terraced:	5 no.	(3%)
3B Detached:	20 no.	(13%)
3B Semi:	34 no.	(23%)
3B Terraced:	8 no.	(5%)
4B Detached:	34 no.	(23%)
Total:	150 units	

KEY

- Site Boundary
- Soft ecology buffer
- Drainage pipe
- Swales
- Slope
- Tree Canopy
- RPA

NORTH

0 10.0 30.0 50.0 100.0 125.0m

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Rev.	Description	Date	Drw.	Chk.

Client
Southern Strategic Land LLP

Project
Denhams Corner
Horton Heath

Drawing Title
Proposed Site Layout

Drawing Status
PLANNING

Corstorphine & Wright

Fordingbridge Studio
27 Glasshouse Studios, Fryern Court Road, Fordingbridge, SP6 1QX
01425 655806
corstorphine-wright.com

Drawing No.	Revision
23063-0100	P-00

Drawn	Checked	Paper Size	Scale	Date
SL	DH	A2	1:1250	08.05.25

Appendix B Topographical Survey

TREES

A	Ash
AL	Alder
AP	Apple
B	Beech
BA	Bay
BT	Blackthorn
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
E	Elm
EL	Elder
EU	Eucalyptus
FM	Field Maple
FR	Fruit
HB	Hornbeam
HC	Horse Chestnut
HO	Holm Oak
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RO	Rowan
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SC	Sweet Chestnut
SP	Scots Pine
SU	Spruce
SY	Sycamore
TU	Tulip Tree
U	Unidentified
W	Willow
WB	Whitebeam
WN	Walnut
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Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

ABBREVIATIONS

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CB	Control Box
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CTV	Cable Television
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EP	Electricity Pole
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GSV	Gas Stop Valve
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IL	Invert Level
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MKR	Marker
MW	Monitoring Well
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WMF	Wire Mesh Fence
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449600mE 449625mE 449650mE 449675mE 449700mE 449725mE 449750mE 449775mE

116450mN 116425mN 116400mN 116375mN

Baker Row

Langleigh

29.9m

Path (um)

Dunrovin

Ivy Cottage

Und

SCOREYS COPSE

BOTLEY ROAD (B3354)

BLIND LANE

unmade woodland trail

unmade path

1.2m wp bwf

public footpath marker

footbridge

2m blackthorn

canopy of 15m oak trees

canopy of neighbouring trees

2.2m brambles + blackthorn

5m brambles + blackthorn

2.5m brambles

canopy of 6m small trees

canopy of 8m hazels

canopy of fallen tree

canopy of leylandii trees

canopy of 4m hawthorns

canopy of 4m hazels

canopy 6m wide

1.5m shrub

2.5m shrub

overhead electric + telecom cables

underground electric cable

ways

CB

SHEET 1 SHEET 2 SHEET 3 SHEET 4 SHEET 5 SHEET 6 SHEET 7 SHEET 8 SHEET 9 SHEET 10 SHEET 11

REVISION B - JULY 2024
Survey of wooded area north of Lane End House.

REVISION A - NOVEMBER 2023
Highway survey extended east on Snakemoor Lane.

NOTES

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DENHAMS CORNER SNAKEMOOR LANE HORTON HEATH	Contract
SITE SURVEY	Title
1234HH01B (Sheet 1 of 11)	Drawing Number
OCTOBER 2023	Date
1:200 (at A0)	Scale
HB AB	Surveyor(s)

TREES

A	Ash
AL	Alder
AP	Apple
B	Beech
BA	Bay
BT	Blackthorn
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
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116325mN
116300mN
116275mN
116250mN
449525mE
449550mE
449575mE
449700mE

SHEET 9
SHEET 8
SHEET 10
SHEET 11
SHEET 1
SHEET 7
SHEET 6
SHEET 2
SHEET 4
SHEET 5
SHEET 3

Stone

Lane End House

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A	Ash
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SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence

Lane End Stables

33.5m

BOTLEY ROAD (B3354)

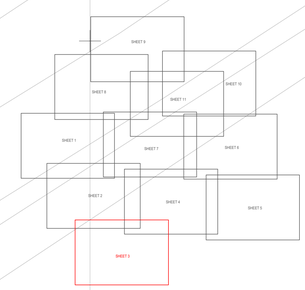
BUBB LANE (B3342)

WINCHESTER ROAD (B3354)

SNAKEMOOR LANE

LANE END HOUSE

116200mN
116175mN
116150mN
116125mN
116100mN
449700mE
449725mE
449750mE
449775mE
449800mE
449825mE
449850mE



REVISION B - JULY 2024
Survey of wooded area north of Lane End House.

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449870mE 449900mE 449925mE 449950mE 449975mE 450000mE 450025mE

116325mN 116300mN 116275mN 116250mN 116225mN

34.1m

SNAKEMOOR LANE

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FENCES

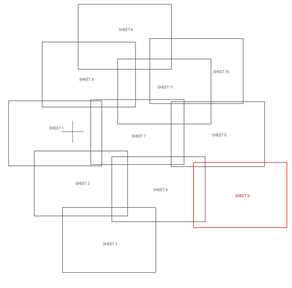
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Oaktree Lodge

25.0m

116350mN
116325mN
116300mN
116275mN
116250mN

450025mE
450050mE
450075mE
450100mE
450125mE
450150mE
450175mE
450200mE



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Dry Pond

Dry Sluice

116500mN

116475mN

116450mN

116425mN

116400mN

455975mE

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REVISION B - JULY 2024
Survey of wooded area north of Lane End House.

REVISION A - NOVEMBER 2023
Highway survey extended east on Snakemoor Lane.

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SOUTHERN STRATEGIC LAND TWO LLP	Client
DENHAMS CORNER SNAKEMOOR LANE HORTON HEATH	Contract
SITE SURVEY	Title
1234HH01B (Sheet 6 of 11)	Drawing Number
OCTOBER 2023	Date
1:200 (at A0)	Scale
HB AB	Surveyor(s)

TREES

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B	Beech
BA	Bay
BT	Blackthorn
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
E	Elm
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EU	Eucalyptus
FM	Field Maple
FR	Fruit
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HZ	Hazel
IBT	Indian Bean Tree
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W	Willow
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Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

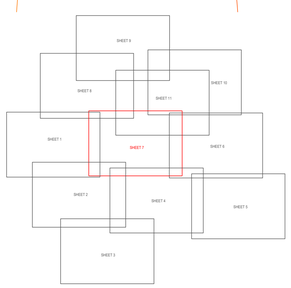
ABBREVIATIONS

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BOL	Bollard
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CTV	Cable Television
EL	Electric
EP	Electricity Pole
FH	Fire Hydrant
GSV	Gas Stop Valve
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UTL	Unable to Lift
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FENCES

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CBF	Closed Board Fence
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SHEET 4
SHEET 5
SHEET 3

SURVEY STATION INFORMATION

Name	Easting	Northing	Height	Type
H1	449644.648	116311.135	33.811	PEG
H2	449652.975	116360.952	34.794	PEG
H3	449636.456	116248.195	34.048	PEG
H4	450034.089	116300.977	29.856	PEG
H5	450127.157	116314.315	24.832	PEG
H6	449986.322	116426.858	31.760	PEG
H7	449911.511	116473.404	34.591	PEG
H8	449852.479	116472.424	34.591	PEG
H9	449881.850	116603.733	25.897	PEG
H10	449788.871	116699.260	28.605	PEG
H11	449617.503	116721.481	26.584	PEG
H12	449831.291	116633.377	25.844	PEG
H13	450116.025	116380.444	24.327	PEG
H14	450116.025	116380.444	24.327	PEG
H15	450260.105	116471.890	24.801	PEG
H17	450068.430	116518.013	24.949	PEG
H18	450045.894	116555.758	25.150	PEG
H19	450008.516	116597.306	25.353	PEG
H20	449963.618	116647.582	25.871	PEG
A1	449863.712	116467.582	29.871	NAIL
A2	449589.964	116496.012	29.900	NAIL
A3	449579.652	116532.241	29.917	NAIL
A4	449614.172	116447.050	29.770	NAIL
A5	449602.813	116372.649	29.710	NAIL
A26	449821.836	116638.010	26.572	PEG
A34	449747.330	116233.368	30.983	NAIL
A35	449724.274	116233.368	30.983	NAIL
A36	449748.714	116185.777	32.039	NAIL
A37	449788.181	116141.924	33.118	NAIL
A38	449789.300	116161.277	33.533	PEG
A39	449734.392	116130.368	33.834	NAIL
A40	449647.406	116225.128	34.754	PEG

REVISION B - JULY 2024
Survey of wooded area north of Lane End House.

A(G) REVISION A - NOVEMBER 2023
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DENHAMS CORNER SNAKEMOOR LANE HORTON HEATH	Contract
SITE SURVEY	Title
1234HH01B (Sheet 8 of 11)	Drawing Number
OCTOBER 2023	Date
1:200 (at A0)	Scale
HB AB	Surveyor(s)

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e.g. OK / 0.6 / 8 / 15

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1234HH01B (Sheet 10 of 11)	Drawing Number
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Appendix C Ground Investigation (extracts)

JOB NO. AD0804

GROUND INVESTIGATION REPORT

Geotechnical Factual Report

Land at Denham's Corner, North of Snakemoor Lane
Horton Heath, Hampshire, SO32 2BW

OCTOBER 2024







On behalf of:
M & G Developments Ltd

Advanced Investigation Systems Ltd
Stout Road, Henley, Langport, Somerset, TA10 9AZ

Email enquiries@windowsampling.com
Web www.windowsampling.com

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Advanced Investigation Systems is an AGS Data Provider

