
Phase IV Site Investigation – Accessible Areas

at: New Place Farm,
Pulborough RH20 1AT

for: BDW Southern
Counties

Report Reference: 3750966/PIV/1

Report Date: 28 November 2025

LEAP ENVIRONMENTAL GENERAL NOTES

Project No.: 3750966/PIV/1

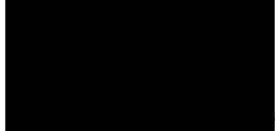
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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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1 EXECUTIVE SUMMARY

The circa 17 Ha site is located approximately 1.1 km northeast of Pulborough town centre in West Sussex. The site is a former plant nursery and at the time of the investigation, consisted of farm buildings in the western region of the site and open fields across the rest of the site. Previously, polytunnels used to be present across the site but have since been removed following demolition activities. It is proposed to redevelop the site with 170 residential properties with associated infrastructure and public open spaces, under planning application DC/21/2321. Historically, the majority of the site comprised undeveloped field with a number of buildings in the northwest, before being developed as a plant nursery with associated infrastructure including a reservoir and basin in the 1970s. The nursery was subsequently demolished and site cleared prior to the current (2025) phase of site investigation, with some buildings remaining in the northwest of the site.

Previous investigations undertaken by GRM, TSA Asbestos, and more recently by LEAP indicate that the ground conditions onsite generally comprise slightly gravelly, silty sand topsoil or silty or sandy made ground (reworked natural), over slightly gravelly, silty sand of the weathered Hythe Formation. However, there were also generally localised and sporadic sandy or clayey Head Deposits identified by LEAP across the southern region of the site.

From the most recent round of site investigation in the eastern region of the site, a total of 58 No. investigation locations were undertaken across the site. The findings of this investigation were broadly similar to the previous works, however additional investigation was not carried out in and around the existing buildings in the western region of the site. Ground conditions comprise silty sand or sandy silt topsoil, to a maximum depth of 0.70 m bgl, sometimes with made ground below, mostly consisting of reworked natural soils, to a maximum depth of 0.60 m, over interbedded sand and clay of the superficial Head Deposits to a maximum recorded depth of 3.00 m bgl, over gravelly, silty sand of the weathered Hythe Formation, to a maximum depth of 3.65 m bgl, over Hythe Formation bedrock, comprising interbedded extremely weak to medium strong sandstone and medium strong limestone, to maximum depth of the investigation 20.00 m bgl.

Groundwater strikes were not encountered during the 2024 or 2025 LEAP site investigations, however subsequent monitoring of installed boreholes from the LEAP 2024 investigation recorded groundwater at 0.00 – 1.89 m bgl. This groundwater is believed to be perched above underlying cohesive horizons.

An allowable bearing capacity of 150 kPa is recommended for the dense to very dense silty sand of the Hythe Formation below about 1.2 m. Where foundation excavations are found to be within clay soils at this depth then they should be deepened until they encounter sands/gravels due to the variable strength of the surficial clay soils recorded across the site. In areas where it is known that deep made ground is present (around the existing reservoir) and areas where deeper clay soils (Head Deposits) are present, such as along the southern boundary, it may be appropriate for piled foundations to be considered. For piled foundations, the piled foundations should be installed as a rock socket 1.0 m into the competent Hythe Formation bedrock. The allowable unconfined compressive strength of the Hythe Formation at this depth is 1.6 MPa. Consideration should be given to the need for implementation of protective measures against undetected gulls based on the assessed risk.

Suspended floor slabs are recommended with piled foundations.

Soil sulphates in the Hythe Formation fall within BRE design class DS-1 and the site conditions fall within the ACEC class AC-1.

Soakage rates suggest that the proposed locations of Attenuation Ponds 2 and 3 are likely to be suitable for soakaway drainage, whilst Attenuation Ponds 1 and 4 may not be suitable for the current drainage design, due to poor soakage rates, and require further investigation or the drainage design to be amended.

A preliminary design CBR value of 1.5% is recommended for the silty, sandy soils of the weathered Hythe Formation.

Recommendations are given for additional work required for the detailed design stage. Allowance should be made for further investigation in the western area of the site which was not accessible during this investigation due to the existing buildings and hardstanding, and also investigation around the existing reservoir in the central eastern region of the site, which also has not been investigated.

A geo-environmental risk assessment has been carried out. Contamination testing of the soils in the LEAP 2024 investigation identified 1 No. made ground sample with an exceedance of lead and 1 No. made ground sample with exceedances of benzo(a)pyrene and naphthalene, with both locations in the northwest corner of the site. In addition, in this investigation, loose fibres of chrysotile (<0.001%) were detected in one topsoil sample from the northwest corner of the site.

