

LAND WEST OF NORWOOD LANE, MEOPHAM

Flood Risk Assessment and Conceptual Drainage Strategy



794-ENV-HYD-22099
Land West of Norwood Lane,
Meopham
004
15th September 2025

Quality Management

Version	Status	Authored by	Reviewed by	Approved by	Review date
001	Draft	Jake Jones	Anna-Lisa Morse	Chris Patmore	14.04.25
002	Draft	Ryan Macbeth	Anna-Lisa Morse	Chris Patmore	07.07.25
003	Final	Ryan Macbeth	Chris Patmore	Chris Patmore	29.07.25
004	Final	Anna-Lisa Morse	Chris Patmore	Chris Patmore	15.09.25

Approval for issue

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29 July 2025

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1 INTRODUCTION

- 1.1 RPS was commissioned to undertake a Flood Risk Assessment (FRA) and Conceptual Drainage Strategy for an outline planning application for the site at Land West of Norwood Lane, Meopham, Kent, DA13 0EP in relation to the proposed residential housing.
- 1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to the CIRIA SuDS manual (C753), BRE Digest 365 Soakaway Design, Kent County Council (KCC) Preliminary Flood Risk Assessment (PFRA), the Kent Thameside Strategic Flood Risk Assessment (SFRA) and the Thameside Stage 1 Surface Water Management Plan.
- 1.3 This report has been produced in consultation with the Environment Agency (EA), the Lead Local Flood Authority (LLFA) and Southern Water (SW). The site is not located within an Internal Drainage Board (IDB) District.
- 1.4 This report is not intended to provide formal details of the final drainage design for the development. However, it provides information regarding the capabilities of the conceptual surface water drainage strategy to meet the requirements of the NPPF.
- 1.5 The desk study was undertaken by reference to information provided / published by the following bodies:
- Environment Agency;
 - Lead Local Flood Authority (Kent County Council (KCC));
 - Centre for Ecology and Hydrology;
 - British Geological Survey (BGS);
 - Ordnance Survey (OS); and
 - Southern Water (SW).

2 PLANNING POLICY CONTEXT

National Planning Policy

- 2.1 The National Planning Policy Framework (NPPF) ¹ was released in March 2012 and was updated in December 2024. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 181 (footnote 63)):
- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
 - All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
 - All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
 - Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
 - Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.
- 2.2 Paragraph 182 of the updated NPPF identifies that applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff; and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of development proposals should:
- a. Take account of advice from the Lead Local Flood Authority.
 - b. Have appropriate proposed minimum operational standards; and
 - c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.
- 2.3 Defra published their 'National standards for sustainable drainage systems'² in June 2025. These are supported by the revised NPPF.

Local Planning Policy

Gravesham Local Plan Core Strategy (2014)

- 2.4 The Gravesham Local Plan Core Strategy (2014) contains the following Policies relating to flood risk and drainage:

¹<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

² [National standards for sustainable drainage systems \(SuDS\) - GOV.UK](#)

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.*

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.*

Water Demand Management

5.14.41 *The Council will seek to manage the supply of water in the Borough and reduce the impact of new development on the supply of potable water as much as possible. In particular, the Council will:*

- *Require all new homes to be built to at least level 3/4 of the Code for Sustainable Homes in terms of water use (105 litres per person per day consumption). Where it can be demonstrated that a development is unable to meet these standards, or the additional standards set out below, permission will only be granted if provision is made for compensatory water savings elsewhere in the Borough;*

- Seek 5% of homes on Key Sites to act as exemplars by meeting level 5/6 of the Code for Sustainable Homes in terms of water use (80 litres per person per day consumption);
- Require all non-residential developments of 1,000 sq m and above to meet the BREEAM "excellent" standards of water efficiency and include provision for the collection of rainwater; and
- Support proposals to retrofit existing residential properties in ways which reduce water consumption.

KCC PFRA

- 2.5 The KCC PFRA provides a high level of flood risk and identifies areas of significant flood risk of which the location site was not designated within. The purpose of the PFRA is to manage local flood risk and meet the county's statutory duties by meeting requirements set out by the Flood Risk Regulations (2009).

Thameside Stage 1 SWMP

- 2.6 The Thameside Stage 1 SWMP assesses the flood risk of surface water flooding in Meopham where the site is situated, amongst other locations. Relevant information from the SWMP has been reproduced throughout this FRA report.

Climate Change

- 2.7 The NPPF and supporting planning practice guidance on Flood Risk and Coastal Change explain when and how flood risk assessments should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.
- 2.8 In May 2022, the EA updated advice on climate change allowances to support the NPPF. Climate change allowances relevant to this site include changes to peak river flow and rainfall intensities. To investigate how the site is at risk to climate change, this FRA will assess these allowances within relevant flood risk sections.

Peak Rainfall Allowances

- 2.9 Peak Rainfall Allowances are used to consider how increased rainfall affects surface water flood risk and the design of drainage systems to manage the increased rainfall.
- 2.10 Climate change allowances are based on UKCP18 Local 2.2km projections and the 'Future-Drainage' research program. The proposed site is located within the Medway Management Catchment these can be seen below in **Table 2.1**.
- 2.11 New guidance requires that for developments with a lifetime of beyond 2100, Flood Risk Assessments should assess the upper allowances for the 2070s epoch for the 1% annual exceedance probability events. As such, a 40% allowance is appropriate.

Table 2.1 Climate Change allowances - Peak Rainfall for the Medway Management Catchment

Applies to Medway Management Catchment	Total potential change anticipated for 1% annual exceedance rainfall event	
	Total potential change anticipated for '2050s' (2040- 2069)	Total potential change anticipated for the '2070s' (2061-2125)
Upper Estimate	45%	40%
Central Estimate	20%	20%

3 CONSULTATION

Environment Agency

- 3.1 As the site is larger than 1ha, a Product 4 data request has been sought from the EA. A response is included within **Appendix A**.
- 3.2 The EA confirmed in their response that they hold no detailed flood model data, or records of historical flooding for the site.

Southern Water

- 3.3 A request for sewer flooding history was made on the 10th February 2025. A response is included within **Appendix B**.
- 3.4 Southern Water confirmed in their response they hold no records regarding sewer flooding history.

LLFA (KCC)

- 3.5 The site is within the administrative boundary of KCC. A response is included within **Appendix C**.
- 3.6 The KCC did not provide any site-specific information, and highlighted paid advice can be sought from the council in regard to flood risk.

Internal Drainage Board (IDB)

- 3.7 The site is not located within a IDB District and as such no consultation has been sought.

4 SITE DESCRIPTION

Site Description

- 4.1 The site is located at National Grid Reference TQ 64823 67171 is irregular in shape and occupies an area of approximately 7.41 hectares (ha). The site location is presented in **Figure 1**. Site Location

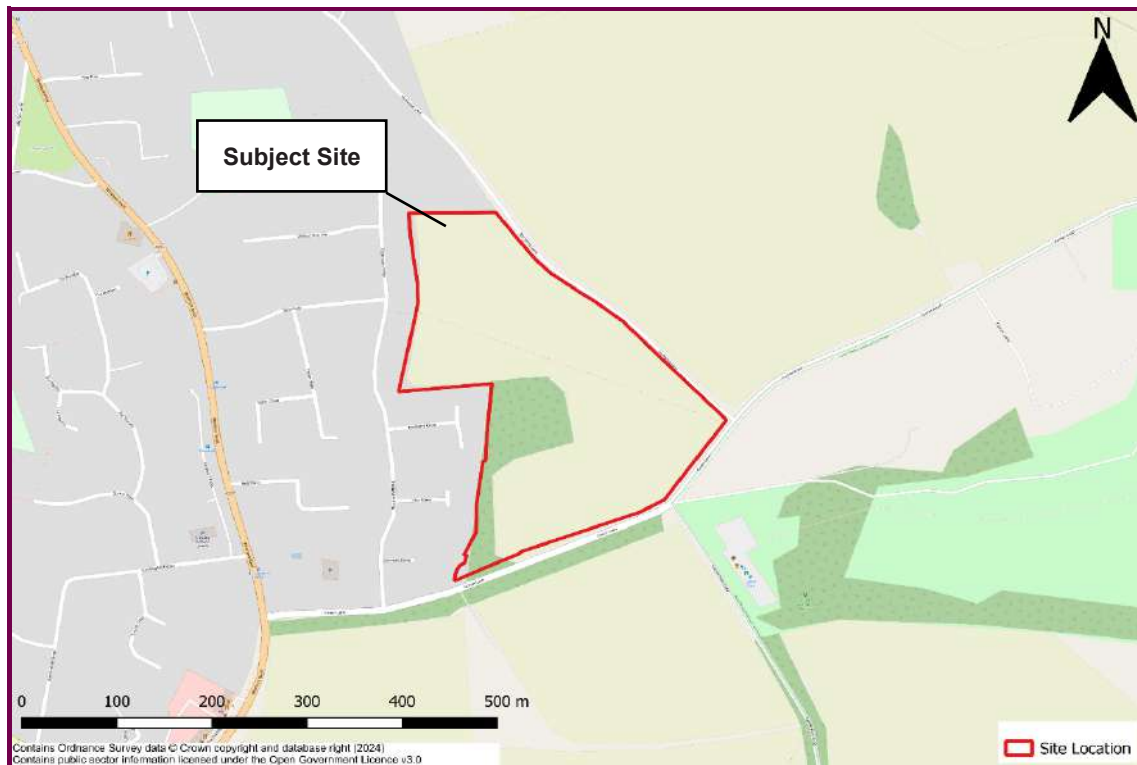


Figure 1. Site Location

- 4.2 The site is currently occupied by undeveloped agricultural land with mixed hedgerows along the perimeters adjacent to Norwood Lane, Green Lane and Camer Road. The western perimeter is borders with resident developments and in the centre has a densely vegetated woodland, known as Churchway Wood which continues down towards the southwest corner of the site.
- 4.3 A footpath crosses the site from northwest to southeast; the southeast point is the junction between Norwood Lane and Camer Lane which is also used as vehicular access to the site.

Surrounding Land Uses

- 4.4 The surrounding area consists of further agricultural land to the east and south of the site with land to the west of the site used for residential use. The eastern boundary is bounded by Norwood Lane which leads to Camer Road at the eastern point, this is the closest point to the Kent Downs National Landscape and Camer Park Country Park. The southern boundary runs along Green Lane.
- 4.5 There are no designated sensitive areas including: Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) or RAMSAR site within close proximity to the development. Within Meopham Village is the Hook Green Conservation Area, which is separated by other residential developments.

Topography

- 4.6 A topographic survey was completed by MK Surveys in February 2025, reference 35434, and indicates the site steadily falls at a gradient of 1 in 30 from a high point of 109.51mAOD (meters above ordnance datum) upon the south-western boundary to a low point of 93.76mAOD on the north-western boundary. The topographic survey is located in **Appendix D**.

5 PROPOSED DEVELOPMENT

- 5.1 Taylor Wimpey South East is planning on creating a residential development encompassing up to 150 new homes. The proposed layout is presented within **Appendix E**.
- 5.2 The residential development and associated hard infrastructure spans approximately 4.6ha with the remaining 2.8ha used for the existing greenfield and green infrastructure. The development area occupies roughly 62% of the total site area. The final non-developed area will be confirmed at a later stage within the design.
- 5.3 Vehicular access will be via the southwest point of the site from Green Lane.
- 5.4 Access to properties will be provided by both pedestrian and vehicular routes to be developed across the site.
- 5.5 The proposed use of the site is classified as 'more vulnerable' within the PPG.
- 5.6 The potential to provide surface water attenuation, including the use of Sustainable Drainage Systems (SuDS), has been considered as part of the preliminary design process (see Section 10 – Surface Water Management).

6 HYDROLOGICAL SETTING

Nearby Watercourses

- 6.1 UKCEH digital river network indicates that there are no surface water features close to the site. The closest watercourse is a main river called River Medway, approximately 6km east of the site.
- 6.2 No significant artificial watercourses / features (e.g. canals, reservoirs) have been identified within 1km of the site.

Fluvial / Tidal Flood Risk Classification

- 6.3 The EA Flood Map for Planning (updated in March 2025), which is available online, indicates that the site is located within Flood Zone 1, whereby the annual probability of flooding from fluvial or tidal sources is classified as less than 0.1%/1 in 1,000 years.
- 6.4 The EA Flood Map for Planning is provided in **Figure 2**.

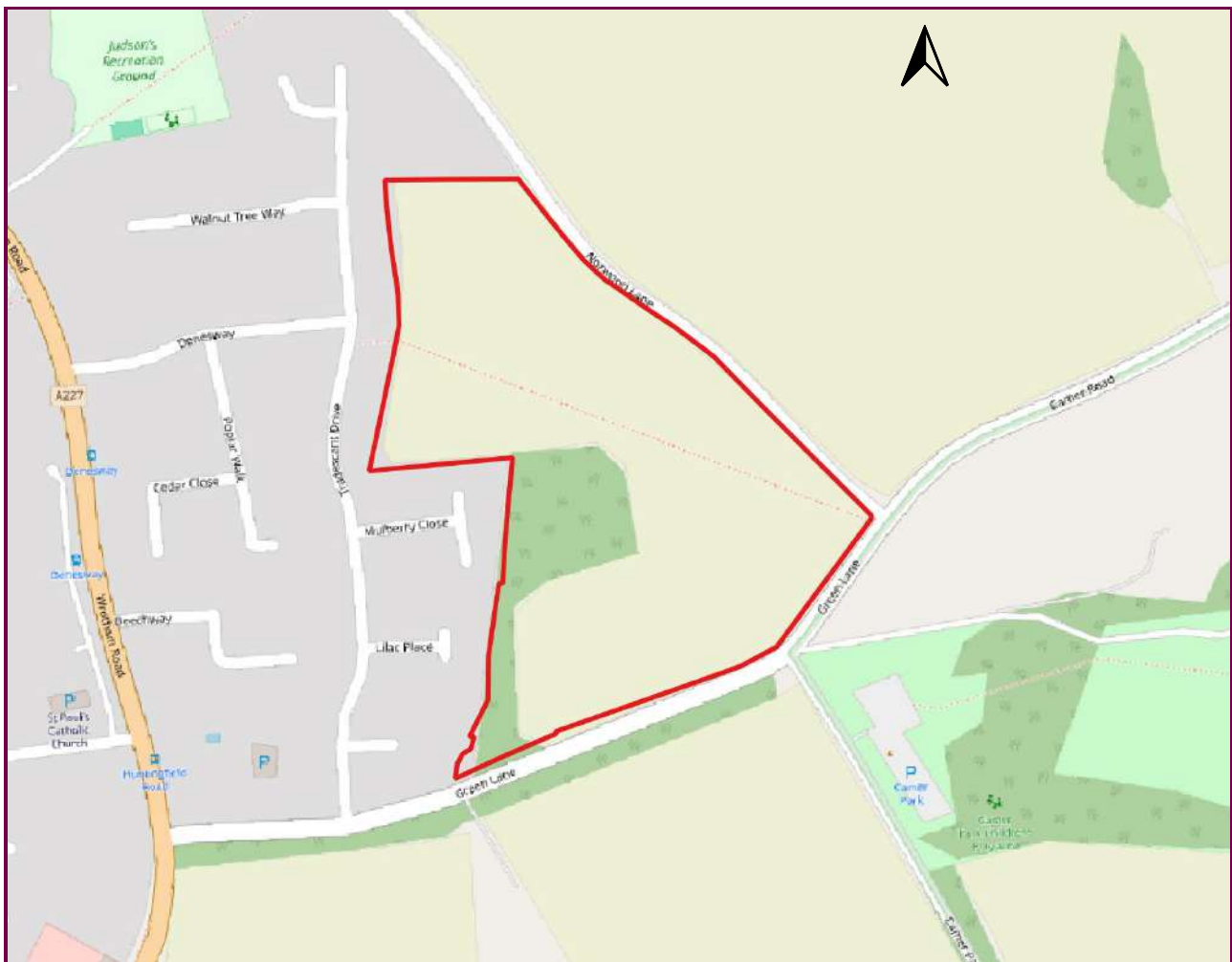


Figure 2. EA Flood Map for Planning

- 6.5 Within their consultation response reference KSL 398509 RL, the EA confirmed that they hold no historical flood information or detailed flood model data in relation to the site. The consultation response is provided within **Appendix A**.

