



Flood Risk Assessment

Land North of Camer Road, Meopham

Client

The McManus Family

Ref: 13675

Date: November 2025

Consulting Engineers

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Executive Summary

- The outline planning application is submitted on behalf of The McManus Family to Gravesham Borough Council for development at Land North of Camer Road, Meopham. The Proposed Development is described in Section 1.
- This Flood Risk Assessment ("FRA") aims to address the requirements of relevant Local Plan Policies and demonstrate compliance with the National Planning Policy Framework ("NPPF") and relevant planning practice guidance, in particular "Flood risk and coastal change" (PPG).
- The Site lies entirely within Flood zone 1 – Low probability remote from any fluvial or coastal risk area. Potential pathways for surface water flood risk are mapped in the west of Site and on Camer Road at the east boundary. The proposed built development is located outside of these risk areas.
- In situ soakaway tests have demonstrated sufficient soil permeability for point-load soakaways within the Chalk strata beneath the Site. Surface water runoff will therefore be discharged to ground. Runoff from paved areas will require treatment upstream of the infiltration features to protect water quality in the receiving aquifer which has groundwater source protection zone designations.
- Sustainable Drainage Systems ("SuDS") features include lined on-plot source control techniques such as permeable paving and bioretention rain gardens as well as grassed conveyance swales and strategic infiltration basins. The proposed SuDS components will provide sufficient treatment to protect the groundwater body beneath the Site.
- The SuDS strategy has been prepared in line with Defra's "National standards for sustainable drainage systems (SuDS)". The infiltration basins have been sized to serve the surface water catchments with sufficient volume provided to cater for the 1 in 100 (1%) annual exceedance probability ("AEP") plus 45% climate change rainfall events.
- Foul drainage from the development will be pumped to the existing Southern Water sewer network in Norwood Lane. The requirement for off-site upgrades will be established by Southern Water. If required, upgrades will be delivered by Southern Water under Infrastructure Charging arrangements with implementation timed to suit the Proposed Development's programme for occupation.

1 Introduction

1.1 The outline planning application is submitted on behalf of The McManus Family to Gravesham Borough Council for the development of Land North of Camer Road, Meopham.

1.2 The Proposed Development, known as Land North of Camer Road, comprises:

"Outline planning application for up to 725 dwellings (Use Class C3), a new two-form entry primary school (Use Class F1), a Local Centre (up to 500sqm of Class E floorspace), the provision of Public Open Space including sport and recreation facilities alongside associated access, landscaping, parking, and infrastructure; with all matters reserved except for access."

1.3 GTA Civils & Transport Ltd was appointed by The McManus Family to provide an FRA to support the planning application to Gravesham Borough Council (GBC) as described above. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.4 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF) (2025) and relevant planning practice guidance, in particular "Flood risk and coastal change" (PPG ID7, updated September 2025).

2 Policy Context

Local Plan

2.1 The Gravesham Local Plan was adopted in 2014 and includes the Gravesham Local Plan Core Strategy (2014) and the Gravesham Local Plan First Review (1994) – saved Policies. The Local Plan sets out policies relevant to this FRA as quoted or summarised in the following paragraphs.

2.2 Policy CS18: Climate Change:

Flood Risk

5.14.36 With the exception of the previously developed sites along the Thames Riverside (see Policies CS03, CS04 and CS05) and those other regeneration sites which have already been evaluated in accordance with the sequential and exception tests at the application stage, development will be directed sequentially to those areas at least risk of flooding.

5.14.37 Proposals in areas at risk of flooding must be accompanied by a Flood Risk Assessment (in accordance with national policy and Environment Agency standing guidance as appropriate) and a Flood Risk Management Plan (if required) to demonstrate that they are adequately defended and safe over their lifetime. Planning permission will be refused for schemes which do not pass the sequential and exception tests.

5.14.38 The Council will prioritise the maintenance, improvement or replacement of flood defence infrastructure over other land uses where relevant. In addition to meeting their own flood defence and management needs, the Council will expect new development to take advantage of opportunities to reduce the causes and impacts of flooding from all sources where it is technically and financially feasible.

Water Quality

5.14.39 As part of its approach to climate change and environmental improvement, the Council will have regard to the delivery of the Water Framework Directive and associated Thames River Basin Management Plan objectives to support water bodies being progressively improved to “good” status over the plan period.

Sustainable Drainage and Surface Water Run-Off

5.14.40 The Council will seek to minimise the impact of drainage from new development on waste water systems. In particular, the Council will:

- *Require that surface water run-off from all new development has, as a minimum, no greater adverse impact than the existing use; and*
- *Require the use of Sustainable Drainage Systems on all developments where technically and financially feasible.*

2.3 Policy CS10: Physical and Social Infrastructure. This policy sets out that infrastructure improvements will be put in place in a timely manner where required to support new development.

Evidence Base

2.4 Kent Thameside Delivery Board published a Strategic Flood Risk Assessment (SFRA) in 2005 covering the Dartford and Gravesham borough areas. An update to the SFRA was published in 2009. The SFRA set out an overview of flood risk from various sources within the borough to inform land use planning. Findings of the SFRA in relation to the Site are discussed in Section 3.

2.5 GBC published a background paper titled Gravesham Water and Flood Risk (GWFR) in October 2020 provides context for draft policies to support the Regulation 18 Stage 2 Consultation of the emerging Local Plan. While this outline application will be determined against the current Local Plan policies, the GWFR background paper includes information on the local wastewater infrastructure.

Surface Water Management Plan

2.6 Kent County Council published the Thameside Stage 1 Surface Water Management Plan (SWMP) in May 2013. The SWMP study area includes Dartford and Gravesham boroughs. The SWMP discusses flooding history in the study area and identifies options for managing or reducing flood risk for problem areas. Information relevant to this FRA is discussed in Section 3.

Legislative Context

2.7 The Flood and Water Management Act 2010 (FWMA) updated legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought. The FWMA helps reduce

flood risk by:

- clarifying who is responsible for managing all sources of flood risk;
- encouraging more sustainable forms of drainage in new developments; and
- making it easier to resolve misconnections to sewers.

- 2.8 The FWMA established the creation of the Lead Local Flood Authority (LLFA) at county or unitary level to manage local flood risk. Each LLFA is required to prepare a Local Flood Risk Management Strategy which considers all sources of flood risk and identifies objectives to manage local flood risk to local communities.
- 2.9 The LLFA relevant to the Proposed Development is Kent County Council (KCC).
- 2.10 The FWMA also laid the groundwork for national Sustainable Drainage Systems (SuDS) standards to be created. Defra published the "National standards for sustainable drainage systems (SuDS)" on 19 June 2025 which provide the technical guidance that developers are expected to follow and which LLFAs will use to assess submissions.
- 2.11 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 tie the UK into the EU Water Framework Directive (WFD) which sets environmental objectives for water bodies. The Regulations set out how the Environment Agency (EA) monitors the ecological and chemical status of surface water bodies and the chemical and quantitative status of groundwater. The EA has published River Basin Management Plans (RBMP) to coordinate the WFD objectives in each river basin district.

3 Existing Site & Current Flood Risk

Site Location

- 3.1 The Site extends to approximately 44ha and is currently in agricultural use. The Site is situated to the east of Hook Green and to the southwest of Sole Street, and is bounded by the Chatham Main Line to the north, Camer Road to the southeast, and Northwood Lane to the southwest.
- 3.2 A location plan is in Appendix A.

Topography

- 3.3 The Site lies on the north edge of the Kent Downs and falls steadily from south to north. Ground levels are highest at the south at around 105m AOD by the Camer Road / Norwood Lane junction. Levels fall to 93m AOD at the north-east corner of the Site by Sole Street and to 85m AOD at the north-west by the Railway Sidings. The railway line flanking the north boundary of the Site is embanked in the west and in cutting to the east.
- 3.4 Survey data is in Appendix B.

Hydrology

- 3.5 There are no watercourses at or in the vicinity of the Site, reflecting the permeable soils in this part of Kent.

Geology

- 3.6 The published bedrock geology for the Site is Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated) – Chalk, with a zone of Thanet Formation – Sand above the chalk in the east of the Site. Superficial deposits of Head – Clay, Silt, Sand and Gravel are mapped in the lower areas of the Site to the north-east and to the north-west.
- 3.7 The Soilscape classifications at the Site comprise loamy and clayey soils with impeded drainage for the central and eastern areas, with freely draining shallow lime-rich soils over chalk in the west of the Site.
- 3.8 The Chalk bedrock is a highly productive Principal aquifer, while the area of Thanet Formation at the Site is classed as a Secondary A aquifer. The Head deposits are classed as Secondary undifferentiated. The BGS hydrogeological map scan indicates the

elevation of the groundwater table in the Chalk was less than 100 feet (30m) AOD in January 1966. This is some 50m below ground level.

- 3.9 Most of the Site is within a groundwater Source Protection Zone (SPZ). A band at the west is within Zone II – Outer with the central band within Zone III – Total Catchment. Around 10% of the Site at the east is outside of the SPZ. An area of Zone I – Inner is located 0.6km to the north-west of the Site. The Site is not within a Drinking Water Safeguard Zone for groundwater, indicating that the SPZ below the Site does not relate to a public water supply where additional pollution control measures are needed.
- 3.10 In common with much of North Kent, the simplified groundwater vulnerability map shows the Site generally in the High-risk category with the zones of Head deposits mapped as Medium-High. Soluble rock risk is mapped across the borough.
- 3.11 An In Situ Infiltration Test Report (Ashdown, May 2025) is included as Appendix C. The intrusive works were carried out in April 2025 and generally confirmed the mapped geology of Head deposits overlying Chalk bedrock. BRE Digest 365 soakaway tests were conducted at three trial pit locations across the Site with pit depths between 2.08 and 2.51m below ground level (bgl). The recorded infiltration rates were above 1×10^{-5} m/s within the Chalk, but below 1×10^{-6} m/s within the Head deposits.
- 3.12 The exploratory holes were found to be dry. Groundwater monitoring was conducted in one borehole in the centre of the Site over a 4-week period after the initial tests with fairly constant groundwater levels recorded between 4.64m to 4.75m bgl.

Flood Zone

- 3.13 The EA's Flood Map for Planning shows the Site lies entirely within Zone 1 – Low Probability, having less than a 1 in 1,000 (0.1%) annual exceedance probability (AEP) of river or coastal flooding. The Site is remote from any areas of river or coastal flood risk.
- 3.14 The EA's "Flood Map for Planning" is in Appendix D.

Surface Water Flood Risk

- 3.15 The EA's Risk of Flooding from Surface Water (RoFSW) mapping is included in Appendix D. It shows isolated small low spots at the Site affected during the High risk scenario, the 1 in 30 AEP. For the Medium risk (1 in 100 AEP) scenario, a potential flow pathway is evident along Camer Road towards Sole Street at the east boundary. For the Low risk (1 in 1,000 AEP) scenario, this pathway is shown to cross the north-east corner of the

Site to the railway cutting. Another potential flow pathway is mapped in the west of the Site from Norwood Lane to The Railway Sidings during the Low risk scenario.

Reservoir Flood Risk

- 3.16 There are no impounded water features in the vicinity and the Site is not close to any reservoir flood risk area shown on the EA's mapping.

Groundwater Flood Risk

- 3.17 The SFRA mapping indicates the Site is remote from any area of groundwater flood risk, which is confined to the lower-lying areas in the north of the Borough. The Site's position with sloping topography at the head of the catchment dictates that the likelihood of significant groundwater emergence will be very low.

Climate Change

- 3.18 The Site lies within the Medway Management Catchment. The applicable peak rainfall allowances for the Site over the development lifetime are 35% for the 1 in 30 AEP events and 45% for the 1 in 100 AEP events.

Historical Flooding

- 3.19 Anecdotal reports from local residents indicate that surface water flooding has occurred by the existing public house at the north-east of the Site, but there are no reports of flooding elsewhere at the Site. The Thameside SWMP mentions surface water flooding incidents in Norwood Lane and in the Wrotham Road area west of the Site due to blocked highway drains and heavy rainfall.
- 3.20 Local flooding incidents appear to be associated with inadequate capacity and/or maintenance of the drainage systems

Existing Sewers

- 3.21 There are no public surface water sewers mapped in the rural part of Gravesham borough. This reflects the established use of soakaway drainage across the catchment to dispose of runoff.
- 3.22 There are public foul sewer systems serving Hook Green and Meopham Station to the west of the Site. The nearest sewer is in Norwood Lane at the south with a diameter of 150mm. The spine of the network is 225mm diameter and runs north along Wrotham

Road. Based on the SWMP mapping, the sewer runs northwards through Istead Rise and terminates at Northfleet Wastewater Treatment Works (WTW).

3.23 There is also a 150mm diameter public foul sewer system in Sole Street to the north of the railway line. The system is routed west along Manor Road towards Istead Rise.

3.24 A copy of Southern Water's sewer records are included in Appendix E.

Existing Drainage Characteristics

3.25 No existing positive drainage features have been identified within the existing fields at the Site. The local highway drainage systems serving Camer Road and Norwood Lane are understood to drain to soakaway.

3.26 Greenfield runoff rates per hectare have been estimated for the Site using the Flood Estimation Handbook (FEH) statistical (2025) method as follows (see Appendix G for calculations):

1 in 1 AEP	0.6 litres per second per hectare (l/s/ha)
1 in 2 AEP	0.6 l/s/ha
Qbar	0.7 l/s/ha
1 in 30 AEP	1.7 l/s/ha
1 in 100 AEP	2.4 l/s/ha

4 Proposed Flood Risk Mitigation

- 4.1 Based on the assessment of existing flood risk at the Site, the only source of flood risk which requires mitigation is that from surface water.
- 4.2 The proposed Concept Masterplan and the proposed Drainage Strategy plan are included in Appendix F. The Strategy plan includes the RoFSW extents overlaid to allow comparison with the Proposed Development layout. The plan shows that all proposed built development has been located outside and away from any area of surface water flood risk, especially the two potential flow pathways identified at the west and east of the Site.
- 4.3 The detailed layout for the built development is not yet available. However, building floor levels will be set at least 150mm above surrounding ground levels to prevent water ingress during extreme rainfall. An overland flow assessment will be carried out at detailed / reserved matters stage.
- 4.4 The Proposed Development follows the sequential approach outlined in the NPPF by locating the more vulnerable uses on land with least flood risk. The updated PPG makes clear that the sequential test does not need to be applied where surface water flood risk is safely mitigated. The measures outlined above will adequately protect the proposed built development from existing surface water flood risk. Hence, the sequential test does not need to be applied in this case.
- 4.5 No further specific flood risk mitigation measures are required beyond the management of development runoff. This is discussed in the next section.

5 Proposed Surface Water Strategy

- 5.1 Defra published the National standards for SuDS ("NSS") on 19 June 2025. The key principles underpinning the NSS include a natural approach to managing water and an early and integrated design. The proposed Drainage Strategy is illustrated in Appendix F and has been prepared in accordance with these key principles. There are 7 core standards set out in the NSS and these are discussed in turn as follows:

Standard 1: runoff destinations.

- 5.2 The NSS hierarchy sets the priority as collecting runoff for non-potable use. Rainwater harvesting (RwH) solutions need to be considered with the architectural and building services design and hence will be considered at detailed stage. Water butts will be included as a minimum. Unless supersized storage tanks are provided in excess of the demand sizing, it must be assumed that any RwH systems are full and quickly overflowing at the time of an extreme storm event. Onward discharge must therefore be considered.
- 5.3 The 2nd priority is to infiltrate runoff to ground. The infiltration test results in Appendix C demonstrate that soakaway drainage will be viable within the Chalk strata below the site. Infiltration rates within the Head deposits are too slow to be effective. The proposed strategy is therefore to discharge runoff to ground via infiltration features set into the Chalk strata. This will promote groundwater recharge in the receiving aquifer.
- 5.4 Roof runoff from dwellings will be discharged to domestic soakaways located in rear gardens. Roof runoff from the proposed school buildings will discharge to soakaways at suitable locations within the school curtilage. The In Situ Infiltration Test Report (see Appendix C) advises that a 10m minimum offset should be observed from buildings. For domestic soakaways it should be possible to locate individual features adjacently in clusters at the ends of the gardens (sized with design calculations taking into account the influence of neighbouring soakaways).
- 5.5 Runoff from paved areas will be conveyed to strategic infiltration basins within the green open space. The Proposed Development is split into two catchments, north and south. The basin locations are indicated on the strategy plan in Appendix F.
- 5.6 A provision has also been made within the layout for an infiltration basin in the open space at the north-east of the site which could serve the existing public house catchment and help to alleviate some of the existing flooding problems experienced. This requires

3rd party involvement and is shown for information only. Potential options will be considered at detailed stage.

Standard 2: management of everyday rainfall (interception)

- 5.7 Standard 2 is intended to prevent any runoff occurring from the Proposed Development during everyday rainfall events. The use of infiltration techniques as a complete surface water management solution ensures compliance with Standard 2.

Standard 3: management of extreme rainfall and flooding

- 5.8 The NSS guidance sets out that infiltration features should be sized to accommodate the design rainfall event, namely the 1 in 100 AEP +45% climate change event. Flow calculations are included in Appendix G showing the required storage volume per impermeable hectare at each strategic basin location. The rates and volumes are summarised in Table 5-1. The infiltration features have been modelled with a factor of safety of 5 in accordance with the NSS.

Catchment	Infiltration rate	Storage estimate per hectare
South	3.19×10^{-5} m/s <i>from trial pit TP02</i>	820m ³ per ha
North	1.27×10^{-5} m/s <i>from trial pit TP01</i>	1,060m ³ per ha
Public house	1.0×10^{-5} m/s <i>assumed</i>	1,085m ³ per ha

Table 5-1: Infiltration rates and volumes

- 5.9 An estimate of proposed impermeable areas has been made to size the strategic infiltration basins and a summary table is included in Appendix G which illustrates the assumptions used including urban creep allowance. The calculations and the strategy plan (see Appendix F) demonstrate that sufficient land has been set aside for strategic infiltration basins within the proposed layout. The calculations demonstrate the half-drain times are within 24 hours for the 1 in 30 AEP events.
- 5.10 The proposed strategy will be developed at detailed / reserved matters stage and will include further infiltration testing and sizing of soakaway features in accord with best practice.

Standard 4: water quality

- 5.11 Discharges to ground within the groundwater SPZs II and III must receive adequate upstream treatment to protect water quality in the receiving aquifer. As the statutory consultee for groundwater, the EA requires that only clean water from roofs can be directly discharged to any soakaway. The proposed drainage strategy therefore includes SuDS treatment measures for the strategic catchments to achieve sufficient controls for the runoff from paved areas. At outline stage, the treatment train can be simplified as follows: 1) on-plot source control measures including permeable surfacing and bioretention areas; 2) conveyance swales; 3) infiltration basins. The features in stage 1) and 2) will be lined as needed to preclude infiltration to ground until sufficient treatment is achieved within the system.
- 5.12 Based on the Simple Index Approach described in CIRIA C753 (The SuDS Manual) the Proposed Development's pollution hazard indices are outlined in Table 5-2 below along with the relevant SuDS mitigation indices for the proposed SuDS components.