Given that no contamination was encountered in other locations in the northwest of the site, the exceedances in lead and PAHs are considered to be hotspots. Further investigation of these should be completed to delineate the extent of these. Also, further investigation should be carried out in vicinity of the asbestos detection in the topsoil to see if it is an isolated detection or whether further asbestos contamination is present. A remedial strategy should be prepared to deal with these hotspots, including verification of the hotspots. Allowances should also be made for inspection of stripped formations, and confirmatory testing of soils where there is any visual or olfactory evidence of potential contamination.

Three gas monitoring visits were carried out as part of the 2024 LEAP investigation. The findings indicated that gas protection measures are not necessary and the findings of this investigation have not given any reason to change this assessment.

As with any redevelopment site, there is always the risk of hitherto undetected contamination, and further investigations should be carried out prior to redevelopment.

Recommendations are given for the sustainable reuse of soils on site. Following a preliminary waste assessment it has been determined that, where it is not possible to reuse the soils on site or offsite, the reworked natural soils, topsoil, and natural soils are expected to be classified as non-hazardous waste and suitable for an inert waste landfill. However, this does not include the stockpiles in the northeastern corner of the site, which have been classified separately.

2 INTRODUCTION

2.1 Authority

RSK Environment Ltd trading as Leap Environmental (hereafter referred to as **LEAP**) were engaged by BDW Trading Ltd, Barratt House, Cartwright Way, Forest Business Park, Bardon Hill, Coalville, Leicestershire, LE67 1UF (company number: 03018173) herein referred to as the “Client” to carry out a Phase IV Investigation at the land at New Place Farm, off London Road, Pulborough, RH20 1AT.

The works were undertaken by means of **LEAP**'s fee proposal letter LPQ12258 rev 1 dated 9 July 2025 including RSK Standard Terms and Conditions April 2025, which forms the appointment between **LEAP** and the Client. The purchase order provided by BDW Trading Ltd for these works is HS-9376/00045.

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

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.

2.2 Objective

LEAP understands that the site is currently owned by Newey Group and that the proposed development comprises the construction of 170 residential dwellings, a country park and associated infrastructure. The site is being developed under the Horsham District Council planning application DC/21/2321. A proposed layout plan for the development at New Place Farm is included in **Appendix B** (Drawing no. H9376-GPA-XX-XX-DR-UD-203001-C01).

The proposed development is currently at a final design phase and has been assessed in accordance with BS EN 1997¹, as **Geotechnical Category 2**.

The objectives of this report are to:

- Provide additional information on the geotechnical and environmental quality of the ground beneath the site with respect to the proposed development.
- Provide geotechnical information on the deeper soils and bedrock onsite, collected from rotary core boreholes, to use for preliminary pile design calculations.
- Provide infiltration testing information for the shallow natural soils within the locations of proposed attenuation ponds, to assess the suitability of these soils for conventional soakaways.
- Assess the potential health and other environmental risks posed by the site to the proposed development and to other specifically identified receptors.

¹ BS EN 1997-1(2004)+A1:2013 Eurocode 7:Geotechnical Design: General Rules

2.3 Previous studies

The site has been the subject of previous site investigations by LEAP and others. Copies of the reports supplied by the Client are detailed below and should be read in conjunction with this report:

- GRM 'Phase I Site Appraisal (Desk Study)' dated January 2016 (ref: GRM/P7298/DS.1)
- GRM 'Re: Soakaway Testing at Drovers Lane, Pulborough' dated 10 March 2016 (ref: P7298 – SA1)
- TSA Asbestos 'Asbestos Survey Report at New Place Nursery' dated 09 March 2016 (ref: Si 1382)
- GRM 'Phase II Site Appraisal' dated April 2016 (ref: GRM/P7298/F.1)
- GRM 'Re: Gas Addendum Letter for Land Northeast of Glebelands, Pulborough' dated 26 July 2016 (ref: P7298\GAL)

- GRM 'Phase I Site Appraisal (Desk Study)' dated August 2020 (ref: GRM/P7298/DS.1/RevA)

NOTE: The above desk study provides an update of the previous desk study undertaken in 2016, following expansion of the site boundary to include the northern portion of the site.