EA Flood Warning Area

- 6.6 The EA defines a Flood Warning Area as “geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater.”
- 6.7 The site is not located in a Flood Warning Area.

Surface Water Flood Risk Classification

- 6.8 The EA's updated Flood Map for Surface Water, which is available online and updated in January 2025, indicates that this site is at 'very low' surface water risk which corresponds with an annual probability of flooding that is less than 1%.
- 6.9 There is 'low' risk of surface water flooding isolated in the north corner parallel to Tradescant Drive and pooling along Norwood Lane. Both areas of flooding relate to a 1% annual chance of surface water flooding; presenting flood depths of up to 0.2 metres.
- 6.10 The updated Flood Map for Surface Water is presented in **Figure 3**.

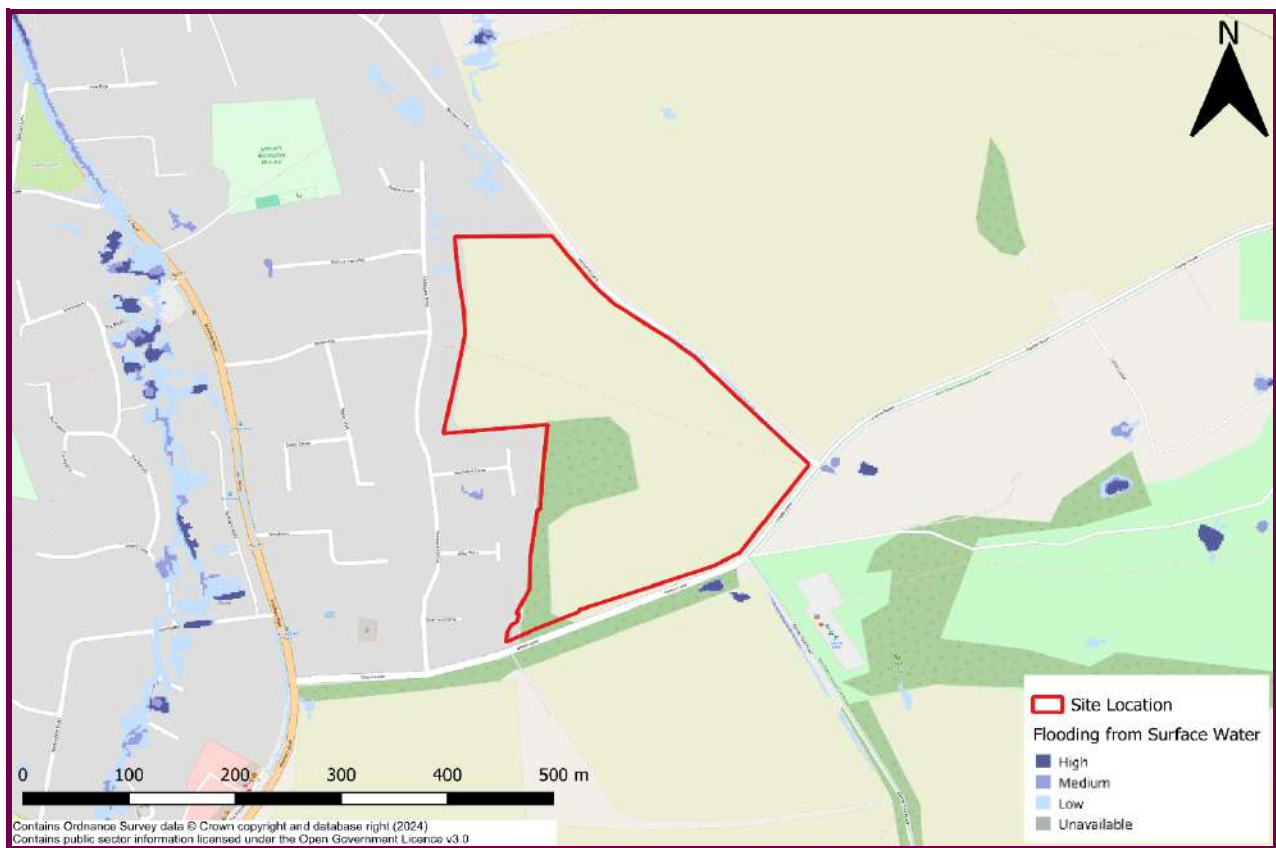


Figure 3. Flooding from Surface Water

- 6.11 As of January 2025, the EA also provides data for Flood Map for Surface Water this includes the climate change extents which consider the 'Central' climate change allowance for the 2050s epoch (2040-2060).
- 6.12 Within the climate change scenario, there is a small extent of surface water flooding within the north site boundary with a 'Low' risk of surface water equivalent to 'Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year', this extent cannot be seen on the EA's surface water + climate change depth map at 0.2 metres. This can be seen below in Figure 4. Updated Flood Map for Surface Water plus Climate Change.

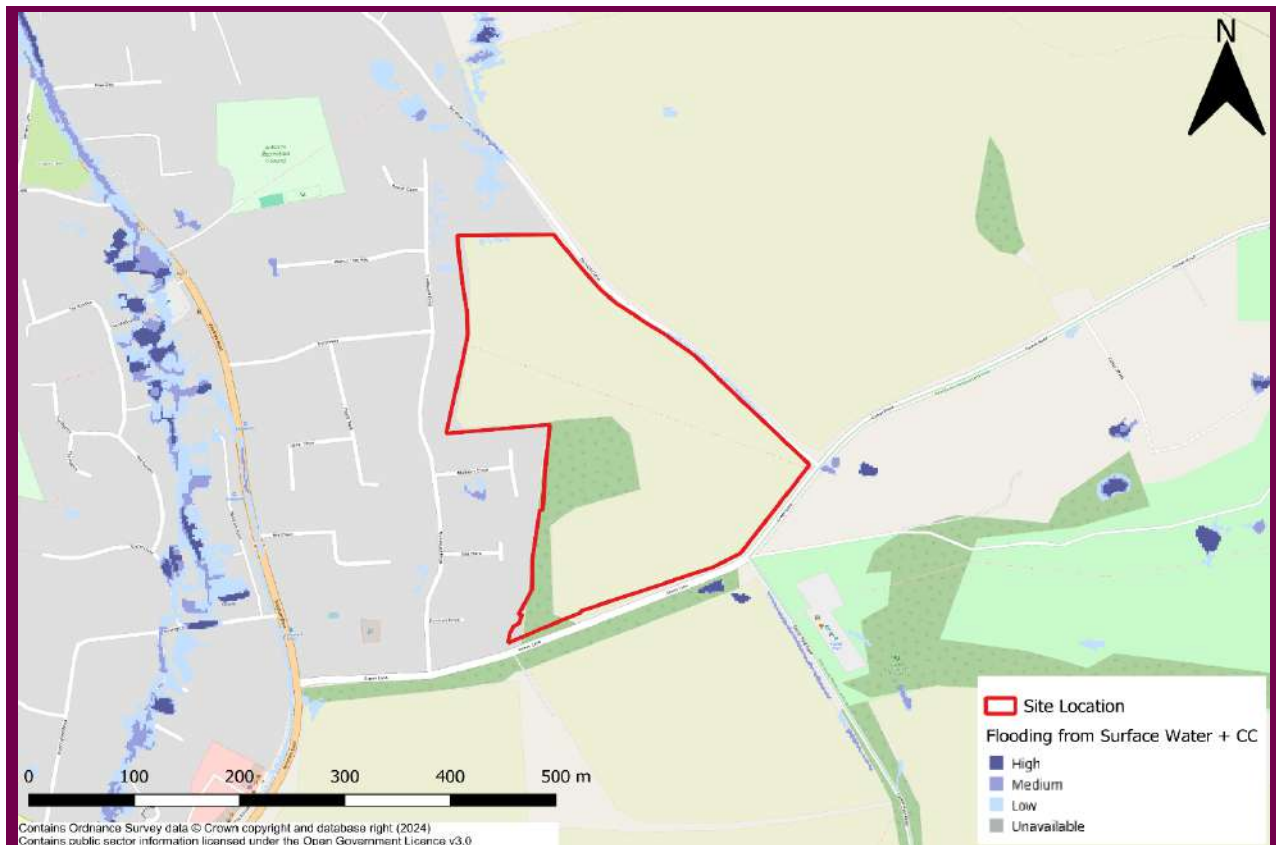


Figure 4. Updated Flood Map for Surface Water plus Climate Change

- 6.13 RPS notes that this modelling has several limitations, most significantly that it does not accurately represent the drainage capacity in urban areas. Consequently, the EA states that the maps 'are not suitable for use at an individual property level' and are instead for indicative purposes.

Reservoir Flood Risk Classification

- 6.14 EA mapping also indicates that the site not located within an area potentially at risk from reservoir flooding.

Local Authority Flood Risk Assessment

- 6.15 The PFRA provides information of the Meopham area stating 310 dwellings at flood risk and 22-50 properties per km² will be predicted to be flooded by 1 in 200 year rainstorm event. The site is within the Lower Medway River catchment and falls under Policy 3 for 'low flood risk'.
- 6.16 The PFRA shows Meopham and its local proximity to be located outside the mapped extent of areas classified to be at risk from groundwater.
- 6.17 No recorded flood events are noted within the PFRA within Meopham or its local vicinity.
- 6.18 Included within Thameside Stage 1 SWMP, the site is located in an area covered by Policy 1 classifying it as 'no active intervention' suggesting no further plans are required regarding surface water flooding. However, adjacent to the west site of the site is Hook Green, a residential neighbourhood, this area is mentioned in the SWMP. Hook Green was referred to have had a known highways flooding hotspot. This hotspot was at the junction intersecting Wrotham Road and Norwood Lane, approximately 468 metres northwest of the site, to address the issue on Wrotham Road, four soakaways on parish land were installed to assist drainage. Included within the SWMP was a record of previous flood events in which there was entries near to the site, this could be attributed to the flooding at Wrotham Road.

7 HYDROGEOLOGICAL SETTING

- 7.1 BGS online mapping (1:50,000 scale) indicates the site is not located on a superficial deposit. The bedrock geology as identified by the BGS is a White Chalk group, Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated). This can be compared to the borehole record reference: TQ66NW41 approximately 350 metres away from the site, this identifies hard white chalk with bands of sub rounded flint.
- 7.2 EA online groundwater Source Protection Zone (SPZ) mapping indicates that the site is located within a groundwater SPZ. Most of the site is situated in the 'Total catchment' zone whilst the north section of the site is within the 'Outer Protection Zone'.
- 7.3 The soils are described as 'slightly acid loamy and clayey soils with impeded drainage' by the National Soils Research Institute.
- 7.4 According to the EA's Aquifer Designation Mapping, the bedrock aquifer is classified as a principal aquifer. These formations provide a high level of water storage and may support water supply and / or river base flow on a strategic scale.
- 7.5 RSK Geosciences undertook trial pits, window samples, and borehole sampling, the draft reports were received by RPS on 24.04.2025. The RSK reports can be found in **Appendix F**.
- 7.6 The borehole found the site to be underlain by chalk from circa 1m below ground level. Above the chalk layer is mostly silty clays.
- 7.7 The borehole report contains no record of groundwater within the 20m depth below ground level (bgl).

8 EXISTING DRAINAGE / WATER MAINS

8.1 Southern Water plans of public sewers, included as **Appendix G**, indicates that the area around the site is served by a foul water sewer (FW) network. Manhole cover levels and invert levels are given in **Table 8.1**.

Table 8.1 Manhole level details

Manhole Reference	Type of Sewer	Manhole Cover Level (mAOD)	Manhole Invert Level (mAOD)	Invert Depth (m)
7301	FW	93.70	92.08	1.62
6201	FW	95.22	93.31	1.91

9 FLOOD RISK AND MITIGATION

- 9.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

- 9.2 The EA Flood Map for Planning (updated March 2025), as seen in Figure 2, indicates that the site and its associated access/egress is wholly located within Flood Zone 1. The annual probability of flooding is classified as less than 1 in 1000 year (<0.1%) in the absence of any defences.
- 9.3 The PPG details the suitability of different land uses within each flood zone. The proposed land use is classified as 'more vulnerable' and such uses are generally considered appropriate within Flood Zone 1.
- 9.4 Due to the sites location, it is not considered to be at risk of tidal flooding. The risk to site from fluvial flooding is considered to be low.

Flooding from Sewers

- 9.5 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. The site is currently served by Southern Water (detailed in Section 8) and a response is currently pending in regard to any sewer flood history at the site location.
- 9.6 KCC PFRA identifies sewer flooding as surface water exceeding the capacity of sewers with combined sewer flooding being a particular concern due to the resultant of discharged effluent. Kent Thameside SFRA supports the use of SuDS, and a movement away from discharging surface water into sewers.³ The SWMP identifies that sewers are predominantly foul sewers with the model network for Gravesham being out of date and requires an update. The area of Hook Green is referenced in the SWMP and should be considered in the drainage strategy to not increase the volume of water into this system. The area surrounding the highways junction prone to flooding is within a historical conservation area as Historic England identifies a cluster of 8 listed properties.
- 9.7 In the event of sewer surcharging in the proximity of the site, the flow of water will be captured by Norwood Lane and travel northward due to the site's prevailing topography.
- 9.8 It is expected that surface and foul water flows from the proposed development are to discharge to the SW sewer network. Consultation and agreement of these connections are to be made at detailed design stage to ensure there is capacity to receive discharge from the site without increasing flood risk.
- 9.9 The risk to site from sewers is considered to be low.

Surface Water Flooding (Overland Flow)

- 9.10 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems.
- 9.11 Surface water flooding from on-site sources is considered in Section 10 of this report. An extent of surface water flooding is present in the low point of the site within its northern extent. There are also isolated areas of surface water flood risk along Norwood Lane, also associated with topographical low points.

³ [Microsoft Word - Thameside SWMP Stage 1 Report.doc](#)

- 9.12 Extents of surface water flooding are shown to increase on the surface water plus climate change flooding map, however shallow flood depths of up to 0.20m are anticipated for both scenarios. It is expected that with development; surface water flood risk on-site will be remediated through the implementation of a positive drainage network and engineering of ground levels to direct surface water from hardstanding away from building and towards the drainage network. Due to anticipated flood depths, flood risk along Norwood Lane is not expected to cause any pedestrian or vehicular access issues.
- 9.13 Consultation with the LLFA did not provide any further information on surface water flooding around the site.
- 9.14 The risk to site from surface water sources is considered to be low.

Groundwater Flooding

- 9.15 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures.
- 9.16 There is no mention of groundwater flooding within proximity of the site mentioned in the SWMP. In the SWMP it is identified that Source Protection Zones need to be considered when utilising SuDS. This site is partially within Outer protection Zone and the Total Catchment Zone which will have to be reflected during the detailed design of the SuDS features on the site.
- 9.17 The groundwater risk areas map within the PFRA identifies the site as an area not at risk from groundwater flooding.
- 9.18 The RSK Geoscience borehole report indicates no records of water being struck. This borehole had a depth of 20m below ground level.
- 9.19 The proposed development does not include any below-ground floor levels, thus even in the event of raised groundwater levels, the site is not expected to be affected.
- 9.20 From the online service provided by the EA 'flooding from groundwater is unlikely in this area'.
- 9.21 The risk to site from groundwater sources is considered to be low.

Other Sources

- 9.22 There is a limited risk of flooding occurring because of a break in a water main. The locations of the water mains in the immediate vicinity of the site are described in Section 8. In the case of a burst main the high-pressure water would flow northward, following the topography of the site.
- 9.23 The site is not at risk of reservoir flooding from either dry-day (breach) or from wet-day (flooding when rivers are also in flood) flood scenarios.
- 9.24 There are no reservoirs, canals or other artificial structures within the vicinity of the site.
- 9.25 No further sources of flood risks are identified in the SWMP.
- 9.26 The risk to site from other sources including infrastructure failure, reservoirs, canals and other artificial structures is considered to be low.

Proposed Mitigation

- 9.27 The conceptual drainage strategy is expected to mitigate surface water flood risk within the site during the development lifetime.