Pollutant type	TSS	Metals	Hydrocarbons
Pollution hazard indices			
Vehicular areas – Low	0.5	0.4	0.4
Spine roads – Medium	0.7	0.6	0.7
SuDS mitigation indices			
Permeable pavement	0.7	0.6	0.7
Bioretention system	0.8	0.8	0.8
Swale	0.5	0.6	0.6
Paving → Swale	0.9	0.9	1.0
Bioretention → Swale	1.0	1.1	1.1
Infiltration basin (assuming aggregate layer in the base)	0.4	0.4	0.4
Swale → Basin	0.7	0.8	0.8
Paving → Swale → Basin	1.1	1.1	1.2
Bioretention → Swale → Basin	1.2	1.3	1.3

Table 5-2: Runoff Treatment - Simple Index Approach

- 5.13 Table 5-2 demonstrates that the proposed SuDS treatment train will sufficiently protect the receiving groundwater body.

Standard 5: amenity

- 5.14 The strategic SuDS features have been integrated into the landscape proposals to ensure their amenity potential is realised. As part of the green infrastructure, the swales and basins will complement the destinations for recreation within the open space.

Softened embankment slopes are proposed, with a maximum gradient of 1 in 4 where needed, to improve visual impact and safety. For more information, refer to the landscape architect's documents. Further details will be provided at the next stage.

Standard 6: biodiversity

- 5.15 The strategy offers potential for biodiversity gains due to the array of wet habitat creation. For more information, refer to the ecology consultant's documents.

Standard 7: design of drainage for construction, operation, maintenance, decommissioning and structural integrity

- 5.16 Construction and Phasing: Limited information is available at this stage regarding the phasing of the Proposed Development. These topics are typically addressed by condition with Phasing Plans and Construction Environmental Management Plans (CEMP). Construction of the surface water drainage scheme will be carried out in line with best practice methods and controls. More information is included within the Environmental Statement.
- 5.17 Ownership and maintenance: A draft Drainage Maintenance Plan (DMP) outlining ownership and maintenance responsibilities is included in Appendix H. This is a draft version based on the information currently available at this stage; the DMP will be updated as the design of each phase is developed and will remain a live document over the duration of the project. A summary of the various responsibilities is as follows:
- Individual property drainage will be cared for by the property owner.
 - Highway drainage and SuDS will be the responsibility of KCC as the Highway Authority. The final extent of adopted roads will be confirmed at the next stage.
 - Adopted sewers and qualifying SuDS components will be the responsibility of Southern Water, or will be vested in a sewerage company under a NAV agreement. The final arrangements will be confirmed at the next stage.
 - The remaining drainage features along with the site-wide infrastructure will be cared for the Estate Management Company set up by the developer.
 - The developer will be responsible for maintaining completed SuDS components in advance of transfer to / adoption by the relevant party.

Consultations

- 5.18 Comments on the Drainage Strategy were obtained from the LLFA at KCC prior to the planning submission. A copy of the written response is included in Appendix J. The comments received have been addressed within this FRA.

6 Foul Drainage Strategy

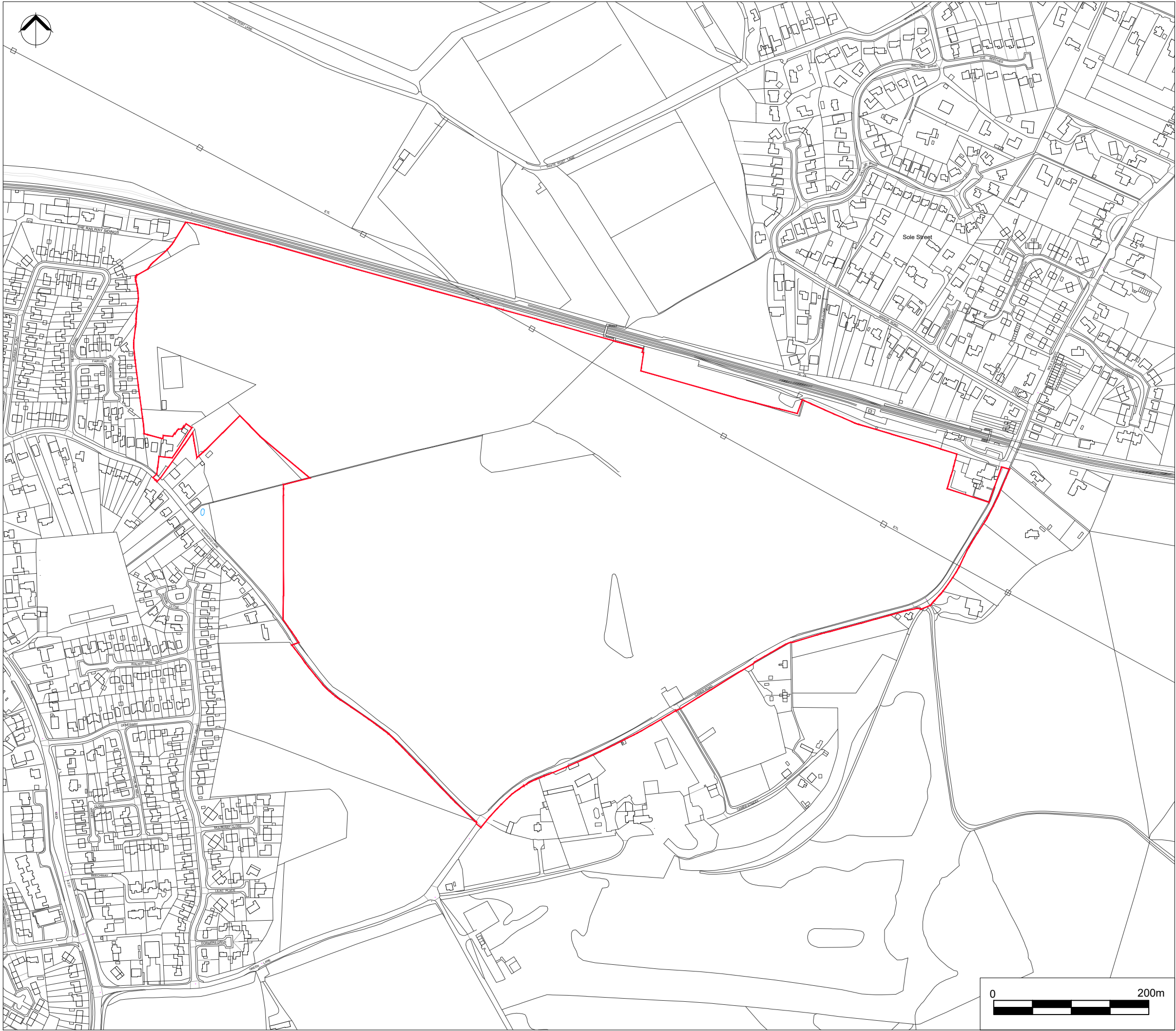
- 6.1 The Proposed Development will require a pumped connection to the public foul sewer network. The locations of the proposed on-site pumping station and point of connection in Norwood Lane are indicated on the Drainage Strategy in Appendix F.
- 6.2 Prior to a planning submission, Southern Water only offers a simple check to identify whether the required capacity for wastewater is available in the piped network local to the Proposed Development. If capacity is not available for consented development, Southern Water will provide network reinforcement subject to the new connections charging rules as directed by Ofwat. Based on the scale of the Proposed Development and the local sewer records, it has been assumed that existing sewer capacity will not be available and the pre-planning check has not been requested.
- 6.3 The nature of the off-site upgrades is to be determined following modelling work which will take place following outline consent being granted. Southern Water will deliver the off-site upgrades, which are funded by the Infrastructure Charges payable by all developers for new connections. The typical programme for delivering upgrades for projects of this scale is 18-24 months including modelling, design and construction, and this programme will commence following outline planning consent. This will be coordinated and phased with the Proposed Development's programme to ensure all required off-site improvements are delivered in time for modelled occupation thresholds. Based on current programme information, construction of the Proposed Development is anticipated to commence in 2028, leaving ample time for the required off-site reinforcements to be implemented in advance of connection.
- 6.4 Information within Southern Water's Business Plan 2025-30 (AMP8) indicates that a statutory improvement scheme is underway to address a lack of capacity at Northfleet WTW to accommodate proposed growth in the catchment. Completion is scheduled for 2028, which is in time to serve a connection from the Proposed Development.
- 6.5 The available information from Southern Water at this stage demonstrates that the required infrastructure upgrades will be delivered by them in a suitable timeframe to accommodate the Proposed Development. The exact dates and details are to be determined in discussion with Southern Water and it is reasonable that these issues should be covered by suitably worded 'prior to occupation' planning conditions. The new connection to the sewer network will be subject to S106 agreement with Southern Water in due course.

7 Conclusions

- 7.1 The site lies entirely within Flood zone 1 remote from any fluvial or coastal risk area. The proposed built development is located outside of existing surface water risk pathways. The Proposed Development is appropriate in terms of flood risk.
- 7.2 The proposed surface water strategy manages runoff by means of infiltration features set within the Chalk strata beneath the Site, for which in situ testing has demonstrated suitable rates.
- 7.3 The proposed SuDS components will capture pollutants to protect water quality in the receiving aquifer and groundwater SPZ. The multi-stage treatment train provides sufficient protection based on the Simple Index Approach set out within CIRIA C753.
- 7.4 The development complies with the NPPF and relevant planning practice guidance in terms of flood risk.
- 7.5 The proposed SuDS and foul drainage strategies comply with Local Plan Policies CS18 and CS10 in terms of flood risk.

Appendix A

Location Plan



 Planning Application Boundary - 44.32 ha

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EC1N 8FH



T 020 3640 8508
mail@iceniprojects.com

CLIENT
McManus Family

PROJECT
Land between Meopham and Sole Street

TITLE
Planning Application Boundary

DRAWN BY MA	CHECKED BY MP
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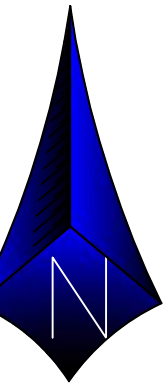
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PROJECT NO. 1000487	DRAWING NO. DL00	REV. D
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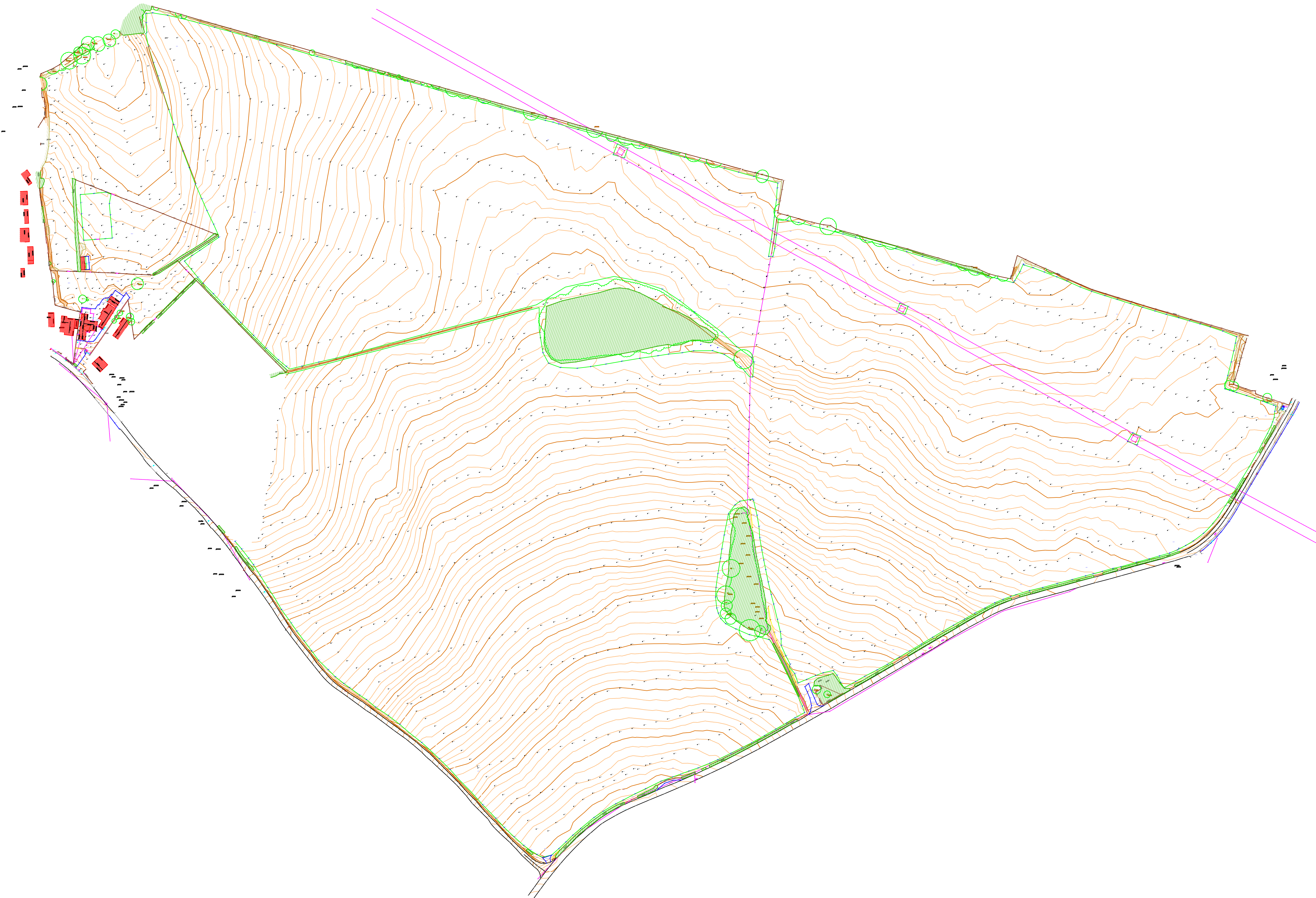
Iceni Projects accept no responsibility for any unauthorised amendments to this drawing. Only figured dimensions are to be worked to.

Appendix B

Site Survey



Co-ordinate Schedule: 0986				
Station	Easting	Northing	Height	Remarks
ADS51385	565631.091	167495.764	93.271	PK SURVEY NAIL
ADS51386	565597.626	167439.018	93.764	PK SURVEY NAIL
ADS51387	565645.473	167371.430	94.892	PK SURVEY NAIL
ADS52082	564704.085	167354.301	92.762	PK SURVEY NAIL
ADS52083	564793.819	167247.778	96.926	PK SURVEY NAIL
ADS52131	564743.863	167304.319	94.861	PK SURVEY NAIL
ADS52360	564553.608	167548.919	89.410	PK SURVEY NAIL
ADS52361	564560.923	167527.033	89.332	PK SURVEY NAIL

[illegible]

CLIENT	GAIL MCMANUS
DRAWING TITLE	TOPOGRAPHIC SURVEY
PROJECT	Land North of Camer Rd Hook Green Meopham



**ADS
SURVEYS**

ADS Surveys Ltd
 Andell House
 Highfield Lane
 Woodfalls, Wiltshire
 SP5 2NG
 Tel: 07738 462205
 Email: andy@ads-surveys.uk



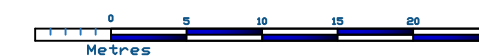
chartered
ICS



**THE SURVEY
ASSOCIATION**

The horizontal & vertical control of this survey is based on Ordnance Survey grid as translated from GPS co-ordinates using the OSTN02 & OSGM02 transformation as supplied by OS. We have applied a reverse scale factor to maintain true ground distances. Vertical values may differ from existing OS benchmarks in the vicinity which should be disregarded. All levels should be taken from ADS survey control.

Scale: 1:2000 Plotted on A1	REV. -	Drawing No: ADS/0986-TP1 © ADS Surveys Ltd. 2014
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Appendix C

Infiltration Tests



IN SITU INFILTRATION TEST REPORT

**LAND NORTH OF
CAMER ROAD
HOOK GREEN
MEOPHAM
KENT**

PROJECT REFERENCE: P17150

REPORT REFERENCE: R16659

Report Beneficiary: Mrs Gail McManus

Document Control			
Issue No.	Status	Issue Date	Notes
1	Final	15 th May 2025	
Report Section		Prepared By	Approved By
Factual Section		Georgia Roper-Docherty BSc MRes	Rebecca Webb BSc FGS
Geotechnical Assessment		Rebecca Webb BSc FGS	Steven McSwiney BA mod Geol MSc FGS

Limitations

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1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ infiltration testing to assist with drainage design for the proposed new development of a large plot of land to the north of Camer Road, Hook Green, Meopham, Kent.

The specific objectives of the works were to:

- a) Establish the expected geology and hydrogeology at the site;
- b) Investigate the shallow ground and groundwater conditions at the specified test locations;
- c) Undertake in situ infiltration testing and provide calculated infiltration rates to assist others with the drainage design.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q15130, dated 27th March, 2025. The instruction to proceed was received on behalf of the client, Mrs Gail McManus.

2. SITE CONTEXT

2.1 Site Location

The site is located off Camer Road, Hook Green, Meopham, Kent and is centred on the approximate Ordnance Survey national grid reference 565052, 167461. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

The site consists of three large agricultural fields, with two small outcroppings of trees towards its centre. To the north, the site is bounded by a railway line running east to west. The site is bounded by Camer Road to the south-east and residential land to the south-west.

2.2 Geological Setting

2.2.1 Expected Geology and Aquifer Designation

The stratigraphic succession that may be expected to underlie the site has been established by reference to British Geological Survey (BGS) mapping and the BGS Lexicon of Named Rock Units. The expected stratigraphy is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Superficial	Head	Secondary Undifferentiated Aquifer
Bedrock	Thanet Formation	Secondary A Aquifer
	White Chalk Subgroup	Principal Aquifer

The eastern and western ends of the site are shown on BGS mapping to be underlain by Head deposits. The superficial Head is a polymict deposit generally comprising clay and sandy clay with variable amounts of gravel and cobbles. The lithology of the Head reflects the nature of the parent solid strata; the gravel and cobble fraction comprising chalk and flint. The material is likely to have been disturbed by intense frost action in a periglacial environment. It is usually poorly sorted but may be stratified where it has been subject to solifluction and/or hillwash and soil creep. It may form infill to solution features within the chalk.

The eastern half of the site is shown on BGS mapping to be partly underlain by Thanet Formation Deposits. The Thanet Formation forms part of the Montrose Group. The formation is of Thanetian age (56 to 59.2 million years old; Late Palaeocene). The Thanet Formation is typically composed of homogeneous, bioturbated, glauconitic silty fine grained sand, with sandy silt, silt or sandy, silty clay especially in the lower part, forming a coarsening upwards sequence. The deposits are generally pale yellow-brown in colour, typically with a 'peppering' of dark-coloured glauconite grains. Sparse white mica occurs throughout. Rare coarse gravel is present in places in London. Patchy calcareous, siliceous or ferruginous cement occurs locally. A thin gravel and cobble bed (the 'Bullhead Bed') is generally present at the base. It comprises unworn green-coated flints in a matrix of green, glauconite rich clayey sand. Dispersed and degraded volcanic ash occurs at least locally in the Thanet Formation. The formation is recorded by the BGS to range in thickness up to 37m.

A majority of the site is shown on BGS mapping to be underlain by undifferentiated White Chalk Subgroup deposits. The White Chalk Subgroup comprises chalk with flints. The Subgroup contains discrete marl seams, nodular chalk and flint seams throughout. The formation is of Maastrichtian to Cenomanian age (66 to 100.5 million years old; Late Cretaceous). The subgroup is recorded by the BGS to range in thickness up to 470 to 515m are preserved in the Hampshire/Sussex Area.