- GRM 'Soakaway Testing Letter Report' dated April 2021 (ref: P7298 SA.2)
- GRM 'Land Off Drovers Lane, Pulborough: Phase II Site Appraisal report' dated August 2022 (ref: GRM/P7298/F.2)
- LEAP 'Technical Appraisal Form' dated 26 January 2024 (ref: LPTA3601)
- LEAP 'Phase III Site Investigation at New Place Farm, Pulborough, RH20 1AT' dated 10 July 2024 (ref: 3750605/PIII/1)
- LEAP Groundwater monitoring letter report titled 'Re: 3750782 New Place Farm, Pulborough RH20 1AT Groundwater Monitoring' dated 03 April 2025 (ref: SH/25/3750782/GW)
- LEAP 'Technical Note for Site Access from Drovers Lane at New Place Farm, Pulborough, RH20 1AT' dated 3 September 2025 (ref: 3750966/1)
- LEAP 'Soil Management and Resource Survey at New Place Farm, Pulborough, RH20 1AT' dated 13 October 2025 (ref: 3750966/SM-RS/1)

2.4 Scope of works

This report describes a two-stage process whereby the site is investigated, and risks are assessed. The terms geotechnical and geoenvironmental are referred to throughout the report.

Geoenvironmental refers principally to the chemical nature of the ground and the degree of soil, water and/or land gas contamination and the impact that contamination may have on current or future development and also on the wider environment.

Geotechnical refers to all other aspects of the ground conditions and the impact they may have on the physical construction of existing or future development, principally foundations, slope stability, drainage, pavement and road design and groundwater control.

The investigation comprises two phases of work.

2.4.1 Phase 1 Scope

The first part of this report presents a review of the previous ground investigations and reports where they have been made available by the Client or where LEAP has been able to locate that information from third party sources. The previous reports referred to are detailed in Section 2.3.

The previous desk study by GRM and site reconnaissance was used to develop an initial conceptual site model, which forms the basis for the site investigation strategy. The initial site conceptual model is used to identify geotechnical and geoenvironmental hazards and the qualitative degree of risk associated with them. In terms of the geoenvironmental assessment the conceptual site model is used to identify potential sources of contamination, potential receptors and pathways by which the two may be connected. These are known as possible contaminant linkages, and it is these contaminant linkages that are key to contaminated land risk assessment.

The Phase I investigation is also referred to as a Preliminary Investigation².

2.4.2 Intrusive Investigation Scope

The Phase IV work comprises intrusive investigation and laboratory analysis. The results of this and previous investigation reports are used to validate and update the initial site conceptual model. This phase of site investigation comprised the following tasks:

- GPS setting out and GPR clearance of the proposed intrusive investigation locations.
- 6 No. 20m rotary core boreholes, with no monitoring installations.
- 32 No. machine excavated trial pits to 2.00 – 3.00m bgl.
- 20 No. hand excavated pits to 0.60 – 1.20m bgl.
- 8 No. BRE365 soakage tests to 2.00m bgl.
- In-situ geotechnical testing including Standard Penetrometer Tests in the rotary core boreholes and field vane tests in the trial pits.
- Geotechnical laboratory testing including: Sulphate Tests, Unconfined Compressive Strength and Point Load Tests on rock, Atterberg Limit Tests, Particle Size Distribution (PSD) with Pipette Tests, Bulk Dry Density Tests (OMC/MDD), Undrained Triaxial Tests, Remoulded California Bearing Ratio (CBR) Tests, and Moisture Content Tests.
- Chemical laboratory testing including 19 No. LEAP Standard Soil Suite tests, 8 No. Single stage 1:10 WAC E Inert, 10 No. RSK Hazardous Waste Suite tests, 10 No. TPH CWG tests, 10 No. BS3882:2015 Topsoil Quality Assessment, 5 No. BS3882:2015 Subsoil Quality Assessment, and 10 No. Pesticide Suite tests (including herbicides).

The intrusive works were completed by contractors who have been scrutinised and are on LEAP's approved contractor list and supervised by LEAP. The GPS setting out and GPR surveys was carried out by MCD Ground Solutions, the rotary drilling was carried out by Central Alliance, the machine excavated trial pits were carried out by Spillane Plant Limited, and the infiltration testing was carried out by Oakland Site Investigation Limited.

² BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice.

Selected samples of soil were scheduled for laboratory testing for a wide range of potential contaminants including metals, non-metals, asbestos, polyaromatic and petroleum hydrocarbons, herbicides, and pesticides. The laboratory testing was carried out by Envirolab.

Selected soil samples have been classified by laboratory analysis for geotechnical design purposes. The laboratory testing was carried out by Ian Farmer Associates.