Event Exceedance

- 9.28 The mitigation measures proposed as part of the development scheme are considered appropriate to help mitigate against event exceedance scenarios.

10 SURFACE WATER MANAGEMENT

Introduction

- 10.1 The development area extends for some 4.6Ha. Of this approximately 60% is estimated to be hardstanding (houses, driveways, roads and parking areas) and will create an impermeable area of 2.34 ha. KCC Drainage and Planning Policy states that an additional 10% uplift of impermeable areas associated with the proposed impermeable areas will be required to account for urban creep. As such, a total impermeable area of 2.57ha will be used within the conceptual drainage strategy going forward.
- 10.2 Generally, this type of development is considered to have a design life of 100 years. Therefore, for the purposes of this assessment, accounting for the Environment Agency's climate change allowances (published in February 2016), a 45% increase in peak rainfall intensity has been included as climate change allowance, which caters up to the year 2115. No climate change guidance is available beyond 2115.

Consideration of Drainage Hierarchy

- 10.3 The recently issued DEFRA "National Standards for Sustainable Drainage Systems (SuDS)" (Published 19 June 2025) advises the following hierarchy for the disposal of surface water;
1. Collection for non-potable use;
 2. Infiltration to ground;
 3. Discharged to an above ground surface water body;
 4. Discharged to a surface water sewer, or another piped surface water drainage system;
 5. Discharged to a combined sewer.
- 10.4 The drainage hierarchy has been considered as follows.

Priority 1 - Rainwater re-use

- 10.5 The new standards list the following reasons that rainwater harvesting shall be considered and that this shall be in all circumstances where any of the following apply:
- There is a demand for non-potable water and available contributing catchment area that will deliver safe and efficient water savings.
 - There is a need for landscape irrigation
 - The development is in an area identified as seriously water stressed.
- 10.6 The site is located within an area of serious water stress, according to the EA's 'Water stressed areas – final classification 2021'.
- 10.7 Rainwater harvesting should be considered as the masterplan progresses. This could be provided via bespoke harvesting solutions or through commercially available solutions which typically connect to rainwater downpipes.

Priority 2 - Infiltration

- 10.8 Infiltration testing was undertaken in March 2025 by RSK Geosciences. Results are provided within Combined Phase 1 and Phase 2 Site Assessment, reference 52731 R01 (00) dated May 2025. Testing was carried out generally in accordance with the method described in BRE Digest 365 (BRE, 2016). Infiltration test results for each trial pit are presented within **Table 10.1**.

Table 10.1 Infiltration rates

	Infiltration rate (m/s)		
	Test 1	Test 2	Test 3
TPSA01	n/a	3.47×10^{-5}	3.44×10^{-5}
TPSA02	2.37×10^{-4}	2.51×10^{-4}	3.48×10^{-4}
TPSA03	2.42×10^{-4}	2.44×10^{-4}	2.89×10^{-4}
TPSA04	4.71×10^{-4}	9.45×10^{-4}	7.00×10^{-4}

- 10.9 Based on the geotechnical information and infiltration test results, discharge to the ground via infiltration basins is proposed as the primary surface water disposal route.

Consideration of Sustainable Drainage Systems

- 10.10 The potential for the use of Sustainable Drainage Systems (SuDS) to provide attenuation within the development has been considered as follows:

Permeable Paving

- 10.11 The DEFRA Standards for SuDS (updated June 2025) states that '*discharge of runoff using point infiltration features shall not be relied on to discharge all runoff where the rates of infiltration are less than $1 \times 10^{-6} \text{ m/s}$* '. The infiltration rates for the site exceed this threshold, with the worst-case result being $3.44 \times 10^{-4} \text{ m/s}$.
- 10.12 As such, online permeable paving is proposed within private parking bays of residential dwellings, subject to detailed design.

Open Storage Features

- 10.13 On the basis that the site currently comprises a greenfield site, it will be necessary to prioritise open storage features such as detention basins as part of a proposed development. Conveyance features such as swales could be staggered in a terrace arrangement to suit the site contours; in order to slow flows across the slope of the site and provide an additional stage of water quality treatment.
- 10.14 The provision of open storage features such as basins would offer benefits in terms of water quality by enabling filtration and settlement of particles prior to discharge off-site via infiltration.
- 10.15 As the basins will drain via infiltration, basins are designed to empty. However, it is anticipated at detailed design stage, when contributing impermeable areas are further ascertained, detention basins can be designed in such a way to ensure a permanently wetted areas of the detention basins to provide additional ecological benefits.

Water Butts

- 10.16 Rainwater harvesting can provide water for non-potable uses such as irrigation. It is recommended that rainwater harvesting systems such as rainwater butts are provided within private garden areas of the proposed development to reduce potable water demand.
- 10.17 Attenuation benefits provided using rainwater harvesting are considered to be limited and therefore this option has not been included within the drainage strategy calculations.

Rainwater Gardens

- 10.18 Rainwater harvesting can also be provided via rainwater gardens located within depressions downstream of impermeable areas to receive surface water runoff.

- 10.19 Attenuation benefits provided using rainwater harvesting are considered to be limited and therefore this option has not been included within the drainage strategy calculations.

Conceptual Surface Water Drainage Strategy

- 10.20 The conceptual surface water drainage strategy is provided within **Appendix H** and supporting Causeway Flow calculations are provided within **Appendix I**.
- 10.21 Following the Drainage Hierarchy, the potential for storage and infiltration of runoff has been considered. Surface water runoff arising from new impermeable areas of the site will be directed into three enhanced infiltration basins within the site, with flows discharging to ground via infiltration from the sides and base of the basins. The enhanced infiltration basins have been designed with a maximum 1 in 3 gradient slope and are to be 1.5m deep, including a 0.3m freeboard. A 5m easement from infiltration features to building and road foundations has also been provided to prevent damage to foundations from arising. The enhanced infiltration basins will be underlain by a 300mm deep layer of gravel to further improve the water quality mitigation properties of the infiltration basins. **Table 10.2** below provides details regarding the contributing impermeable area for each pond and associated infiltration rates.

Table 10.2 Infiltration basin summary

	Infiltration basin 1	Infiltration basin 2	Infiltration basin 3
Contributing impermeable area	0.876ha	0.589ha	1.104ha
Infiltration rate	0.124m/hr	0.853m/hr	0.871m/hr
Storage required (m ³)	618	212	395
Storage provided (m ³)	631	221	398

- 10.22 Additional surface water storage is also provided within the subbase of permeable paving. Based on an area of 2878m² and a 0.300m depth of subbase, 259m³ of surface water attenuation is expected to be provided by permeable paving.
- 10.23 The SuDS proforma is provided within **Appendix J**.

Pollution Mitigation

- 10.24 The CIRIA SuDS Manual (2015) provides pollution hazard indices from an assortment of land uses and the pollution mitigation indices for a number of SuDS techniques, including detention basins and permeable paving. It is noted that the pollution hazard indices are not cumulative, and that the mitigation should be designed to the maximum pollutant use. Furthermore, it is not anticipated that there would be coarse sediments for removal at the site, therefore specific design for this purpose would not be required.
- 10.25 Hardstanding within the development predominantly comprises of residential roofs and individual property driveways and low traffic roads with under 300 traffic movements per day. The most significant pollutant load within the site will arise from access roads within the development which, although not expected to have frequent use with over 300 traffic movements per day, have been considered. As such the development is assessed to have a 'Medium' pollution hazard level as per the SuDS Manual (CIRIA C753) Table 26.2. Pollution hazard indices for land uses within the development are shown below within **Table 10.3**.
- 10.26 Inlets to the basins will consider the inclusion of pre-treatment sediment bays for water quality control.

- 10.27 The infiltration basins will be underlain with a 300mm deep layer of gravel, enhancing the mitigation properties of the infiltration basins.
- 10.28 Three stages of treatment will provide additional environmental protection in the event of an unexpected pollution event or in the unlikely event of poor system performance.
- 10.29 The SuDS Manual also notes that in systems where multiple SuDS features are incorporated, the subsequent treatment stages are considered to perform at 50% of their optimum pollution mitigation, due to the reduced inflow concentrations. The maximum pollution mitigation indices have been included for each SuDS feature below, followed by an evaluation of the total mitigation provided by the treatment stages, taking into account the 50% efficiency of the second and tertiary stages. Finally, mitigation indices are limited to a maximum value of >0.95.
- 10.30 It can be seen from **Table 10.3** below that the proposed permeable paving, filter strips and detention basins will provide mitigation that combined exceeds the maximum pollution hazard indices generated by the roofs of the buildings and the internal road network, thereby sufficiently treating the runoff that will be generated post-development prior to discharge into the fluvial network.

Table 10.3 Pollution Hazard and Mitigation Indices

Land Use / SuDS Feature	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Proposed Land Uses			
Medium pollution hazard level roads	0.7	0.6	0.7
Mitigation			
Pre-treatment Pond	0.7	0.7	0.5
Enhanced Infiltration Basin	0.8	0.8	0.8
Mitigation accounting for 50% efficiency of second and third stage			
Paving and pond (latter at 50% efficiency) combined	1.10	1.10	0.9

Event Exceedance

- 10.31 The proposed indicative surface water drainage concept provides above ground storage up to the 1 in 100 year plus climate change event. In an event exceeding this magnitude, detailed drainage design will identify mitigation measures to ensure that the resulting above-ground flooding will be confined to temporary shallow flooding of the on-site road network and will not affect the buildings on site or significantly increase flood risk to off-site locations.
- 10.32 Event exceedance planning will be undertaken as part of the final design process. Suitable mitigation measures will be incorporated into the development to ensure water is retained on-site should surcharging of on-site drains occur during extreme rainfall events.

Maintenance of Sustainable Drainage Systems

- 10.33 As described in the CIRIA SuDS Manual C753, regular inspection and maintenance will be required following construction to allow effective operation of the proposed surface water drainage network and SuDS features. A SuDS Maintenance Plan for the proposed SuDS features is included as in **Table 10.4**, **Table 10.5**, and **Table 10.6** below. A detailed maintenance programme will be required as part of the detailed drainage design for the site.

Table 10.4 – Permeable Paving Maintenance

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Quarterly, 48 hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually

Monitor inspection chambers

Annually

Table 10.5 - Pre-treatment Pond Maintenance

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required

	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25-50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows	As required

Table 10.6 - Enhanced Infiltration Basin Maintenance

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut grass - for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass - meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect base to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (e.g. oils)	Monthly (at start, then half yearly)
	Check base surface for even level	Monthly (at start, then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then half yearly)

Occasional Maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial Actions	Repair erosion or other damage by reseeding or returfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

Foul Drainage

- 10.34 The foul water drainage strategy is included within the conceptual drainage strategy, **Appendix H**, and is subject to detailed design. Foul flows are to drain via gravity to a Southern Water sewer reference MH7301 located to the north of the site in Norwood Lane. This connects to a 150mm diameter pipe in Norwood Lane.
- 10.35 A pre-development enquiry has been submitted to SW and a response has yet to be received. Developers have a right under S106 of the Water Industry Act to connect to the foul network.

11 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

- 11.1 The site has been considered as part of the Gravesham Local Plan, Hook Green is identified as a 'Tier 2' settlement with options discussed for its expansion.
- 11.2 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding.
- 11.3 The site is within Flood Zone 1 and has no other flood risk except 'low' surface water + climate change flood risk.
- 11.4 Flood risk from surface water on site is minimal with the development not generating additional external flood risk.
- 11.5 This site is preferable as it would be beneficial for the Gravesham Local Plan and could mitigate current sewer flooding within the conservation area of Hook Green.
- 11.6 The sites meets the criteria set out in Section s14, Paragraphs 170 to 182. As such it is recommended the Sequential Test to be passed.

The Exception Test

- 11.7 According to Table 3 of the PPG to the NPPF, 'more vulnerable' developments are considered appropriate within Flood Zone 1 without the requirement to apply the Exception Test. Therefore, application of the Exception Test is not required for the proposed development.
- 11.8 It is considered that the development passes the Exception Test.

12 SUMMARY AND CONCLUSIONS

- 12.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF. Reference has also been made to the CIRIA SuDS manual (C753), the SFRA and the SWMP and following consultation with the EA's Partnership and Strategic Overview Team.
- 12.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in **Table 12.1**.

Table 12.1. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial	✓				✓		
Tidal	✓				✓		
Sewers	✓				✓		
Surface Water	✓				✓		
Groundwater	✓				✓		
Other Sources (e.g. reservoirs, water mains)	✓				✓		

- 12.3 The proposed surface water drainage management will be undertaken in accordance with the latest local and national SuDS policies such that development will not cause an increase in flood risk off site.
- 12.4 The site is located wholly within Flood Zone 1 – low risk.
- 12.5 There are no surface water flood risk areas identified on or close to the site.
- 12.6 The underlying soils include Chalk bedrock with groundwater recorded at least 20m below ground level.
- 12.7 Surface water drainage is to be by infiltration, using a combination of swales, basins and permeable pavement areas.
- 12.8 As the site is located in Flood Zone 1 and with no on site surface water flood risk, it has been demonstrated that the development meets the Sequential and Exception Tests imposed under the NPPF.
- 12.9 Overall, it has been demonstrated that the development would be safe, without increasing flood risk elsewhere, and that a positive reduction in flood risk would be achieved through the design of the infiltration systems to cater for the 1 in 100 year event including a 40% climate change allowance.

APPENDICES

Appendix A

EA Consultation Response

Anna-Lisa Morse

From: KSL Enquiries <KSLE@environment-agency.gov.uk>
Sent: 18 February 2025 09:05
To: Jones, Jake1
Subject: KSL 398509 RL: Norwood Lane, Meopham, DA13 0YF
Attachments: 7458-SK-03-Location Plan.pdf

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Dear Jake,

KSL 398509 RL: Norwood Lane, Meopham, DA13 0YF

Thank you for your request for information that was received on 10 February 2025.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

This site is located in an area of Flood Zone 1 where we do not have modelled flood levels.

We can confirm that we have no record of flooding (from rivers and/or the sea) for this location.

You may wish to check with the Lead Local Flood Authority for this area, Kent County Council, who hold detailed records for surface water flooding.

Please be aware that you can access our flood map for planning at <https://flood-map-for-planning.service.gov.uk/>

If you have requested this information to help inform a development proposal, then you should refer to the flood risk standing advice pages on our website

<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

You can find further information about flooding and our flood maps on our website:

<http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

Kind regards,

Robyn

Robyn Latter

Customer & Engagement Officer
Customer and Engagement Team – Kent, South London and East Sussex Area
Environment Agency | Orchard House, London Road, Addington, West Malling, ME19 5SH |
KSLE@environment-agency.gov.uk | 0208 474 6848



From: Jones, Jake1 <jake.jones2@rps.tetrattech.com>
Sent: 10 February 2025 17:41
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: Norwood Lane, Meopham - Flood risk information request

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Good afternoon Team,

We are undertaking a Flood Risk Assessment for Norwood Lane, Meopham. Kent . DA13 0YF. A red line boundary is attached. From the EA Flood Map for Planning, the site is located within Flood Zone 1 but has small patches of low surface water risk.

Please can you provide Product 4 for the site?

Thank you for your time,

Kind regards,

Jake

Jake Jones

Consultant - Hydrology
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Appendix B

Southern Water Consultation Response



jake.jones2@rps.tetrattech.com

Date

7th March 2025

Contact

Tel 0330 303 0368

Dear Mr Jones

**The Environmental Information Regulations 2004
Request for Information
EIR reference 3183**

Thank you for your request for information which we received on 10th February 2025. We have dealt with your request under The Environmental Information Regulations 2004 (EIR 2004). This letter provides the response to your request, as follows:

*We are currently undertaking a flood risk assessment of a site located at Norwood Lane, Meopham, Kent. DA13 0YF (see location plan attached).
If possible, we would like to request any sewer flood history at the site held by Southern Water.*

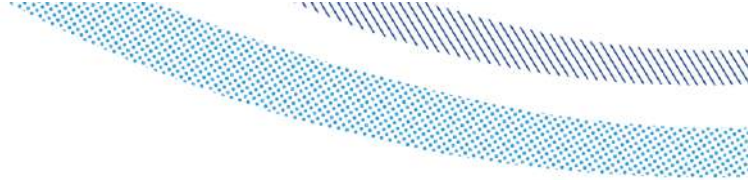
We can confirm that Southern Water does hold this type of information you have requested.