2.2.2 *Groundwater Source Protection Zones (SPZ)*

The Environment Agency defines SPZs as those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption.

The western end of the site lies within an Outer zone – SPZ2, while the central part of the site lies within a Total Catchment – SPZ3. The far eastern end of the site does not lie within a SPZ.

3. SITE WORKS

3.1 Introduction

The intrusive site works comprised the excavation of a series of mechanically dug trial pits and the drilling of a single dynamic sampler borehole. The intrusive work was carried out between 15th and 17th April 2025. The exploratory hole locations are shown on Figure 2.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in Appendix A, which also includes explanatory notes to assist in their interpretation.

3.2 Exploratory Holes

The following table summarises the intrusive works undertaken at the site.

Table 2. Summary of Intrusive Works Undertaken

Designation	Depth (m bgl)	Method
WS01	5.30	Dynamic Sampler
TP01	2.12*	Machine Dug
TP02	2.08*	Machine Dug
TP03	2.51*	Machine Dug

Notes: * Average Depth

3.3 Sampling

Samples of soil were taken from the exploratory holes at the depths shown in the exploratory hole records. The types of samples taken are indicated on the exploratory hole records. Details on the sample types are provided in the explanatory notes.

3.4 In Situ Infiltration Testing

In situ infiltration testing was undertaken in trial pits in general accordance with the test methodology given by BRE guidance¹.

In addition, falling head soakage tests were undertaken at different depths in the borehole, in general accordance with Kent County Council guidance².

The results of the testing along with the infiltration rate calculations are included in Appendix B.

¹ Section 3.2.3 of Building Research Establishment (BRE) Digest 365, 2016.

² The Soakaway Design Guide published by Kent County Council, 2000.

3.5 Installations

A groundwater monitoring standpipe was installed to a depth of 5.30m in the dynamic sampler borehole. A description of the installation is shown on the exploratory hole record.

A groundwater data logger was installed within this standpipe on 16th April 2025 and collected on 8th May 2025. The data logger was programmed to collect readings at 15-minute intervals. The results of the groundwater monitoring are included within Appendix C.

3.6 Laboratory Testing

Laboratory testing was scheduled by Ashdown Site Investigation Ltd.

Geotechnical testing was undertaken by a laboratory with recognised (UKAS) accreditation for quality control.

Results from the laboratory tests are provided in Appendix D.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 *Surface Covering*

Each of the exploratory holes was excavated through a surface cover of topsoil and underlying subsoil layer, totalling some 250mm to 400mm in thickness.

4.1.2 *Head*

Underlying the topsoil/subsoil, the investigation progressed into undisturbed slightly gravelly clay deposits, which continued within exploratory holes WS01, TP01 and TP02 to depths of between 0.60m and 1.00m below ground level, and to the final excavation depth of 2.51m below ground level within exploratory hole TP03. The gravel fraction comprised subangular to subrounded fine to coarse flint and chalk.

These deposits are considered to represent the Head deposits indicated to underlie the site on BGS geological maps.

4.1.3 *White Chalk Subgroup*

Beneath the Head deposits, where penetrated, the exploratory holes encountered chalk deposits, which became structured with depth. Aside from within exploratory hole TP03, these deposits continued to the full depth of the investigation.

These deposits are considered to represent the White Chalk Subgroup indicated to underlie the Head deposits on BGS geological maps.

4.2 Stability

Each of the exploratory holes was recorded to remain stable during the course of drilling/excavation.

4.3 Groundwater Conditions

The exploratory holes were recorded to remain dry during the course of the investigation.

Monitoring of the stand-pipe installed in borehole WS01 by way of data loggers showed that after the initial water that had been introduced into the borehole for the soakage testing had drained away, groundwater was recorded at a fairly constant depth of between 4.64m and 4.75m below ground level over the monitoring period.

5. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing³ was carried out in trial pits TP01, TP02 and TP03.

For the testing carried out within TP02, the soil infiltration rate (f) was calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period, and its base area. This figure was then divided by the test duration (time taken for the water level to fall between 75% and 25% of the initial test depth) to give the soil infiltration rate in metres per second.

During the tests performed within trial pits TP01 and TP03, the water level within the test pits did not fall below 25% of the initial test depth and calculation of the soil infiltration rates in accordance with the BRE digest was not possible. The number of tests that could be achieved was also limited. For these tests the soil infiltration rate has been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds.

In-situ infiltration testing⁴ was also undertaken in borehole WS01 at various depths as the borehole progressed. From the test results, calculations were made to estimate the infiltration rate that could be expected for soakaways constructed to discharge into the underlying soils within the test zone.

The infiltration rates derived from the tests are summarised in the following table.

Table 3. Calculated Infiltration Rates

Exploratory Hole	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Stratum	Infiltration Rate (f) (m/sec)	Driving Head of Water (m)
TP01 Test 1	1.23	2.12	White Chalk Subgroup	1.27×10^{-5}	-
TP01 Test 2	1.20	2.12	White Chalk Subgroup	2.55×10^{-5}	-
TP02 Test 1	1.40	2.08	White Chalk Subgroup	3.19×10^{-5}	-
TP02 Test 2	1.37	2.08	White Chalk Subgroup	6.71×10^{-5}	-
TP02 Test 3	1.29	2.08	White Chalk Subgroup	9.07×10^{-5}	-
TP03 Test 1	1.97	2.51	Head	4.75×10^{-7}	-
WS01 Test 1	2.00	3.00	White Chalk Subgroup	1.09×10^{-4}	2.0
				3.37×10^{-5}	1.0
				1.91×10^{-5}	0.6
WS01 Test 2	2.90	4.00	White Chalk Subgroup	4.13×10^{-5}	3.0
				1.49×10^{-5}	2.3
				3.82×10^{-6}	1.6
WS01 Test 3	3.90	4.90	White Chalk Subgroup	2.00×10^{-5}	4.0
				8.17×10^{-6}	3.6

³ Conducted in general accordance with the requirements of BRE 365, Soakaway Design.

⁴ Conducted in accordance with The Soakaway Design Guide, published by Kent County Council, July 2000.

Exploratory Hole	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Stratum	Infiltration Rate (f) (m/sec)	Driving Head of Water (m)
WS01 Test 3	3.90	4.90	White Chalk Subgroup	6.24×10^{-6}	3.1

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system.

To comply with building regulations⁵, point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings. However, CIRIA guidance⁶ recommends that where soakaways are to be sited on chalk deposits that are of low density they should be constructed a minimum of 10m away from buildings. The laboratory testing undertaken on samples of the chalk indicate they are of low density.

⁵ The Building Regulations 2010; Part H; Drainage and Waste Disposal

⁶ CIRIA C574: Engineering in Chalk

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Site Plan



Head Office

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
contact@ashdownsi.co.uk

Site

Land North of Camer Road
Hook Green
Meopham
Kent

Project Ref

P17150

Figure No

1

Drawing Title

Site Location Plan

Scale

Not To Scale



Head Office

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
contact@ashdownsi.co.uk

Site

Land North of Camer Road
Hook Green
Meopham
Kent

Project Ref

P17150

Figure No

2

Drawing Title

Site Plan

Scale

Not To Scale



APPENDIX A

Explanatory Notes
Exploratory Hole Records

EXPLANATORY NOTES

Symbols and abbreviations on Exploratory Hole Records

Samples

U	'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample
R	Root Sample
B	Bulk Disturbed Sample
W	Water Sample
ES	Environmental Suite (on older records may be referenced J T)

In Situ Testing

S	Standard penetration test (SPT): Using the split spoon sampler.
C	Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

CP	Cable Percussion Borehole
RC	Rotary Cored Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HDP	Trial Pit excavated using hand tools

Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

In Situ Strength Testing

Standard penetration testing (SPT) carried out in accordance with BS EN ISO 22476-3:2005.

Continuous dynamic probe testing conducted using a super heavy DPSH-B (As defined by BS EN ISO 22476-2:2005) probing geometry. The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

Perth penetrometer tests carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained shear strength determinations made in-situ using a Geonor hand shear vane or a hand penetrometer.

Testing to determine the in-situ California Bearing Ratio (CBR) of soils conducted at shallow depths using a hand-held Transport Research Laboratory (TRL) cone penetrometer.



Site Name: Land North of Camer Road, Hook Green, Meopham, Kent

Job Number: P17150

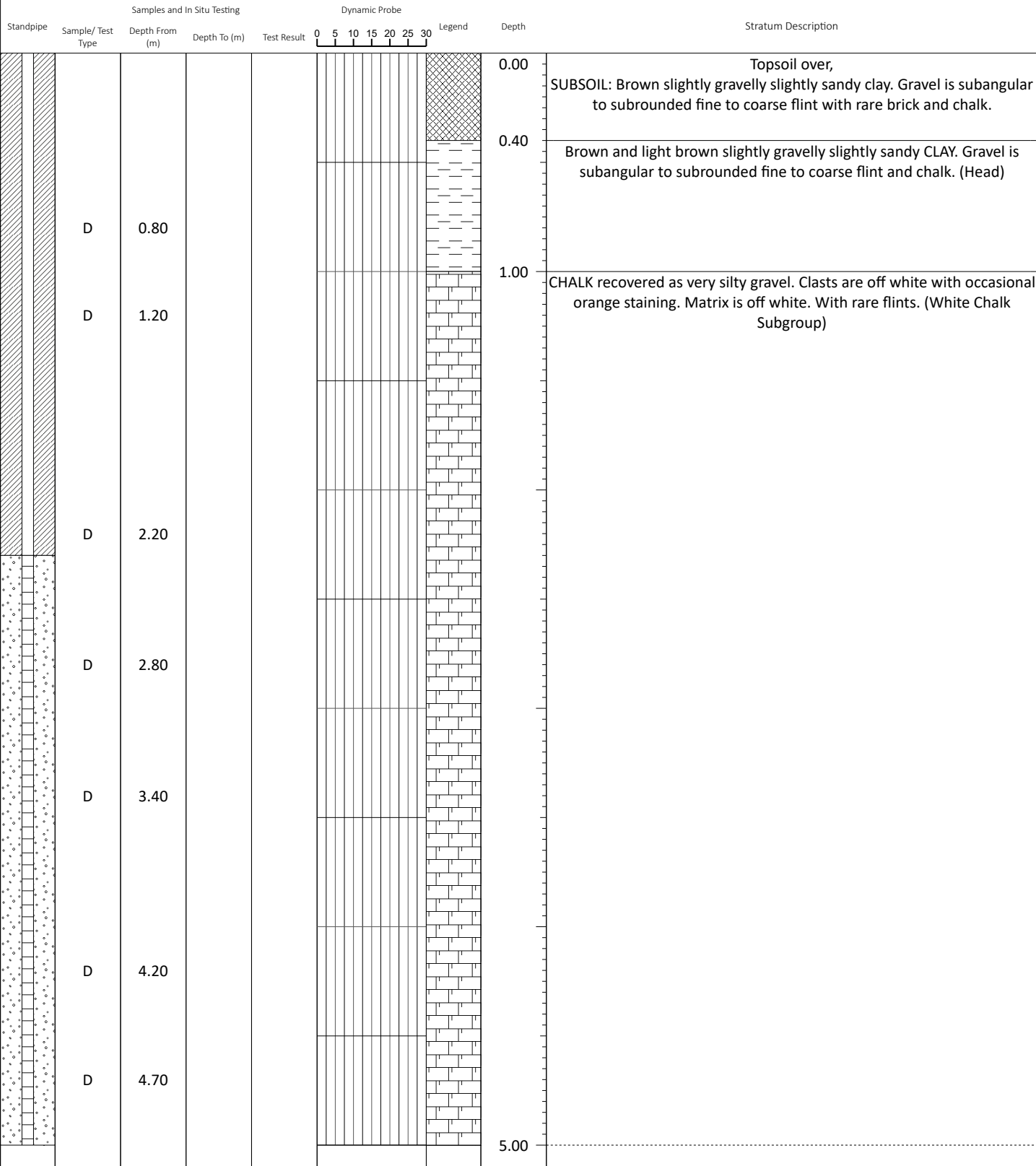
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Start Date: 16/04/2025

End Date: 16/04/2025

Borehole Number: **WS01**

Sheet 1 of 2



Remarks

Groundwater: Borehole dry at 3.00m depth, prior to start of first soakage test.

Stability: Borehole cased to 3.90m depth.
Borehole stable on completion.

Notes: No further progress below 5.30m depth - too hard/dense.
Soakage testing undertaken when borehole progressed to 3.00m, 4.00m and 4.90m depth.
Standpipe installed to 5.30m depth; 5.30m to 2.30m slotted pipe with gravel surround; 2.30m to ground level plain pipe with bentonite seal; completed with an end cap and upstanding cover concreted into the ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: TM



Job Number: P17150

Start Date: 16/04/2025

End Date: 16/04/2025

Borehole Number: **WS01**

Sheet 2 of 2

Remarks	
Groundwater: Borehole dry at 3.00m depth, prior to start of first soakage test.	Excavation Method: WLS
Stability: Borehole cased to 3.90m depth. Borehole stable on completion.	Borehole Diameter: Various
Notes: No further progress below 5.30m depth - too hard/dense. Soakage testing undertaken when borehole progressed to 3.00m, 4.00m and 4.90m depth. Standpipe installed to 5.30m depth; 5.30m to 2.30m slotted pipe with gravel surround; 2.30m to ground level plain pipe with bentonite seal; completed with an end cap and upstanding cover concreted into the ground surface.	Made By: TM



Site Name: Land North of Camer Road, Hook Green, Meopham, Kent

Job Number: P17150

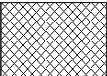
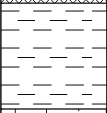
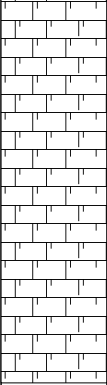
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Start Date: 16/04/2025

End Date: 16/04/2025

Trial Pit Number: TP01

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
D	0.40				0.00	Topsoil over,
					0.25	SUBSOIL: Dark brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint.
					0.60	Brown and orange brown CLAY with rare subangular to subrounded fine to coarse gravel of flint. (Head) with rare gravel of chalk below 0.45m depth.
						CHALK recovered as very silty gravel. Clasts are off white with frequent orange staining. Matrix is off white. With rare flints. (White Chalk Subgroup) with rare pockets of brown clay between 0.60m and 0.85m depth.
D	2.10				2.12	End of trial pit at 2.12m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: Pit depth varied between 2.01m and 2.23m, averaging a depth of 2.12m.

Excavation Method: TP

Pit Length: 1.98m

Pit Width: 0.56m

Made By: GRD



Site Name: Land North of Camer Road, Hook Green, Meopham, Kent

Job Number: P17150

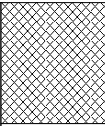
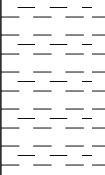
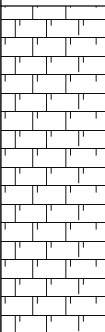
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Start Date: 15/04/2025

End Date: 15/04/2025

Trial Pit Number: TP02

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
D	0.70				0.00	Topsoil over, SUBSOIL: Brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint. With occasional cobbles of flint.
					0.40	Brown and orange brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk. (Head) with occasional pockets of chalk below 0.60m depth.
D	2.00				1.00	CHALK recovered as very silty gravel. Clasts are off white with frequent orange staining. Matrix is off white. (White Chalk Subgroup)
					2.08	End of trial pit at 2.08m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: Pit depth varied between 1.88m and 2.30m, averaging a depth of 2.08m.

Excavation Method: TP

Pit Length: 2.01m

Pit Width: 0.55m

Made By: GRD



Site Name: Land North of Camer Road, Hook Green, Meopham, Kent

Job Number: P17150

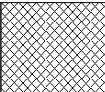
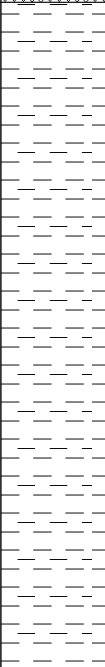
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Start Date: 17/04/2025

End Date: 17/04/2025

Trial Pit Number: TP03

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil over,
					0.30	SUBSOIL: Dark brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint.
						Brown and orange brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (Head)
					2.51	End of trial pit at 2.51m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: Pit depth varied between 2.43m and 2.56m, averaging a depth of 2.51m.

Excavation Method: TP

Pit Length: 2.22m

Pit Width: 0.57m

Made By: GRD

APPENDIX B

Borehole Infiltration Test Results

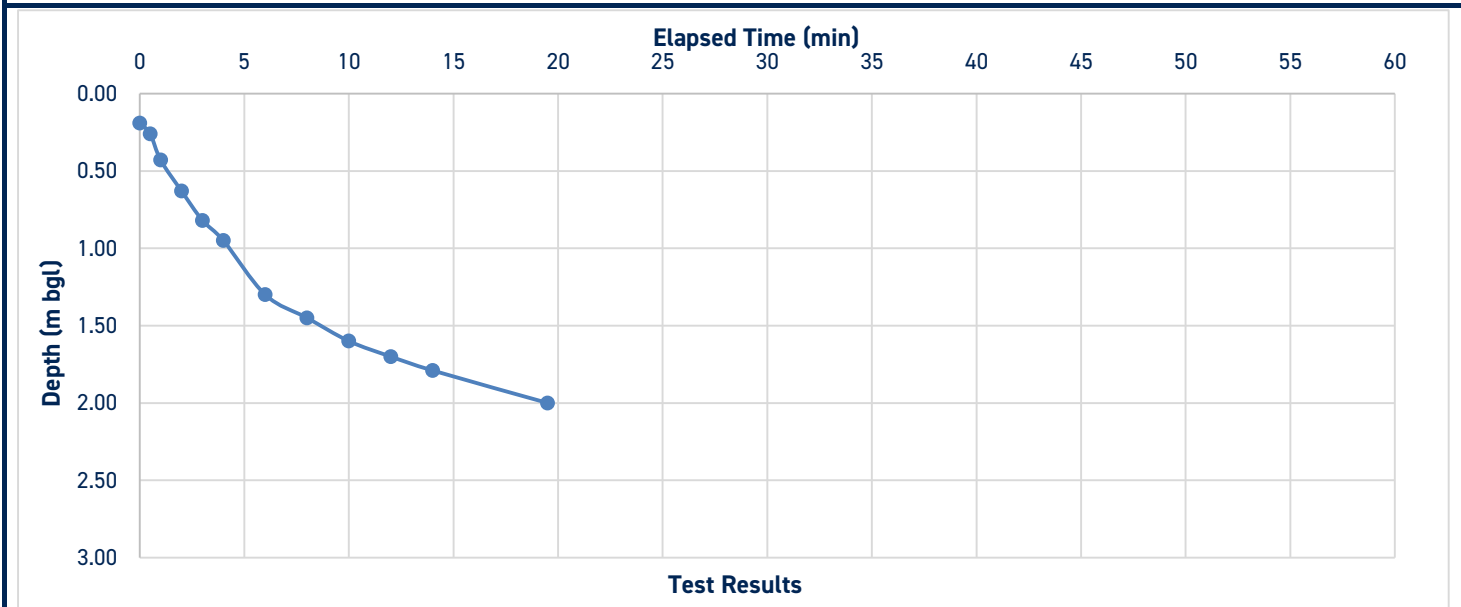
Trial Pit In Situ Infiltration Test Results