The final stage in the geoenvironmental assessment comprises a quantitative risk assessment and revision of the preliminary Conceptual Site Model. Preliminary recommendations for remediation have been provided, based on various development assumptions which are detailed in the following section and in the text of this report. The risk assessment has been carried out in accordance with UK industry standards and in particular in accordance with LCRM³ and BS10175:2011+A2:2017.

The final stage of the geotechnical assessment is the provision of preliminary soil parameters for use in geotechnical design, and broad recommendations for appropriate foundation options. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in Section 6 of BS EN 1997-2:2007⁴.

2.4.3 Scope omissions

Prior to the commencement of siteworks, LEAP were informed by the Client that an area in the northeastern region of the site, referred to as the 'Ecology Translocation Zone', must be excluded from the intrusive site investigation scope. The constraints plan for the site, which highlights this area, is included in **Appendix B** as Drawing No. 3750966-LW-113-XX-D-G-11302-C02.

2.5 Sustainability considerations

2.5.1 Potential for ground source heating and cooling

Most locations in the UK are suitable for the installation of ground source heating or cooling (GSHC) systems. The most appropriate type of installation is determined by the available space, heating and cooling demands of the proposed development and a number of geological and hydrogeological factors, and drilling risks (amongst other factors). LEAP can appraise these site-specific conditions through a desk-based feasibility study to assist in determining the viability of this sustainable source of heating/cooling energy at the site, should this be of interest to you. We also have in-house capability to undertake field assessments including soil thermal conductivity surveys and soil thermal response test (TRT), as well as the design and installation of GSHC systems.

2.6 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.

³ Environment Agency. Land Contamination Risk Management (LCRM), <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

⁴ BS EN 1997 Eurocode 7- Geotechnical Design- Part 2: Ground Investigation and Testing (2007)

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.

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.

Some of the comments given in this report and the opinions expressed are partly 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 third-party 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.

3 SITE SETTING

The sections below provide a summary of the environmental setting, site usage, and historical setting of the site, based on information obtained from the previous reports produced by GRM and LEAP.

3.1 Environmental setting

3.1.1 Site location and description

The circa 14.7 Ha site is located approximately 1.1 km northeast of Pulborough town centre in West Sussex, as shown on the site location plan in **Appendix B**, Drawing 3750966-LW-111-XX-D-G-11102-C01. The approximate National Grid Reference of the site is TQ 057 193 and can be located at postcode RH20 1AT. The site lies at an estimated elevation of 31 m Above Ordnance Datum (mAOD) in the southwest corner of the site rising to 51 mAOD in the northeast corner of the site. During previous investigations referred to in Section 2.3, retaining structures were observed on the slope towards the railway.

At the time of the most recent investigation, the site was secured with Heras fencing and comprised predominantly open fields, however there were farm buildings and areas of hardstanding in the western region of the site, which was not included this intrusive investigation as it was considered inaccessible. The site is bounded by residential properties to the south, open fields to the east, and mature trees to the north and the south. There is one man-made surface water feature (reservoir) in the eastern central region of the site, which is fenced off with Heras fencing.

During the previous LEAP investigation in April 2024, the northern, central, and southwestern regions of the site were described as comprising polytunnels and or part demolished polytunnels, whilst in the eastern and southeastern regions of the site, the site comprised a series of rectangular geotextile sheets secured to the ground, with wooden stakes supporting wire for securing immature trees in rows along the strips. These features were no longer present during the most recent LEAP investigation in August 2025 and the Client has confirmed that demolition and clearance works have been undertaken onsite.

In addition, there are 2 No. waste stockpiles present in the northeastern corner of the site. The location of these stockpiles in relation to the wider site are shown in **Appendix B**, Drawing No. 3750966-LW-222-XX-D-G-22204-C01. Stockpile SP1 (previously referenced as M2 in Section 3.2.3 of the August 2022 GRM Phase II Site Appraisal for the site (Report ref: P7298)) comprised plant/tree container arisings, with some pieces of broken plastic container. The arisings comprised brown gravelly and silty sandy loam with quartzite, sandstone and abundant roots and other woody plant material.

In comparison, stockpile SP2 (previously referenced as M1 in Section 3.2.3 of the August 2022 GRM Phase II Site Appraisal for the site (Report ref: P7298)) was observed to contain a mixture of timber, damaged pallets, green waste mainly comprising conifer, some plastic netting, and the remains of three bonfires. It is understood that the materials were stockpiled pending being burned. The bonfire remains were noted to contain sandy ashy soil with metal items including hinges, brackets, nails, and screws, along with some glass, brick, pieces of burned timber and pallet, and plastic.