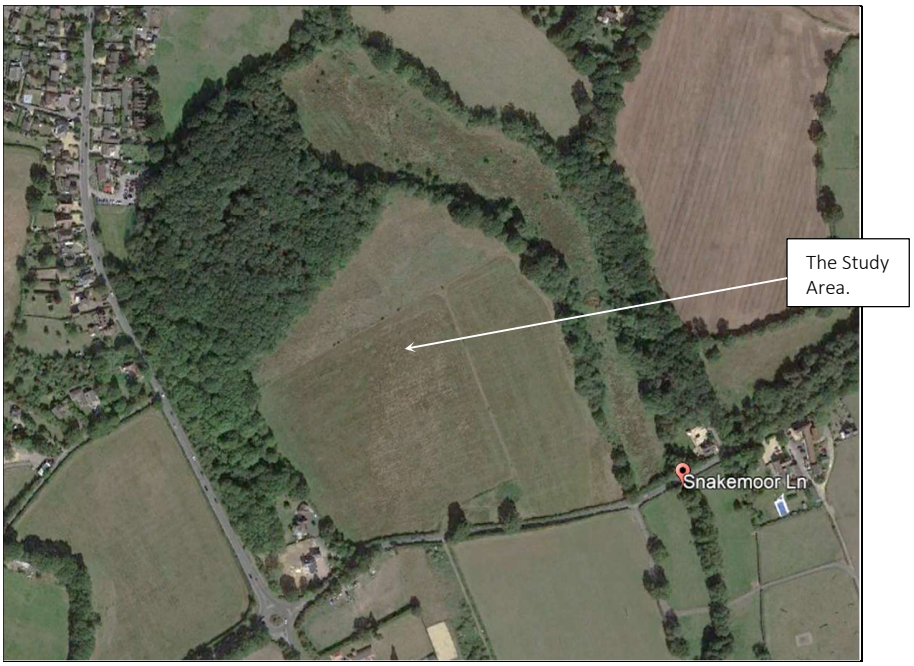
GROUND INVESTIGATION GEOTECHNICAL FACTUAL REPORT

Project Title	Land at Denham's Corner	Job Number	AD0804
Location	North of Snakemoor Lane, Horton Heath, Hampshire, SO32 2BW	Date	06 November 2024
Client	M & G Developments Ltd	Engineer	SLR Consulting Limited

1. INTRODUCTION

		Comments	References
1.1	Preamble	Following an instruction from the Client, and under the direction of the Engineer, a ground investigation including drainage (infiltration) testing was undertaken by Advanced Investigation Systems Ltd within a field to the north of Snakemoor Lane, Horton Heath.	Instruction date: 27 August 2024
1.2	Proposed Development	The investigation was designed to examine ground and groundwater conditions with respect to the construction of sustainable drainage systems (SuDS) in support of a surface drainage water strategy for the Site. At the time of the investigation the study area was in use as arable farmland and a maize crop had recently been harvested.	
1.3	Purpose of Investigation	The investigation had the following objectives: 1) Obtain information concerning ground and groundwater conditions; 2) Determine drainage characteristics and soakaway design Infiltration rate parameters. Access was good for all ground investigation plant and test equipment.	

2. SITE DESCRIPTION

		Comments	References
2.1	Site Size & Extent	The Site lies just beyond the south-eastern margins of Horton Heath, 9km north-east of Southampton City Centre and is centered on Grid Coordinates: Easting 449897, Northing 116374. The nearest Post Code is SO32 2BW. The investigation was carried out within an approximate pentagonal area with maximum dimensions of 320m by 300m. The aerial image (dated 2020) below, shows the location of the field that comprises the study area.  Figure 1: Location of Site (Image Date 2020)	Google Earth, 2024
2.2	Topography	Regionally, the Site is slightly elevated within a gently undulating landscape. The study area was raised centrally with a maximum elevation of 35.0m AOD, reducing to the north and east to approximately 27.0m AOD.	Google Earth, 2024
2.3	Geology	The BGS on-line viewer indicates Sand, Silt and Clay of the Wittering Formation immediately underlying the Site. The Wittering Formation is described as greyish brown laminated clay; wavy- to lenticular-bedded sand interbedded with clay in equal proportions; and fine- to medium-grained sparsely glauconitic sand. The strata encountered by this investigation was consistent with the former designation.	BGS Online Viewer (2024) BGS Lexicon (2024)

3. INVESTIGATION STRATEGY

		Comments	References
3.1	Methodology & Techniques	<u>Underground Services</u> Once suitable exploratory hole locations had been identified, an on-site underground services check, was carried out by A.I.S. Ltd prior to excavation, probing and drilling. The check used standard radio & electromagnetic detection techniques including a cable avoidance tool and signal generator; compliant with PAS 128 & HSG47 and constituted a PAS128 Type B survey. <u>Trial Pits (Machine Excavated)</u> Three trial pits (TP01, TP02 & TP03) were machine excavated with a 5 tonne, 360-degree, mechanical excavator to depths of 2.10m, 2.40m & 2.30m BGL, in order to determine ground conditions and to carry out full-scale BRE365 surface water infiltration tests, determine drainage conditions and where possible, drainage design parameters. During the trial pit excavation and borehole drilling process, detailed engineering descriptions to BS 5930:2015+A1:2020 (Code of practice for ground investigation) were made of all strata encountered and the ground water conditions were recorded by a Geotechnical Engineer. The trial pit logs are appended.	PAS 128: Specification for underground utility detection, verification and location BSI, 2022 Health & Safety Guidance 47. HSE, 2014 BRE3 DG365: 2016 BS5930:2015+A1:2020 Appendix 1
3.2	*In Situ* Testing	<u>Infiltration (Soakaway) Testing</u> Infiltration testing to the BRE 365: 2016 procedure (Digest 365), was carried out within Trial Pits TP01, TP02 & TP03. Water was provided by a water bowser and high volume delivery rate, pumping system. The trial pit (soakaway) infiltration tests were facilitated by the insertion of slotted well-screen to the base of each pit and with a small stick-up above ground level, and then the pit partially infilled with 10-20mm washed gravel. The slotted pipe and gravel infill ensured consistency of readings and prevent caving/collapse of the sides of the exploratory holes. The permeable infill also had a safety function that removed the potential for accidental slips or falls into the excavations. On conclusion of the testing, any remaining water was pumped from the trial pit and the excavation were backfilled with arisings compacted in suitable lifts to ensure optimum compaction. The test results are appended.	BRE Digest DG365, 2016 Appendix 2
3.3	Laboratory Testing	Not required.	

4. RESULTS

		Comments	References
4.1	Ground Conditions	The main stratum types and ground conditions encountered by the investigation can be summarized, from top to base, as follows: <u>Topsoil</u> Initially TOPSOIL comprising firm to stiff, dark brown-grey, slightly gravelly, organic silty CLAY with gravel of sub angular, flint chert was encountered to a depth of between 0.3m and 0.4m BGL. <u>Superficial Deposits (Head)</u> Underlying the Topsoil, firm to stiff, brown mottled light grey-brown, sandy, slightly gravelly CLAY where the gravel is disseminated sub angular, fine medium coarse flint & chert. This horizon was interpreted as Head* Deposits and was proved to a depth of between 0.9m and 1.1m BGL. The gravel content was recorded as fine medium coarse, sub angular, flint & chert. **Head is defined as poorly sorted and poorly stratified angular soil/rock debris and/or clayey hill-wash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction and is dependent on the upslope source and distance from the source.* <u>Bedrock (Wittering Formation)</u> Underlying the Head Deposits, firm to stiff, brown mottled light grey brown & gleyed, locally sandy & silty, CLAY was proved to the base of trial pits TP01 & TP03 In trial pit TP02, loose, light brown yellow, silty, fine SAND was proved to the base of the excavation at 2.4m BGL. The trial pit logs are appended.	Appendix 1 Appendix 1
4.2	Groundwater	No groundwater was encountered within any of the trial pits, and all were recorded as dry.	Appendix 1

5. GEOTECHNICAL PARAMETERS & DESIGN

		Comments	References
5.1	Surface Water Drainage (Infiltration Testing)	Infiltration testing With respect to surface water drainage design, the results from the full-scale infiltration testing within trial pits TP01, TP02 & TP03 are appended and summarised in Figure 2 below:	Appendix 2

Trial Pit	Infiltration First Filling (m/s)	Infiltration Second Filling (m/s)	Infiltration Third Filling (m/s)
TP01(SA)	No measurable infiltration – test abandoned	No test	No test
TP02(SA)	5.91×10^{-6}	1.87×10^{-6} (Test result extrapolated)	No test
TP02(SA)	No measurable infiltration – test abandoned	No test	No test

Figure 2: Summary of Infiltration Test Results

No measurable infiltration was recorded in trial pits TP01 & TP03 and the tests were abandoned.

In trial pit 02, a silty Sand horizon encountered towards the base of the excavation proved sufficiently permeable to enable one complete and one partial test within a single day.

The findings & opinions given in this document are subject to the limitations imposed by employing normal site investigation methods & techniques. They are relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Factual information has largely been obtained from exploratory holes, which, by their nature, provide specific information about a relatively small area of ground.

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Email: enquiries@windowsampling.com
Web: www.windowsampling.com

TRIAL PIT RECORD

Trial Pit Number

TP01

Site:	Engineer:	Plant Equipment:
Land at Denhams Corner, Horton Heath	SLR Consulting	5 tonne Takeuchi Slew

Client:	Elevation mAOD:	Easting:	Northing:	Start:	Finish:	Scale:
M & G Developments	28.500	450046.00	116283.00	14/10/2024	14/10/2024	1:25

GROUND WATER | **SAMPLING & IN SITU TESTING** | **STRATA RECORD**

Strike	Well	Depth (m)	Depth/Type (m)		Sampler / Recovery	Depth mBGL	Depth mAOD	Key	Description
						0	28.5		TOPSOIL: firm to stiff dark brown grey slightly gravelly organic silty CLAY. Gravel is sub angular flint chert.
						0.5	28.0		Firm to stiff brown mottled light grey brown sandy slightly gravelly CLAY. Gravel is disseminated sub angular fine medium coarse flint chert.
						1			
						1.5	27.0		Firm to stiff brown mottled light grey brown & gleyed sandy silty CLAY.
						2			
						2.5	26.0		
						3			
						3.5	25.0		
						4			
						4.5	24.0		
						5			

Remarks / Orientation / Dimensions / Stability

Dry hole. 50mm ID slotted well screen installed to 2.10m BGL. Infiltration test carried out. Backfilled with arisings. Trial pit dimensions: 1.2m x 0.3m.