Site: Land North of Camer Road, Hook Green, Meopham, Kent

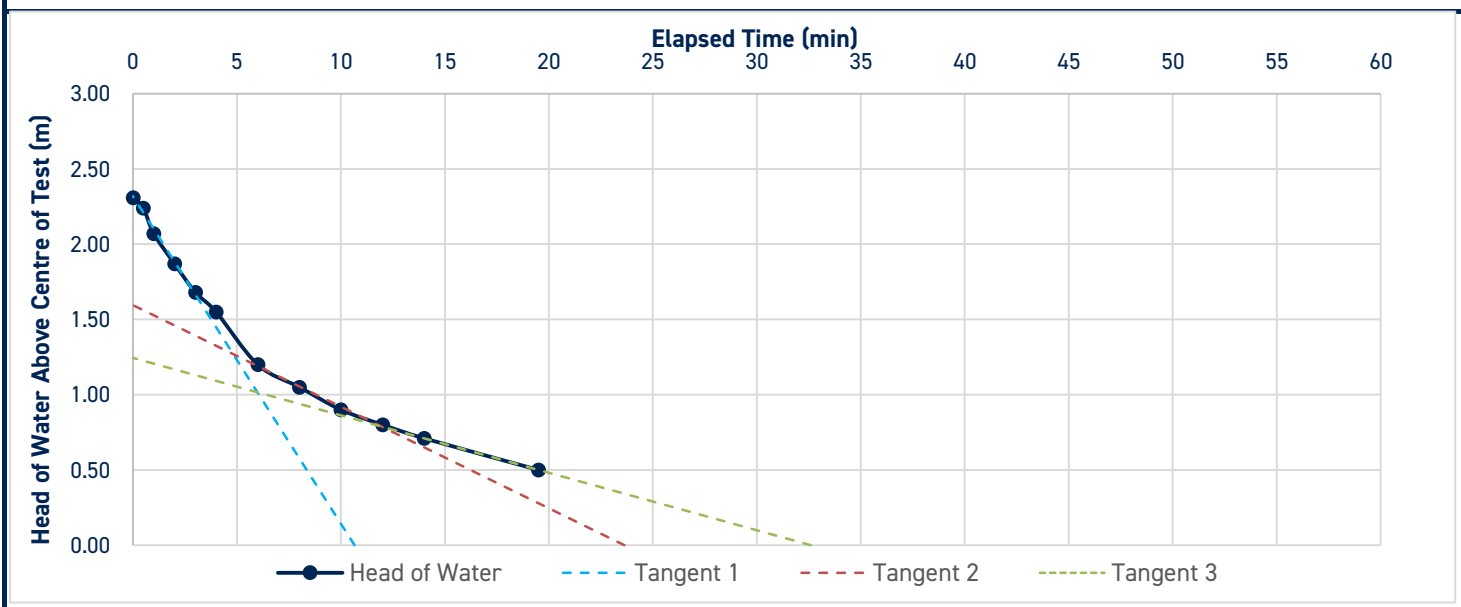
Project Ref: P17150

Test Location Reference	WS01
Test Number	1

Casing Depth	2.00 m bgl
Borehole Depth	3.00 m bgl
Casing Diameter	0.105 m
Average Borehole Diameter	0.092 m



Length of Test Zone	1.00 m	L
Depth to Center of Test Zone	2.50 m	X
Water level at start of test	0.19 m	
Water level at end of test	2.00 m	
Duration of test	20 min	
Average Depth Of Water	1.91 m	
Average Drained Area	0.56 m ²	
Volume of Water Lost	0.01 m ³	
Driving Head	2.0	1.0
Infiltration rate	1.09E-04	3.37E-05
		0.6 m
		1.91E-05 m/sec
Calculation method:	Calculated in accordance with The Soakaway Design Guide, published by Kent County Council, July 2000.	



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference WS01

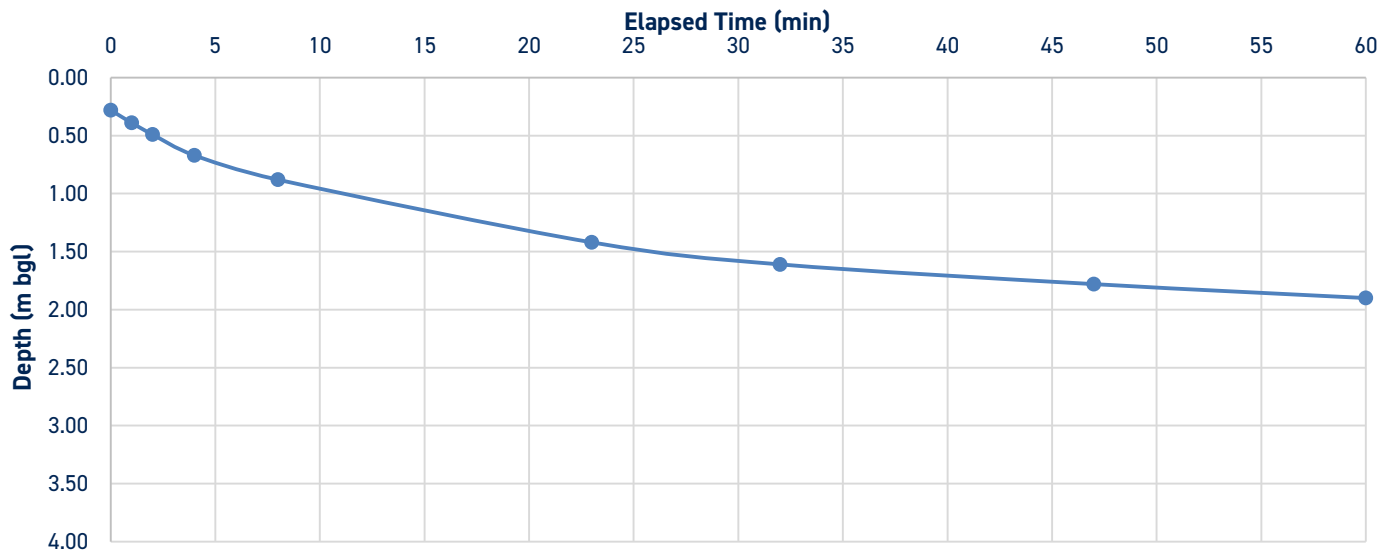
Test Number 2

Casing Depth 2.90 m bgl

Borehole Depth 4.00 m bgl

Casing Diameter 0.105 m

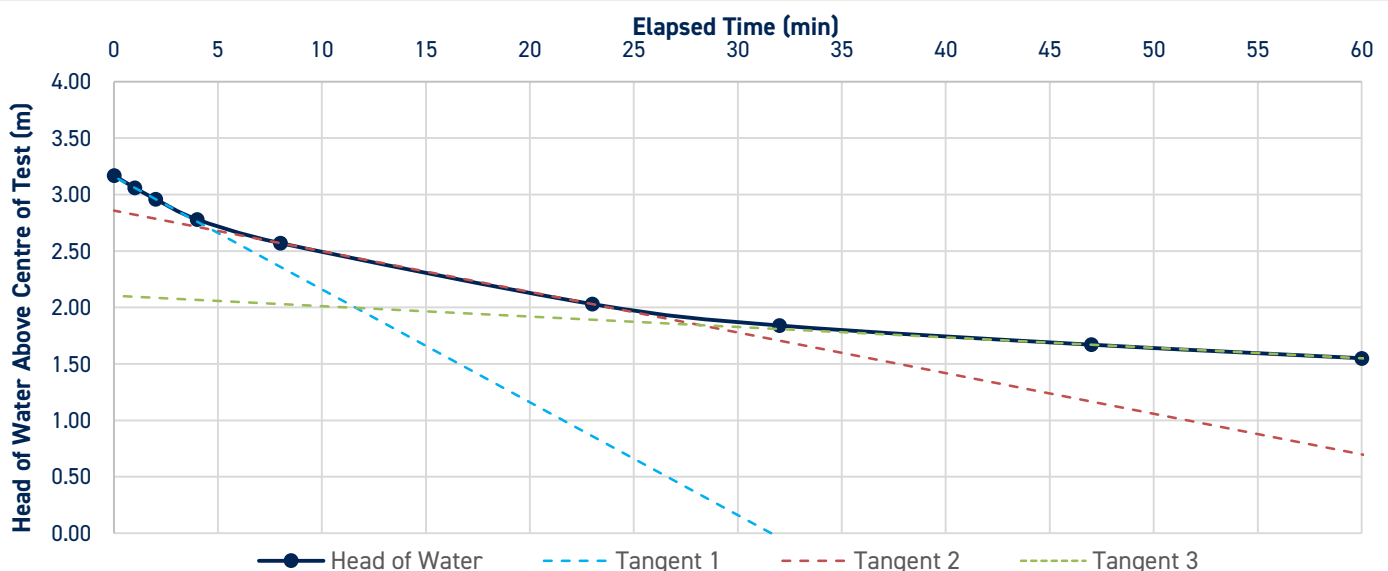
Average Borehole Diameter 0.101 m



Test Results

Length of Test Zone	1.10 m	L
Depth to Center of Test Zone	3.45 m	X
Water level at start of test	0.28 m	
Water level at end of test	1.90 m	
Duration of test	60 min	
Average Depth Of Water	2.91 m	
Average Drained Area	0.93 m ²	
Volume of Water Lost	0.01 m ³	

Driving Head	3.0	2.3	1.6 m
Infiltration rate	4.13E-05	1.49E-05	3.82E-06 m/sec
Calculation method:	Calculated in accordance with The Soakaway Design Guide, published by Kent County Council, July 2000.		



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference WS01

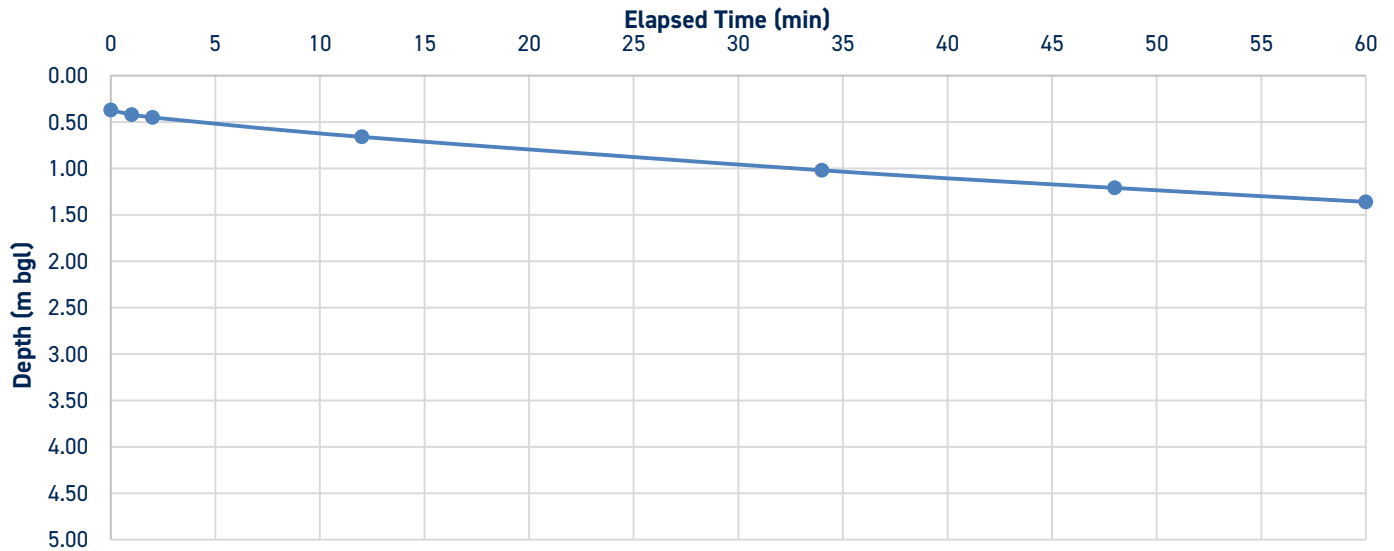
Test Number 3

Casing Depth 3.90 m blg

Borehole Depth 4.90 m blg

Casing Diameter 0.105 m

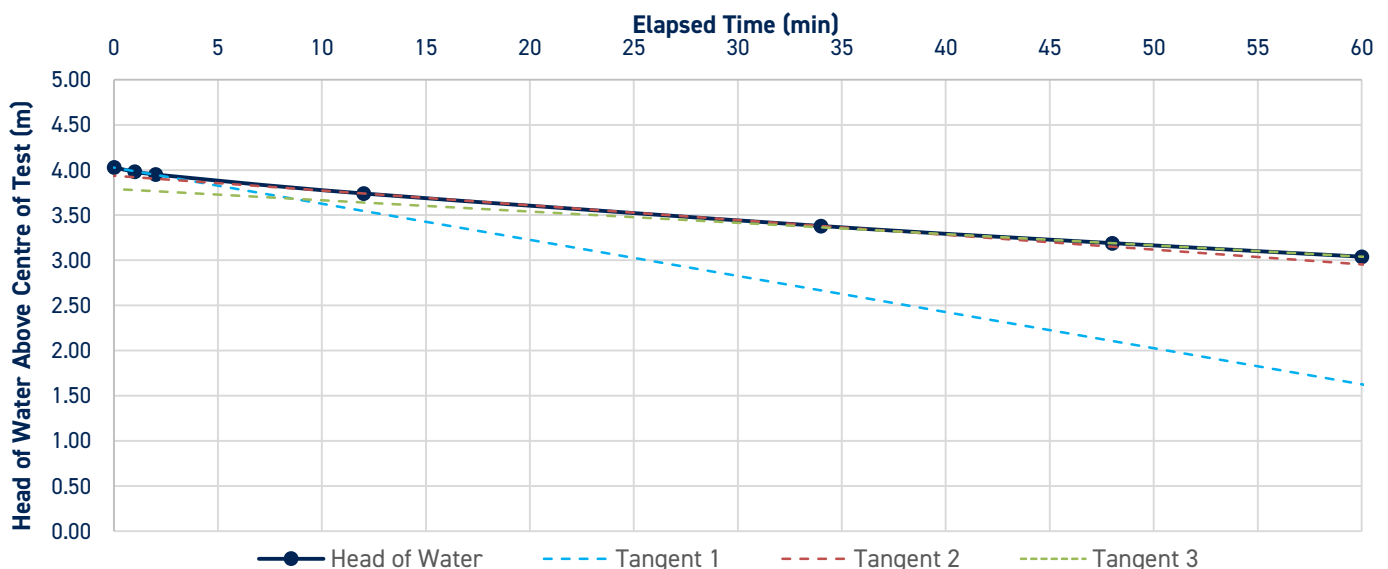
Average Borehole Diameter 0.092 m



Test Results

Length of Test Zone	1.00 m	L
Depth to Center of Test Zone	4.40 m	X
Water level at start of test	0.37 m	
Water level at end of test	1.36 m	
Duration of test	60 min	
Average Depth Of Water	4.04 m	
Average Drained Area	1.17 m ²	
Volume of Water Lost	0.01 m ³	

Driving Head	4.0	3.6	3.1 m
Infiltration rate	2.00E-05	8.17E-06	6.24E-06 m/sec
Calculation method:	Calculated in accordance with The Soakaway Design Guide, published by Kent County Council, July 2000.		



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP01
Test Number	1

Width of Pit	0.56 m	W
Length of Pit	1.98 m	L
Depth of Pit	2.12 m	D
Pit type	Open	

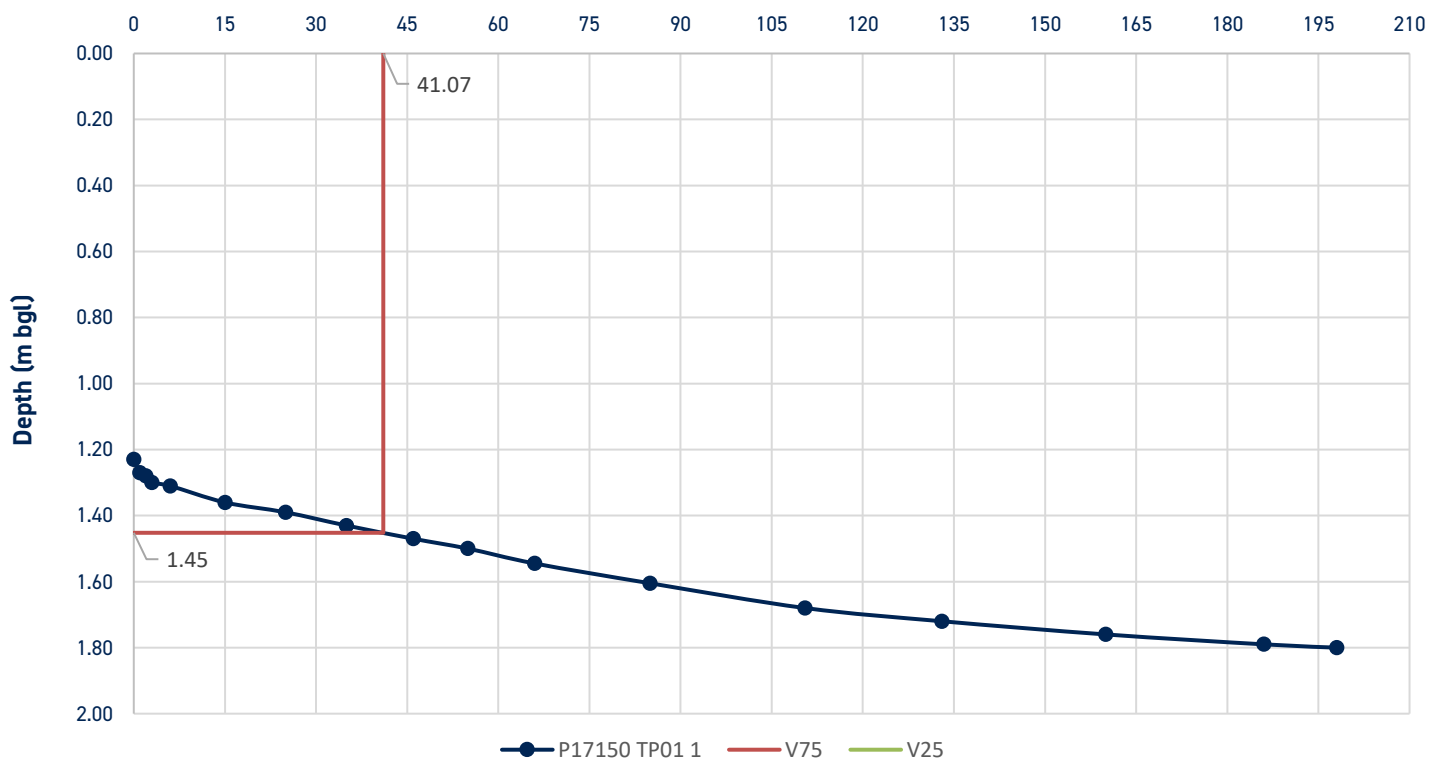
Volume of water introduced into pit	0.974 m ³	
Initial head of water	0.89 m	h_o
Water level at start of test	1.23 m	
Water level at end of test	1.80 m	
Volume of water discharged from pit	0.625 m ³	
Duration of test	198 min	
Average soaked surface area	4.15 m ²	
Time for water level to fall to 75% of initial head	41.07 min	t_{p75}
Time for water level to fall to 25% of initial head	Not reached min	t_{p25}
Depth to water at 75% of initial head	1.45 m	d_{75}
Depth to water at 25% of initial head	Not reached m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	3.34 m ²	a_{s50}

Infiltration rate

1.27E-05 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.