We have reviewed our records for Northwood Lane, Meopham, Kent, DA13 0YF, as well as the surrounding 200m area, and found no flooding records for the past 10 years.

We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: <https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information>. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.



Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Appendix C

Kent County Council Consultation Response

Anna-Lisa Morse

From: SUDS@kent.gov.uk
Sent: 12 February 2025 16:47
To: Jones, Jake1
Subject: RE: Flood Information Request: Norwood Lane, Meopham. Kent . DA13 0YF

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Good afternoon,

Thank you for your email.

The information that you require would come under our Pre-Application Advice scheme. Since 15 January 2017, Kent County Council charge for the provision of pre-application advice. Please refer to our [website](#) to find our Pre-Application Advice request form and charging schedule.

If you wish to proceed please complete the Pre-Application form with the appropriate information. To maximise the value of information that we can provide, please complete all boxes to the best of your knowledge. We will provide a response within 21 days of receipt of the completed form with the expectation that payment will be provided as stated.

Best wishes,

Becca Nicholas | Technical Support Officer | Flood & Water Management | Kent County Council |
Invicta House, County Hall, Maidstone ME14 1XX | 03000 414141 | www.kent.gov.uk

From: Jones, Jake1 <Jake.Jones2@rps.tetrattech.com>
Sent: 10 February 2025 17:20
To: SUDS - GT <SUDS@kent.gov.uk>
Subject: Flood Information Request: Norwood Lane, Meopham. Kent . DA13 0YF

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Good Afternoon Team,

I trust you are well.

I am looking to obtain some insight into flooding for a site located at Norwood Lane, Meopham. Kent . DA13 0YF (see location plan attached).

We note that the site is in Flood Zone 1 but there is low surface water risk in the highway on the east perimeter and in the north corner of the site.

We would like to request:

1. Details of any groundwater flooding issues in the area

2. Details of any sewerage flood risk at the site.
3. Details of any historical flooding at the site.
4. Any specific requirements for managing the surface water flood risk at the site (including any requirements for SuDS such as acceptable discharge restriction rates etc).

If you require any more information, please don't hesitate to get in touch.

Thank you for your time.

Kind regards,

Jake

Jake Jones

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Appendix D

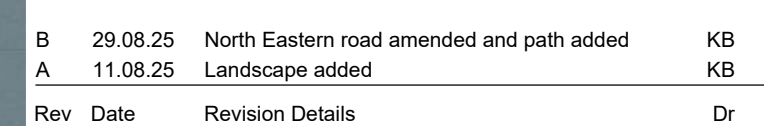
Topographical Survey

Appendix E

Proposed Development Layout

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

- 1 New site access is to be constructed prior to any commencement on site to allow safe travel to construction vehicles
- 2 Site to be adequately guarded from all sides due to openness to boundaries and to residential gardens in other areas
- 3 Protection Of Foot crossing the site to be either temporarily closed, diverted, or fenced with appropriate signage
- 4 The Rising Ham along the southern site boundary to be suitably flagged and fenced where necessary
- 5 Retained Trees and Churchyard Wood should be suitably protected from construction works
- 6 Due to potential water run-off towards existing properties to north during construction works the construction of the northern basin at start of works to be considered
- 7 All floor top and above windows to be cleanable from inside with easy access
- 8 Roof Trusses to be braced immediately once in position



Client's Name
Taylor Wimpey

Job Title
Land west of Norwood Lane,
Meopham

Drawing Title
Illustrative Masterplan

Scale
1:500 @ A0 / 1:1000 @ A2

metres 10 20 30 40

Dream Checked

KB	KE	28.07.2
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Job No	Drawing No	Page No
7458	PL-03	1

Status INFORMATION

CAD Plot date: 25/05/2025 - 09:45:00 7458-afte

Appendix F

RSK Geotechnical Report



Taylor Wimpey South East

Land at Norwood Lane, Meopham, Gravesend, Kent, DA13 0EE

Combined Phase 1 & Phase 2 Site Assessment

52731 R01 (00)

RSK GENERAL NOTES

Project No.: 52731

Title: Combined Phase 1 & Phase 2 Site Assessment: Land at Norwood Lane,
Meopham, Gravesend, Kent, DA13 0EE

Client: Taylor Wimpey South East

Date: May 2025

Office: RSK Environment Limited, Bridge House, North farm Road, Tunbridge Wells,
Kent, TN2 3DR

Status: Rev 00

Author Niki Dubber / Mike
Williams

Signature



Technical reviewer Svetislav Trajkovski

Signature



Project manager Mike Williams

Signature



Quality reviewer Victoria Fletcher

Signature



Revision control sheet				
Revision ref.	Date	Reason for revision	Amended by:	Approved by:
R01 (00)	19/05/2025	First issue	n/a	see above

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) were engaged by Taylor Wimpey South East Limited (Weald Court, 103 Tonbridge Road, Hildenborough, Kent, TN11 9HL herein referred to as the 'Client' to carry out a combined Phase 1 & Phase 2 Site Assessment of the Land at Norwood Lane, Meopham, Gravesend, Kent, DA13 0EE.

The works were undertaken by means of RSK Fee Proposal ref. 52731 T01 (00), dated 7 February 2025 under RSK Standard Terms and Conditions, Issue No. 12, July 2023 and Purchase Order Agreement ref. PO No. HM-10010/00487, which forms the appointment between ourselves and the Client.

References in this report to 'we', 'us', or 'our' shall mean RSK Geosciences as a trading name of RSK Environment Limited (company no.SC115530) at registered address 65 Sussex Street, Glasgow, G41 1DX.

The site location is provided in **Figure 1** and the site layout boundary to which this report refers is presented in **Figure 2**.

The report should be read and used in accordance with the limitations and constraints identified in the report text, and at **Appendix A – Service Constraints**.

1.2 Objectives

The site is being considered for development for residential use.

The objective of the work is:

- to identify any contamination and/or geotechnical constraints to the proposed development and, where relevant, to support discharge of planning conditions and building control requirements; and,
- to identify based on risk assessment whether additional investigation or remediation works may be required to support safe development to make the site suitable for use.

1.3 Scope of works

The scope of works has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2023) and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance (i.e. National Planning Policy Framework).

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017. Ground gas assessment has been undertaken in general accordance with BS8576: 2013 and BS 8485:2015+A1:2019.

The scope of works for the assessment has included the following:

Desk study:

- review of the history of development on the site and surroundings assessment of local geology, hydrogeology and hydrology
- review previous reports pertaining to the site condition where available
- completion of a site reconnaissance survey to assess the visual condition of the site
- development of an initial conceptual site model (CSM) and preliminary risk assessment
- preliminary consideration of geotechnical constraints and hazards; and,
- provide recommendations for further works should this be required.

Intrusive investigation:

- Intrusive investigation works comprising:
 - Buried service detection and avoidance
 - Unexploded ordnance assessment
 - 1no. cable percussive boreholes to 20m depth
 - 1no. day window sampling
 - 3no. days of trial pitting with selected locations for infiltration testing
 - laboratory analysis (geotechnical and geoenvironmental)
- refinement of the conceptual site model (CSM) and complete generic quantitative risk assessment (GQRA) of relevant contaminant linkages
- interpretation of ground conditions and geotechnical data to provide preliminary recommendations with respect to foundations and infrastructure design; and,
- preparation of this interpretative report.

1.3.1 Agreed variations

Installation of window sample locations and requirement for subsequent groundwater/ground gas monitoring was removed from the Scope of Works as per Client request.

1.4 Existing reports

No existing reports relevant to the site assessment have been provided to RSK.

1.5 Limitations

This report is subject to the RSK service constraints given in **Appendix A** and limitations that may be described below and throughout this document.

This report was prepared in accordance with good practice guidance at the time of issue. Consideration should be considered in the light of changes in legislation, statutory requirements, or industry practices subsequent to the date of issue.

The study aims to principally identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

Although asbestos may not have been encountered as part of these works, asbestos could be present in soil in discrete areas and may be encountered in future ground investigation.

A detailed survey of invasive plant species is outside the scope of this investigation therefore detailed comments with regards to such species have been omitted from this report.

The comments given in this report and the opinions expressed are primarily based on third party data and investigations, while RSK have undertaken a review of the information provided RSK cannot be held liable for the quality of the data provided. There may be conditions pertaining to the site that have not been disclosed by the investigations and therefore could not be taken into account.

In particular, it should be noted that there may be areas of made ground and potential contamination not detected due to the limited nature of the investigations or the thickness and quality of made ground and concentrations of contamination across the site may be variable. In addition, groundwater levels and groundwater concentrations may vary from those reported due to seasonal, or other, effects.

2 SITE DETAILS

2.1 Site location

Site location details are presented in Table 1 and a site location plan is provided on **Figure 1**.

Table 1 Site location details

Site name	Land at Norwood Lane, Meopham
Full site address and Post code	Gravesend, Kent, DA13 0EE
National Grid reference (centre of site)	TQ647671

2.2 Site description

The Site boundary and current site layout are shown on **Figure 2**. The site comprises 7.13 hectares of open arable agricultural land. The site is irregular in shape and is occupied by an existing small Woodland (Churchway Wood), situated centrally on the western site boundary.

2.3 Surrounding land uses

The Site is located to the east of Hook Green Village within the Parish of Meopham. Immediate surrounding land uses are described in Table 2.

Table 2 Surrounding land uses

North	Existing residential properties, Norwood Lane with open agricultural land beyond
East	Norwood Lane with open agricultural land beyond
South	Green Lane with open greenfield beyond
West	Existing residential properties of Hook Green Village

2.4 Proposed development plans

It is understood that proposed development plans are still in their infancy however it is understood that the land is being considered for residential development of up to 160no. low-rise residential dwellings with associated private gardens, surrounding areas of landscaping and infrastructure.

No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

3 DESK-BASED ASSESSMENT

The desk-based assessment was designed to generally meet the objectives of a preliminary or Phase 1 investigation, as defined by BS 10175:2011+A2:2017 (BSI, 2017) and BS 5930:2015, and is set in context of a Tier 1 preliminary risk assessment as defined in LCRM.

The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250m radius of the site, although certain sources and/ or sensitive targets further than 250m distance from the site may also have been considered.

3.1 Site history

3.1.1 Historical development record

The development history of the site and surrounding area based upon assessment of historical plans and records is detailed in Table 3 and Table 4 respectively.

The historical maps reviewed are shown within the environmental database report in **Appendix B**.

Table 3 Summary of historical development on site

Date from	Date to	Historical Land Use (on-site)
1895	2025	Unoccupied (assumed agricultural), unnamed woodland to the north, Churchway Wood central west. Abound by Greenlane South, Norwood Lane East-Northeast and localised boundary trees and vegetation. Public footpath traverses centre of site east-west.

Table 4 Summary of historical development in the vicinity of the site

Date from	Date to	Historical Land Use (off-site)
1985	2025	Woodland immediately beyond northern and south-western site boundaries. Rural largely unoccupied agricultural land beyond, save for detached rare, detached buildings and managed woodland and or orchards. Woodlands and or orchards make way for the Village of Hook Green and surrounding rural village development. Camer Park located south-east. Meopham Station servicing Chatham and Dover Railway Line located 1/2km north.
1908	1933	Detached buildings located beyond South-western site boundary. Managed woodland and or orchards diminishing west. Local Wells (assumed private abstraction) depicted within region.
1933	1939	Detached building directly north and expansion of detached buildings beyond the South-western site boundary. A Tank is denoted.
1939	1962	Residential buildings beyond northern boundary, same configuration as present today (2025). Commencement of the expansion of Hook Green Village West (residential houses,

Date from	Date to	Historical Land Use (off-site)
		telephone exchange. Managed woodland and or orchards diminishing west and south. Tank no longer denoted.
1962	2025	Expansion of Hook Green Village West, same configuration as present today. Mulbury Close located adjacent western site boundary. Properties fronting Tradescant Drive.

Key potential contaminative land uses identified from the available historical maps are limited to the historical agricultural end-use and the potential use of agrichemicals (herbicides, pesticides and fertilizers), if any.

3.1.2 Unexploded ordnance

A review of publicly available unexploded ordnance (UXO) risk maps indicates that the site is located in an area with 'Moderate' potential for wartime bombs to be present (Zetica, 2025).

Areas of 'moderate' or 'high' potential presence for wartime bombs should be further investigated through desk-based study in advance of SI in accordance with RSK Technical Procedure TP223 'Unexploded Ordnance Risk Assessment Procedure For Site Work' and documented in the HASP.

A preliminary UXO risk assessment was commissioned by RSK in March 2025, the conclusions of which recommended a detailed UXO risk assessment is undertake prior to undertaken any ground investigation works (ref. S1RA-1054, RSK OM, dated 3 March 2025).

A detailed UXO risk assessment was commissioned by RSK in March 2025, the conclusions of which recommended UXO safety briefing, borehole support and UXO watching brief would be required as part of any future ground investigation works (ref. S2RA-1061, dated 14 March 2025).

Copies of both preliminary and detailed UXO risk assessments have been presented as **Appendix C** of this report.

3.2 Information from environmental database report

Relevant environmental permits and incidents detailed within the environmental database report (see **Appendix B**) are summarised below in Table 5.

Table 5 Summary of environmental permits, landfills and incidents

Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
Agency and hydrological				
Environmental permits – incorporating Environmental Permitting Regulations (EPR) and/ or Pollution Prevention and Control (PPC) permits; former Integrated Pollution Controls (IPC), Local Authority Pollution Control (LAPC)	0	0	1	>250m: Meopham Service Station (petrol filling station), located 578m northwest (Pp1/98/031), dated 1998, now revoked.

Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
Enforcement and prohibition notices	n/a			
Pollution incidents to controlled waters, Prosecutions relating to controlled waters, Substantiated pollution incident register, Water Industry Act referrals	0	0	1	>250m: atmospheric pollution occurring in 2002 (Category 2), located 803m southwest (ref.80985), no impact to water, minor incident (Cat 3) to land.
Discharge consents	0	1	1	<250m: Domestic treated effluent discharge to land/soakaway (Camer Barn), located 167m East, dated 2001 >250m: Care Home treated effluent discharge to land/soakaway (Camer Barn), located 894m northwest, dated 2013
Registered radioactive substances	n/a			
Landfill and waste				
Active landfills	n/a			
Historic / closed landfills	n/a			
Other waste management licences	n/a			
Potentially in-filled land (pit, quarry, pond, marsh, river, stream, dock etc)	0	0	2	>250m both of which relate to potential unknown infilled land located 735m and 968m southwest and northeast respectively.
Hazardous substances/ industrial land uses				
Control of Major Accident Hazards (COMAH) sites	n/a			

Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
Explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning hazardous substance consents/enforcements	n/a			
Contaminated land Part 2A register entries and notices	n/a			
Fuel station entries	0	0	2	>250m: n/a (note Meopham Service Station (petrol filling station), located 578m northwest (Pp1/98/031), dated 1998, now revoked/obsolete). Whitehall Ltd, located 972m south (obsolete)
<i>Note: Entries have only been included within the table where they are located within a 250m radius of the site or, where they fall outside of this radius but are considered to comprise a significant entry.</i>				

All entries have been omitted from further assessment based on proximity and or absence of any reported significant pollution incidents.

3.2.1 Contemporary trade directory entries

There are seven (7no.) 'active' trade directory entries within 1km of the site, the closets of which relates to garage services (Big M Motor Spares) located 349m southwest. Other entries include garages services located circa 1/2km northwest, and air conditioning and refrigeration contractors located 950m northeast.

There are twenty-seven (27no.) 'inactive' trade director entries within 1km, the closet of which relates to Electrical Engineers located 100m northwest. Other entries include engineering works, waste disposal services, food manufacturing, boiler repairs, building supplies, garages services, freight services, cleaning services and printing works.

3.3 Site geology

3.3.1 Anticipated geological sequence

Published records for the area and available historical borehole logs indicate the geology of the site to be characterised by the succession recorded in Table 6.