AGS

ES ES Sample
● □ Disturbed Sample
W Water Sample
Φ Bulk Sample

WLS Windowless Sampler
WS Window Sampler
▽ Depth to water strike
▼ Standing water depth

Job No. AD0804

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TRIAL PIT RECORD

Trial Pit Number

TP02

Site:	Engineer:	Plant Equipment:
Land at Denhams Corner, Horton Heath	SLR Consulting	5 tonne Takeuchi Slew

Client:	Elevation mAOD:	Easting:	Northing:	Start:	Finish:	Scale:
M & G Developments	33.500	449909.00	116517.00	14/10/2024	14/10/2024	1:25

GROUND WATER | **SAMPLING & IN SITU TESTING** | **STRATA RECORD** | Sheet 1 of 1

Strike	Well	Depth (m)	Depth/Type (m)		Sampler / Recovery	Depth mBGL	Depth mAOD	Key	Description
						0			TOPSOIL: firm to stiff dark brown grey slightly gravelly organic silty CLAY. Gravel is sub angular flint chert.
							33.0		
									Stiff brown sandy very gravelly silty CLAY. Gravel is fine medium coarse sub angular to rounded flint chert.
						1			Stiff brown mottled light grey & gleyed very sandy silty CLAY. Locally laminated fabric with silty sand interlaminae & partings.
							32.0		
									Loose light brown yellow silty fine SAND.
						2			
							31.0		
						3			
							30.0		
						4			
							29.0		
						5			

Remarks / Orientation / Dimensions / Stability

Dry hole. 50mm ID slotted well screen installed to 2.4m BGL. Infiltration test carried out. Backfilled with arisings. Pit dimensions 1.5m x 0.3m.

AGS

ES ES Sample
● □ Disturbed Sample
W Water Sample
Φ Bulk Sample

WLS Windowless Sampler
WS Window Sampler
▽ Depth to water strike
▼ Standing water depth

Job No. AD0804

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TRIAL PIT RECORD

Trial Pit Number

TP03

Site:	Engineer:	Plant Equipment:
Land at Denhams Corner, Horton Heath	SLR Consulting	5 tonne Takeuchi Slew

Client:	Elevation mAOD:	Easting:	Northing:	Start:	Finish:	Scale:
M & G Developments	34.000	449841.00	116349.00	14/10/2024	14/10/2024	1:25

GROUND WATER | SAMPLING & IN SITU TESTING | STRATA RECORD

Strike	Well	Depth (m)	Depth/Type (m)		Sampler / Recovery	Depth mBGL	Depth mAOD	Key	Description
						0	34.0		TOPSOIL: firm to stiff dark brown grey slightly gravelly organic silty CLAY. Gravel is sub angular flint chert.
						1	33.0		Firm to stiff brown mottled light grey brown sandy slightly gravelly CLAY. Gravel is disseminated sub angular fine medium coarse flint chert. Locally lenses of brown very gravelly Clay.
						2	32.0		Stiff yellow brown mottled white grey & gleyed CLAY.
						3	31.0		
						4	30.0		
						5	29.0		

Remarks / Orientation / Dimensions / Stability

Dry hole. 50mm ID slotted well screen installed to 2.3m BGL. Infiltration tests carried out. Backfilled with arisings. Pit dimensions 1.2m x 0.3m.

AGS

ES ES Sample
● □ Disturbed Sample
W Water Sample
Φ Bulk Sample

WLS Windowless Sampler
WS Window Sampler
▽ Depth to water strike
▼ Standing water depth

Job No. AD0804

APPENDIX 2

Infiltration Test Reports

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CALCULATION OF SOIL INFILTRATION RATE

To: BRE Digest 365: 2015

Engineer:	SLR Consulting
Client:	M&G Developments
Site:	Land at Denham's Corner, Horton Heath
Job No:	AD0804

Trial Pit Number	TP01(SA)
Test Number:	1
Date	14 October 2024
Trial Pit Width (m)	0.30
Trial Pit Length (m)	1.20
Trial Pit Depth (m)	2.10
Effective Storage Depth (m)	0.70
Maximum Effective Depth (m BGL)	1.40
Empty Depth (m BGL)	2.10
V_{p75-25} (m3)	0.13
$a_{p50\ (m2)}$	1.41
t_{p75-25}	N/a

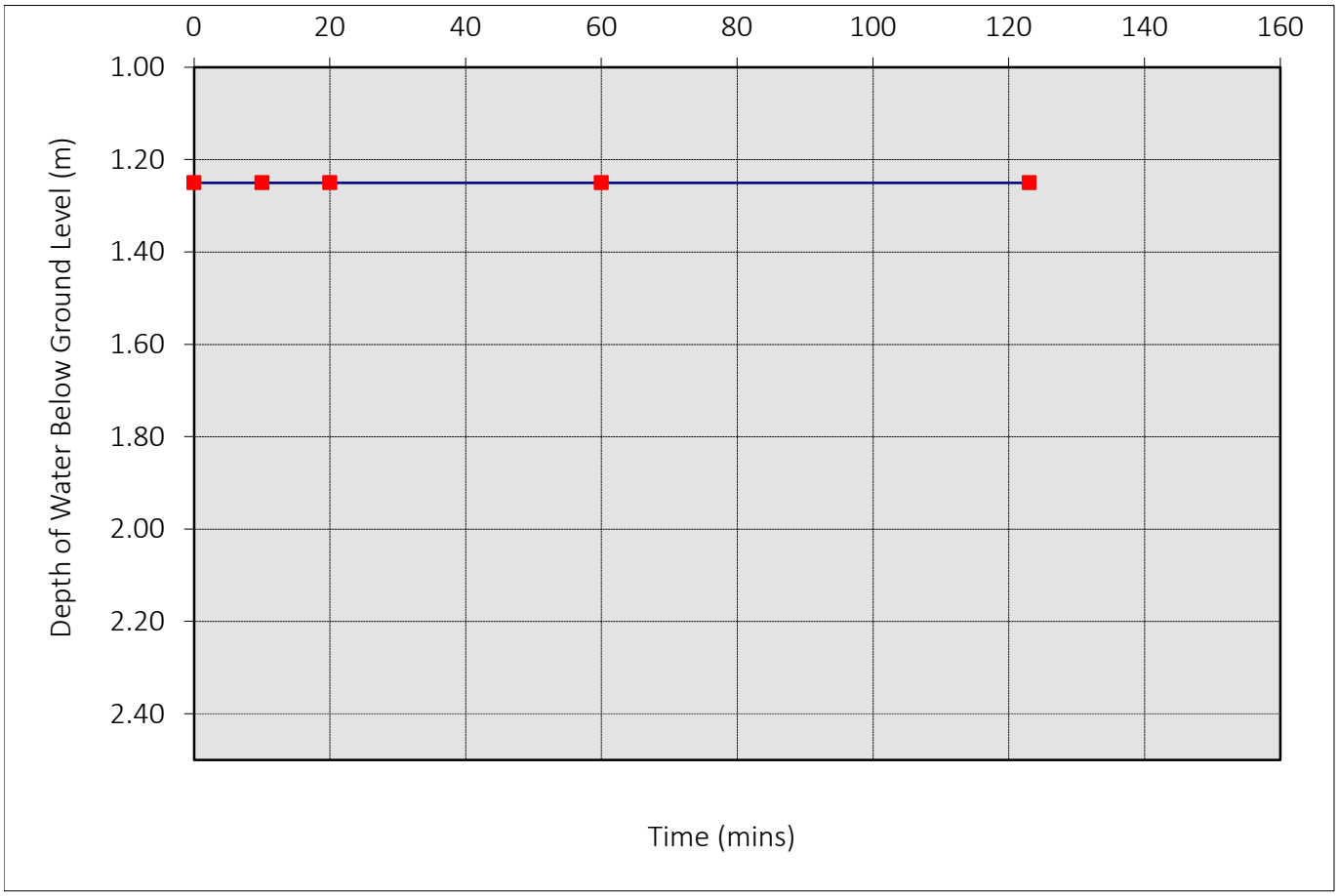
Time (min)	Depth (m BGL)
0	1.25
10	1.25
20	1.25
60	1.25
123	1.25

Comments:

No measureable infiltration, test terminated.

SOIL INFILTRATION RATE (m/s) N/a

75% Full (m BGL)	1.58
25% Full (m BGL)	1.93



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CALCULATION OF SOIL INFILTRATION RATE

To: BRE Digest 365: 2015

Engineer:	SLR Consulting
Client:	M&G Developments
Site:	Land at Denham's Corner, Horton Heath
Job No:	AD0804

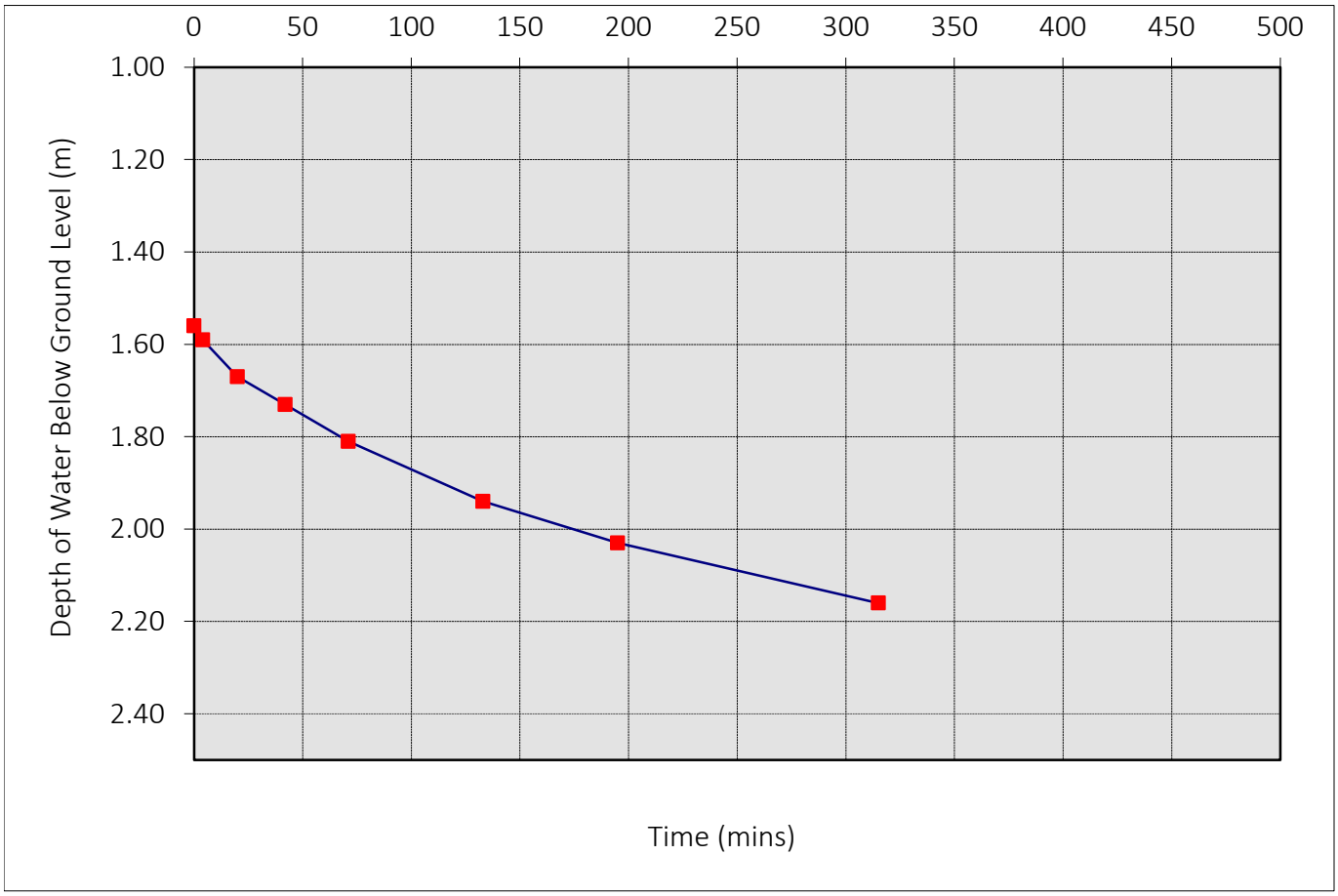
Trial Pit Number	TP02(SA)
Test Number:	1
Date	14 October 2024
Trial Pit Width (m)	0.30
Trial Pit Length (m)	1.50
Trial Pit Depth (m)	2.40
Effective Storage Depth (m)	1.00
Maximum Effective Depth (m BGL)	1.40
Empty Depth (m BGL)	2.40
V_{p75-25} (m3)	0.23
$a_{p50\ (m2)}$	2.25
t_{p75-25}	282