Elapsed Time (min)



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP01
Test Number	2

Width of Pit	0.56 m	W
Length of Pit	1.98 m	L
Depth of Pit	2.12 m	D
Pit type	Open	

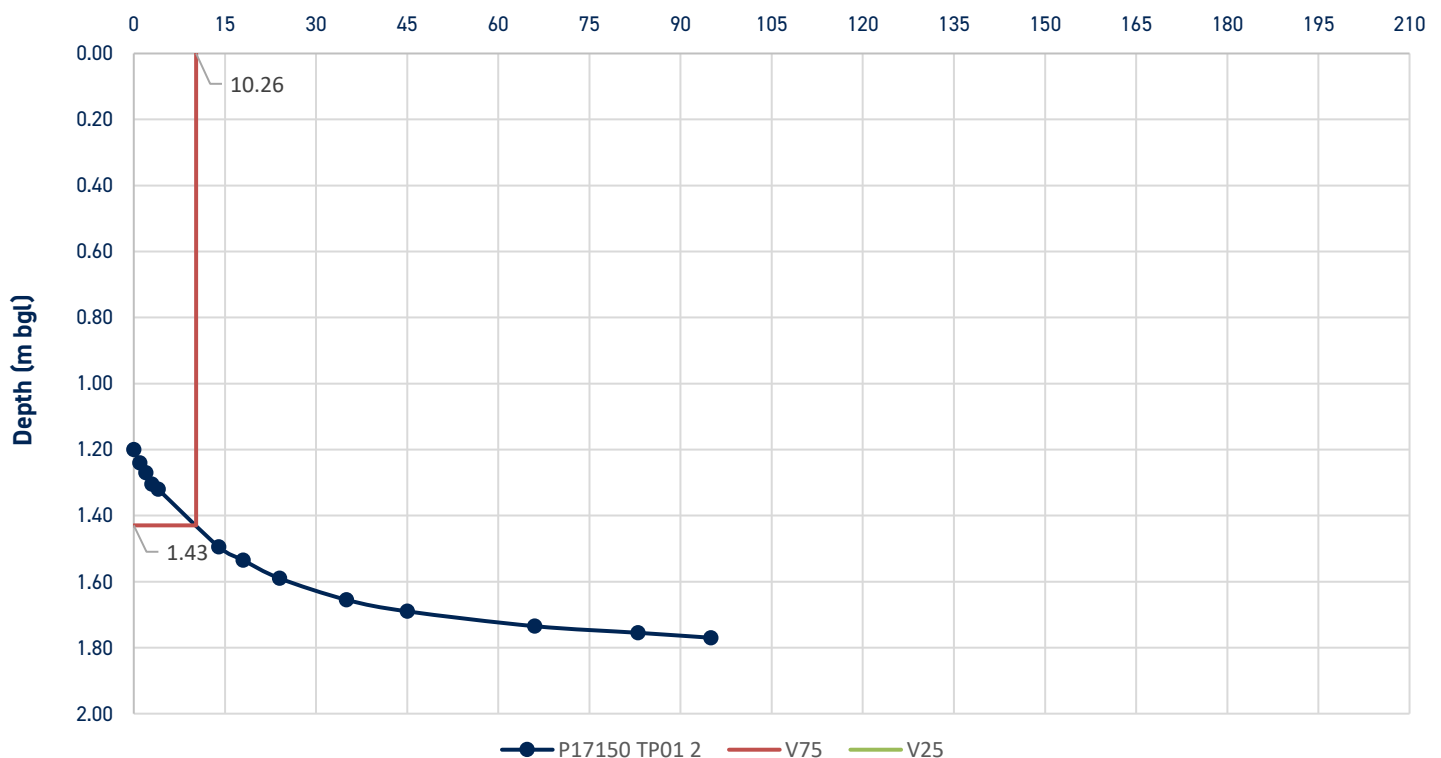
Volume of water introduced into pit	1.007 m ³	
Initial head of water	0.92 m	h_o
Water level at start of test	1.20 m	
Water level at end of test	1.77 m	
Volume of water discharged from pit	0.625 m ³	
Duration of test	95 min	
Average soaked surface area	4.30 m ²	
Time for water level to fall to 75% of initial head	10.26 min	t_{p75}
Time for water level to fall to 25% of initial head	Not reached min	t_{p25}
Depth to water at 75% of initial head	1.43 m	d_{75}
Depth to water at 25% of initial head	Not reached m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	3.42 m ²	a_{s50}

Infiltration rate

2.55E-05 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.

Elapsed Time (min)



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP02
Test Number	1

Width of Pit	0.55 m	W
Length of Pit	2.01 m	L
Depth of Pit	2.08 m	D
Pit type	Open	

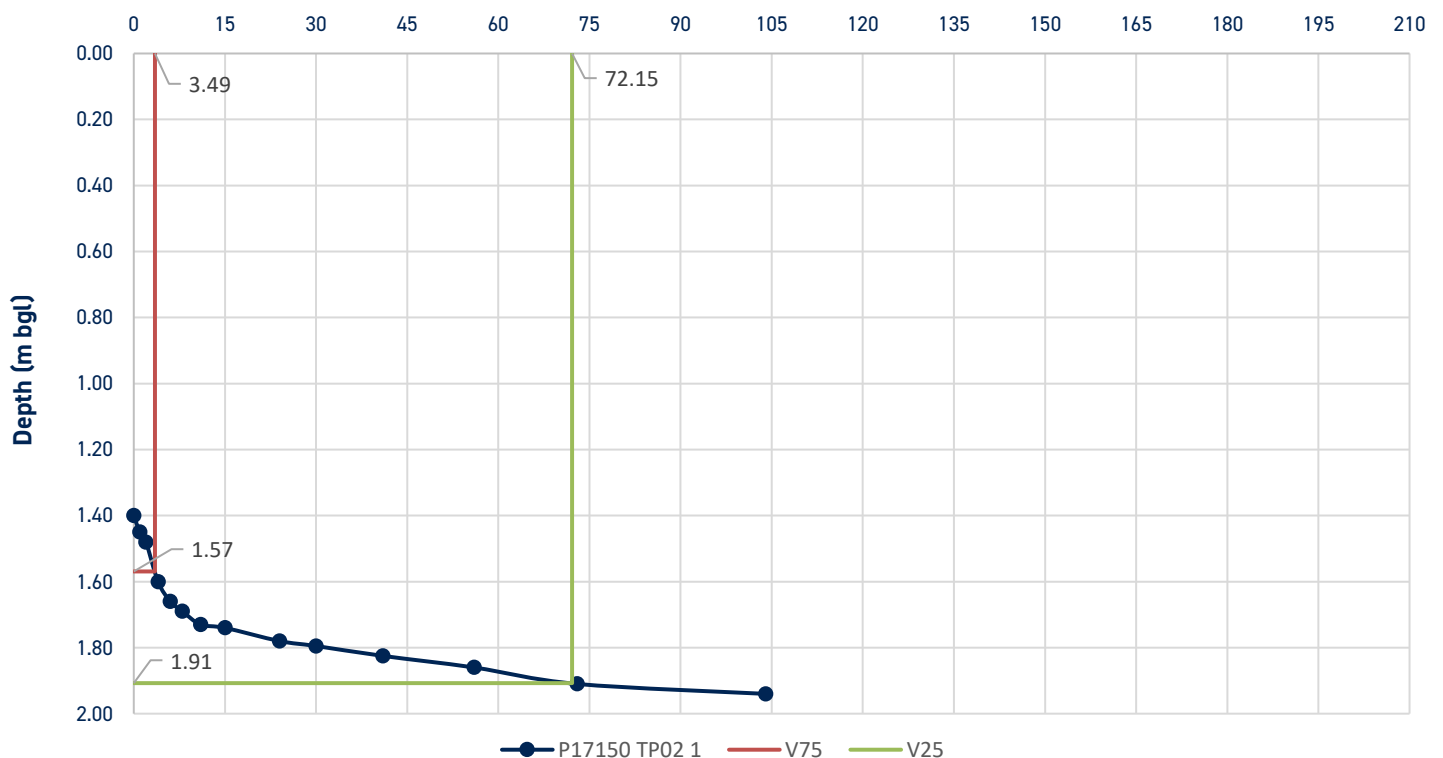
Volume of water introduced into pit	0.741 m ³	
Initial head of water	0.68 m	h_o
Water level at start of test	1.40 m	
Water level at end of test	1.94 m	
Volume of water discharged from pit	0.592 m ³	
Duration of test	104 min	
Average soaked surface area	3.17 m ²	
Time for water level to fall to 75% of initial head	3.49 min	t_{p75}
Time for water level to fall to 25% of initial head	72.15 min	t_{p25}
Depth to water at 75% of initial head	1.57 m	d_{75}
Depth to water at 25% of initial head	1.91 m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	68.66 min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	0.371 m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	2.82 m ²	a_{s50}

Infiltration rate

3.19E-05 m/sec f

Calculation method: BRE 365

Elapsed Time (min)



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP02
Test Number	2

Width of Pit	0.55 m	W
Length of Pit	2.01 m	L
Depth of Pit	2.08 m	D
Pit type	Open	

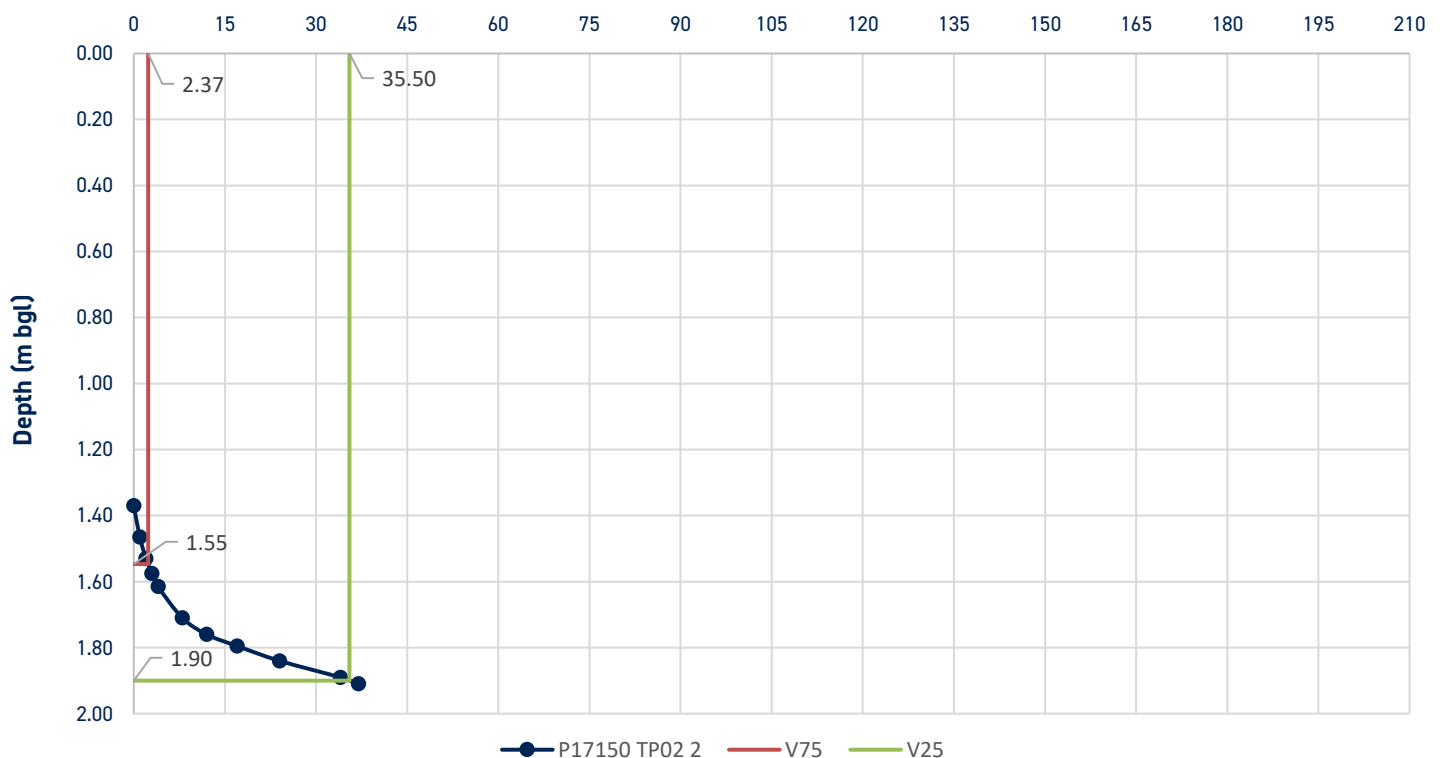
Volume of water introduced into pit	0.774 m ³	
Initial head of water	0.71 m	h_o
Water level at start of test	1.37 m	
Water level at end of test	1.91 m	
Volume of water discharged from pit	0.592 m ³	
Duration of test	37 min	
Average soaked surface area	3.33 m ²	
Time for water level to fall to 75% of initial head	2.37 min	t_{p75}
Time for water level to fall to 25% of initial head	35.50 min	t_{p25}
Depth to water at 75% of initial head	1.55 m	d_{75}
Depth to water at 25% of initial head	1.90 m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	33.13 min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	0.387 m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	2.90 m ²	a_{s50}

Infiltration rate

6.71E-05 m/sec f

Calculation method: BRE 365

Elapsed Time (min)



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP02
Test Number	3

Width of Pit	0.55 m	W
Length of Pit	2.01 m	L
Depth of Pit	2.08 m	D
Pit type	Open	

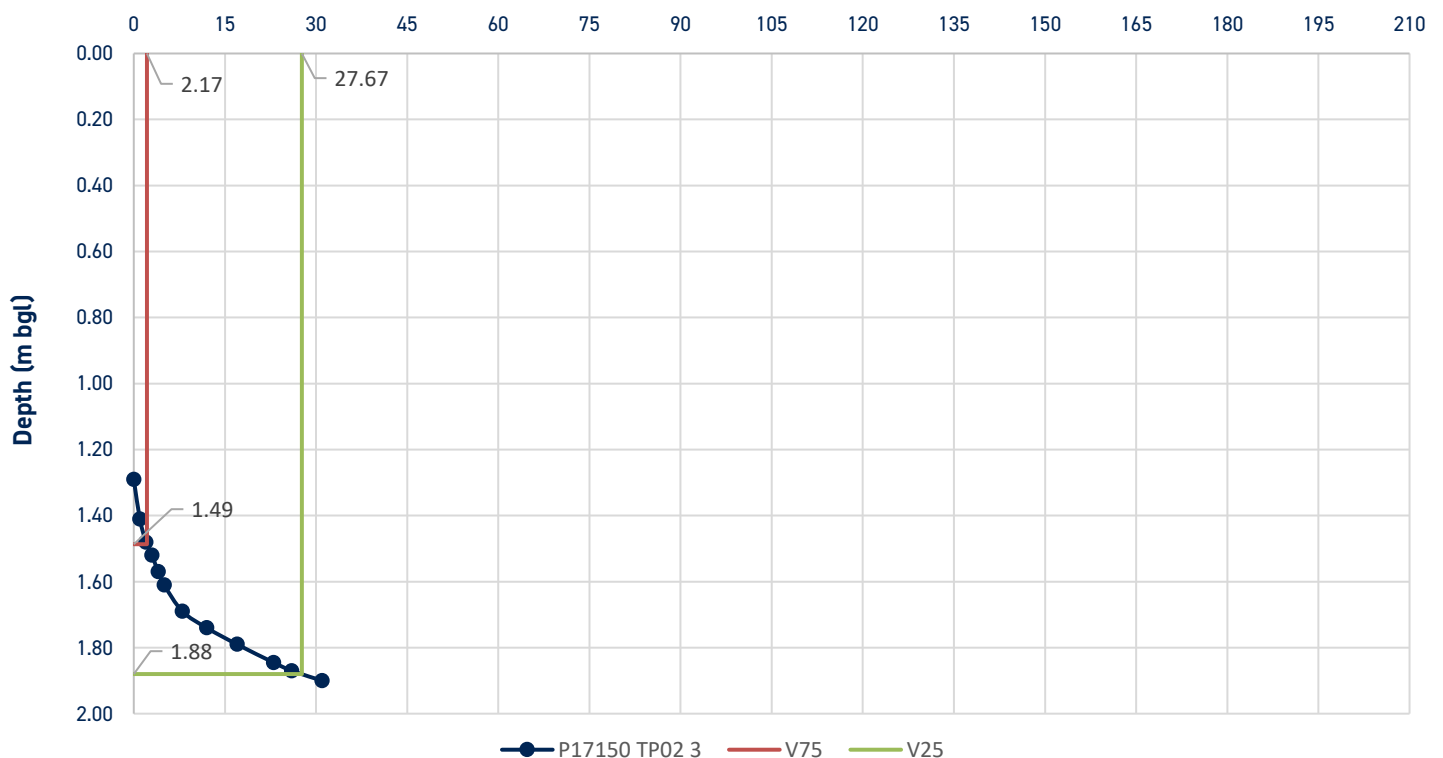
Volume of water introduced into pit	0.862 m ³	
Initial head of water	0.79 m	h_o
Water level at start of test	1.29 m	
Water level at end of test	1.90 m	
Volume of water discharged from pit	0.668 m ³	
Duration of test	31 min	
Average soaked surface area	3.56 m ²	
Time for water level to fall to 75% of initial head	2.17 min	t_{p75}
Time for water level to fall to 25% of initial head	27.67 min	t_{p25}
Depth to water at 75% of initial head	1.49 m	d_{75}
Depth to water at 25% of initial head	1.88 m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	25.50 min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	0.431 m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	3.11 m ²	a_{s50}

Infiltration rate

9.07E-05 m/sec f

Calculation method: BRE 365

Elapsed Time (min)



Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150

Test Location Reference	TP03
Test Number	1

Width of Pit	0.57 m	W
Length of Pit	2.22 m	L
Depth of Pit	2.51 m	D
Pit type	Open	

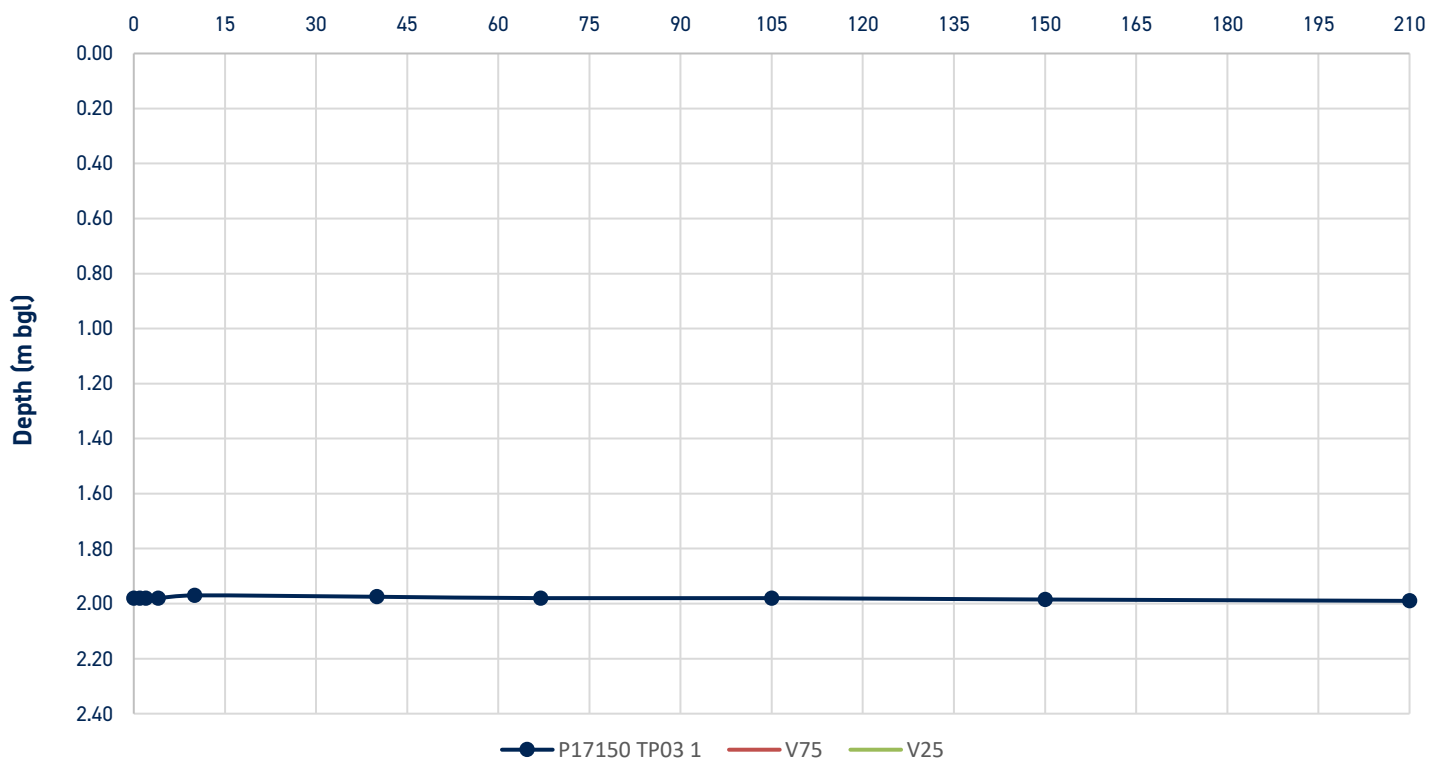
Volume of water introduced into pit	0.661 m ³	
Initial head of water	0.53 m	h_o
Water level at start of test	1.97 m	
Water level at end of test	1.99 m	
Volume of water discharged from pit	0.025 m ³	
Duration of test	210 min	
Average soaked surface area	4.19 m ²	
Time for water level to fall to 75% of initial head	Not reached min	t_{p75}
Time for water level to fall to 25% of initial head	Not reached min	t_{p25}
Depth to water at 75% of initial head	Not reached m	d_{75}
Depth to water at 25% of initial head	Not reached m	d_{25}
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t_{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V_{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	2.72 m ²	a_{s50}

Infiltration rate

4.75E-07 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.

Elapsed Time (min)

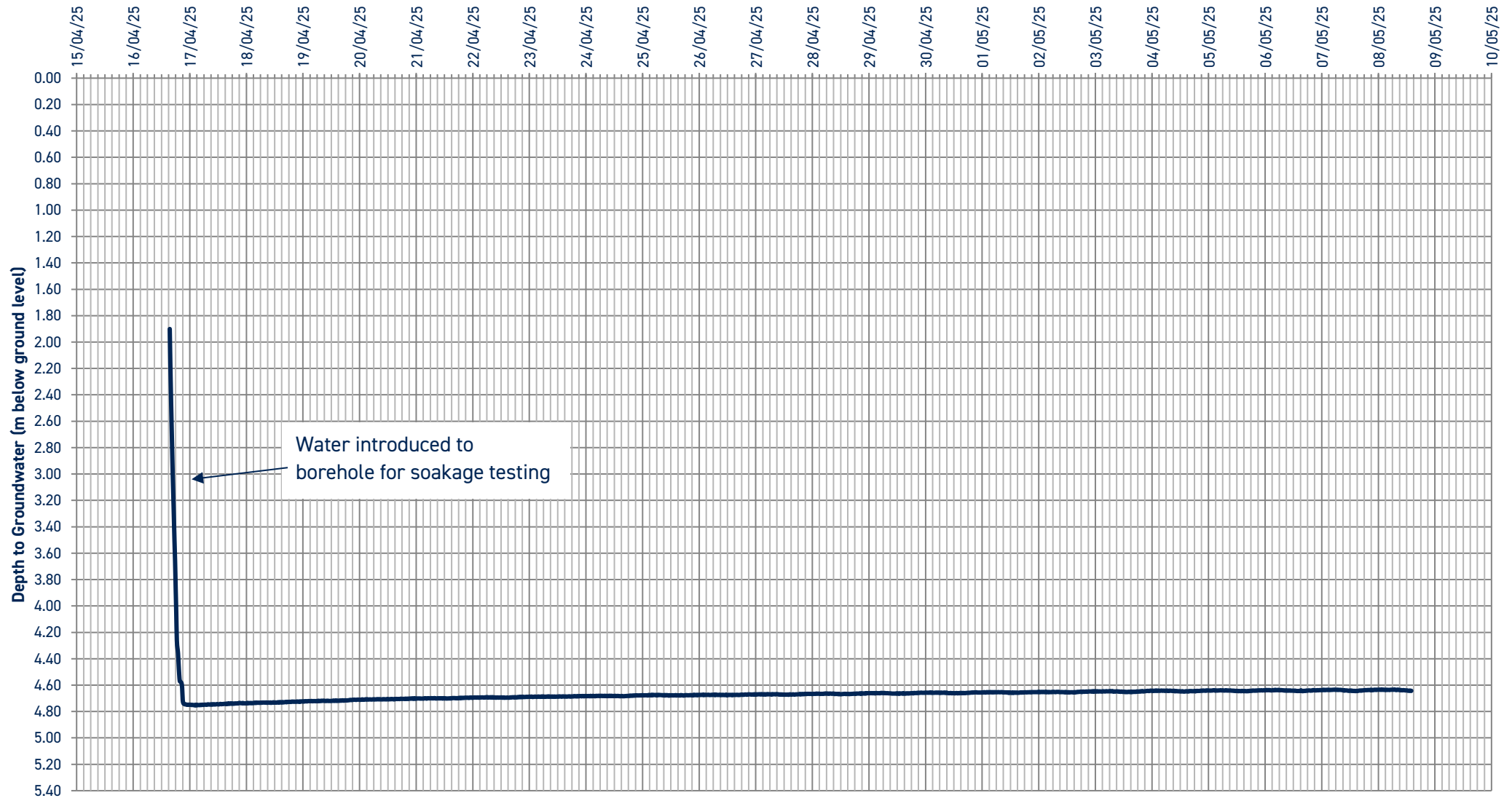


APPENDIX C

Groundwater Monitoring Results

Site: Land North of Camer Road, Hook Green, Meopham, Kent

Project Ref: P17150



WS01

APPENDIX D

Geotechnical Laboratory Test Results

GEOLABS Limited
Bucknalls Lane
Garston
Watford
Hertfordshire
WD25 9XX
Tel: +44(0) 1923 892 190

email: admin@geolabs.co.uk
web: www.geolabs.co.uk

Ashdown Site Investigation Ltd
Unit 3 The Grain Store
Ditchling Common Business Park
Ditchling Common
West Sussex
BN6 8SG

07 May 2025

Report No : GEO/42432/01

Page 1 of 1

For the attention of Ms J Phillpot

Our ref	GEO / 42432	Date samples received	28/04/2025
Your ref	P17150	Date written instructions received	28/04/2025
Order ref	12157	Date testing commenced	29/04/2025
		Date of sample disposal	04/06/2025

Project **LAND NORTH OF CAMER ROAD, HOOK GREEN, MEOPHAM, KENT**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	1	Water Content
2	2	Saturation Water Content

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional and may be subject to change unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
on behalf of **GEOLABS Limited**



S Burke
Senior Technician

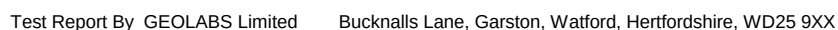
GL Version 03.210917-1114

Checked and Approved by:

S Burke

S Burke - Senior Technician
07/05/2025

**LAND NORTH OF CAMER ROAD, HOOK GREEN, MEOPHAM, KENT
P17150**

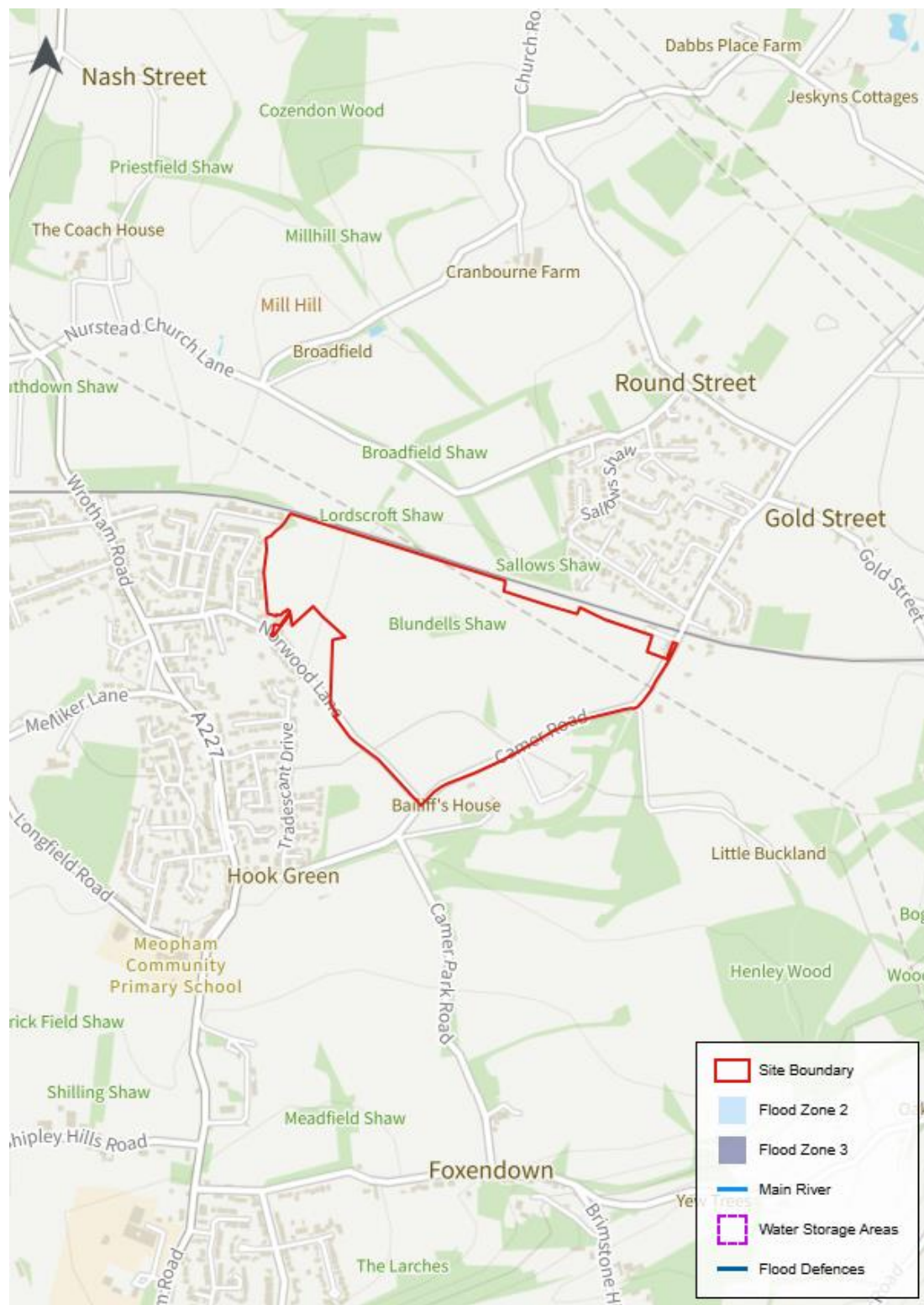


GL Version 22.220908-1125

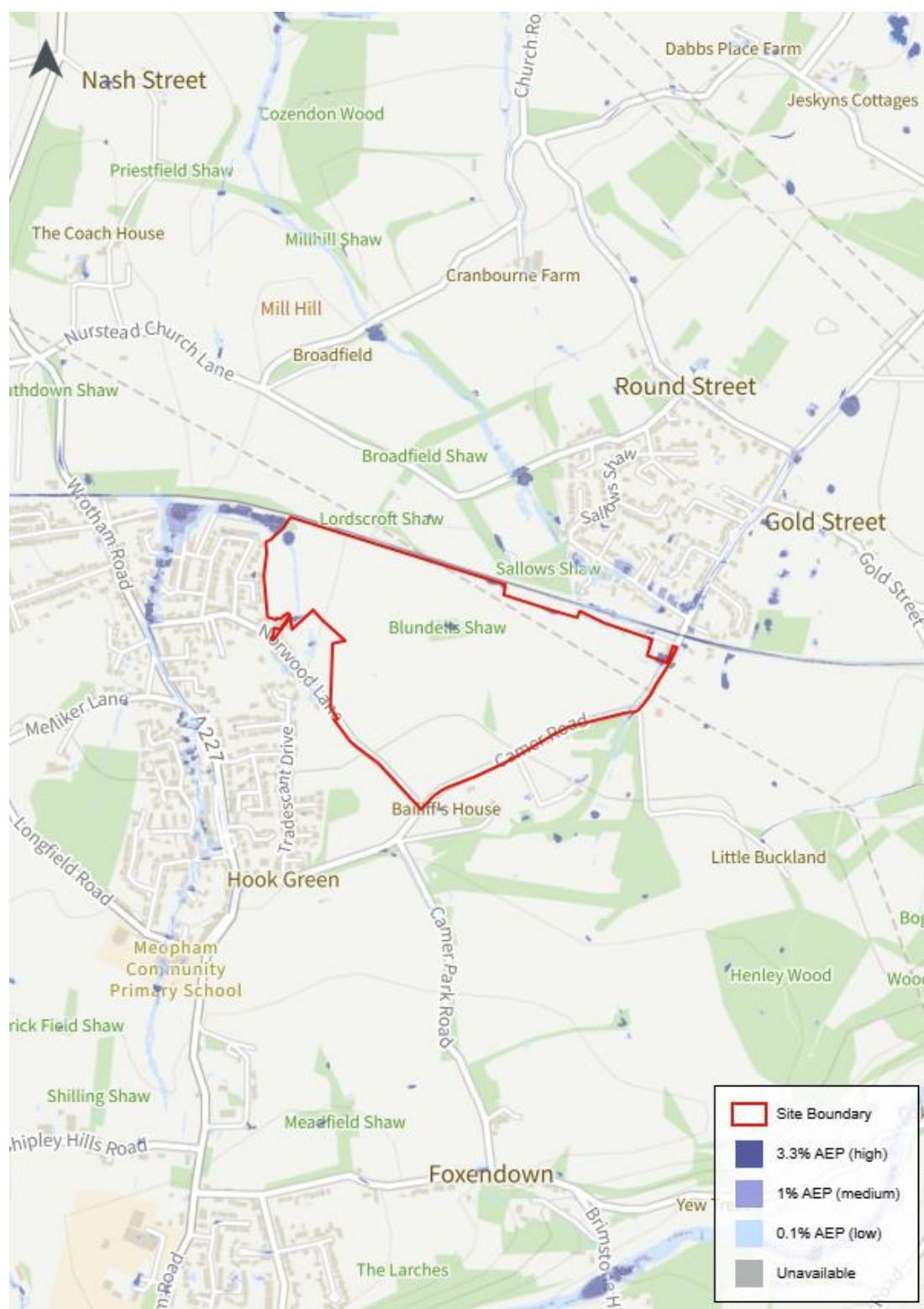
Tested by SB Checked and Approved by  S Burke - Senior Technician 06/05/2025	Project Number: GEO / 42432	
	Project Name: LAND NORTH OF CAMER ROAD, HOOK GREEN, MEOPHAM, KENT P17150	

Appendix D

EA & BGS Maps



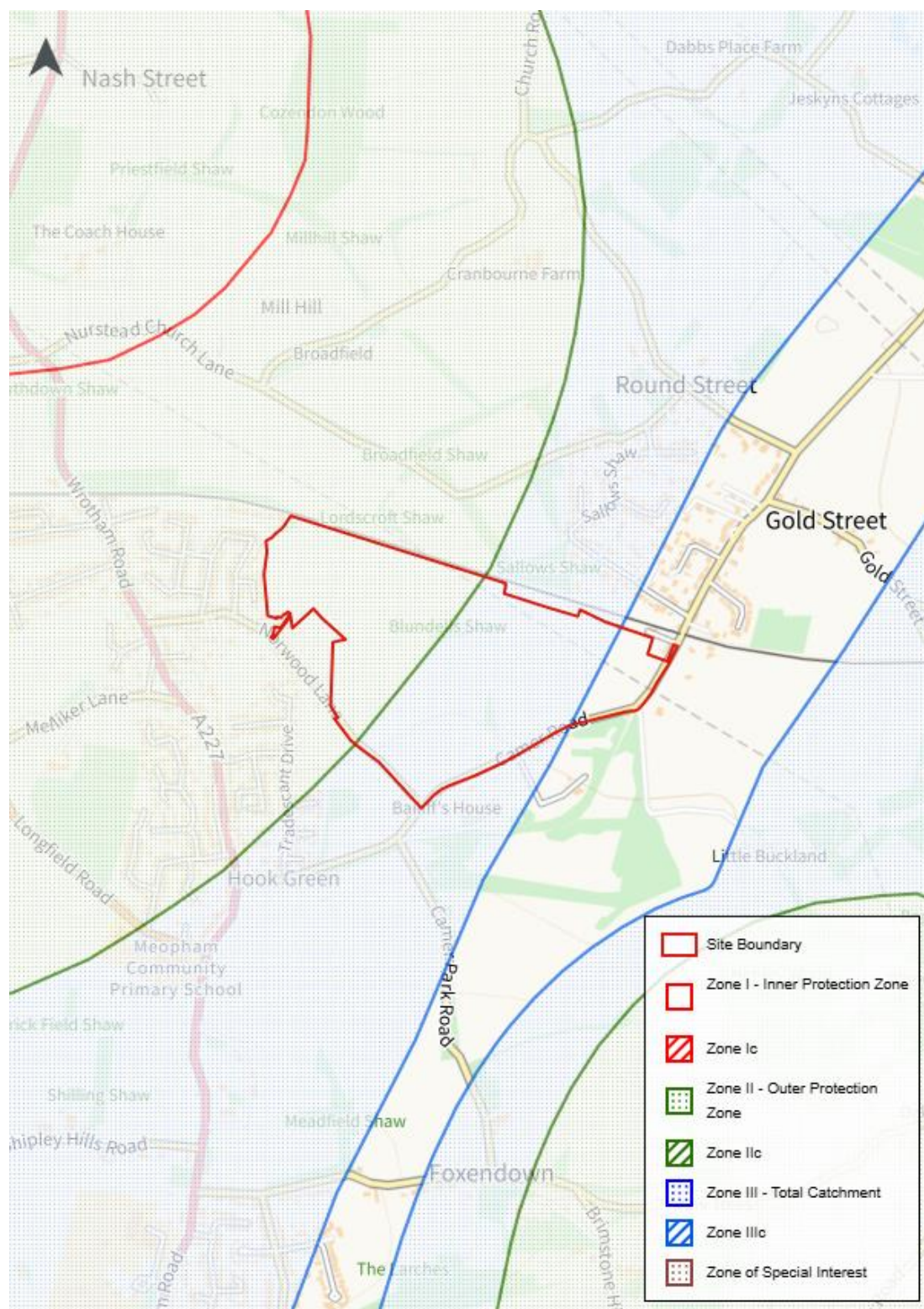
EA Flood Map for Planning



EA RoFSW Extents Map



BGS Hydrogeology Map



EA Groundwater Source Protection Zones Map

Appendix E

Sewer Records

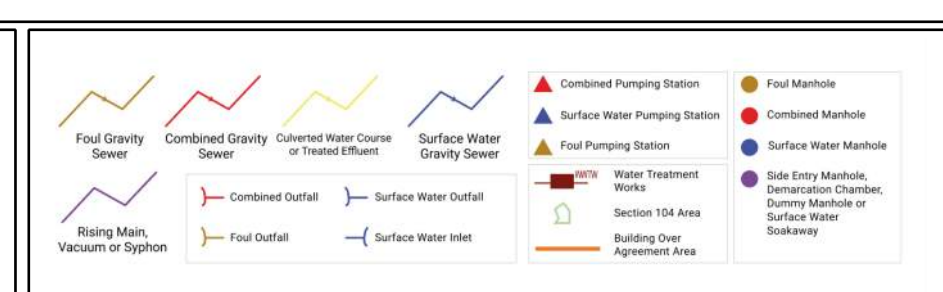


(c) Crown copyright and database rights 2025 Ordnance Survey 10000808122 Date: 01/04/25 Scale: 1:1250 Map Centre: 564963.187381 Data updated: 20/03/25 Our Ref: 1731732-1