There are publicly available BGS historical boreholes located within 250m of the site, a selection of which are presented in **Appendix D**.

Table 6 Site geology

Strata	Description	Estimated thickness	Permeability
White Chalk Subgroup (Undifferentiated Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation)	Hard white horizontally laminated CHALK with limonite speckling on joints and rare to occasional subrounded flint bands	Proven >60m	High
Relevant information sources: BGS Geoindex ☒ BGS borehole logs ☒ Previous SI reports ☐			

Although not identified in BGS records it is likely that thin deposits of made ground, topsoil and superficial head deposits are present on site.

The environmental database report indicates on-site ground stability hazards (collapsible/compressible ground, dissolution, landslide, running sands, shrinking or swelling clay), are non-hazard to very low/low risk.

The environmental database report indicates six (6no.) natural cavity entries located within 1km of the site. The closets entry relates to solution pipes (x3) located circa 500m east of the site. Remaining entries all relate to solution pipe features located between circa 500m to 1km of the site.

3.3.2 Radon

The environmental database report provides an assessment of site-specific radon risk. The report indicates that the estimated percentage of houses with radon above the Radon Action Level (200 Bq m⁻³) is 1-3%.

The report indicates that these areas do not require radon protective measures within new domestic premises, refurbishments, or extensions in accordance with BRE publication 211 (2023).

In line with BRE 211 guidance, where basements are constructed radon ingress must be considered regardless of the site's geographical location. Radon resistance should be considered in the design of waterproofing measures by appropriate specialists with consideration to site conditions such as site geology and hydrogeology. In any basement, post-construction monitoring is recommended by BRE (2023) in all habitable basements.

3.4 Mining and quarrying

Evidence has been sought to identify any mining, quarrying, landfilling and land reclamation operations, past and present, which have taken place within 500m of the site. An initial site appraisal has been carried out based on the information provided on the Coal Authority Interactive Viewer of the UK Coalfield areas and the commercial environmental databased report for information on non-coal mining.

Use of the Coal Authority interactive viewer indicates the site lies outside their Coal Mining Reporting Area and therefore no further assessment of coal mining issues is required within this report.

3.4.1 Areas of other (rock or mineral) mining

The environmental database report indicates:

- three (3no.) BGS records mineral sites located within 1km of the subject site. the closest of which is located 793m southwest relating to Meopham Brick Works, a former open cast quarry for Clay and Shale commodities, now ceased. Other entries include Henley Wood Chalkwell located 902m east, underground mining for Chalk, now ceased and Foxen Down Chalk Pit located 1km southeast, open cast quarrying for Chalk commodity.
- One (1no.) man-made mining cavity located 983m south relating to a Denehole entry (vertical shaft with chambers at the base).

3.5 Hydrogeology

A summary of the hydrogeological setting of the site, with respect to the anticipated geological sequence set out in Section 3.3 is presented below in Table 7.

Table 7 Summary of hydrogeological setting

Condition	Description
Aquifer characteristics	The site is underlain by a principal aquifer relating to the bedrock geology of the White Chalk Subgroup. Groundwater vulnerability is mapping indicates the site is situated upon a Highly Vulnerable aquifer, relating to the underlying Bedrock Chalk Geology.
Depth to groundwater and flow	The anticipated depth to the groundwater table is anticipated to be >60m below ground level estimated from BGS logs. Albeit hydrogeological mapping data indicates a groundwater level of circa 30mbgl (Hydrogeological Map of the Chalk and Lower Greensand of Kent, Sheet 1 Chalk, BG, dated 1970) A nominal hydraulic gradient and groundwater flow direction northwards is anticipated within the deep Chalk aquifer. Flow may be locally influence by groundwater abstractions Shallow perched groundwater bodies are not anticipated.
Groundwater recharge/attenuation	The site is currently unsurfaced and will therefore drain to ground.
Historical implications for hydrogeology	Local abstractions (private domestic) and more regional abstraction (potable water supply) may locally influence groundwater flow.
Licensed groundwater abstractions	The environmental database report indicates that there are no groundwater abstractions within a 1km radius of the site. Closets abstractions are located circa 1550m southeast, relating to Luddesdown Pumping Station, owned and operated by Southern water Service Ltd. Multiple entries for the site relate to both surface water abstractions (pond/lake) and groundwater (chalk aquifer).
Source protection zones	Information available in the Envirocheck report the site lies at a Zone 2 (outer) and Zone 3 (total catchment) of the groundwater Source Protection Zone (SPZ) for the public supply borehole located circa 1.5m northwest of the site. Details of the SPZ designation are contained in Appendix C . The Water Framework Directive indicates the Groundwater within the North Kent Medway Chalk has an overall 'poor' quality rating (2019).

3.6 Hydrology

A summary of the hydrology within the site area is summarised in Table 8.

Table 8 Summary of hydrology in site area

Condition	Description
Surface watercourses/features	There are no ponds, streams or drainage ditches on or adjacent to the site. The nearest identified surface water feature is a field drain located circa 120m north of the site.
Surface water abstractions	There are no surface water abstractions identified by the environmental database, within a 1km radius of the site.
Site drainage	No evidence of formal drainage infrastructure (drainage lines/manholes/covers) or informal drainage infrastructure (boundary ditches) etc.
Preliminary flood risk assessment	The indicative floodplain map for the area, shows that the site lies does not lie within designated Flood Zone. The site is not located within an area at risk from flooding from Rivers and Sea (.GOV). Information contained within the environmental database report indicates the north-western extents of the site is at low (1000 year) to medium (100 year) risk of flooding from surface water. BGS Groundwater Flooding Susceptibility maps indicate that there is a "limited potential for groundwater flooding to occur" A flood risk assessment (FRA) is outside the scope of this report.

3.7 Sensitive land uses

Table 9 provides a summary of any environmentally sensitive areas identified within 250m of the site based on the environmental database report.

Table 9 Environmentally sensitive areas

Feature	Present within 250m of site?	Details	Likely pathways from site?
International designations – Ramsar wetland, Special Area of Conservation (SAC), Special Protection Area (SPA)	No	Designation type, distance and direction from site	n/a
National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland	No	Henley Wood located 857m east and Rabbit Wood North, located 995m west.	n/a
Areas of Outstanding Natural Beauty (AONB) and designated Green Belt	Yes	Kent Downs located 12m southeast	Yes

Feature	Present within 250m of site?	Details	Likely pathways from site?
Local designations – Local Nature Reserve, Site of Importance for Nature Conservation (SINC)	No	Designation type, distance and direction from site	n/a
Nearest high sensitivity development, e.g. residential	Yes	Adjacent northern and western site boundaries	Yes

4 SITE RECONNAISSANCE FINDINGS

A site reconnaissance survey was completed on 7 March 2025 by RSK.

It should be noted that the site reconnaissance survey was subject to limitations that included the accessibility of the woodlands due to the density of vegetation.

The key findings from the site reconnaissance survey were as follows:

- No buildings or hardstanding on site. The site was 100% soft landscaping.
- Vegetation was observed as area of woodland to the west and southwest, bushes and trees at the east and northwest boundaries and a hedge located along the southern boundary. The field comprised young crops.
- Minor rubbish observed north of the woodland area (at the site boundary).
- No surface water features on site or within 250m of site.
- Surface water is observed to drain into the ground.

A site plan is provided in **Figure 2** and photographic records are included in **Appendix F**.

The notes recorded during the reconnaissance survey are provided in **Appendix G**.

5 PRELIMINARY GEOTECHNICAL CONSTRAINTS

5.1 Design class

BS EN 1997-1 defines three different Geotechnical Categories that structures may fall into, which are summarised as follows:

- Category 1: Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk
- Category 2: Conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions
- Category 3: Structures or part of structures, which fall outside limits of Geotechnical Categories 1 and 2. Examples include very large or unusual structures; structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions; structures in highly seismic areas; structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

Based on the information provided above on the proposed development and in view of the anticipated ground conditions, a Geotechnical Category 2 has been assumed for the purposes of designing the geotechnical investigation. This should be reviewed at all stages of the investigation and revised where necessary.

5.2 Preliminary geotechnical hazards assessment

A summary of commonly occurring geotechnical hazards associated with the anticipated geology outlined in Section 3.3 above is given in Table 10 together with an assessment of whether the site may be affected by each of the stated hazards.

Table 10 Summary of preliminary geotechnical risks that may affect site

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	☐	☒	Likely to affect ground engineering and foundation design and construction.
Shrinkable clay soils ¹⁾	☐	☒	Design to NHBC Standards Chapter 4 or similar
Highly compressible and low bearing capacity soils, (including peat and soft clay)	☐	☒	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Silt-rich soils susceptible to rapid loss of strength in wet conditions ¹⁾	☒	☐	Likely to affect ground engineering and foundation design and construction. Head Deposits
Running sand at and below water table	☐	☒	Likely to affect ground engineering and foundation design and construction
Karstic dissolution features (including 'swallow holes' in Chalk terrain) ¹⁾	☒	☐	May affect ground engineering and foundation design and construction – refer to Section 6.2.1. Bedrock Chalk Geology
Evaporite dissolution features and/or subsidence ¹⁾	☒	☐	May affect ground engineering and foundation design and construction
Ground subject to or at risk from landslides ¹⁾	☐	☒	Likely to require special stabilisation measures
Ground subject to peri-glacial valley cambering with gulls possibly present	☐	☒	Likely to affect ground engineering and foundation design and construction
Ground subject to or at risk from coastal or river erosion ¹⁾	☐	☒	Likely to require special protection/stabilisation measures
High groundwater table (including waterlogged ground) ¹⁾	☐	☒	May affect temporary and permanent works
Rising groundwater table due to diminishing abstraction in urban areas ¹⁾	☐	☒	May affect deep foundations, basements and tunnels
Geological faults, fissures and break lines	☐	☒	May affect ground engineering and foundation design and construction
Underground mining including shafts and adits (e.g. coal, mineral)	☐	☒	Likely to require further assessment including potentially special stabilisation measures
Effects of extreme temperature (e.g. cold stores or brick kilns/furnaces)	☐	☒	Likely to affect ground engineering and foundation design and construction
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)	☐	☒	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Filled and made ground (including embankments, infilled ponds and quarries)	☐	☒	Likely to affect ground engineering and foundation design and construction
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	☐	☒	May affect ground engineering and foundation design and construction
Site topography, including presence of steep slopes	☐	☒	May affect ground engineering and foundation design and construction
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK. ¹⁾ The potential for these geohazards to impact the site may be exacerbated by climate change related fluctuations in temperature and precipitation.			

5.2.1 Chalk

In view of the prevailing ground conditions, with Chalk at shallow depth beneath the site, it is normal practice to consider the potential risk of ground subsidence related to the presence of swallow holes and other natural chalk solution features or man-made cavities.

Based on the Edmund's risk assessment model for natural dissolution features referred to in CIRIA Report C574 (Lord et al. 2002), the site falls into the 'no anticipated subsidence risk' category. With reference to Edmund's database of known natural and man-made chalk solution features there are no such features in the immediate vicinity of the site.

6 INITIAL CONCEPTUAL SITE MODEL

In the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present.

The relationship between sources, pathways and receptors are referred to as a conceptual site model. A risk can only be realised where a contaminant source, pathway and receptor are all in place, referred to as a 'contaminant linkage'.

In line with LCRM (Environment Agency, 2023) and BS 10175: 2011 + A2 2017 (BSI, 2017), RSK has used information in the preceding sections to identify hazards (sources of contaminants), receptors that may be impacted and plausible linking pathways. Where all three are present this is termed a potentially complete contaminant linkage and a qualitative risk estimation is made.

The conceptual site model has been considered in context of the proposed development as understood at the time of writing this report. Should the site development proposals change, the CSM and the associated contaminant linkages identified may need to be revised.

6.1 Potential soil, soil vapour and groundwater linkages

6.1.1 Potential sources of contamination

Potential sources of soil and groundwater contamination identified from current activities and the history of the site and surrounding area are presented in Table 11.

Table 11 Potential sources of soil and groundwater contamination

Potential sources	Contaminants of concern
On-site	
Localised Made Ground / reworked soils associated with historic/current agricultural land use	Petroleum hydrocarbons, toxic and phytotoxic metals, inorganics, PAHs, asbestos, herbicides/pesticides
Off-site	
Localised Made Ground / reworked soils associated with abounding development – notably north and southwest	Petroleum hydrocarbons, toxic and phytotoxic metals, inorganics, PAHs, asbestos, herbicides/pesticides
Locally impacted soils associated with historic Tank located adjacent south-western site boundary	

With regards to potential off-site source of contaminative impact, surrounding development may have resulted in some localised reworking of soils at the site boundaries however, potential risk has been omitted owing to the nature of development (residential) and time elapsed since development (40-50yrs). Likewise potential risks posed from the offsite Tank within proximity to the

south-western site boundary has been omitted from further assessment owing to the time elapsed since mapping (40-50yrs) and the anticipated domestic nature of the feature (likely domestic heating oil).

6.1.2 Sensitive receptors

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential sources identified above comprise:

- future site users (residential end-users)
- existing adjacent site users (residential end users)
- future buildings and services (i.e. foundations and potable water pipes)
- future vegetation
- groundwater in principal aquifer of the underlying bedrock White Chalk Sub Group (and associated Source Protection Zone 2 and 3); and,
- ecological receptors (ANOB, Greenbelt and Woodlands)

6.1.3 Potential contaminant pathways

Exposure pathways applicable to human health receptors include:

- direct ingestion, inhalation and dermal contact with soil and soil-derived dust and consumption of site-grown produce
- soil-derived dust migration followed by off-site deposition and ingestion, inhalation, and dermal contact
- asbestos fibre release followed by inhalation
- wind-blown dust and deposition off-site followed by direct ingestion, inhalation, and dermal contact.

Pathways applicable to environmental pathways include:

- direct contact of foundations/services with contamination in soil and/or groundwater
- root uptake of contaminants leading to phytotoxicity
- leaching from soil followed by migration in groundwater
- migration in groundwater
- migration via run-off through drainage
- wind-blown dust and deposition off-site followed by direct ingestion, inhalation, and dermal contact

Ecological receptors are only considered within the conceptual model in the context of statutory protected sites.

Please note that construction workers and future maintenance workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to the Health & Safety at Work Act 1974 and associated regulations and guidance.

Where there are potential instances that construction methods may result in short term environmental impacts, these will need to be assessed at design stage, within a construction phase environmental management plan and mitigation measures put in place where required.

6.2 Potential ground gas linkages

6.2.1 Ground gas generation potential

Potential ground gas sources identified for the site and surrounding are shown in Table 12.

Table 12 Potential ground gas sources (excludes mine gas)

Potential sources	Indicative ground gas generation potential (CIEH, 2008)	Additional information
On-site		
Natural carbonate soil and strata such as chalk and limestone	Very low	Bedrock chalk
Off-site		
Made ground with low degradable organic content (e.g. up to 5% organic material and no easily degradable waste).	Very low	Potential for reworked soils and or Made Ground at site boundaries with adjacent development

No significant potential sources of ground gas generation have been identified therefore this potential issue has not been taken forward for further assessment as part of the initial conceptual site model.

6.2.2 Radon

The site is in an area where the estimated percentage of homes exceeding the action level of 200 Bq m³ is 1-3% as indicated on available radon potential mapping (UKHSA & BGS, 2022).

In accordance with BRE 211 guidance (2023) and associated building regulations/standards no protection measures are considered to be required in new developments.

6.3 Preliminary risk assessment

The preliminary risk assessment findings and potentially complete contaminant linkages are shown in Table 13.

The risk classification is based on the combination of hazard consequence and probability using a risk matrix from CIRIA C552 (Rudland et al., 2001). The requirement for a preliminary qualitative risk assessment is in accordance with LCRM (Environment Agency, 2023). A summary of the risk assessment process is in **Appendix H**.