Time (min)	Depth (m BGL)
0	1.56
4	1.59
20	1.67
42	1.73
71	1.81
133	1.94
195	2.03
315	2.16

Comments:

SOIL INFILTRATION RATE (m/s)	5.91E-06

75% Full (m BGL)	1.65
25% Full (m BGL)	2.15



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CALCULATION OF SOIL INFILTRATION RATE

To: BRE Digest 365: 2015

Engineer:	SLR Consulting
Client:	M&G Developments
Site:	Land at Denham's Corner, Horton Heath
Job No:	AD0804

Trial Pit Number	TP02(SA)
Test Number:	2
Date	14 October 2024
Trial Pit Width (m)	0.30
Trial Pit Length (m)	1.50
Trial Pit Depth (m)	2.40
Effective Storage Depth (m)	1.00
Maximum Effective Depth (m BGL)	1.40
Empty Depth (m BGL)	2.40
V_{p75-25} (m3)	0.23
$a_{p50\ (m2)}$	2.25
t_{p75-25}	890

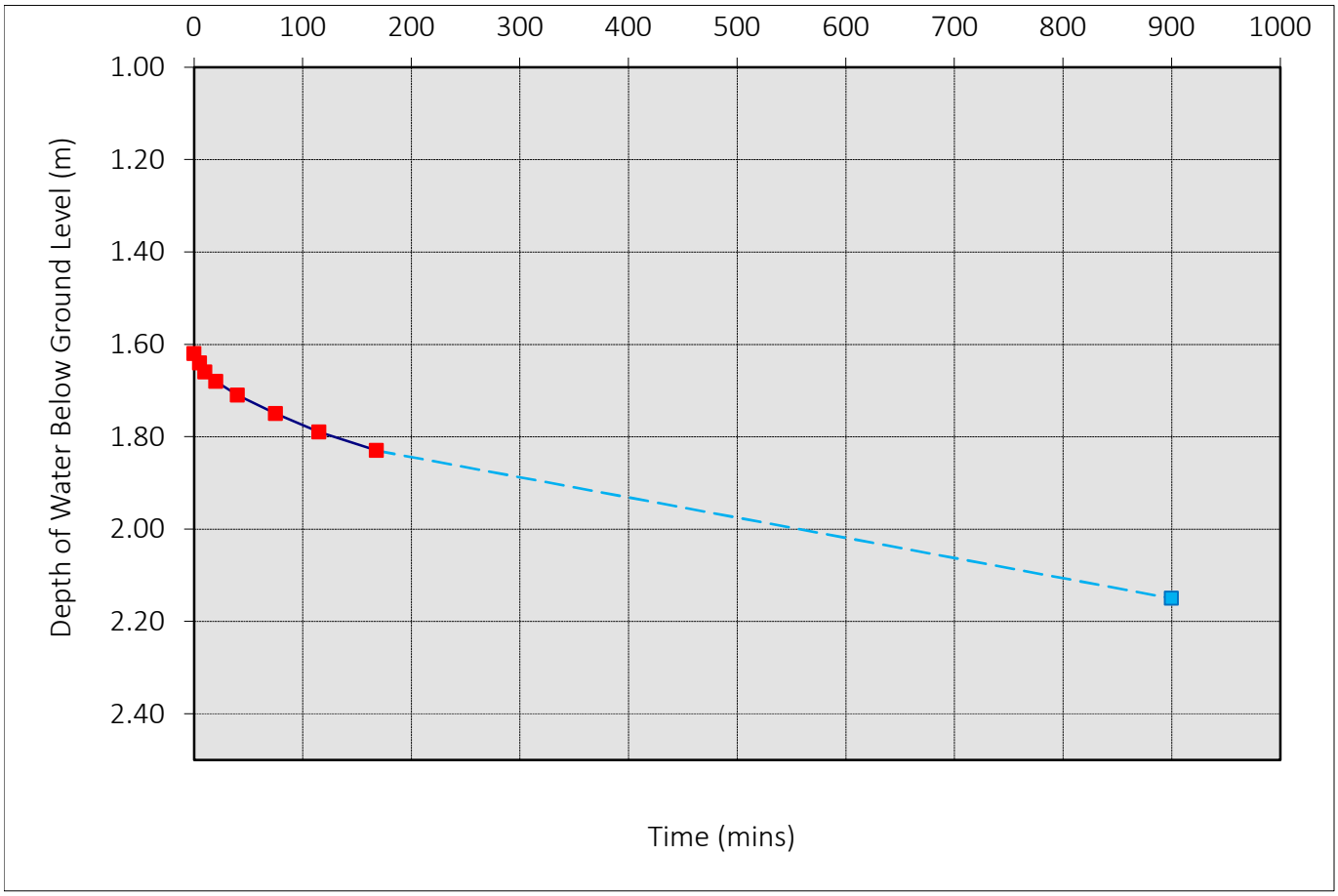
Time (min)	Depth (m BGL)
0	1.62
5	1.64
10	1.66
20	1.68
40	1.71
75	1.75
115	1.79
168	1.83
900	2.15

Comments:

Final data point extrapolated

SOIL INFILTRATION RATE (m/s) 1.87E-06

75% Full (m BGL)	1.65
25% Full (m BGL)	2.15



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CALCULATION OF SOIL INFILTRATION RATE

To: BRE Digest 365: 2015

Engineer:	SLR Consulting
Client:	M&G Developments
Site:	Land at Denham's Corner, Horton Heath
Job No:	AD0804

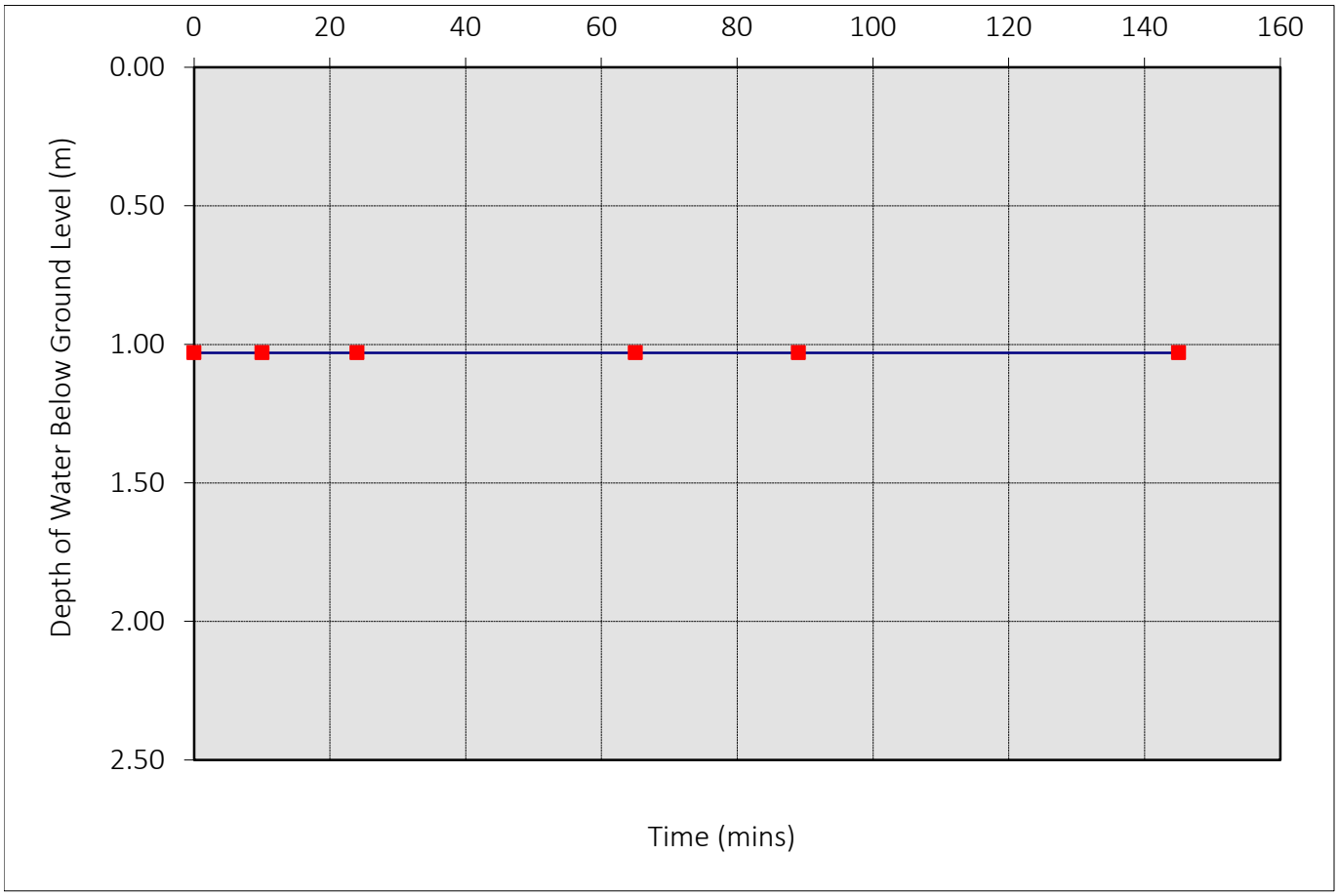
Trial Pit Number	TP03(SA)
Test Number:	1
Date	14 October 2024
Trial Pit Width (m)	0.30
Trial Pit Length (m)	1.20
Trial Pit Depth (m)	2.30
Effective Storage Depth (m)	0.90
Maximum Effective Depth (m BGL)	1.40
Empty Depth (m BGL)	2.30
V_{p75-25} (m3)	0.16
$a_{p50\ (m2)}$	1.71
t_{p75-25}	N/a

Time (min)	Depth (m BGL)
0	1.03
10	1.03
24	1.03
65	1.03
89	1.03
145	1.03

Comments:
No measureable infiltration, test terminated.