3.1.2 Geology

The site is mapped as being underlain by the Hythe Formation (Sandstone) with superficial Head Deposits mapped overlying the Hythe Formation in the southernmost corner of the site. The Head Deposits to the south are shown to extend approximately east to west in a 270 m wide band, then extending north in an arc to the west of the site. No superficial deposits are mapped across the rest of the site.

3.1.2.1 Potential cambering and associated gulls

The Hythe Formation in the area has been extensively affected by cambering and valley bulging. This is a process by which loss of strength in an underlying clay soil causes block movement of overlying competent jointed rocks. Cambering of blocks and their subsidence into the weak clay underneath causes the clay to bulge upwards. Rotation and movement of the competent blocks causes wide fissures or gulls to open up. The gulls tend to be infilled with periglacial debris i.e. poorly sorted silty clay and locally derived gravel. These gulls can provide an easy route for the downward passage of surface water, which can lead to washing out of fines and has in some instances led to the opening up of gulls and subsequently to subsidence at the ground surface (sometimes referred to as solution features or swallow holes).

3.1.3 Hydrogeology & Hydrology

The superficial Head Deposits soils mapped beneath the southernmost corner of the site are classified as a Secondary A Aquifer whilst the underlying Hythe Formation is classed as a Principal Aquifer. In addition, the site is not situated within a groundwater Source Protection Zone (SPZ).

There are no natural surface water features within the site, however, there is a lined reservoir for storage of water for irrigation present in the centre east of the site.

Topographically the site slopes downwards to the south and southwest with a change in level of ~20 mAOD. The River Arun is approximately 900m to the south of the site and it is considered likely that surface water and groundwater flow is towards the south.

3.1.4 Flooding

According to the Environment Agency, the site is not located within a flood zone and has a very low risk of surface water flooding from the rivers and sea.

The GRM Phase I report notes a Flood Risk Assessment is required due to the size of the site.

3.2 Site usage

3.2.1 Site History

Between 1876 and 2002 the site was predominantly an open field bounded by hedgerows to the east, southeast and west with buildings present in the northeastern corner of the site, labelled as 'New Place'. From 1972 onwards, a reservoir and pump house are present in the central region of the site, with long, rectangular buildings labelled as 'New Place Farm'. Following this, from 2002 onwards, further buildings have been erected onsite, and the site is referred to as a nursery on the historical maps.

During the previous LEAP investigation in April 2024, parts of the site were described as comprising polytunnels, part demolished polytunnels, and geotextile sheets secured to the ground relating to usage of the site as a nursery. As detailed in section 3.1.1, these features were no longer present by August 2025, and the Client has confirmed that demolition works have been undertaken onsite.

3.2.2 Unexploded ordnance (UXO)

The risks from unexploded ordnance have been assessed in accordance with CIRIA guidance⁵. A non-UXO specialist preliminary screening assessment has been carried out. The risks have been assessed by considering firstly the likelihood of military activities on, or in the vicinity of the site as determined from the desk study and historical review. Secondly the risk of UXO has been assessed by reference to the unexploded WWII aerial delivered bomb (UXB) regional risk maps produced by Zetica.

The Zetica risk maps indicate a low risk and there is no evidence of military activities having taken place near to the site. Hence the overall risk of UXO is rated as low.

3.2.3 Waste planning and landfill records

The Phase I report notes a historical landfill site 243 m to the north of the site that accepted inert landfill last recorded in 1981.

3.2.4 Radon

The Phase I report dated January 2016 indicates that the site is located in an area where less than 1% of homes are above the action level (200 Bq/m³) and therefore no radon protection measures were considered to be required.

An updated Radon Risk Map was released by UKHSA and BGS on 2 December 2022 and no change to the radon potential is recorded for the site.

3.3 Previous Investigations

The site has been the subject of a number of reports undertaken by GRM, LEAP and others between 2016 and 2025, the findings of which are summarised below. A location plan which illustrates the location of all the site investigation locations from all the investigations carried out onsite to date is included in **Appendix B**, Drawing No. 3750966-LW-112-XX-D-G-22201-C01.

The findings of these investigations are summarised below.

3.3.1 GRM Phase I Site Appraisal (Desk Study) ref: GRM/P7298/DS January 2016

GRM were appointed by Catesby Estates Limited to undertake a Phase I Site Appraisal. At the time of writing the site was proposed to be developed with up to 100 dwellings and associated infrastructure.

⁵ CIRIA C681 2009. Unexploded ordnance (UXO) - A guide for the construction industry

Significant features identified during the inspection included potential pesticide contamination from the current site use as a plant nursery, drainage ditches as possible receptors and trees requiring deepening of foundations.