Table 13 Risk estimation for potentially complete contaminant linkages

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Risk Rating	Justification
On-site: Localised Made Ground / reworked soils associated with historic/current agricultural land use	Future site users (residential end-users)	Direct contact (oral, dermal and inhalation)	Low	Medium	Moderate / Low	Low likelihood of future contact given anticipated localised nature of any potential impacted Made Ground/reworked natural soil soils (if any) and degraded status of any residual agri-chemicals (if any). Medium severity conservatively assigned given unknown extent and chemical composition of any impacted Made Ground/reworked natural soil soils (if any) and unknown use of agri-chemicals (if any).
	Existing adjacent site users (residential end users)	Direct contact (dermal, inhalation)	Unlikely	Medium	Low	Future contact unlikely assuming construction best practice adopted and adhered to. Mitigation through suitably developed construction environmental management plans inclusive (but not limited to) an air quality management plans, for example. Medium severity conservatively assigned given unknown extent and chemical composition of any impacted Made Ground/reworked natural soil soils (if any) and unknown use of agri-chemicals (if any).
	Future buildings and services (i.e. foundations and potable water pipes)	Direct contact (chemical attack)	Unlikely	Medium	Low	Unlikely future contact given anticipated localised nature of any potential impacted Made Ground/reworked natural soil soils (if any). Medium severity conservatively assigned given unknown extent and chemical composition of any impacted Made Ground/reworked natural soil soils (if any) and unknown use of agri-chemicals (if any).
	Future vegetation	Root uptake	Unlikely	Medium	Low	Unlikely given the absence of any signs of vegetative distress and given existing agricultural end-use. Medium severity conservatively assigned given unknown extent and chemical composition of any impacted Made Ground/reworked natural soil soils (if any) and unknown use of agri-chemicals (if any).
	Groundwater in principal aquifer of the underlying bedrock White Chalk Sub Group	Leaching followed by percolation and vertical/lateral	Unlikely	Medium	Low	Unlikely when considering depth to Groundwater(>30mbgl) and the localised nature/persistence of any potential impacted soils (if any). Medium severity assigned given presence of an underlying principal aquifer and SPZ designation, albeit nearest potable groundwater abstraction located

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Risk Rating	Justification
	(and associated source protection zone 2 and 3);					circa 1.5km southeast (up-gradient) of an anticipated nominal groundwater flow direction (north).
	Ecological receptors (ANOB, Greenbelt and Woodlands)	Lateral migration of dissolved phase/ site run-off/ drainage/ dust deposition	Unlikely	Medium	Low	Future contact unlikely assuming construction best practice adopted and adhered to. Mitigation through suitably developed construction environmental management plans inclusive (but not limited to) an air quality management plans, for example. Medium severity conservatively assigned given unknown extent and chemical composition of any impacted Made Ground/reworked natural soil soils (if any) and unknown use of agri-chemicals (if any).
Notes: n/a						

Risk matrix		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low
	Very Unlikely	Low	Very Low	Negligible	Negligible

Potentially complete contaminant linkages with a potential risk of moderate to low or higher comprise:

- Direct contact (oral, dermal, inhalation) by future site users with potential localised Made Ground / reworked soils associated with historic/current agricultural land use

In line with LCRM, these potentially complete contaminant linkages need to be assessed further through an appropriate scope of site investigation and/or mitigation incorporated into the development as may be appropriate.

6.4 Data gaps and uncertainties

Key data gaps and uncertainties identified in the CSM at desk study stage include:

- gaps in available historical OS maps
- there are no previous investigations available for the site, therefore no information on actual ground conditions and the contamination status of the site at this stage; and,
- groundwater depth and flow direction are conceptual at this stage.

7 SITE INVESTIGATION STRATEGY & METHODOLOGY

7.1 Introduction

RSK carried out intrusive investigation works at the end of March and early April 2025.

7.2 Objectives

The specific objectives of the investigation were as follows:

- to establish the ground conditions underlying the site
- to investigate specific potential sources of contamination identified in initial CSM
- to assess geotechnical properties of soils; and,
- to address data gaps identified in Section 6.4

Prior to conducting intrusive works, utility service plans were obtained and buried service clearance undertaken in line with RSK's health and safety procedures. Copies of 'affected' statutory service records obtained by RSK as part of the agreed scope of works are contained in **Appendix E**.

7.3 Investigation strategy

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930:2015+A1:2020, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the boreholes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

The investigation strategy involved non-targeted boreholes and trial pits. Details of the investigation locations, installations and rationale are presented in Table 14. An exploratory hole location plan is shown on **Figure 3**.

Table 14 Exploratory hole and monitoring well location rationale

Investigation type	Number	Designation	Monitoring well installation	Rationale
Boreholes by cable percussive methods	1	CP01	For falling head test only	To prove the geological succession beneath the site, obtain geotechnical data and undertake soil infiltration testing
Boreholes by dynamic/windowless sampling methods	4	WS01-WS04	n/a	To prove the geological succession beneath the site, obtain geotechnical data

Investigation type	Number	Designation	Monitoring well installation	Rationale
Trial-pits excavated by hand/mechanical excavator	4	TP01 – TP10	n/a	To accurately log the upper strata beneath the site. Collect samples of the shallow soils for geo-environmental assessment.
Trial-pits excavated by hand/mechanical excavator	4	TPSA01 – TPSA04	n/a	To accurately log the upper strata beneath the site and undertake soil infiltration testing

7.3.1 Implementation of investigation works

The site investigation works were carried out in general accordance with the UK Specification for Ground Investigation (UKSGI), third edition (AGS, 2022)

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930:2015+A1:2020 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1) and CIRIA C574.

The soil sampling and analysis strategy was designed to characterise each encountered soil strata, permit an assessment of the potential contaminant linkages identified and investigate the geotechnical characteristics. In addition, samples were taken to allow for geo-environmental and geotechnical testing to be undertaken.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite required. They were dispatched to the laboratory in cool boxes under chain of custody documentation. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

7.4 Laboratory testing

Laboratory testing was undertaken at a UKAS accredited laboratory with ISO17025 and MCERTS accredited test methods were specified where applicable for contamination testing and as shown in the laboratory test certificates appended.

7.4.1 Chemical analysis of soil samples

The soil sampling strategy was designed to characterise the upper 1m of the ground profile. The programme of chemical tests undertaken on soil samples obtained from the intrusive investigation is presented in Table 15 with the laboratory testing results contained in **Appendix K**.

Table 15 Summary of chemical testing of soil samples

Stratum	Tests undertaken	No. of tests
Topsoil and Superficial Head Clay, silt, sand and gravel.	Soils Suite 2 - Speciated PAH-16MS, TPHCWG (spec.TPH), pH, As, Cd, Cr, Cr Vi, Cu, Hg, Pb, Ni, Se, Zn, Total Sulphate, ws Sulphate, TOC and Total CN	5
	Asbestos Screen (%w/w)	8
	Pesticide Suite (combined OPP and OCP)	3

7.4.2 Geotechnical analysis of soils

Where appropriate disturbed, bulk and undisturbed soil samples were taken for geotechnical classification testing with the depth and nature of samples detailed within the exploratory hole records.

Where appropriate, testing was undertaken in accordance with BS 1377:1990: Parts 1 to 4 Method of Tests for Soils for Civil Engineering Purposes or, where superseded, by the relevant part of BS EN ISO 17892:2014 Geotechnical investigation and testing - Laboratory Testing of Soil. Tests carried out in order to classify the concrete class required on-site have been undertaken following the procedures within BRE SD1:2005.

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in Table 16. The results and UKAS accreditation of tests methods are shown in **Appendix K**.

Table 16 Summary of geotechnical testing undertaken

Strata	Tests undertaken	No. of tests
Superficial Head Deposits	Moisture content %	6
	Liquid/ plastic limits (single point)	6
	BRE aggressivity suites	6
Bedrock White Chalk Sub Group	Moisture content %	3
	Saturation Moisture Content, Bulk Density and Intact Dry Density	4
	Liquid/ plastic limits (single point)	3
	Bulk density (SMC and IDD)	5
	BRE aggressivity suites	5

7.4.3 Infiltration testing

Infiltration tests were carried out in trial pits TPSA01 – TPSA04 and within the deep borehole CP01 to establish the infiltration rate of the underlying bedrock Chalk.

The tests were carried out generally in accordance with the method described in BRE Digest 365 (BRE, 2016). This involved filling the pits and the borehole installation with water from a tanker and recording the drop in water level with time as the water soaked into the ground.

Copies of the testing records are included in **Appendix J**.

8 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation and subsequent geo-environmental and geotechnical laboratory analysis undertaken are detailed below.

8.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented in **Appendix I**.

The exploratory holes revealed that the site is underlain by Topsoil and Superficial Head Deposits over bedrock White Chalk Sub Group. The presence of Superficial Head deposits was not anticipated albeit locally mapped within the surrounding environ. No evidence of Made Ground or reworked soils was recorded within any of the soils encountered as part of these exploratory works.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in Table 17 with the strata discussed in subsequent subsections.

Table 17 General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Topsoil	All	GL	0.25 – 0.40
Head	All	0.25 – 0.40	0.25 – 3.25
White Chalk Sub Group	All	0.50 – 3.50	17.50+

8.1.1 Topsoil

The topsoil encountered was generally described as a brown slightly sandy slightly gravelly SILT with frequent fine rootlets. The gravel was fine to coarse subrounded to subangular flint and chalk with rare brick.

8.1.2 Head

This stratum was encountered beneath the topsoil at all exploratory hole locations. The Head Deposits were generally described as light orangish brown slightly gravelly slightly sandy CLAY or clayey SILT. The gravel was fine to coarse subrounded to subangular flint and very weak chalk.

The deposit generally became lighter in colour with an increased frequency of chalk fragments with depth nearer to the Head/Chalk boundary.

The thickness of the Head Deposits varied across the site. The base was generally encountered between 1.0m and 1.5m below ground level, however it was found to be as shallow as 0.50m in TP05 in the west of the site and as deep as 1.9m (TP08) and 3.50m (TP03) also in the west of the site.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in Table 18.

Table 18 Summary of in-situ and laboratory test results for cohesive unit

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	17	20	Appendix K
Liquid limit (%)	30	58	Appendix K
Plastic limit (%)	18	33	Appendix K
Plasticity index (%)	12	25	Appendix K
Modified plasticity index (%)	5	22	Appendix K
Plasticity term	Low	High	Appendix K
Volume change potential	Low	Medium	Appendix K
SPT 'N' values	9	14	Appendix I
Undrained shear strength inferred from SPT 'N' values (kN/m ²)*	746	71	Appendix I
Consistency term from field description	Soft	Stiff	Appendix I
Notes: *derived using a Stroud Factor of 5.1.			

8.1.3 White Chalk Sub Group

This stratum was encountered at a depth of between 0.50m and 3.50m below ground level.

Reference to the chalk descriptions suggest that the chalk is generally structureless (Grade Dc) to around a depth of 2.00m below ground level below which it begins to grade into structured chalk.

The structureless chalk was generally described as cream or light yellowish/brownish white structureless weathered silty GRAVEL as CHALK. Gravel is fine to coarse subrounded to subangular very weak yellow stained chalk and flint.

Structured chalk was generally described as off-white with yellow staining structured CHALK with coarse subangular flint gravels and cobbles.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in Table 19.

Table 19 Summary of in-situ and laboratory test results for White Chalk Sub Group unit

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	26.1	28.6	Appendix K
Bulk Density (Mg/m ³)	1.88	1.98	Appendix K
Dry Density (Mg/m ³)	1.46	1.57	Appendix K
Density Term	Low	Low	CIRIA 574
Saturated Water Content (%)	26.8	31.4	Appendix K
SPT 'N' values	10	47	Appendix I

8.1.4 Visual/olfactory evidence of soil contamination

No visual or olfactory evidence of gross contaminative impact was identified within any of soils encountered as part of these exploratory works.

8.1.5 Groundwater encountered during intrusive works

Groundwater was not encountered during the investigation works.

8.1.6 Results of Infiltration testing

BRE 365 soakage TPSA01-TPSA04 and a falling head test was completed at CP01. The calculations are presented in **Appendix J** and Table 20 summarises the results. Note: adjust text if completed during drilling.

Table 20 Infiltration testing results

Exploratory location	Saturated geological unit	Hydraulic conductivity (m/d) – min. value	Hydraulic conductivity (m/d) – max. value	Comments
CP01	Chalk	2.29×10^{-5}	2.29×10^{-6}	1 test completed
TPSA1		3.44×10^{-5}	3.47×10^{-5}	3 tests completed. Test 1 - 75% drained was not reached by the end of the working day
TPSA2		2.37×10^{-4}	3.48×10^{-4}	3 tests complete
TPSA3		2.42×10^{-4}	2.89×10^{-4}	3 tests complete
TPSA4		4.71×10^{-4}	9.45×10^{-4}	3 tests complete

8.2 Chemical laboratory results

The soil testing results are presented in **Appendix K**.

8.3 Geotechnical laboratory results

The results of the geotechnical testing are discussed in Section 10 and presented in **Appendix K**.

9 GEO-ENVIRONMENTAL ASSESSMENT

9.1 Generic quantitative risk assessment

In accordance with Stage 1 of LCRM (Environment Agency, 2023) the Tier 2 GQRA comprises the comparison of soil, groundwater, soil vapour and / or ground gas results with generic assessment criteria (GAC) appropriate to the linkage being assessed. This assessment relates to LCRM Stage 1, Tier 2 generic quantitative risk assessment.

The potentially complete contaminant linkages that require further assessment are detailed below:

- Linkage 1: Direct contact (oral, dermal, inhalation) by future site users with potential localised Made Ground / reworked soils associated with historic/current agricultural land use

Additional linkages have been included as part of this assessment to confirm the assumptions made as part of the development of the initial conceptual site model. These include:

- Linkage 2: Direct contact: chemical attack on future potable water supply lines
- Linkage 3: Root uptake by future vegetation; and,
- Linkage 4: Leaching of contaminant to Groundwater

The potentially complete contaminant linkages that require further assessment and the methodology of assessment are presented in each section.

9.2 Methodology and assessment of human health linkages

The linkages pertaining to human exposure to chemical contamination are as follows:

- H1. Oral, dermal and inhalation exposure with impacted soil, soil vapour and dust by future residents
- H2. Inhalation exposure of future residents to asbestos fibres
- H3. Uptake of contaminants by vegetation potentially impacting plant growth (phytotoxicity)
- H4. Organic contaminants permeating potable water supply pipes

9.2.1 H1. Oral, dermal and inhalation exposure with impacted soil by future occupants/site users

Soil contaminant concentrations have been compared against Human health GAC for a residential with home-grown produce land use based on a conservative 1% soil organic matter in **Appendix L**. As part of this preliminary site assessment, all soil test results have been compared directly against the adopted GACs.

Results indicate that all contaminants in soil were below the relevant GAC. In addition, all soils submitted for combined pesticide suite remained below laboratory detection limits. On this basis, it is considered that a relevant contaminant linkage does not exist.

9.2.2 H2. Inhalation exposure of future occupants to asbestos fibres

The assessment of risk from human exposure to asbestos fibres from soil has been undertaken on a qualitative basis with consideration to the type, concentration, and form of asbestos detected, the soil conditions, the proposed land use, and potential for fibre release and subsequent inhalation.

The visual inspection at the laboratory identified no materials suspected of potentially containing asbestos and the scheduled laboratory screening for asbestos found no detectable asbestos fibres within the samples submitted. On this basis, it is considered that a relevant contaminant linkage does not exist.

It should be noted however that asbestos could be present at discrete locations in made ground and vigilance should be maintained for its potential presence.

9.2.3 H3. Uptake of contaminants by vegetation potentially inhibiting plant growth (phytotoxicity)

The soil sample concentrations for total zinc, copper, nickel, lead, cadmium and mercury have been compared with the GAC as summarised in **Appendix L**.

The results indicate that a relevant contaminant linkage is unlikely to exist associated with phytotoxic effects.

9.2.4 H4. Organic contaminants permeating potable water supply pipes

The results of the investigation have been compared with the GAC presented in **Appendix L**, which are reproduced from UKWIR Report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' (UKWIR, 2010).

The results indicate that chemical contaminants in soils is unlikely to pose a permeation risk to water supply pipes. Therefore standard potential water pipes are expected to be suitable for use on the development.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

9.3 Methodology and assessment of controlled waters-related linkages

The potential contaminant linkages pertaining to controlled waters receptors (groundwater) have been qualitatively assessed with reference to the initial conceptual site model, the ground conditions encountered and available soil laboratory analysis.