SOIL INFILTRATION RATE (m/s) N/a

75% Full (m BGL)	1.63
25% Full (m BGL)	2.08





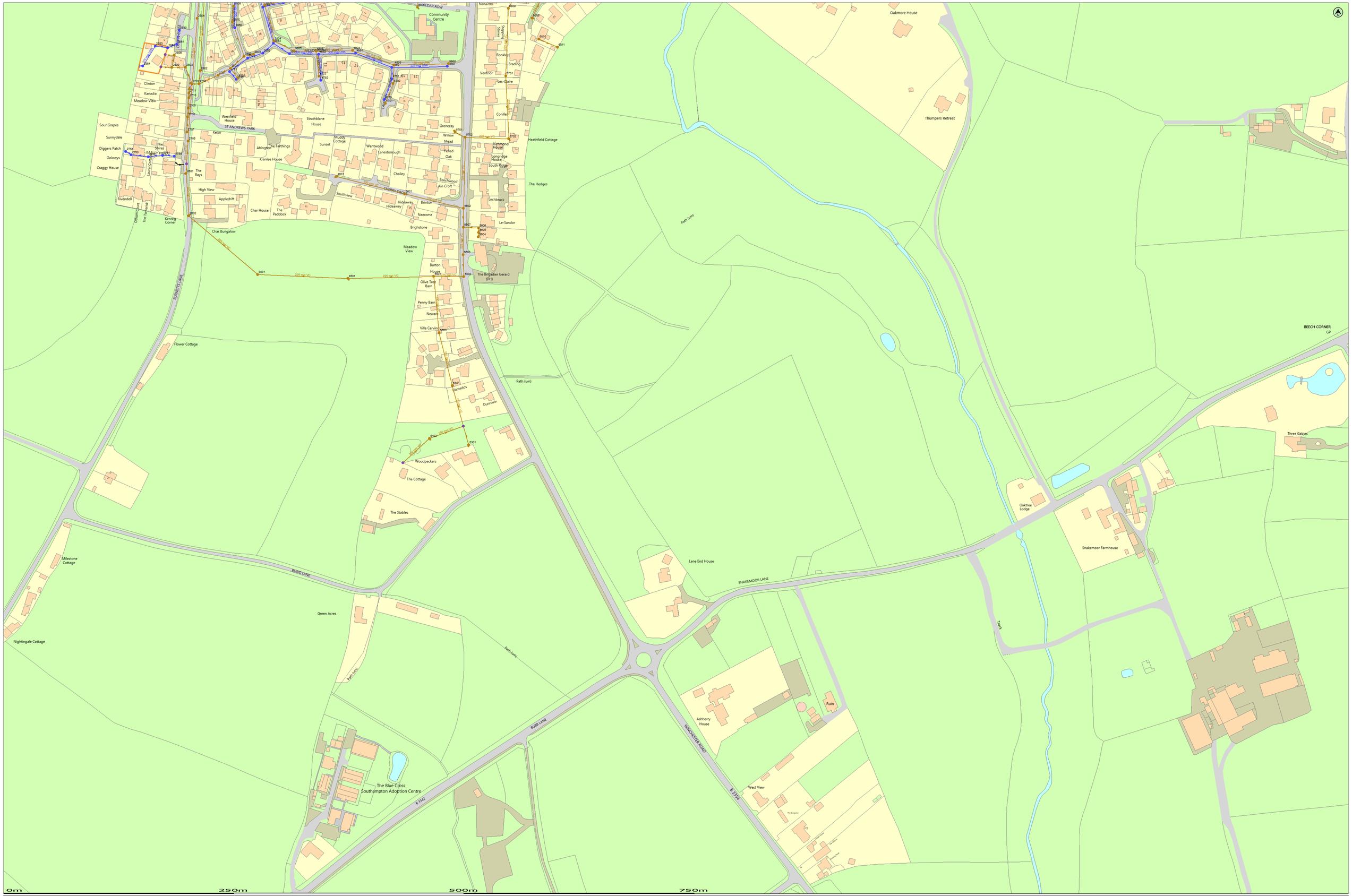
Scale:	NTS	Drawn:	PK	Date:	14 October 2024
Drawing No:	After Bing Mapping 2024	Rev:	1	Job No:	AD0804

Title:

Aerial Image with Exploratory Hole (Trial Pit) and Infiltration Test Locations
Land at Denham's Corner, North of Snakemoor Lane, Horton Heath, Hampshire, SO32 2BW

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Web: www.windowsampling.com

Appendix D Southern Water Correspondence



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Date: 09/10/24 | Scale: 1:1250 | Map Centre: 449804,116391 | Data updated: 24/09/24 | Our Ref: 1590342 - 1

Wastewater Plan A0
Powered by digital

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey AC0000808122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer | Combined Gravity Sewer | Culverted Water Course or Feature Effluent | Surface Water Gravity Sewer | Rising Main, Vacuum or Syphon

Combined Outfall | Foul Outfall | Surface Water Outfall | Surface Water Inlet

Combined Pumping Station | Surface Water Pumping Station | Foul Pumping Station | Water Treatment Works | Section 104 Area | Agreed Section 104 Agreement Area

Foul Manhole | Combined Manhole | Surface Water Manhole | Side Entry Manhole, Combined, Foul or Surface Water | Surface Water Soakaway

nick.bosanko@slrconsulting.com

Denhams Corner

WATER for LIFE

from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2601	F	27.45	25.73	
2602	F	27.24	25.87	
2701	F	28.39	25.29	
2702	F	27.99	26.14	
2705	F	27.38	26.48	
2707	F	27.12	25.43	
2708	F	27.24	25.35	
2709	F	27.45	25.32	
2710	F	27.55	25.26	
2711	F	27.56	25.24	
2802	F	28.12	25.25	
2803	F	27.17	27.11	
2804	F	28.14	25.78	
2806	F	0.00	0.00	
2809	F	0.00	0.00	
3501	F	29.25	26.22	
3701	F	0.00	0.00	
3702	F	0.00	0.00	
3801	F	0.00	0.00	
3802	F	0.00	0.00	
3803	F	0.00	0.00	
3804	F	0.00	0.00	
3805	F	0.00	0.00	
3806	F	0.00	0.00	
3809	F	0.00	0.00	
3810	F	0.00	0.00	
4501	F	31.27	26.61	
4601	F	33.61	31.55	
4701	F	0.00	0.00	
4702	F	0.00	0.00	
4703	F	0.00	0.00	
4803	F	0.00	0.00	
4804	F	0.00	0.00	
4805	F	0.00	0.00	
5301	F	29.60	28.08	
5401	F	0.00	0.00	
5402	F	30.29	28.81	
5501	F	29.57	26.89	
5502	F	0.00	0.00	
5503	F	0.00	0.00	
5601	F	31.24	29.66	
5602	F	29.57	27.42	
5603	F	0.00	0.00	
5604	F	0.00	0.00	
5605	F	0.00	0.00	
5606	F	0.00	0.00	
5607	F	0.00	0.00	
5701	F	30.41	27.88	
5702	F	30.41	27.64	
5801	F	32.04	30.30	
5802	F	0.00	0.00	
6701	F	29.45	28.10	
6702	F	29.10	27.82	
6806	F	29.93	28.83	
6809	F	30.44	0.00	
6810	F	0.00	0.00	
6811	F	0.00	0.00	
2750	S	9.43	8.05	
2751	S	8.89	7.69	
2752	S	8.20	7.24	
2753	S	8.15	7.16	
2754	S	0.00	0.00	
2850	S	27.76	25.87	
2851	S	27.40	25.82	
2852	S	27.35	25.74	
2853	S	27.10	25.71	
2854	S	26.29	25.66	
3750	S	0.00	0.00	
3751	S	0.00	0.00	
3851	S	0.00	0.00	
3852	S	0.00	0.00	
3853	S	0.00	0.00	
3854	S	0.00	0.00	
3856	S	0.00	0.00	
3857	S	0.00	0.00	
3860	S	0.00	0.00	
4750	S	0.00	0.00	
4751	S	0.00	0.00	
4752	S	0.00	0.00	
4850	S	0.00	0.00	
4851	S	0.00	0.00	
4852	S	0.00	0.00	
5850	S	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

from Southern Water

Hamza El-Adnany
Brew House
Jacob Street, Tower Hill
Bristol
BS2 0EQ

Your ref
17946

Our ref
DSA000038588

Date
27 February 2025

Contact
Tel 0330 303 0119

Dear Mr El-Adnany,

Level 1 Capacity Check Enquiry: Denham's Corner, Horton Heath, Eastleigh, Hampshire, SO32 2BW

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 7.1 l/s at manhole reference SU49165301.

There is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of 7.1 l/s for the above development at manhole reference SU49165301. The proposed development would increase flows to the public sewerage system which may increase the risk of flooding to existing properties and land. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. Southern Water has a duty to provide Network capacity from the point of practical connection (point of equivalent or larger diameter pipe) funded by the New Infrastructure Charge.

Southern Water aim to provide this within 24 months following the date that planning has been granted for developments not identified as strategic sites in our current business plan. Strategic sites are larger developments and will often take longer than 24 months for a full solution to be provided.

Rights are not issued for a direct connection to Wastewater Treatment Works (WTW). Please note that connection to the WTW will have to be agreed by Southern Water Services before being carried out.