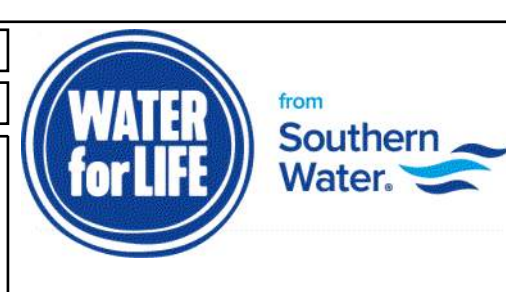
The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey 10000808122. This map is to be used for the purposes of viewing the location of Southern Water part only. Any other use of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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



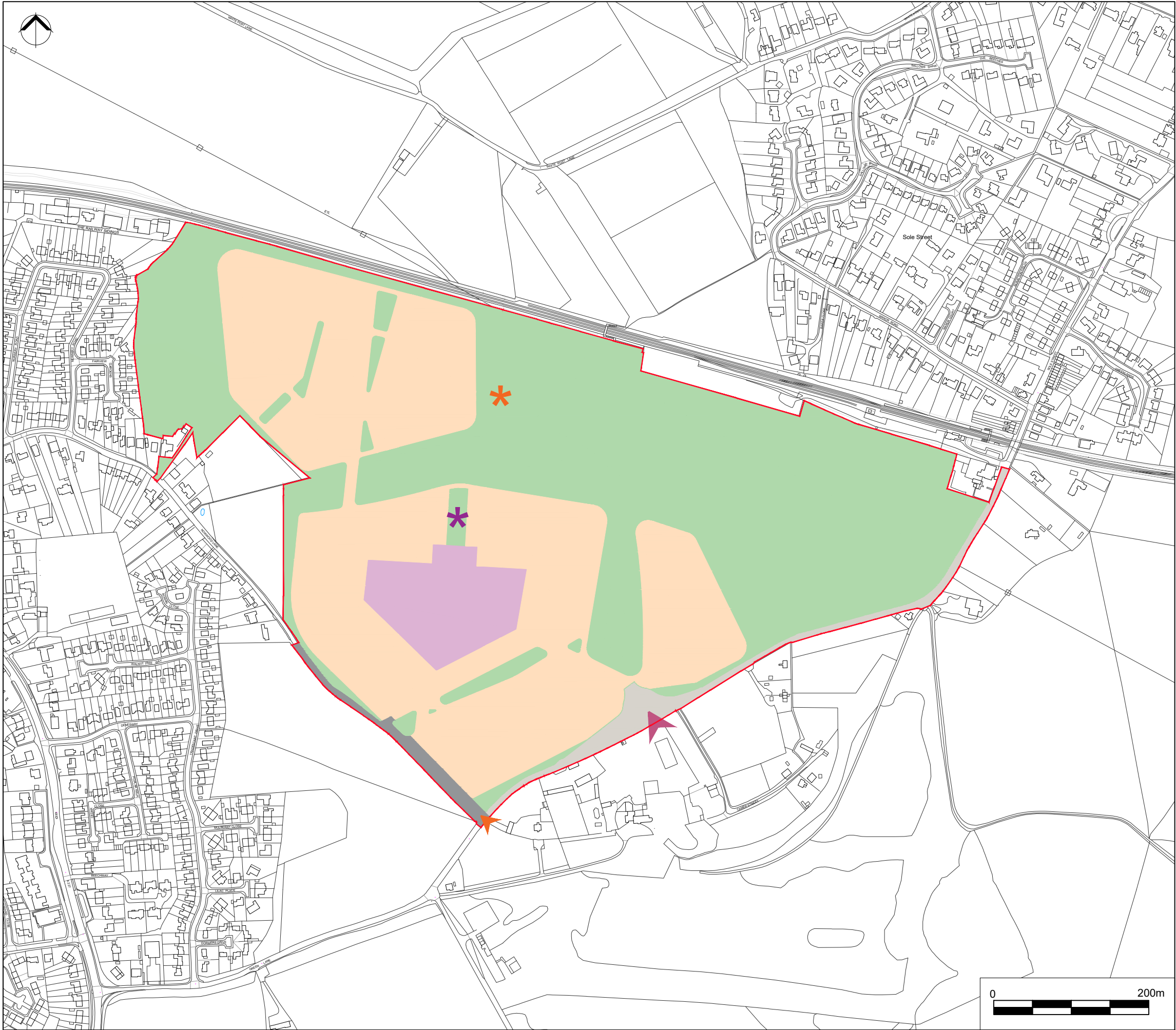
chgan@gsws.co.uk
13675 - Camer Road



Waterwise Plan A2
Powered by rights

Appendix F

Drawings



-  Planning Application Boundary - 44.32 ha
-  Residential parcels - up to 18.12 ha (725 homes at 40 dph)
-  Public Open Space to include areas of hard and soft landscape features, planting and Sustainable Drainage Systems
-  2FE Primary School site - 2.20 ha
-  General location of Local Centre including maximum 500 sqm of Class E uses
-  General location of Sports Pitches including a Club House with changing facilities, kitchen and rooms for community uses. Maximum 750 sqm.
-  Zone for improvements to Norwood Lane including a bus only / emergency access and an active travel route
-  Zone for improvements to Camer Road, including new access, visibility splays and a new pedestrian crossing point
-  Primary Access Point
-  Bus Only & Emergency Access Point

ICENI PROJECTS LIMITED
DA VINCI HOUSE
44 SAFFRON HILL
LONDON
EC1N 8FH

T 020 3640 8508
mail@iceniprojects.com

CLIENT

McManus Family

PROJECT

Land between Meopham and Sole Street

TITLE

Land Use Parameter Plan

DRAWN BY

MA

CHECKED BY

MP

SCALE @ A3

1:5000

DATE

22.09.2025

PROJECT NO.

1000487

DRAWING NO.

DL01

REV.

B

Iceni Projects accept no responsibility for any unauthorised amendments to this drawing. Only figured dimensions are to be worked to.



- GENERAL NOTES**
1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.
 2. Tender or billing drawings shall not be used for construction or the ordering of materials.
 3. Do not scale. All dimensions and levels to be site confirmed.
 4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
 5. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
 6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.
 7. If viewing this drawing as an Autocad file (.dwg) in digital format then it is done so with this Disclaimer due to the fact that it can be altered and manipulated following its issue by GTA Civils & Transport and therefore, any alteration or modification of DWG data files provided by GTA Civils & Transport, by you or a third party, without GTA Civils and Transport's express written approval, is done so entirely at your own risk. Modification includes (but is not limited to) turning layers on and off, unfreezing layers and reloading, turning on and off print functions and unloading x-refs.
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 9. Should any apparent discrepancies between the data contained within the DWG file and the current contract drawings become evident, it must be reported back to GTA Civils & Transport as soon as reasonably practicable. Precedence should be given to the current contract drawings (PDF) unless advised otherwise.

- NOTES**
1. LAYOUT UNDERLAY: CONCEPT MASTERPLAN I000487 DL03 REV E (NOVEMBER 2025) BY ICENI.
 2. SITE CONSTRAINTS: IN SITU TESTING FOUND CLAY SUBSOILS OVER CHALK BEDROCK. SUITABLE INFILTRATION RATES RECORDED WITHIN CHALK STRATA AS SHOWN ON THIS PLAN. NO WATERCOURSES OR SURFACE WATER SEWERS PRESENT IN THE VICINITY. AN OFF-SITE OUTFALL IS NOT REQUIRED.
 3. SITE IS WITHIN A GROUNDWATER SOURCE PROTECTION ZONE II & III. SUITABLE SuDS TREATMENT IS NEEDED PRIOR TO DISCHARGE TO GROUND.
 4. ASSUMED THAT ROOF RUNOFF WILL BE DISCHARGED TO GROUND VIA ON-PLOT SOAKAWAYS. PAVED SURFACES TO DRAIN VIA STRATEGIC SuDS BASINS.
 5. STRATEGIC INFILTRATION STORAGE BASINS SIZED FOR 1 IN 100 AEP +45% STORM EVENTS BASED ON RECORDED INFILTRATION RATES. REFER TO FLOW CALCULATIONS.
 6. INFILTRATION FEATURE SIZING IS SUBJECT TO DETAILED DESIGN INCLUDING FURTHER TARGETED IN SITU TESTING AND CALCULATIONS BASED ON DETAILED PLOT AND DRAINAGE LAYOUTS. THE OUTLINE STRATEGY IS PRESENTED TO DEMONSTRATE VIABILITY AND THAT SUFFICIENT LAND IS AVAILABLE FOR STRATEGIC SuDS.
 7. SuDS STRATEGY SUBJECT TO APPROVAL FROM KENT LLFA.
 8. FOUL DRAINAGE WILL REQUIRE AN ON-SITE PUMPING STATION WITH RISING MAIN DISCHARGING TO EXISTING SEWER IN NORWOOD LANE. SUBJECT TO AGREEMENT WITH SOUTHERN WATER WITH DELIVERY PROGRAMME FOR ANY OFF-SITE UPGRADES TO BE DETERMINED.

INDICATIVE ROUTES FOR STRATEGIC CONVEYANCE SWALES

P4	MINOR UPDATES	25.11.25	PH	FV
P3	NOTE 6 ADDED	11.11.25	PH	FV
P2	UPDATED TO LATEST MASTERPLAN	20.08.25	PH	FV
P1	INITIAL ISSUE	14.04.25	PH	FV
Rev	Amendments	Date	Dsn	Chk

Status	PRELIMINARY			
Client	Mrs G McMANUS			
Architect	ICENI			
Project	LAND NORTH OF CAMER ROAD, MEOPHAM			
Title	DRAINAGE STRATEGY			
Date	APRIL 2025	Scale @ A1	1 : 2,500	
Clients Ref	Project Ref.		13675	

gta Civils & Transport
Maple House, 192-198 London Road,
Burgess Hill, West Sussex, RH15 9RD
Tel 01444 871444 Web: www.gtacivils.co.uk

Drawing Number	13675-1101	Rev.	P4
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Appendix G

Calculations



GTA Civils & Transport Limited
 Maple House
 192-198 London Road
 Burgess Hill, RH15 9RD

File: 13675 Prelim Infiltration Basins V3.pfd
 Network: Storm Network
 PH
 11/11/2025

Page 1
 13675 Camer Rd, Meopham
 Preliminary infiltration basins - Rev V3
 1 in 30 AEP +35% - Half-empty times

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	30	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
SOUTH INFLOW	1.000	5.00	95.000	1200	565100.000	167500.000	1.000	94.000
SOUTH BASIN			95.000	1200	565100.000	167520.000	1.000	94.000
NORTH INFLOW	1.000	5.00	85.000	1200	564650.000	167760.000	1.000	84.000
NORTH BASIN			85.000	1200	564630.000	167760.000	1.000	84.000
PUB INFLOW	1.000	5.00	92.500	1200	565560.000	167550.000	1.000	91.500
PUB BASIN			92.500	1200	565540.000	167550.000	1.000	91.500

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	4320	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	35	0	0

Node SOUTH BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.11500	Safety Factor	5.0	Invert Level (m)	94.000	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.11500	Porosity	1.00	Time to half empty (mins)	536		

Inlets
SOUTH INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1000.0	1000.0	1.000	2000.0	2009.1

Node NORTH BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.04600	Safety Factor	5.0	Invert Level (m)	84.000	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.04600	Porosity	1.00	Time to half empty (mins)	1290		

Inlets
NORTH INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1500.0	1500.0	1.000	2500.0	2512.3

Node PUB BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Safety Factor	5.0	Invert Level (m)	91.500	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.03600	Porosity	1.00	Time to half empty (mins)	1320		

Inlets
PUB INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	2000.0	2000.0	1.000	3000.0	3015.4

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SOUTH INFLOW	456	94.421	0.421	60.5	0.0000	0.0000	OK
480 minute winter	SOUTH BASIN	456	94.414	0.414	33.9	505.3423	0.0000	OK
1440 minute winter	NORTH INFLOW	1320	84.379	0.379	27.3	0.0000	0.0000	OK
1440 minute winter	NORTH BASIN	1320	84.374	0.374	15.7	636.7354	0.0000	OK
1440 minute winter	PUB INFLOW	1350	91.803	0.303	27.3	0.0000	0.0000	OK
1440 minute winter	PUB BASIN	1350	91.799	0.299	15.7	648.8523	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	SOUTH BASIN	Infiltration	8.9
1440 minute winter	NORTH BASIN	Infiltration	4.7
1440 minute winter	PUB BASIN	Infiltration	4.5



Causeway

GTA Civils & Transport Limited

Maple House

192-198 London Road

Burgess Hill, RH15 9RD

File: 13675 Prelim Infiltration Basins V3.pfd

Network: Storm Network

PH

11/11/2025

Page 1

13675 Camer Rd, Meopham

Preliminary infiltration basins - Rev V3

1 in 100 AEP +45% - Peak volumes

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	30	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
SOUTH INFLOW	1.000	5.00	95.000	1200	565100.000	167500.000	1.000	94.000
SOUTH BASIN			95.000	1200	565100.000	167520.000	1.000	94.000
NORTH INFLOW	1.000	5.00	85.000	1200	564650.000	167760.000	1.000	84.000
NORTH BASIN			85.000	1200	564630.000	167760.000	1.000	84.000
PUB INFLOW	1.000	5.00	92.500	1200	565560.000	167550.000	1.000	91.500
PUB BASIN			92.500	1200	565540.000	167550.000	1.000	91.500

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	4320	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440	2160	2880
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------

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

Node SOUTH BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.11500	Safety Factor	5.0	Invert Level (m)	94.000	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.11500	Porosity	1.00	Time to half empty (mins)	1020		

Flow+ v16.0 Copyright © 1988-2025 Causeway Technologies Ltd

Inlets
SOUTH INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1000.0	1000.0	1.000	2000.0	2009.1

Node NORTH BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.04600	Safety Factor	5.0	Invert Level (m)	84.000	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.04600	Porosity	1.00	Time to half empty (mins)	1860		

Inlets
NORTH INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1500.0	1500.0	1.000	2500.0	2512.3

Node PUB BASIN Infiltration Basin Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Safety Factor	5.0	Invert Level (m)	91.500	Analyse flow through structure	x
Side Inf Coefficient (m/hr)	0.03600	Porosity	1.00	Time to half empty (mins)	2040		

Inlets
PUB INFLOW

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	2000.0	2000.0	1.000	3000.0	3015.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	SOUTH INFLOW	1020	94.628	0.628	60.9	0.0000	0.0000	OK
1440 minute summer	SOUTH BASIN	1050	94.620	0.620	34.7	820.1119	0.0000	OK
1440 minute winter	NORTH INFLOW	1380	84.592	0.592	40.9	0.0000	0.0000	OK
1440 minute winter	NORTH BASIN	1380	84.587	0.587	22.7	1060.0600	0.0000	OK
2160 minute winter	PUB INFLOW	2040	91.986	0.486	30.4	0.0000	0.0000	OK
2160 minute winter	PUB BASIN	2040	91.981	0.481	17.4	1084.8500	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
1440 minute summer	SOUTH BASIN	Infiltration	10.3
1440 minute winter	NORTH BASIN	Infiltration	5.3
2160 minute winter	PUB BASIN	Infiltration	4.9

13675 Camer Road, Meopham

Storage Strategy

V4 - 25.11.2025

	Area (ha)	Imp. Area %	Imp. Area (ha)	Strategic storage (m ³)
SOUTH CATCHMENT				
Storage estimate per ha (m ³)				820
Residential zone	12.58	70%		
Roof runoff (to on-plot soakaways)		25%	3.15	
Paved surfaces (to strategic SuDS)		45%	5.66	4,650
School parcel	2.21	45%		
Roof runoff (to on-plot soakaway)		10%	0.22	
Paved surfaces (to strategic SuDS)		35%	0.77	640
Total	14.79		9.80	5,290
NORTH CATCHMENT				
Storage estimate per ha (m ³)				1,060
Residential zone	6.90	70%		
Roof runoff (to on-plot soakaways)		25%	1.73	
Paved surfaces (to strategic SuDS)		45%	3.11	3,300
Total	6.90		4.83	3,300
PUBLIC HOUSE CATCHMENT				
Storage estimate per ha (m ³)				1,085
Existing areas	0.26	80%	0.21	230
Total	0.26		0.21	230

Based on recorded rate of 3.19×10^{-5} m/s (TP02)

70% includes 10% urban creep allowance

Based on recorded rate of 1.27×10^{-5} m/s (TP01)

70% includes 10% urban creep allowance

Based on assumed rate of 1.0×10^{-5} m/s

Areas based on Concept Masterplan rev E by Icení (November 2025)

Appendix H

Draft Drainage Maintenance Plan

DRAFT

Drainage Maintenance Plan

Land North of Camer Road, Meopham, Kent



Contents

1	Introduction	2
2	Summary Description of Drainage Systems	3
3	Ownership & Maintenance Responsibilities	4
4	Health and Safety	6
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6	Schedule B – Ponds and Swales	10
7	Schedule C – Permeable Pavements	12
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Schedule of Appendices

A	Site Drainage Plans
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Issue	Issue date	Compiled	Checked
First Draft Issue	13.11.2025	PH	FVV
Second Draft Issue	25.11.2025	PH	FVV

1 Introduction

- 1.1 This report has been prepared by GTA Civils & Transport Ltd for Gladman Developments Ltd in relation to the development at Land north of Camer Road, Meopham, Kent. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.2 This Draft Drainage Maintenance Plan (DMP) has been prepared for inclusion as an Appendix to the Flood Risk Assessment (FRA) report required by Gravesham Borough Council (GBC) as part of the Application.
- 1.3 The Draft DMP sets out the framework for the management of the proposed sustainable drainage systems (SuDS) at the development. The document will be updated with further information through the next stage of detailed design and coordination. At this stage, what is set out herein is intended to be sufficient to demonstrate the viability of the proposed SuDS maintenance regime for planning purposes.