Based upon the evidence collated as part of this assessment, the risks posed from on-site sources of contamination to the underlying groundwater and principal Chalk aquifer are considered negligible/low.

9.4 Uncertainties and implications in refined CSM and GQRA

In accordance with good practice, data gaps and uncertainties in the refined CSM have been identified at this stage. These are summarised in Table 21 along with the likely implications.

Table 21 Data gaps and uncertainties

Data gap/ uncertainty	Details	Implications
Asbestos not found in made ground samples tested	Although not encountered to date, asbestos containing material (ACM) could still be present in discrete locations	Vigilance should be maintained for any potential ACM or fibrous material during below ground works.
No return groundwater or ground gas monitoring has been completed	Although considered 'low' risk, it would be prudent to undertake confirmatory level ground gas monitoring programme	Requirement for ground gas mitigation measures may be underestimated

10 GEOTECHNICAL ASSESSMENT

10.1 Proposed development

It is understood that the proposed development is to involve the construction of residential properties and associated infrastructure. It has been assumed the ground-bearing floor slabs will not be required and that beam and block flooring will be utilised.

10.2 Key geotechnical hazards / development constraints

The key geotechnical risk identified from the available ground investigation data is the variability in the thickness, strength and consistency of the Head Deposits strata.

Reference to the index property testing for the Head Deposits suggests a degree of desiccation is present in clay samples obtained from 0.90m and 1.20m depth.

10.3 Foundations

10.3.1 Foundation options

Given the presence of competent natural soils at a relatively shallow depth it is considered that traditional spread footings will be suitable for the proposed development across much of the site area.

Due to the variability in strength and consistency of the shallow Head Deposits it is recommended, where possible, to extend foundations to bear entirely upon the chalk strata. A minimum foundation depth of 0.75m below finished ground level should be observed when founding in chalk due to the presence of low shrinkage potential soils.

However, due to the depth to chalk in some areas of the site it may be necessary to found wholly or partially within Head Deposits. In that case, a minimum foundation depth of 0.9m below finished ground level should be observed when founding in Head Deposits due to the presence of medium shrinkage potential soils.

Conventional strip/spread footings for proposed residential properties/garages within the vicinity of future trees/shrubs or for areas where trees are to be removed may need to deepen further due to the shrinkable nature of the Head Deposit clay soils in line with the NHBC Chapter 4.2 Building near trees guidance.

10.3.2 Spread foundations

The recommendations for the design and construction of spread foundations in relation to the ground conditions are set out in Table 22.

Table 22 Design and construction of spread foundations

Design/construction considerations	Design/construction recommendations
Founding stratum	Head Deposits (firm sandy slightly gravelly silt/clay) Or White Chalk
Depth	Foundations should be taken to a minimum depth of 0.90m below the final or existing ground level, whichever is lower, in Head Deposits and minimum of 0.75m in Chalk . In both cases the foundations should be taken at least 0.20m into the founding stratum below any overlying topsoil or to any greater depth required in respect of the special design considerations given below.
Special design considerations	
Shrinkable soils	Owing to the presence of shrinkable clay soils, foundations should be designed taking into account all the normal precautions, including minimum founding depths, to minimise the risk of future foundation movements in accordance with NHBC standards or similar. The findings of the ground investigation indicate that foundations should be designed for shrinkable soils of medium volume change potential when founding in Head Deposits and shrinkable soils of low volume change potential when founding in Chalk.
Variable founding soils	Owing to the significant lateral and vertical variability of the Head Deposits strata, consideration should be given to incorporating appropriate reinforcement into the strip foundations to minimise the risk of future differential foundation movements. This would also apply when foundations span Head Deposits and Chalk strata.
Presumed bearing capacity	Strip/trench fill foundations with a width of up to 1m and constructed on the Head Deposits at a minimum depth of 0.90m may be designed using a presumed bearing capacity of 60kN/m ² . Strip/trench fill foundations with a width of up to 1m and constructed wholly within Chalk at a minimum depth of 0.75m may be designed using a presumed bearing capacity of 125 kN/m ² . The presumed bearing capacity includes a factor on bearing resistance of 3 against bearing capacity failure. Total settlements associated with the presumed bearing pressure are anticipated to be less than 25mm.
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete. The Head Deposits is a relatively silt-rich soil, hence susceptible to rapid softening once exposed. Hence all foundation excavations should immediately be blinded with concrete or the full foundation constructed.

10.3.3 Piled foundations

Recommendations for the design and construction of pile foundations in relation to the ground conditions are set out in Table 23.

Appendix F

PHOTOGRAPHIC RECORD

PHOTOGRAPHIC LOG

Photo no. 1	Date: 07/03/25	
General View		
Description: View from south west facing east		

Photo No. 2	Date: 07/03/25	
General View		
Description: View from centre of site facing north west		

Photo No. 3	Date: 07/03/25	
General View		
Description: View from centre of site facing south east		

Photo No. 4	Date: 07/03/25	
General View		
Description: View from west facing north		

Photo No. 5	Date: 07/03/25	
General View		
Description: View from north of site facing west		

Photo No. 6	Date: 07/03/25	
General View		
Description: View from road (off south east boundary) facing west		

Photo No. 7	Date: 07/03/25	
General View		
Description: View from centre/east of site facing west		

Photo No. 8	Date: 07/03/25	
Fly tipping / rubbish		
Description: View of minor rubbish north of the woodland, facing south.		

Photo No. 9	Date: 03/0425	
TP01		
Description: Photo during digging		

Photo No. 10	Date: 03/0425	
TP01		
Description: Photo after digging		

Photo No. 11	Date: 03/0425	
TP02		
Description: Photo during digging		

Photo No. 12	Date: 03/0425	
TP02		
Description: Photo after digging		

Photo No. 13	Date: 03/0425	
TP03		
Description: Photo during digging		

Photo No. 14	Date: 03/0425	
TP03		
Description: Photo after digging		

Photo No. 15	Date: 03/0425	
TP04		
Description: Photo during digging		

Photo No. 16	Date: 03/0425	
TP04		
Description: Photo after digging		

Photo No. 17	Date: 03/0425	
TP05		
Description: Photo during digging		

Photo No. 18	Date: 03/0425	
TP05		
Description: Photo after digging		

Photo No. 19	Date: 03/0425	
TP06		
Description: Photo during digging		

Photo No. 20	Date: 03/0425	
TP06		
Description: Photo after digging		

Photo No. 21	Date: 03/0425	
TP07		
Description: Photo during digging		

Photo No. 22	Date: 03/0425	
TP07		
Description: Photo after digging		

Photo No. 23	Date: 03/0425	
TP08		
Description: Photo during digging		

Photo No. 24	Date: 03/0425	
TP08		
Description: Photo after digging		

Photo No. 25	Date: 04/0425	
TP09		
Description: Photo during digging		

Photo No. 26	Date: 04/0425	
TP09		
Description: Photo after digging		

Photo No. 27	Date: 04/0425	
TP10		
Description: Photo during digging		

Photo No. 28	Date: 04/0425	
TP10		
Description: Photo after digging		

Photo No. 29	Date: 26/03/25	
TPSA01		
Description: Photo during digging		

Photo No. 30	Date: 26/03/25	
TPSA02		
Description: Photo during digging		

Photo No. 31	Date: 04/04/25	
TPSA02		
Description: Photo after digging		

Photo No. 32	Date: 04/04/25	
TPSA03		
Description: Photo after digging		

Photo No. 33	Date: 26/03/25	
TPSA04		
Description: Photo during digging		

Photo No. 34	Date: 04/04/25	
TPSA04		
Description: Photo after digging		

Appendix G

SITE RECONNAISSANCE SURVEY NOTES

Feature observed	Presence Y/N	Description
Physical characteristics		
1. Are there any access constraints?	Y	a) Barbed wire fencing within southeastern corner of site
	-	b) Wooded area to the west of site was too dense for access
2. Is the site approximately level?	Y	Site was generally flat
3. Any evidence of subsidence, landslip or slope erosion?	N	None Observed
4. Any changes in level between the site and adjacent sites?	N	None Observed
5. Surface cover	-	a) Approx. 100% Soft landscaping
	-	b) Approx. 0% hard surfacing
	-	c) Surface cover was a field of crops
Environmental characteristics		
6. Vegetation on site	Y	Woodland area of semi mature trees to the west and southwest. Bushes and trees were sporadic along the east and northwest boundaries of site. A hedge was located along the southern boundary. The field comprised young crops.
7. Evidence for vegetation stress	N	None Observed Note: Caveat for time of year (Oct-Apr) if applicable due to dieback
8. Invasive species	N	Based upon the walkover survey obvious evidence of Japanese Knotweed or other invasive species has not been identified on-site. However, it should be noted that a detailed survey of the possible presence or absence of invasive species is outside of the scope of investigation and consideration should be given to commissioning a specialist survey, as necessary.
Site visit undertaken in dormancy period?	Y	Note: Caveat for time of year (Oct-Apr) if applicable due to dieback
9. Surface water features	N	None Observed
	N	None Observed with 250m of the site
10. Site drainage	-	Surface water on site drains into the ground

Feature observed	Presence Y/N	Description
Structures and services		
11. Existing buildings on-site	N	No buildings are present on-site
12. Buried and overhead services present	N	No overhead services observed
	N	None buried services observed
13. Underground structures	N	None Observed
Geotechnical characteristics		
14. Evidence of damage to existing building structures on site?	N	None Observed
15. Remains of building structures present on or adjacent to site?	N	None Observed
16. Retaining walls and adjacent buildings on or close to site boundary?	N	None Observed
17. Any abrupt changes in ground level present on or adjacent to site?	N	None Observed
18. Any potentially unstable slopes/ exposed ground present on or adjacent to site?	N	None Observed
19. Any mature trees on site?	N	None Observed
20. Any visual evidence of infilled basements on site?	N	None Observed
Potential evidence for contamination		
21. Underground/ above ground storage tanks and pipework	N	None Observed
22. Potentially hazardous materials storage and use	N	None Observed
23. Waste storage	N	None Observed
24. Fly-tipping	Y	Minor rubbish north of the woodland at the site boundary
25. Electricity sub-stations/ transformers	N	None Observed
26. Asbestos-containing materials	N	None Observed

Feature observed	Presence Y/N	Description
27. Fire suppression	N	None Observed
28. Fire history	N	Unknown
29. Is there any visual evidence of potential contamination on site?	N	None Observed
30. Is there any visual evidence of potential contamination on adjacent sites?	N	None Observed

Appendix H

TECHNICAL BACKGROUND

H 1. Desk Study

Aquifer designation and Source protection zones (England and Wales)

Principal aquifer: layers of rock or drift deposit that have high intergranular and/or fracture permeability (usually providing a high level of water storage). They may support water supply and/or river base flow on a strategic scale.

Secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

Secondary B aquifer: predominantly lower permeability layers that may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

Secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both a minor and non-aquifer in different locations owing to the variable characteristics.

Unproductive strata: low permeability with negligible significance for water supply or river base flow.

The EA generally adopts a three-fold classification of source protection zones (SPZ) surround abstractions for public water supply. The Site is situated in an area defined as follows:

- Zone 1 or the 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- Zone 2 or the 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants
- Zone 3 or the 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Preliminary risk assessment methodology

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) contaminant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the

likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

RSK also adopt a 'very unlikely' probability to account for where there may be increased certainty over whether an event is probable in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)
- medium: chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the following table.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low
	Very Unlikely	Low	Very Low	Negligible	Negligible

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required
- high: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term
- moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term
- low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild
- very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

H2 Site Investigation Methodology

Ground gas monitoring

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO₂), methane (CH₄) and oxygen (O₂) in percentage by volume, while hydrogen sulphide (H₂S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

Low flow groundwater sampling

Groundwater samples were retrieved using a low-flow purging and sampling methodology

The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

Reuse of suitable materials

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on-sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

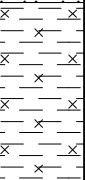
The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.

Appendix I

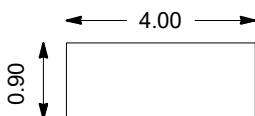
EXPLORATORY HOLE RECORDS

TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP01
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 94.75	National Grid Co-ordinate: E:564690.0 N:167275.0	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Dark brown sandy silty CLAY with frequent rootlets and roots. Sand is fine to coarse. (TOPSOIL)	(0.30)	
0.40	2	ES				Light orange brown silty CLAY with occasional fine to coarse sub-angular gravels of flint. (HEAD DEPOSITS)	(0.60)	
0.60	3	B					0.90	
2.00	4	B				Recovered as off white structureless CHALK composed of fine to coarse subrounded to subangular gravels of flint and cobbles of chalk with infills of light brown orange mottled sandy clayey SILT. Sand is fine to medium. (Grade Dc) (SEAFORD CHALK FORMATION) ... Northern side of trial pit is sandy silty clay and southern end is structureless CHALK.	(2.60)	
						Trial pit remained dry and stable. Backfilled with arisings.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

Ben King

Checked By:

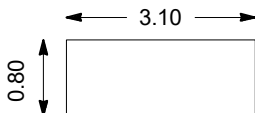
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP02
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 98.05	National Grid Co-ordinate: E:564729.0 N:167206.0	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Dark brown sandy clayey silt. Frequent rootlets and root material. (TOPSOIL)	0.25	
0.30	2	ES				Orange brown slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to sub-rounded flint. (HEAD DEPOSITS)		
0.50	3	D					(0.70)	
							0.95	
2.00	4	B				Recovered as off-white yellow staining structureless CHALK with occasional medium to coarse flint gravels and flint cobbles. (Grade Dc) (SEAFORD CHALK FORMATION)	(1.85)	
						Recovered as off white low density structured CHALK with fine to coarse gravels and cobbles of chalk with occasional flint. (SEAFORD CHALK FORMATION)	2.80	
3.40	5	B					(0.70)	
						Pit remained dry and stable. Backfilled with arisings.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

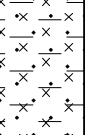
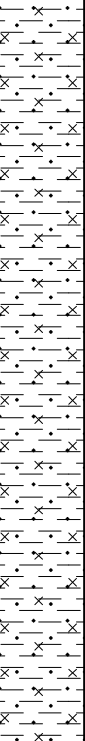
Ben King

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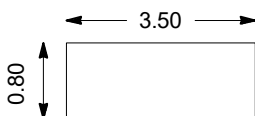
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP03
Contract Ref: 52731	Start: 03.04.25 End: ???	Ground Level: 96.22	National Grid Co-ordinate: E:564663.0 N:167227.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Dark brown slightly sandy gravelly CLAY with frequent fine rootlets. Sand is fine to coarse. Gravel are fine to coarse subangular to subrounded flint. (TOPSOIL)	0.25	
0.30	2	ES				Orange brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint gravel. (HEAD DEPOSITS)	(0.55)	
						Orange brown slightly sandy silty CLAY. Sand is fine. With rare gravel of subangular to subrounded fine to coarse flint. (HEAD DEPOSITS)	0.80	
1.20	3	D				... HP= 1.7, 1.8, 1.9	(2.70)	
3.50	4	LB				Trial pit terminated at 3.50m depth.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

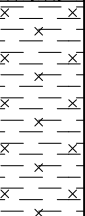
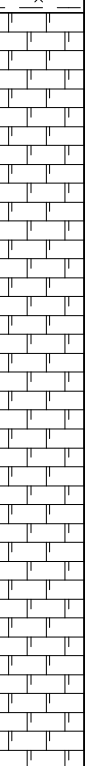
Peter Griffiths

Checked By:

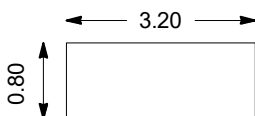
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP04
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 99.43	National Grid Co-ordinate: E:564817.0 N:167203.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Dark brown slightly gravelly silty CLAY with frequent rootlets and roots. Gravel is fine to coarse subangular to subrounded flint. (TOPSOIL)	0.25	
0.35	2	ES				Orange brown slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded flint. (HEAD DEPOSITS)	(0.75)	
1.50	3	B				Recovered as off white yellow staining structureless CHALK with occasional fine to coarse subrounded to subangular gravels of flint. (Grade Dc) (SEAFORD CHALK FORMATION)	1.00	
3.20	4	B				Pit remained dry and stable. Backfilled with arisings.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