Please note, the assessment that has been undertaken has used an assumed pump rate of 6.0 l/s. This has been calculated using Southern Water's modelling specifications.

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

New Infrastructure Charging

Please note as of 1st April 2018 we have moved to the “New Connections Services Charging Arrangements”. We understand that this may cause uncertainty for customers, particularly where they may have already committed to a development based on previous charging arrangements. We have worked with our stakeholders and Water UK to agree a set of principles by which we will base our charges. Please read through our new charging arrangement documents available at the following link: Connecting Charging Arrangements - Southern Water

Alternatively, New Appointees and Variations (NAVs), also known as ‘inset’ companies, can provide new connection services or take ownership of the new water and wastewater connection infrastructure provided for a new development. NAVs are appointed by Ofwat and replace the regional water company. It is for the developer to choose whether to use a NAV or the regional water company to supply services for new sites, according to certain legal criteria.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Please get in touch via the Get Connected customer dashboard if you have any queries.

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

Developer Capacity Enquiries Flow Calculation - Impact of New Developments

Peak Flow:

Development Size - Units	N	154	
Occupancy - persons/dwelling (default 2.4)	O	2.4	
Per Capita Flow - l/h/d (default 125l/h/d)	G	125	l/h/d
Infiltration (default 10%)	I	10%	
Trade Flow - L/day	E	0	l/d
DWF Multiplier (PF) (default 2.5)		2.5	See Table 1
Population of development (P)	=	369.6	

Peak Foul Flow = 1.39 l/s

New development gravity connection: peak rate flow of 2.5DWF plus storm contribution of 1.4m² per property shall be used.

Surface water misconnection allowance will be assigned to (unused) runoff surface 12 and assigned a land use to generate 85% fixed runoff.

Table 1

DWF Peaking Factor	
Storm Duration (SD)	Multiplier (PF)
30 to 120	2.5
240 to 480	2
960	1.4

Allowance for Surface water misconnection

Surface water misconnection (default 1.4)	1.4	215.6	m²	0.02156 Ha

Note 1: Surface water misconnection: - 1.4 m²/property - Based on average development density of 32 properties/Hectare - See Table 2

Note 2:Surface water misconnection: - Flats, housing association, and commercial property addresses will have no misconnected surface water allowance applied.

Example:

DWF = PG + I +E

I = 10% Infiltration

I = 10% PG

E - Trade Flow

DWF = PG + 0.1PG + E

2.5DWF Multiplier

2.5DWF = 2.5PG + 0.1PG + 2.5E

2.5DWF = 2.6PG +2.5E

$P_{(population)} = N \times O$

$$\text{Peak Flow} = \frac{2.6 \times N \times O \times G}{24 \times 60 \times 60} + 2.5E$$

Table 2

Development Density (Properties/4Ha)	Surface water misconnection (m2/Property)
<=100	2.1
120	1.6
140	1.1
180	0.6
>=200	0.3

Note: To change default settings - unprotect sheet

Sewers for Adoption - (SFA)

Design Flow -4000 l/unit dwelling/day

Approximates to 3 person/property:

*200 l/hd/d : 6.0*DWF+10% Infiltration*

2000 l/dwelling/day (50% Design Flow)	3.56	l/s
4000 l/dwelling/day	7.13	l/s

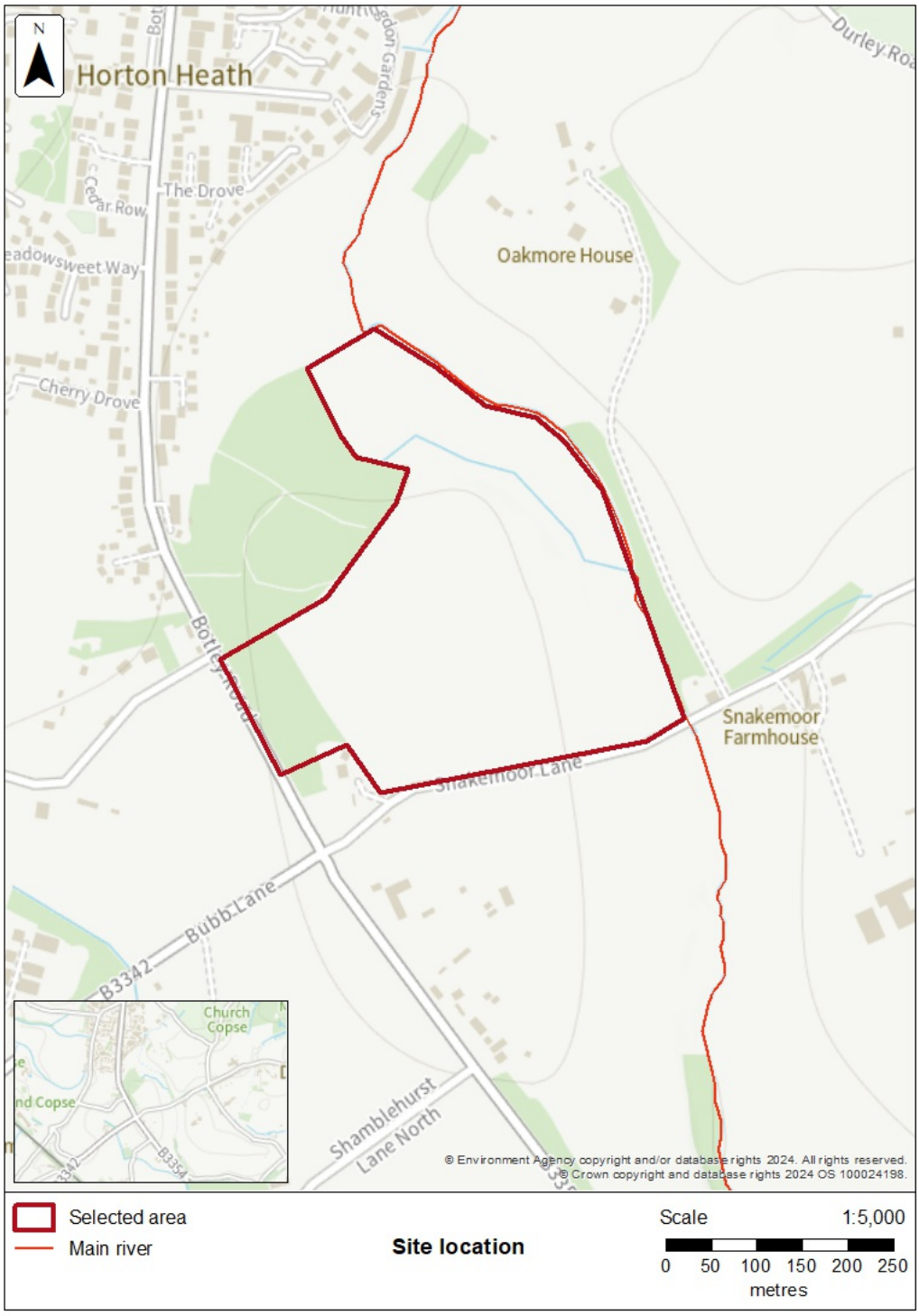
New development pumped flow: peak flow shall be calculated as 2000 l/dwelling/day in accordance to SFA & CED 4015

Appendix E EA Correspondence

Flood risk assessment data

Location of site: 449920 / 116443 (shown as easting and northing coordinates)
Document created on: 8 August 2024
This information was previously known as a product 4.
Customer reference number: SSD/370880DP

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

> **We recommend that you work with a flood risk consultant to get your flood risk assessment.**

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
  help and advice

Information that's unavailable

This document **does not** contain:

- historic flooding
- flood defences and attributes
- climate change modelled data

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

There is not any modelled climate change data for this location. This is because detailed modelling hasn't been carried out in this area. You will need to consider the latest flood risk assessment climate change allowances and factor in the new allowances to demonstrate the development will be safe from flooding.

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is Hampshire County Council.

For information about sewer flooding, contact the relevant water company for the area.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

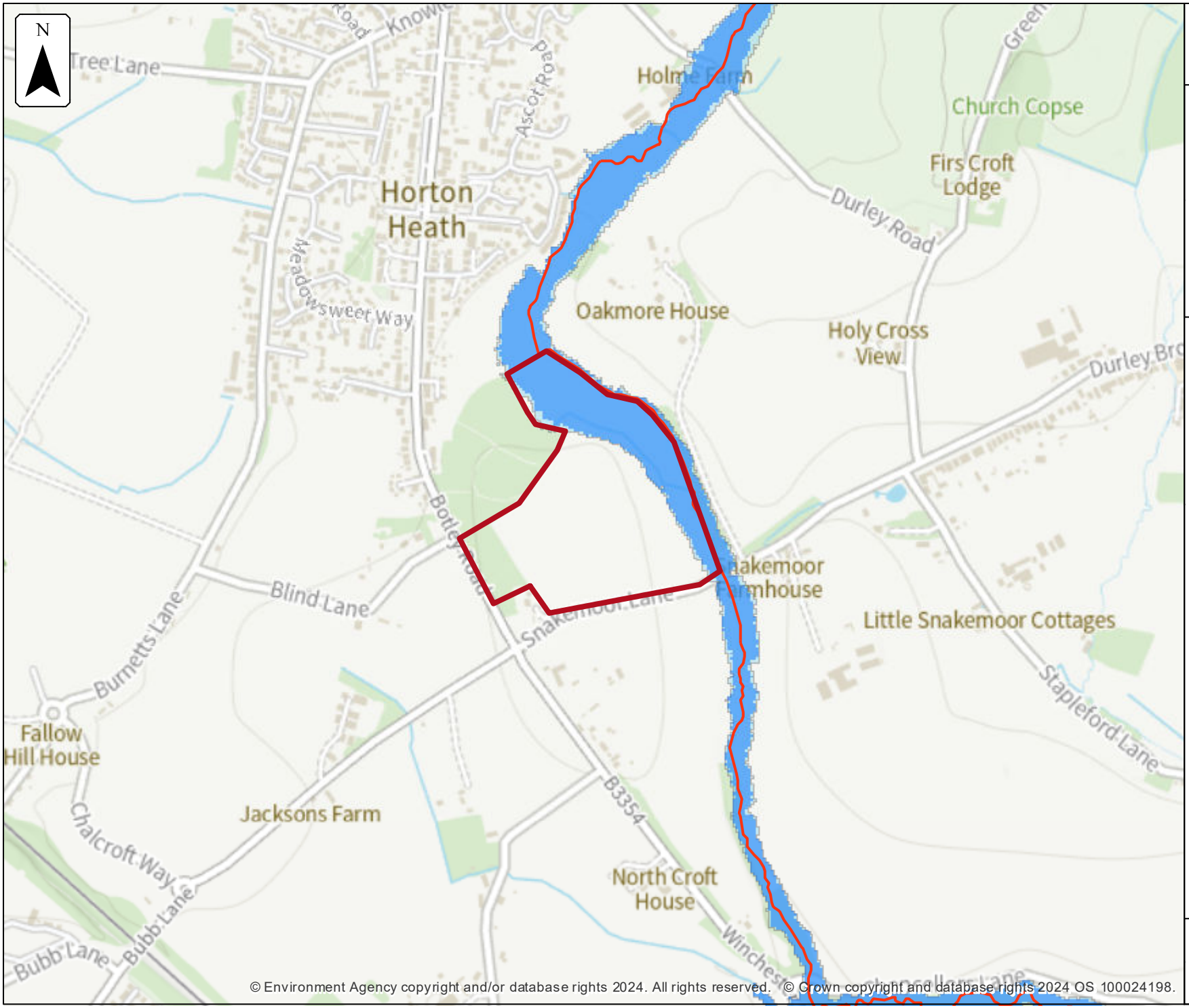
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.