2 Summary Description of Drainage Systems

2.1 Existing: the pre-development Site comprises existing agricultural fields.

2.2 The description of development is as follows:

Outline planning application for up to 725 dwellings (Use Class C3), a new two-form entry primary school (Use Class F1), a Local Centre (up to 500sqm of Class E floorspace), the provision of Public Open Space including sport and recreation facilities alongside associated access, landscaping, parking, and infrastructure; with all matters reserved except for access.

2.3 Drainage design: the drainage layout drawings, by GTA Civils & Transport Ltd, are included in Appendix A (for the Draft DMP – see FRA Appendix F).

2.4 The surface water drainage design is based on treated surface water runoff discharging to ground via infiltration. Part of the site lies within a groundwater Source Protection Zone II – Outer and Zone III – Total Catchment, thus the treatment of runoff prior to discharge is key.

2.5 Runoff from paved areas is to be treated within a SuDS treatment train upstream of the final infiltration features in the lower parts of the site. The treatment train is lined as required to prevent untreated flows entering the aquifer. The SuDS treatment train comprises permeable paving, bioretention features, swales and final infiltration basins.

2.6 All features mentioned above have been included in this draft DMP; however, this document will be updated at detailed design stage.

2.7 Foul drainage will connect via pumped rising main to Southern Water's existing foul sewer network in Norwood Lane to the south.

3 Ownership & Maintenance Responsibilities

3.1 Responsibility for the maintenance of the drainage system will be apportioned generally as follows:

- The developer will remain responsible for each drainage component until such time as it is handed over to the adopting authority, agent or end user.
- Individual property drainage will be cared for by the property owner.
- Drainage features in adopted highway areas will be the responsibility of Kent County Council as the Highway Authority. This includes highway SuDS features and the associated pipes and structures as far as their connections to the strategic drainage system.
- Adopted sewers and SuDS components will be the responsibility of Southern Water, or will be vested in a sewerage company under a NAV agreement. The final arrangements will be confirmed at the next stage.
- The remaining drainage features along with the site-wide infrastructure will be cared for by the Estate Management Company. This includes permeable pavements in non-adopted areas and the piped systems that are not owned by the public bodies mentioned above.
- The main piped foul sewer networks downstream of each individual property will be adopted by the sewerage authority.

3.2 The drainage layout plans in Appendix A are colour-coded to illustrate the various ownerships across the development [...TO BE COMPLETED AT THE NEXT STAGE...].

3.3 The following sections set out schedules detailing the maintenance requirements for each of the main drainage items used within the scheme. The Estate Management Company will undertake the inspections and maintenance activities in accordance with these schedules. Public bodies will maintain adopted features in line with their established procedures.

- 3.4 Additional reference should be made to currently established best practice and guidance documents such as The SuDS Manual (CIRIA C753, 2015) and other resources available at the susdrain website (www.susdrain.org).
- 3.5 This DMP should be considered a live document. The frequency of maintenance intervals may need to be increased or decreased based on the observed performance of the drainage systems over time. Changes should be agreed with the drainage authority and recorded and dated in the DMP.
- 3.6 Important safety information is set out in the next section.

4 Health and Safety

- 4.1 All those responsible for and involved in the maintenance of the site drainage systems should be safety-conscious and comply with the relevant health and safety legislation. This includes:
- The Health and Safety at Work etc Act 1974
 - The Management of Health and Safety at Work Regulations 1999
 - The Workplace (Health, Safety and Welfare) Regulations 1992
- 4.2 The Estate Management Company is responsible for suitable risk assessment and management to ensure safe working conditions and practices. Measures to protect potential visitors also need to be considered.
- 4.3 Specialist contractors used should work to industry guidelines and be able to demonstrate safe working practices.
- 4.4 Employers have a duty to employees to inform them about the risks of their work environment and to decrease the risk as far as reasonably practicable. Appropriate personal protective equipment (PPE) should be provided and policies implemented based on risk assessment.
- 4.5 Operatives should be trained for working near water. Risks of contaminated water should be considered. Checking for open cuts and using nitrile gloves, waterproof plasters etc is advised.
- 4.6 Entry of pipes, chambers, tanks and culverts should be avoided. Work should be carried out from the surface using appropriate equipment. In the event that entry cannot be avoided to perform a critical task, the required safety training, protection measures and precautions must be implemented prior to entry. Lone working should never be attempted.
- 4.7 For further information refer to Section 36 of The SuDS Manual (CIRIA C753).

5 Schedule A – Sewers, Manholes, Gullies, Channel Drains

- 5.1 Regular inspection and maintenance is required to ensure the effective long-term operation of private drains, manholes, gullies & channel drains.
- 5.2 Prior to construction: a CCTV survey to be carried out on all receiving existing public sewer systems prior to connection with adopted sewers.
- 5.3 Post Completion: a CCTV survey to be carried out on all new and retained existing drainage systems and any downstream receiving systems, prior to connection with adopted sewers.
- 5.4 The report will be used to prove the integrity of the as-built drainage system prior to issue of practical completion certificate and will be handed over to the Client & Management Company for future reference.
- 5.5 Ongoing maintenance responsibility for all adopted sewers is by the sewerage authority and for adoptable highway drainage is by Kent County Council. All other private gullies and drainage marked black on the layouts to be maintained by the Management Company in shared areas and the homeowner within any conveyed land. Operation and maintenance requirements for all sewers, manholes, gullies and channel drains are described in the following table:

Schedule	Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	6 Monthly intervals.
	Common yard & car park & other hard standing areas to be swept clear of debris, to prevent possibility of blockages to the receiving drainage systems.	Monthly.
	Debris removal from gullies & channel drains (where may cause risks to performance).	6 Monthly intervals, after autumn leaf fall, or as required based on specific observations.
	Lift and inspect receiving manholes to check for any blockages.	Monthly.
Remedial Actions	Repair any damaged gully or channel drain gratings.	As required.
	Replace / fix any loose channel drain covers.	As required.
Monitoring	Carry out full CCTV survey to confirm ongoing integrity of all drains. Inspect all gullies and silt pits & drainage channels during the survey.	10-yearly intervals.

5.6 Where appropriate refer also to specialist drainage manufacturer's information and maintenance requirements.

5.7 In all instances, inspection and cleaning should be carried out only by a specialist contractor and in accordance with the guidelines given in 'Safe Working in Sewers and

at Sewage Works' published by National Joint Health and Safety Committee for the Water Services.

5.8 Further information on safety is set out in Section 4.

6 Schedule B – Ponds and Swales

6.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass.	Monthly (during growing season)
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required
	Inspect permanent water depth for silt accumulation. Silt removal is only to be carried out after consultation with Environmental Officers.	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then 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 reseeded.	As required.
	Relevel uneven surfaces and reinstate design levels.	As required.
	Remove build-up of silt accumulation from permanent water depth. Silt removal is only to be carried out after consultation with Environmental Officers.	Monthly for 6 months, quarterly for 2 years, then half yearly

	Remove and dispose of oils or petrol residues using safe standard practices.	As required.
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6.2 Safety information is set out in Section 4.

7 Schedule C – Permeable Pavements

7.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Maintenance	Standard road sweeper	Annually after autumn leaf fall
Occasional Maintenance	Weed removal	Annually
Remedial Actions	Remediate adjacent landscaping to original levels	As required
	Paving repairs including replenishment of lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required if infiltration is reduced by clogging
Monitoring	Initial inspection	Monthly for first three months
	Inspection for evidence of poor operation and/or weed growth	Quarterly, 48 hrs after large storms in first six months
	Inspection for silt accumulation to establish sweeping frequencies	Annually
	Monitor inspection chambers	Annually

7.2 Safety information is set out in Section 4.

8 Schedule D – Rain Gardens, Bioretention Features, Tree Pits

8.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time and assess standing water levels in underdrain	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly; monthly for tree pits
Regular Maintenance	Remove litter, debris and weeds	At least quarterly; monthly for tree pits
	Replace any plants, to maintain planting density	As required
	Manage other vegetation and remove nuisance plants from tree pits	Monthly (at start, then as required)
	Remove sediment, build-up from around inlets and forebays	Quarterly to biannually
Occasional Maintenance	Infill any holes or scour, improve erosion protection	As required
	Repair minor accumulations of silt by raking away surface mulch,	As required

	scarifying surface of filter medium and replacing mulch Tree pits: check tree health and manage tree appropriately Tree pits: remove silt build-up from inlets and surface and replace mulch as necessary Tree pits: watering	Annually Annually, or as required As required in periods of drought
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly
Remedial Actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

8.2 Safety information is set out in Section 4.

9 Schedule E – Cellular Soakaways

9.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Maintenance	Remove debris which could impact performance from catchment surface	Monthly
	Remove sediment from upstream catchpits	Annually
Remedial Actions	Repair inlets, outlets, overflow weirs and vents	As required
	Reconstruct soakaway if performance deteriorates, geotextile is clogged or failure occurs	As required
Monitoring	Inspect full system to ensure good condition and operating correctly	Monthly for first 3 months, then annually
	Inspect soakaway to ensure emptying is occurring	Annually
	CCTV survey inside tanks for sediment build-up	5 years

9.2 Safety information is set out in Section 4.

10 Schedule F – Infiltration Basin

10.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Mowing	Monthly or as required
	Mowing meadow grass	Twice a year: spring (before nesting season) and autumn
	Manage vegetation and remove nuisance plants	Monthly at start, then as required
Occasional Maintenance	Reseed areas of poor growth	Annually or as required
	Prune trees and remove cuttings	As required
	Remove sediment from inlet forebay when 50% full	As required
Remedial Actions	Repair erosion damage etc with seed/turf	As required
	Repair inlet structure	As required
	Rehabilitate infiltration surface by scarifying etc if performance decreases	As required
	Reinstate design levels	As required
Monitoring	Inspect inlet for blockage	Monthly
	Inspect banksides and structures for damage	Monthly

	Inspect silt accumulation and establish removal frequency	Twice a year
	Inspect infiltration surface for compaction and ponding	Monthly

10.2 Safety information is set out in Section 4.

11 Contamination or Dilution of Spillage

11.1 In the event of a spillage it is the responsibility of the landowner to clear up any spillage before it enters the drainage system. The primary method of dealing with any spillage of hydrocarbons should be using sand to soak up the leak and prevent any hydrocarbons entering the drainage system. Once sand has been contaminated it should not be washed into the drainage system but disposed of by a Licensed Contractor.

11.2 Environment Agency – Emergency Contact Number

In the event of a spillage the Environment Agency should be contacted to notify the event and seek advice. The Environment Agency Incident Hotline is **0800 80 70 60** (Freephone 24hrs).

- End of Report -

Appendix A

Site Drainage Layouts

[Refer to FRA Appendix F]

Appendix J

Consultations

Send via email



Flood and Water Management

Sessions House
County Hall
Maidstone
Kent
ME14 1XQ

Website: www.kent.gov.uk/flooding

Email: suds@kent.gov.uk

Tel: 03000 41 41 41

Our Ref: NON/2025/107281

Date: 21 October 2025

Application No: Pre-application enquiry

Location: Land at Camer Road, Meopham

Proposal: Mixed use development

Thank you for your enquiry in relation to the above site.

We have reviewed our records that we hold for your site and we can provide you with the following information:

Site Conditions

The proposed development is located north of Camer Road and east of Norwood Lane in Meopham. It is a greenfield site currently in agricultural use, with some areas of woodland. Sole Street railway station and the Chatham Main Line run along the northern boundary, while existing residential development is present along the northwestern boundary. The site's topography generally slopes towards the north and west.

A ground investigation report has been provided, indicating that the site is underlain by superficial Head Deposits, as well as the Thanet Sand and White Chalk bedrock formations.

It is generally expected that the superficial deposits and Thanet Sand exhibit lower permeability compared to the White Chalk, although they may still be suitable for some infiltration features. Generally it is expected that infiltration will be the most viable outfall for surface water for the development, in common with the existing built development local to the site, where the use of soakaways is common.

Published flood maps for planning show areas of surface water flood risk along the dry valley feature at the western boundary, as well as along Camer Road and the northeastern corner of the site. These risks are associated with overland flow following the natural topography. Overall, the majority of the site is not indicated to be at risk of surface water flooding.

Historic flood events

We have the following reports of flooding held that have occurred within the last 5 years:

Date	Description	Actions
05/10/2021	OOH call out for flooding of road, also affecting Railway Inn car park	OOH call out for 3 in 1 tanker attendance
21/10/2021	Report of flooding of the car park of Sole Street Station and Railway Inn	Reactive drainage cleansing
22/11/2021	Drain blocked causing large puddle near Railway inn	Reactive drainage cleansing
15/04/2023	Report of flooding of road near the Railway inn due to 'drain persistently flooding'	Routine cyclical gully cleansing
20/07/2023	Report of two blocked drains as you go into Sole Street on right hand side	Routine cyclical gully cleansing

Local surface water features and drainage assets

We are not aware of any existing surface water drainage features within the site boundary. We understand that Sole Street / Camer Road may drain to soakaway(s) in the car park of the Railway Inn where there are some gullies within the public highway. Much of the length of Camer Road and Norwood Lane local to site boundary does not appear to have any formal surface water drainage.

Other identified flood issues or ground conditions

Infiltration testing carried out during the investigation confirmed a relatively shallow thickness (up to 1 m) of superficial deposits overlying the Chalk at the tested locations, with the exception of TP03, where Chalk was not encountered within the 2.51 m depth of the trial pit.

Although infiltration testing was undertaken, it did not follow the BRE 365 test procedure. Nevertheless, the results provide a good indication that infiltration is likely to be viable across the site. Groundwater was not encountered during excavations but was observed in a borehole at a depth of 4.64 to 4.75 mBGL following infiltration testing.

In areas of the site where the superficial deposits are deeper, lower infiltration rates may occur. While this may still be suitable for some SuDS features, it may be necessary to convey some runoff to 'site control' SuDS features if the Thanet Sand or Chalk surface lies at greater depth. A 'partial infiltration' approach may be required in these areas, although this is expected to be limited to smaller parts of the site due to the generally shallow depth to Chalk elsewhere.

The current information is suitable for outline design purposes; however, further infiltration testing and groundwater monitoring will likely be required to provide broader coverage across this large site, assess the extent of deeper superficial deposits, and determine groundwater levels—particularly at the site's low points.

Recommendation on surface water management within the development

In June 2025, the Department for Environment, Food and Rural Affairs (DEFRA) released their National standards for sustainable drainage systems (NSSDS).

Standard 1 of the new national standards places a greater emphasis on prioritisation and evidencing the choice of final run-off destination. It strengthens the position that runoff shall be treated as a resource and gives priority for the collection of runoff for non-potable use, before then considering other discharge destinations following the hierarchy. The use of higher priority discharge destinations should be maximised where they are viable in parts of a site, rather than being ruled out across an entire site.

The remaining six standards 2 to 7 state minimum design criteria that all surface water drainage systems should meet. These include the inception of everyday rainfall, management of extreme rainfall and flooding, designing for multi-functional benefits (including the management of water quantity and quality, biodiversity benefits and amenity value) and promoting good construction, operation and management practice throughout its lifetime. Underpinning the standards are eleven principles for the natural approach to managing water (principles 1 to 3), early and integrated design (principles 4 to 8) and links with development planning (principles 9 to 11).

The full standards can be found here: [National standards for sustainable drainage systems \(SuDS\) - GOV.UK](#)

Until our Drainage and Planning Policy Statement is updated, we advise all applicants submitting drainage strategies to reflect these latest national standards within their drainage strategies. Any existing local plan policies should also be referenced within submissions, where applicable.

In this case, it has been established that infiltration is viable for the disposal of surface water. However, before water is discharged via infiltration measures, consideration must be given to the incorporation of water reuse features (e.g. water butts or other rainwater harvesting systems).

Following water reuse measures, source control features should be utilised. In this case, the use of on-plot soakaways, permeable paving, and bioretention features is being considered. We support this proposal, as it will distribute surface water discharge throughout the development, helping to manage runoff as close as possible to where rainfall lands.

A strategy reliant solely on a 'pipe to pond' layout would not be considered acceptable. We would support a proposal where residual runoff, which cannot be discharged via source control features, is conveyed via swales and pocket wetlands to the proposed infiltration basins. This approach is also likely to provide a good standard of runoff treatment before it reaches the basins. The use of the aforementioned source control features could help reduce the size of the strategic infiltration basins, allowing them to be shallower with gentler side slopes, which could improve integration into the landscape.

We note that a new infiltration basin is proposed for the existing public house catchment, and there is an opportunity to provide a new infiltration feature within the development site to reduce existing surface water flood risk at Sole Street. We support proposals to reduce existing risk, given the history of flooding that correlates with mapped surface water flood risk near the Railway Inn. Any improvements could be linked with necessary highway upgrades, especially given the limited formal drainage provision along much of

the highway. This would help facilitate those works and reduce the overall surface water flood risk in the area.

All infiltration measures should incorporate an appropriate factor of safety based on the catchment area served and the potential for inconvenience or damage resulting from system failure. These are set out in Table S3.1 of the NSSDS, based on CIRIA RP156. Infiltration features must be designed so that rainfall events up to the 3.3% AEP event can half-empty their runoff volume within a maximum of 24 hours.

We note that the outline calculations are based on a 70% impermeable area, inclusive of 10% for urban creep. The lowest infiltration rates obtained have been used for the design, and a safety factor of 5 has been selected. Simulations use the FEH-22 methodology with a Cv value of 1 for impermeable areas. This is likely to provide a conservative approach, which can be refined as site layouts are developed.

Currently, calculations are provided for the climate change-adjusted 1-in-100-year event only. However, we recognise that at this stage, this is used to assess the required storage volumes, and further detail is likely to be submitted as part of a future planning application, given the scale of the development.

Climate Change Allowances

As of the 10th of May 2022, the Environment Agency's climate change allowances have been updated. As part of this update, revisions have been made to the 'Peak Rainfall Intensity Allowances' that are used in applying climate change percentages to new drainage schemes. The LLFA would now seek the 'upper end' allowance is designed for both the 30 (3.3%) and 100 (1%) year storm scenarios.

The latest information on the allowances and map can be found at the following link:

[Flood risk assessments: climate change allowances - GOV.UK](#)

Please note that, with regards to the climate change allowances, if the allowance for the 2050s epoch is higher than that for the 2070s epoch for the 100 (1%) year storm scenario. We would expect that for a development that has a lifetime beyond 2061, the higher of the two allowances is to be used.

Further information

We support the provision of information to delineate drainage strategies and endeavour to respond to all enquiries. If this information raises further questions, please do not hesitate to contact us. Depending upon the size and nature of your development other authorities may need to be consulted. Information and advice may also be needed from the Environment Agency or sewerage undertaker.

I trust this information assists with your enquiries.

Yours faithfully,

Alex Brauningner

Senior Flood Risk Officer
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Civil Engineering - Transport Planning - Flood Risk

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