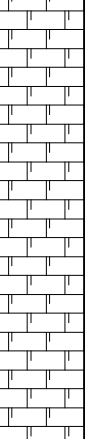
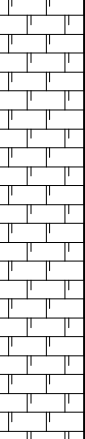
Ben King

Checked By:

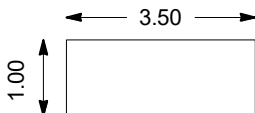
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham			Client: Taylor Wimpey Uk Limited		Trial Pit: TP05
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 100.61	National Grid Co-ordinate: E:564646.9 N:167143.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.15	1	ES				Dark brown slightly gravelly silty CLAY with frequent rootlets and roots. Gravel is fine to coarse subangular to subrounded flint. (TOPSOIL)	0.25	
0.35	2	ES				Orange brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded flint. (HEAD DEPOSITS)	0.50	
0.40	3	D						
						Recovered as off white structureless CHALK composed of silty gravel (Grade Dc). (SEAFORD CHALK FORMATION) ... 2.9, 2.9, 3.0	(1.50)	
1.20	4	LB					2.00	
						Recovered as off white low density structured CHALK with occasional flint subangular to subrounded fine to coarse gravel and rare cobbles of flint and occasional orange staining and black specks (Grade Dc). (SEAFORD CHALK FORMATION)	(1.50)	
2.40	5	LB					3.50	
3.30	6	LB						
						Trial pit terminated at 3.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

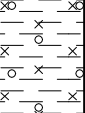
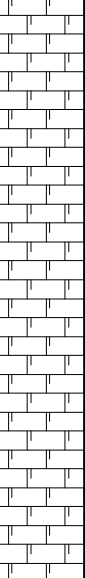
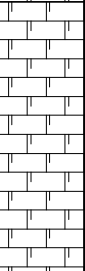
Peter Griffiths

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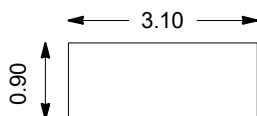
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP06
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 100.41	National Grid Co-ordinate: E:564749.1 N:167146.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.05	1	ES				Dark brown slightly gravelly silty CLAY with frequent rootlets. Gravel is fine to medium subrounded to subangular flint. (TOPSOIL)	0.25	
0.40	2	ES				Orange brown slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded flint. (HEAD DEPOSITS)	(0.40)	
1.20	4	B				Recovered as off-white with yellow staining Structureless CHALK with occasional flint gravels and cobbles of chalk (Grade dc). (SEAFORD CHALK FORMATION)	(1.95)	
2.70	3	B				Recovered as off-white low density structured CHALK with fine to coarse gravels and cobbles of chalk (Grade Dc). (SEAFORD CHALK FORMATION)	2.60	
						. . . Pockets of unstructured chalk grade dm.	(0.90)	
						Pit remained dry and stable. Backfilled with arisings.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

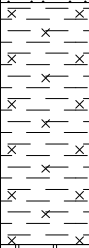
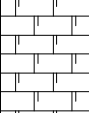
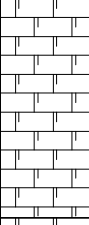
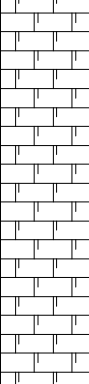
Ben King

Checked By:

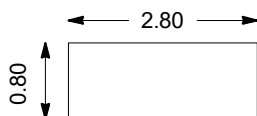
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TRIAL PIT LOG

Contract: Land at Norwood Lane, Meopham		Client: Taylor Wimpey Uk Limited		Trial Pit: TP07
Contract Ref: 52731	Start: 03.04.25 End: 03.04.25	Ground Level: 101.92	National Grid Co-ordinate: E:564876.0 N:167155.0	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.25	1	ES				Dark brown slightly gravelly silty CLAY with frequent rootlets and roots. Gravel is fine to coarse subangular to subrounded flint. (TOPSOIL)	(0.30)	
0.40	2	ES				Orange brown slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded flint. (HEAD DEPOSITS)	(0.80)	
0.90	3	D					1.10	
1.70	4	B				Recovered as off-white yellow staining structureless CHALK with frequent fine to coarse subangular to subrounded flint (Grade Dc). (SEAFORD CHALK FORMATION)	(1.10)	
3.10	5	B				Recovered as off-white slight yellow staining structured CHALK with occasional fine to coarse subrounded to subangular flint and cobbles of flint (Grade Dc). (SEAFORD CHALK FORMATION)	(1.30)	
						Pit remained dry and stable. Backfilled with arisings.	3.50	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT, Genny and GPR prior to excavation.
2. Inspection pit dug to 1.20m.
3. No groundwater encountered.

All dimensions in metres

Scale: **1:25**

Method Used:

Hand dug

Plant Used:

Unknown

Logged By:

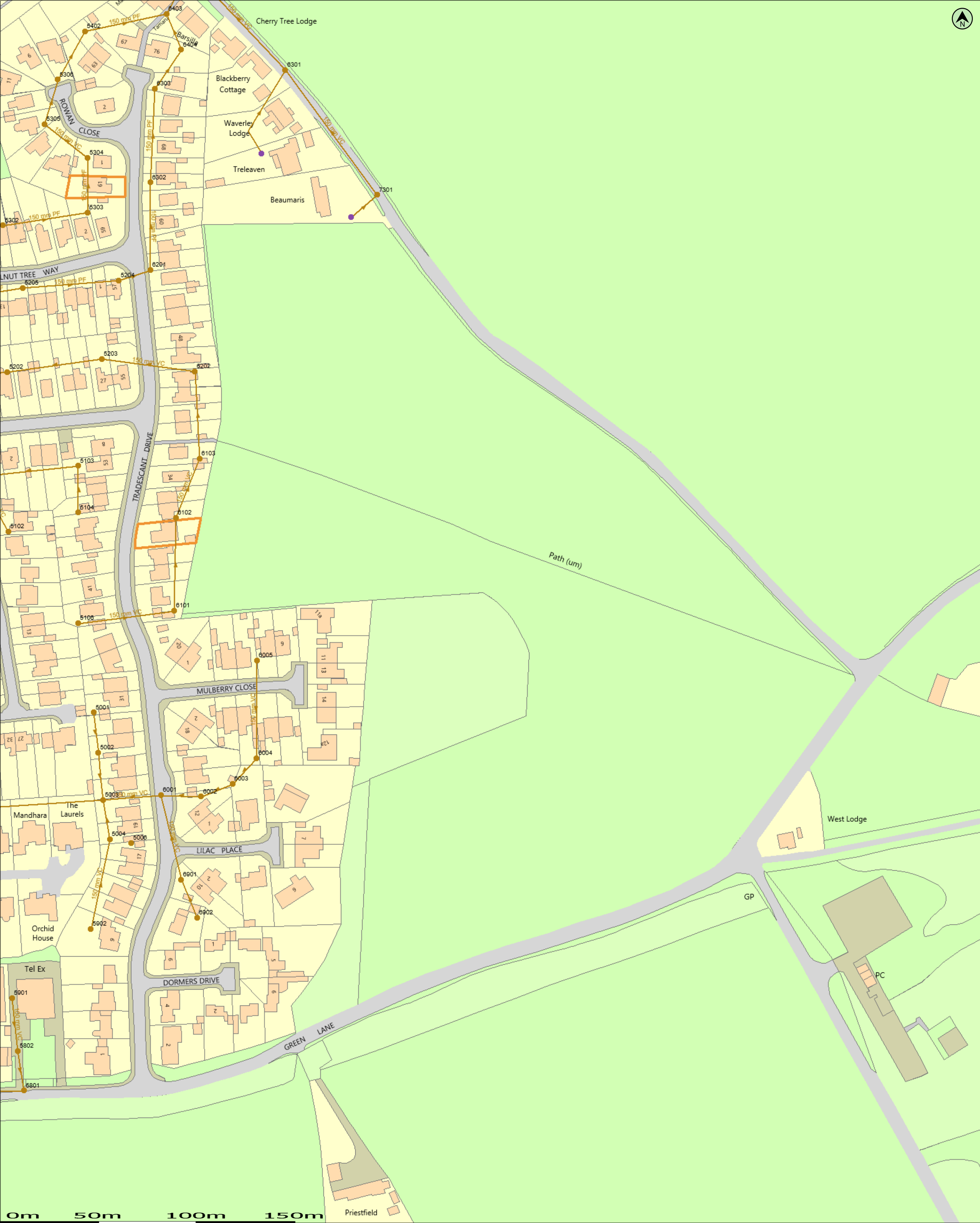
Ben King

Checked By:

ST

Appendix G

Southern Water Asset Plans and Water Mains Location



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Data updated: 21/01/25

Scale: 1:1250
Map Centre: 564780.167120

Date: 20/02/25
Our Ref: 1695111 - 1

Wastewater Plan A2
Powered by digdat

annalisa.morse@rps.tetrattech.com	
Norwood Lane Meopham	

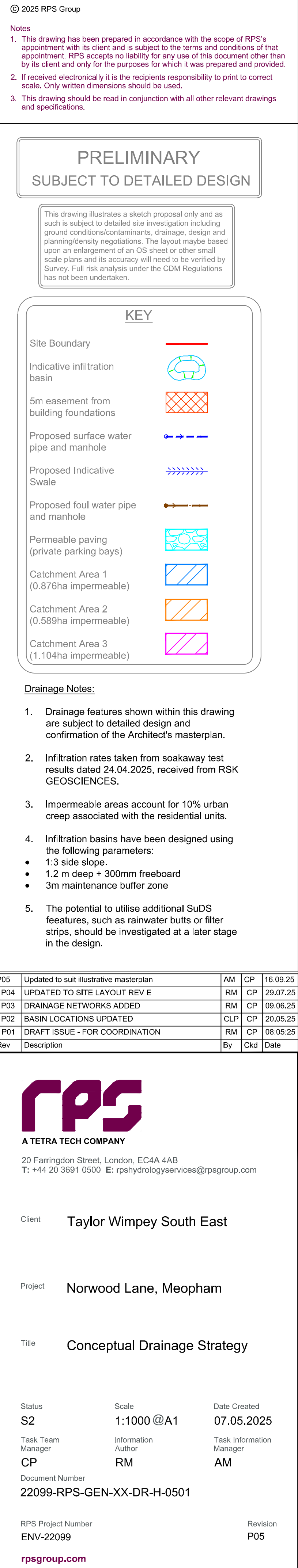


The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Appendix I

Causeway FLOW Calculations



Appendix H

Conceptual Drainage Strategy

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	1.000
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00	100.000	1200	1010.000	1000.000	1.400
2-SOAKAWAY	0.876	5.00	100.000	1200	1020.000	1000.000	1.500

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	1	2-SOAKAWAY	10.000	0.600	98.600	98.500	0.100	100.0	225	5.13	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node 2-SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.12384	Safety Factor	2.0	Invert Level (m)	98.500
Side Inf Coefficient (m/hr)	0.12384	Porosity	1.00	Time to half empty (mins)	553

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	370.0	400.0	1.500	740.5	782.7

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
960 minute summer	1	690	99.691	1.091	0.1	1.2344	0.0000	SURCHARGED
960 minute summer	2-SOAKAWAY	690	99.691	1.191	71.6	617.5016	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
960 minute summer	1	1.001	2-SOAKAWAY	-0.1	0.004	-0.002	0.3977
960 minute summer	2-SOAKAWAY	Infiltration		12.1			

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	1.000
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00	100.000	1200	1010.000	1000.000	1.400
2-SOAKAWAY	0.589	5.00	100.000	1200	1020.000	1000.000	1.500

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	1	2-SOAKAWAY	10.000	0.600	98.600	98.500	0.100	100.0	225	5.13	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node 2-SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.85320	Safety Factor	2.0	Invert Level (m)	98.500
Side Inf Coefficient (m/hr)	0.85320	Porosity	1.00	Time to half empty (mins)	60

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	90.0	150.0	1.500	305.0	409.0

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
60 minute winter	1	51	99.698	1.098	1.1	1.2420	0.0000	SURCHARGED
60 minute winter	2-SOAKAWAY	51	99.698	1.198	216.8	212.0516	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
60 minute winter	1	1.001	2-SOAKAWAY	-1.1	-0.058	-0.020	0.3977
60 minute winter	2-SOAKAWAY	Infiltration		42.1			

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	1.000
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00	100.000	1200	1010.000	1000.000	1.400
2-SOAKAWAY	1.104	5.00	100.000	1200	1020.000	1000.000	1.500

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	1	2-SOAKAWAY	10.000	0.600	98.600	98.500	0.100	100.0	225	5.13	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node 2-SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.87120	Safety Factor	2.0	Invert Level (m)	98.500
Side Inf Coefficient (m/hr)	0.87120	Porosity	1.00	Time to half empty (mins)	56

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	211.0	350.0	1.500	506.3	712.1

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
60 minute winter	1	52	99.692	1.092	1.2	1.2351	0.0000	SURCHARGED
60 minute winter	2-SOAKAWAY	52	99.692	1.192	406.4	392.7444	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
60 minute winter	1	1.001	2-SOAKAWAY	-1.2	-0.048	-0.022	0.3977
60 minute winter	2-SOAKAWAY	Infiltration		76.9			

Appendix J

SuDS Proforma

Appendix C. Drainage Strategy Summary



1. Site details	
Site/development name	Norwood Lane, Meopham
Address including post code	Norwood Lane, Meopham, Kent DA13 0EP
Grid reference	E 564667 N 167061
LPA reference	
Type of application	Outline ☒ Full ☐ Discharge of Conditions ☐ Other ☐
Site condition	Greenfield ☒ Brownfield ☐

2. Existing drainage		Document/Plan where information is stated:	
Total site area (ha)	7.41	HYD-ENV-22099 Norwood Lane Meopham	
Impermeable area (ha)	2.569		
Final discharge location	Infiltration ☒ Watercourse ☐ Sewer ☐ Tidal reach/sea ☐		
Greenfield discharge rate (l/s) for existing site area	QBAR (l/s) _____ 1 in 1 year (l/s) _____ 1 in 30 year (l/s) _____ 1 in 100 year (l/s) _____		
3. Proposed drainage areas		Document/Plan where information is stated:	
Impermeable area (ha)	Roof	0.908	See FRA table 10.2 for specific infiltration rates
	Highway/road	1.661	
	Other paved areas		
	Total	2.569	
Permeable area (ha)	Open space	4.243	
	Other permeable areas	0.288	
	Total	4.531	
Final discharge location	Infiltration ☒ Infiltration rate <u>Varies</u> m/s Watercourse ☐ Sewer ☐ Tidal reach/sea ☐	See FRA table 10.2 for specific infiltration rates	
Climate change allowance included in design	20% ☐ 30% ☐ 40% ☐	45%CC	

4. Post-Development Discharge rates, without mitigation			Document/Plan where information is stated:
Developed discharge rates (l/s)	1 in 1 year		N/A
	1 in 30 year		
	1 in 100 year		
	1 in 100 year + CC		
5. Post-Development Discharge rates, with mitigation			Document/Plan where information is stated:
Describe development drainage strategy in general terms:			
(a) No control required, all flows infiltrating ☒			
(b) Controlled developed discharge rates (l/s)	1 in 1 year		
	1 in 30 year		
	1 in 100 year		
	1 in 100 year + CC		
6. Discharge Volumes			Document/Plan where information is stated:
	Existing volume (m ³)	Proposed volume (m ³)	N/A
1 in 1 year			
1 in 30 year			
1 in 100 year			
1 in 100 year + CC			

All information presented above should be contained within the attached Flood Risk Assessment, Drainage Strategy or Statement and be substantiated through plans and appropriate calculations.

Form completed by	R.Macbeth
Qualifications	Hydrology Consultant
Company	RPS - Tetrattech
Telephone	+44 117 244 0507
Email	ryan.macbeth@rps.tetrattech.com
On behalf of (client's details)	Taylor Wimpey South East
Date	04.07.2025