Environment Agency

Flood map for planning

Location (easting/northing)
449920/116443

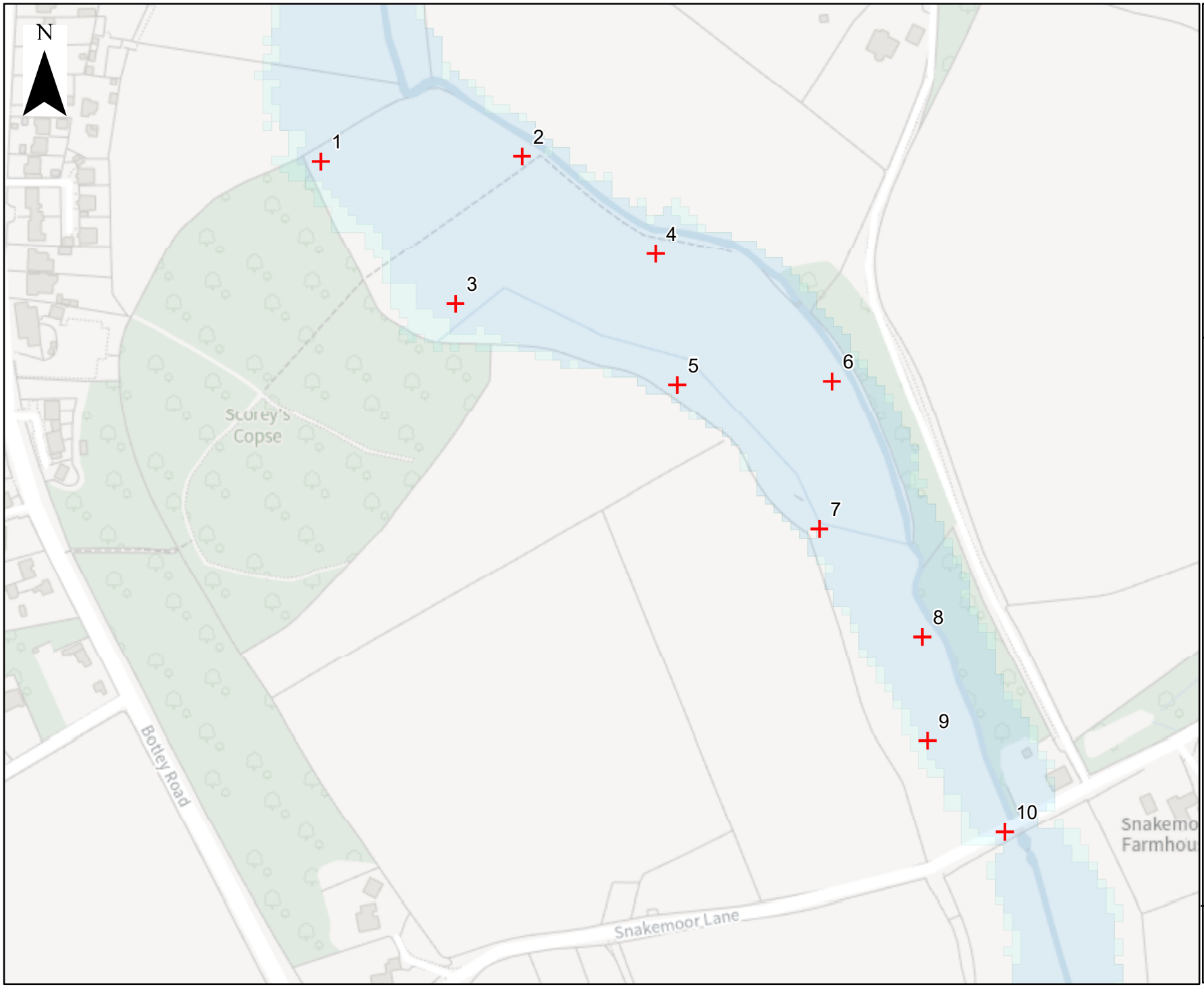
Scale
1:10,000

Created
8 Aug 2024

- Selected area
- Main river
- Flood zone 3
- Flood zone 2

0 100 200 300 400 500
metres

2009 JFLOW - Flood Levels Centred on: SU4990716415



Environment Agency

Flood Levels Map

Location (easting/northing)
449907/116415

Scale
1:3,000

Created
8th August 2024

Legend

- Location Points
- flood_zone_3
- flood_zone_2

Meters
0 12.5 25 50 75 100

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

Water Depths & Levels for SU4990716415

Point	Water Depth (Metres)		Water Surface Level (mAOD*)		Ground Level
	1% Annual Probability/1 in 100 Year (Flood Zone 3)	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	1% Annual Probability/1 in 100 Year (Flood Zone 3)	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	
1	0.12	0.25	26.70	26.83	26.58
2	0.17	0.27	26.40	26.50	26.23
3	0.02	0.11	26.24	26.33	26.22
4	0.32	0.44	25.84	25.96	25.52
5	0.15	0.25	25.51	25.61	25.36
6	0.35	0.49	25.24	25.38	24.89
7	0.24	0.39	25.00	25.15	24.76
8	0.27	0.49	24.57	24.79	24.30
9	0.14	0.39	24.47	24.72	24.33
10	0.25	0.45	23.12	23.32	22.87

* Levels in metres above Ordnance Datum Newlyn

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Hampshire County Council.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the Solent and South Downs Environment Agency team at ssdenquiries@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Appendix F Surface Water Drainage Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Hamza El-Adnany
Site name:	Denham's Corner
Site location:	Horton Heath

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

Site Details

Latitude:	50.94480° N
Longitude:	1.29102° W
Reference:	1659160502
Date:	Sep 09 2024 16:35

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.343
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	800	800
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):		7
1 in 1 year (l/s):		5.95
1 in 30 years (l/s):		16.11
1 in 100 year (l/s):		22.34
1 in 200 years (l/s):		26.19

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Basin 02	2.380	5.00	29.500		450024.237	116465.320	1.500
SW02 (FC)			29.500	1800	450028.265	116468.122	1.550
Outfall			25.500	1200	450053.352	116485.081	1.000
Basin 01	1.012	5.00	30.000		450017.652	116389.340	1.300
SW01 (FC)			30.000	1350	450018.711	116399.324	1.325

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.002	Basin 02	SW02 (FC)	5.000	0.600	28.000	27.950	0.050	100.0	525	5.74	50.0
1.003	SW02 (FC)	Outfall	30.281	0.600	27.950	24.500	3.450	8.8	225	5.85	50.0
1.000	Basin 01	SW01 (FC)	10.040	0.600	28.700	28.675	0.025	400.0	450	5.17	50.0
1.001	SW01 (FC)	Basin 02	66.227	0.600	28.675	28.000	0.675	98.1	450	5.70	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.002	2.240	484.8	459.7	0.975	1.025	3.392	0.0	411	2.529
1.003	4.443	176.6	459.7	1.325	0.775	3.392	0.0	225	4.524
1.000	1.010	160.7	137.2	0.850	0.875	1.012	0.0	321	1.129
1.001	2.052	326.4	137.2	0.875	1.050	1.012	0.0	203	1.968

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	5.000	100.0	525	1 STANDARD	29.500	28.000	0.975	29.500	27.950	1.025
1.003	30.281	8.8	225	1 STANDARD	29.500	27.950	1.325	25.500	24.500	0.775
1.000	10.040	400.0	450	1 STANDARD	30.000	28.700	0.850	30.000	28.675	0.875
1.001	66.227	98.1	450	1 STANDARD	30.000	28.675	0.875	29.500	28.000	1.050

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	Basin 02		Junction		SW02 (FC)	1800	Manhole	1 STANDARD
1.003	SW02 (FC)	1800	Manhole	1 STANDARD	Outfall	1200	Manhole	1 STANDARD
1.000	Basin 01		Junction		SW01 (FC)	1350	Manhole	1 STANDARD
1.001	SW01 (FC)	1350	Manhole	1 STANDARD	Basin 02		Junction	

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Basin 02	450024.237	116465.320	29.500	1.500		1	1.001	28.000	450
						0	1.002	28.000	525
SW02 (FC)	450028.265	116468.122	29.500	1.550	1800	1	1.002	27.950	525
						0	1.003	27.950	225
Outfall	450053.352	116485.081	25.500	1.000	1200	1	1.003	24.500	225
Basin 01	450017.652	116389.340	30.000	1.300					
						0	1.000	28.700	450
SW01 (FC)	450018.711	116399.324	30.000	1.325	1350	1	1.000	28.675	450
						0	1.001	28.675	450

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	2160	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	45	0	0

Node SW02 (FC) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.003	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0193-1950-1250-1950
Invert Level (m)	27.950	Min Outlet Diameter (m)	0.225
Design Depth (m)	1.250	Min Node Diameter (mm)	1500
Design Flow (l/s)	19.5		

Node SW01 (FC) Online Orifice Control

Flap Valve	x	Replaces Downstream Link	x	Diameter (m)	0.075
Downstream Link	1.001	Invert Level (m)	28.675	Discharge Coefficient	0.600

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Node Basin 02 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	28.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	1155