The CSM identified pesticides as a potential risk to human health and controlled waters concluding that the risk was considered low.

A preliminary geotechnical assessment identified localised cohesive soils which may require the deepening of foundations and with piling unable to be ruled out.

Further investigation was recommended to include dynamic sampling, cable percussion borehole drilling and soakaway testing with chemical and geotechnical analysis. Further recommendations were made for a flood risk assessment, tree survey and liaison with local authority regarding the requirements for an archaeological site appraisal.

3.3.2 GRM Soakaway Testing ref: P7298 – SA1 March 2016

The Phase 2 investigation considered that the natural granular deposits underlying the site would potentially be suitable for soakaway drainage. Soakaway testing was carried out on 3rd and 4th March 2016 at three locations under the area of proposed surface water attenuation basins in the fields in the southern part of the site. The tests were carried out with soakaway crates installed between surface and 1.2 mBGL. Results from two of the completed tests suggested an infiltration rate of around 10⁻⁶m/s, whilst testing at a third location was unsuccessful (water did not drain from the pit during the test period).

3.3.3 TSA Asbestos Survey ref: Si 1382 March 2016

TS Asbestos carried out a HSG264 (2010) Asbestos Management Survey into the presence of asbestos containing material at the site in March 2016, report no. Si 1382. The survey identified asbestos containing materials within the fabric of the workshop/warehouse/storage building in the western part of the site. The materials comprised:

- Asbestos cement Mill Board internal cladding containing crocidolite/chrysotile.
- Asbestos cement corrugated roof panels throughout containing chrysotile.
- Asbestos cement Mill Board external cladding containing crocidolite/chrysotile.
- Asbestos cement rainwater gutter and downpipes containing chrysotile.

The asbestos management survey report made recommendations to apply “asbestos beware” labels, maintain an asbestos register, repair or remove broken panels and manage asbestos which is to remain in place. A comment was made that the asbestos management plan must advise incoming tradesmen of the location of the asbestos.

During the site reconnaissance/walkover carried out for the phase III intrusive investigation (2024) it was apparent that no significant repair work had been carried out on the building which remained in a poor condition at the time of site works. The area remained fenced off with Heras fencing at the time of the current phase of intrusive works (2025).

3.3.4 GRM Phase II Site Appraisal project ref: GRM/P7298/F.1 April 2016

The GRM Phase II investigation encountered a shallow depth of made ground comprising red brown, grey and brown clayey gravelly sand within four exploratory holes on the access routes

between the growing beds of the nursery. The made ground ranged in depth from 0.3 to 0.4 m BGL. The made ground was found to be underlain by Head Deposits to depths between 0.9 to 2.7 m bgl and was on average 1.4 m thick.

The underlying Hythe Formation comprising medium dense orangish brown, grey brown and red brown silty sand with sandstone gravel, becoming extremely weak to weak sandstone with depth, was encountered to the terminal depth of each exploratory hole.

No visual or olfactory evidence of potential contamination was encountered during the fieldwork or the following period of gas/groundwater monitoring.

Gas and groundwater monitoring wells were installed in seven of the exploratory holes. Due to the absence of any significant depth of made ground, the response zones were installed within the underlying natural strata.

One gas and groundwater monitoring visit was carried out on 17 March 2016. Standing water was recorded at a depth of 1.67 m bgl in monitoring well WS5. All other monitoring wells were dry.

No methane was detected in any of the monitoring wells, carbon dioxide concentrations of between 0.0% v/v and 4.5% v/v were recorded. No VOCs were detected by the PID. No gas flows were recorded.

Made ground had been identified as a potential source of contamination of controlled waters and so soil leachate testing was conducted. Leachate testing of soil samples taken during the intrusive investigation recorded concentrations of all contaminations of concern as being below relevant threshold values when compared against UKDWS and EQS values, and the risk to controlled waters determined to be negligible.

3.3.5 GRM Gas Addendum Letter ref: P7298\GAL July 2016

Gas monitoring post site works was carried out fortnightly over a two-month period between 17 March and 25 May 2016.

No methane was detected. Carbon dioxide concentrations of between 0.0% v/v and 7.0% v/v were recorded. No gas flows were recorded. Groundwater was encountered in WS5 in the east-southeast of the site between 1.67 and 1.95 m bgl, however the remainder of the wells were generally dry to 3 m bgl.

The gas risk assessment derived a GSV (Gas Screening Value) of 0.007 l/hr for carbon dioxide, based on the maximum recorded steady state carbon dioxide concentration of 7.0% v/v and the default flow rate of 0.1 l/hr which is adopted when no gas flow is recorded.

Although the GSV is less than 0.07 l/hr, which would indicate that a Characteristic Situation CS1 was appropriate, due to the maximum concentration of carbon dioxide recorded being greater than 5.0% v/v, further consideration was given as to whether CS1 was appropriate for the site.

GRM's detailed logging of the soils encountered during the site investigation did not reveal any high ground gas potential source such as paper, timber, refuse etc. and on the basis of the low number of carbon dioxide readings exceeding 5.0% v/v (5/42), and the absence of any gas flow, a Characteristic Situation CS1 was deemed appropriate.

3.3.6 GRM Phase I Site Appraisal (Desk Study) ref: GRM/P7298/DS.1/RevA – 2020-12-08 (updated to larger site area) August 2020

The GRM 2016 Phase I and II reports were completed for the southern area of the site only. The northern part of the site was subsequently included within an updated Phase I in 2020.

The 2020 Phase I report identified the presence of the bonfire stockpile and the stockpile of discarded plants and pots in the northeast of the site (mistakenly reported as northwest of the site in the report). These are identified as stockpiles M1 and M2 on the site plans within LEAP reports LP3646-LW-111-XX-D-G-11101-C01 and LP3646-LW-222-XX-D-G-22202-C01).

Small stockpiles of general waste were identified across the site, although no potentially contaminative materials were noted.

The presence of the pump house associated with the centrally located reservoir was noted.

The presence of suspected asbestos containing corrugated cement roof panels on the pesticide store in the northwest of the site was noted, as was the bunded oil tank.

Both pesticide contamination and localised TPH contamination were considered likely based on the former and current land use. Soil capping and/or localised removal of any contaminated soils, including hotspot removal for the bonfire area, were recommended.

A number of geotechnical/general hazards were identified, and these are detailed within the report.

3.3.7 GRM Soakaway Testing Letter Report ref: P7298 SA.2 April 2021

GRM attended site between 22 and 26 February 2021 to carry out dynamic/windowless sampling and trial pitting with soakage testing carried out in a number of the exploratory holes and pits. The exploratory holes encountered a shallow depth of topsoil, overlying a shallow depth of made ground ranging in depth from 0.05 m to 0.8 m bgl, overlying Head Deposits in turn overlying the Hythe Formation, in line with the conditions encountered during the earlier GRM intrusive investigations.

Soakage testing was carried out within 21 No. exploratory holes/pits and the calculated infiltration rates and conclusions are presented within the report.

The results were considered to indicate potentially but variably good performance in the Hythe Formation, and generally poor and variable performance within the Head Deposits.

3.3.8 GRM Phase II Site Appraisal report ref: GRM/P7298/F.2 August 2022

A further 25 No. exploratory holes were excavated for the purposes of confirming ground conditions and contamination levels across the site. The contamination assessment recommendations suggested that no remediation of the site was required, but careful management and disposal of mounded soils (M1 – the bonfire stockpile area) would be required due to an elevated arsenic concentration in one sample of the mounded soils of 87 mg/kg against the generic assessment criteria (GAC) of 37 mg/kg for a Residential with Home Grown Produce (RES_{HGP}) end use, and 79 mg/kg for a Public Open Space Residential (POS_{RES}) end-use scenario.

No concentrations of petroleum hydrocarbons were reported in exceedance of their respective GACs. Where pesticides were recorded above the limit of detection of the test the recorded concentrations were below their threshold values. Asbestos screening of soil samples did not reveal the presence of asbestos in any of the samples analysed.

Further ground gas monitoring summarised in GRM/P7298/F.2 recorded the following data for monitoring wells installed within the made ground:

- maximum gas flow below limit of detection
- methane concentration 0% to 5% v/v (WS202)
- carbon dioxide concentration 2.3% to 2.5% v/v, and
- oxygen concentration 16.1% to 17.4% v/v

The following data was recorded for monitoring wells installed within the natural strata:

- maximum gas flow -0.4 l/hr (this is a negative gas flow, and no positive gas flows were recorded),
- methane concentration below limit of detection
- carbon dioxide concentration 0.0% to 7.3% v/v, and
- oxygen concentration 7.7% to 20.3% v/v.

Based on the maximum gas flow rates and concentrations, the ground gas risk assessment placed the site within Characteristic Situation CS1, for which no gas protection measures are required. Whilst one well found methane at a concentration of up to 5% v/v, this was an isolated occurrence, and no other wells recorded methane levels above detection limits on any monitoring occasion. Based on the isolated nature of this methane detection and the overall gas screening value being well below that needed to bring the site into a higher risk band the conclusion of CS1 was maintained.