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	858.4	0.0	1.500	1735.0	0.0

Node Basin 01 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	28.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	616

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	340.0	0.0	1.300	920.0	0.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Basin 02	280	28.323	0.323	64.5	318.1059	0.0000	OK
360 minute winter	SW02 (FC)	280	28.323	0.373	32.7	0.9494	0.0000	SURCHARGED
15 minute summer	Outfall	1	24.500	0.000	18.7	0.0000	0.0000	OK
360 minute winter	Basin 01	272	29.019	0.319	25.3	135.9534	0.0000	OK
360 minute winter	SW01 (FC)	272	29.019	0.344	6.4	0.4917	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	Basin 02	1.002	SW02 (FC)	32.7	0.609	0.067	0.7587	
360 minute winter	SW02 (FC)	Hydro-Brake®	Outfall	19.5				717.7
360 minute winter	Basin 01	1.000	SW01 (FC)	6.4	0.179	0.040	1.2545	
360 minute winter	SW01 (FC)	1.001	Basin 02	6.4	0.398	0.020	4.2909	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Basin 02	352	28.683	0.683	117.7	744.5751	0.0000	SURCHARGED
360 minute winter	SW02 (FC)	352	28.683	0.733	32.5	1.8647	0.0000	SURCHARGED
15 minute summer	Outfall	1	24.500	0.000	19.5	0.0000	0.0000	OK
240 minute winter	Basin 01	232	29.291	0.591	64.9	287.8547	0.0000	SURCHARGED
240 minute winter	SW01 (FC)	232	29.291	0.616	8.8	0.8809	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	Basin 02	1.002	SW02 (FC)	32.5	0.562	0.067	1.0802	
360 minute winter	SW02 (FC)	Hydro-Brake®	Outfall	19.5				1340.0
240 minute winter	Basin 01	1.000	SW01 (FC)	8.8	0.209	0.055	1.5908	
240 minute winter	SW01 (FC)	1.001	Basin 02	8.8	0.343	0.027	5.5671	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Basin 02	705	29.203	1.203	121.3	1494.4880	0.0000	FLOOD RISK
720 minute winter	SW02 (FC)	705	29.204	1.254	27.9	3.1902	0.0000	FLOOD RISK
15 minute summer	Outfall	1	24.500	0.000	19.5	0.0000	0.0000	OK
360 minute winter	Basin 01	352	29.691	0.991	83.6	571.1818	0.0000	SURCHARGED
360 minute winter	SW01 (FC)	352	29.691	1.016	9.5	1.4533	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	Basin 02	1.002	SW02 (FC)	27.9	0.590	0.058	1.0802	
720 minute winter	SW02 (FC)	Hydro-Brake®	Outfall	19.5				2729.3
360 minute winter	Basin 01	1.000	SW01 (FC)	9.5	0.199	0.059	1.5908	
360 minute winter	SW01 (FC)	1.001	Basin 02	9.0	0.339	0.028	10.4932	

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Appendix G Preliminary Surface Water Strategy

N

SW02
FLOW CONTROL CHAMBER.
DISCHARGE RATE
RESTRICTED TO 19.5L/S.
CL:29.500M
IL:27.950M

OUTFALL
IL:24.500M

ATTENUATION BASIN 02
CL:29.500M
IL:28.000M
DEPTH:1.500M
FREEBOARD:0.300M
REQUIRED AREA:1,735M²
AVERAGE SLOPE:1IN4

SW01
FLOW CONTROL CHAMBER.
(75MM ORIFICE)
CL:30.000M
IL:28.675M

ATTENUATION BASIN 01
CL:30.000M
IL:28.700M
DEPTH:1.300M
FREEBOARD:0.300M
REQUIRED AREA:920M²
AVERAGE SLOPE:1IN4

ROW 719
ROW 15
BOTLEY ROAD
Scorey's Copse
ED & West Boy
Knowle Woodland Park
20m buffer
5m buffer
SUDS
POS
LAP
Play Area
Lane End House
Lane End Stables
DENHAM'S CORNER
SITE ENTRANCE
PROPOSED CYCLE / PEDESTRIAN ACCESS WITH CROSSING
Pond
SNAKEMOOR

0 10 20 30 40 50 60 70 80 90 100m
Scale 1:1,000

Notes:

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT DOCUMENTS AND SLR FLOOD RISK ASSESSMENT.
2. DRAINAGE STRATEGY IS SUBJECT TO DETAILED DESIGN INCLUDING LEVELS.
3. ALL LEVELS ARE SHOWN IN METRES ABOVE ORDNANCE DATUM.
4. DRAINAGE STRATEGY DESIGN ATTENUATES SURFACE WATER RUNOFF FOR THE 1 IN 100 YEAR EVENT PLUS 45% CLIMATE CHANGE.
5. DISPLAYED ACRONYMS:
   - CL - COVER LEVEL
   - IL - INVERT LEVEL

Legend:

- SITE BOUNDARY
- EXISTING STREAM / DITCH
- PROPOSED SURFACE WATER DRAIN
- PROPOSED HEADWALL
- PROPOSED PERFORATED DRAIN
- PROPOSED SWALE
- PROPOSED ATTENUATION POND
- PROPOSED FLOOD EXCEEDANCE ROUTE
- CATCHMENT 01 (AREA - 3.607HA)
- CATCHMENT 02 (AREA - 1.533HA)
- 1 IN 1,000 SURFACE WATER FLOOD EXTENTS
- FLOOD ZONE 2
- FLOOD ZONE 3

Rev	Amendments	Date	By	Chk	Auth
P02	ARCHITECT LAYOUT UPDATED. DRAINAGE AMENDED TO SUIT.	16.05.25	HE	NB	NB

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Drawing Status & Suitability Code: **FOR INFORMATION**

Client: SOUTHERN STRATEGIC LAND LLP

Project: DENHAM'S CORNER
HORTON HEATH

Drawing Title: PRELIMINARY SURFACE WATER DRAINAGE LAYOUT

Scale	SLR Project No.
1:1,000 @ A1	416.065671.00001

Designed	Drawn	Checked	Authorised
HE	HE	NB	NB
Date: NOV 2024	Date: NOV 2024	Date: NOV 2024	Date: NOV 2024

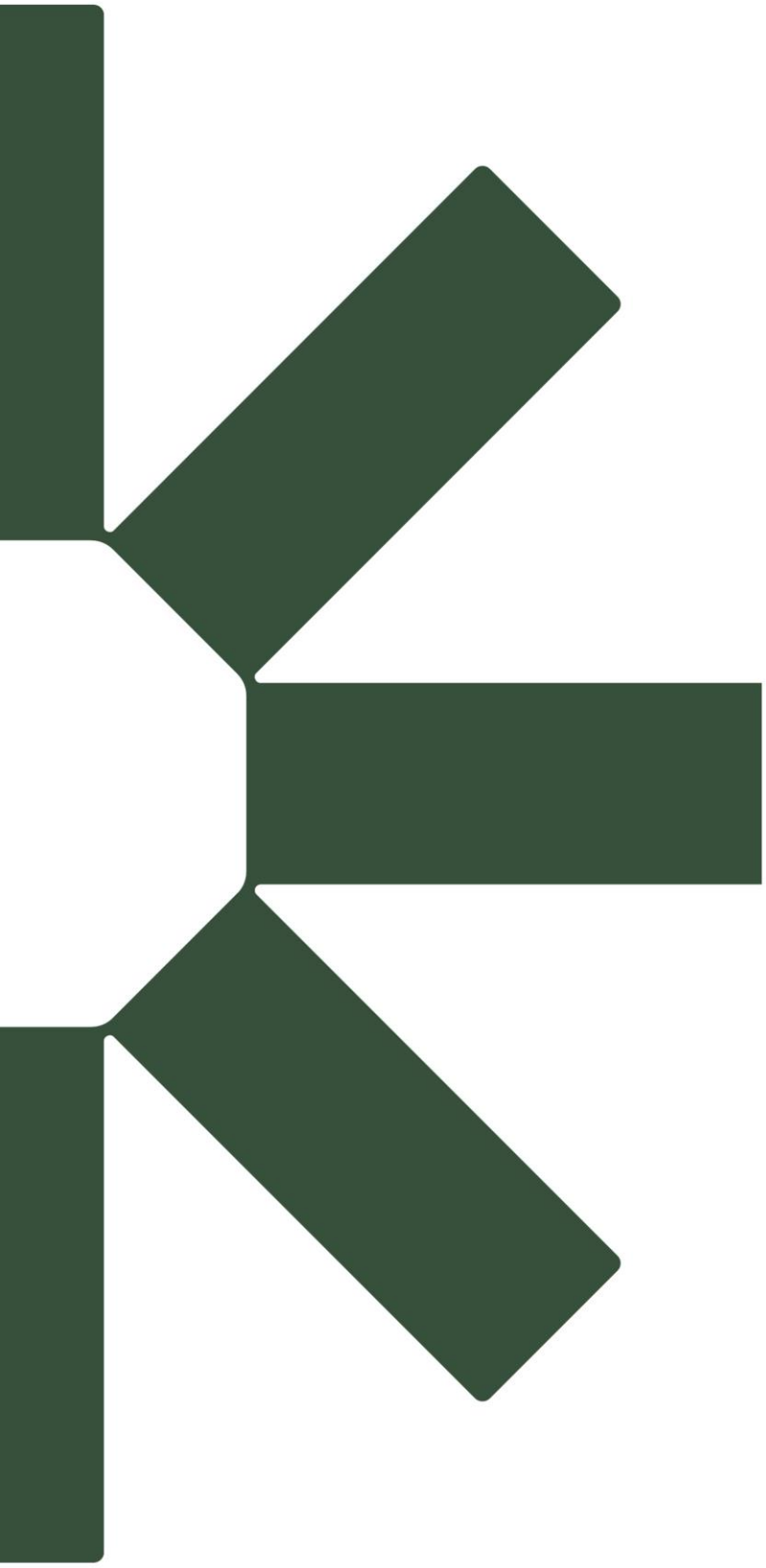
Drawing Number: **416.065671.00001_PDL_01** Rev: **P02**

16/05/2025

\\slr-local\eu\Offices\UKBristol\Admin\Projects\S3264 - Southern Strategic Land LLP\416.065671.00001 - Denham's Corner, Horton Heath\Tech\HYD\Dwgs\Wking\416.065671.00001_PDL_01-P02 Preliminary Surface Water Drainage Layout.dwg

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