A recommendation was made for additional testing in areas previously not investigated due to existing structures/vegetation.

Made ground had previously been identified as a potential source of contamination of controlled waters. Report GRM/P7298/F.2 referred back to the leachate testing carried out for GRM/P7298/F.1 and repeated the conclusion that the risk to controlled waters was determined to be negligible.

With respect to water supply pipes, the investigation report considered that at the concentrations of contaminants recorded to date (report date August 2022), and based on UKWIR guidance, the standard water supply pipes should be suitable for the site. However, it was recommended that the local water supply company be approached for confirmation of their requirements.

3.3.9 LEAP Phase III Site Investigation ref: 3750605/PIII/1 July 2024

LEAP conducted a further intrusive site investigation to provide coverage of previously inaccessible areas of the site. 24 No. windowless boreholes to depths of 0.8 m to 3.45 m bgl and 28 No. hand dug pits to 1.0 m bgl were undertaken.

Ground conditions encountered were as previously described in the GRM intrusive investigation reports. With topsoil, to a maximum depth of 0.70m bgl, or made ground, to a maximum depth of 0.55m bgl, underlain by either sporadically located superficial Head Deposits, to a maximum depth of 0.70m bgl, underlain by the weathered Hythe Formation, to a maximum recorded depth of 3.45m bgl.

36 No. samples comprising 10 No. topsoil and 26 No. made ground were tested for heavy metals, asbestos, PAH and pesticides.

One sample reported lead exceeding the GAC for RESI_{WHGP}, but did not exceed the POS_{RESI}, with the recommendation that this area was remediated as a hot spot.

One sample reported Benzo(a)pyrene exceeding the GAC for POS_{RESI}, with the recommendation that this area was remediated as a hot spot.

Five samples reported pesticides above limit of detection. However, there are no published GACs and the reported concentrations were low and were considered not to pose a significant risk to human health.

3.3.10 LEAP Groundwater Monitoring ref: SH/25/3750782/GW dated April 2025

LEAP attended site in April 2024 to install two additional groundwater monitoring wells (WS301 and WS315) and then attended site again in October 2024 to install more groundwater monitoring wells for improved coverage for winter water level monitoring (WS401-WS406).

The ground conditions identified during this investigation did not match those described previously by LEAP across the site, with clay Head Deposits found more frequently and with a greater thickness. This is more consistent with GRM's interpretation of the distribution of the Head Deposits as sitewide instead of across the southern half of the site.

Subsequent winter groundwater monitoring was carried out between May 2024 and June 2024 at 8 locations, of which 6 locations were dry (WS7, WS201, WS202, WS203, WS204, WS315). Groundwater levels were encountered in WS207 and WS301 during the monitoring period and were recorded at levels of between 0.32 m and 1.30 m below ground level. A further six rounds of groundwater monitoring were completed between October 2024 and March 2025, with the majority of wells found to be dry over the course of the monitoring period between October 2024 and March 2025. During this monitoring period groundwater ranged between ground level and 1.80m bgl, with water at ground level only identified in WS315 and this was believed to be associated with the proximity (downgradient) to the reservoir in the central eastern region of the site.

There appeared to be no clear distribution in relation to where groundwater was and was not encountered. However, the locations where groundwater was identified do tend to be in the southern half of the site where more cohesive Head Deposits are anticipated and therefore the likelihood for perched groundwater is greater. A plan which shows the monitoring wells locations is included in **Appendix B**, Drawing No. 3750966-LW-112-XX-D-G-22201-C01.

3.3.1 LEAP Preliminary Waste Classification Report for 2 No. Stockpiles ref: 3750966/PWC dated November 2025

As part of the LEAP August 2025 investigation, LEAP undertook sampling of the 2 No. stockpiles in the northeastern corner of the site. The stockpiles were referenced as SP1 (previously referenced as M2) and SP2 (previously referenced as M1). A preliminary hazardous waste assessment was carried out and the testing carried out found that stockpile SP1 may be classified as non-hazardous soils and stones (17 05 04), whilst SP2 may be classified as hazardous soils and stones (17 05 03*), due to elevated zinc.

WAC testing was carried out on both stockpiles. SP1 was found to be not suitable for inert landfill and should be sent to a non-hazardous landfill, due to elevated TOC (>3%). Also, SP2 was found to be not suitable for a hazardous waste landfill due to elevated loss on ignition and TOC, therefore pre-treatment is required before it goes to landfill.

4 PRELIMINARY RISK ASSESSMENT

4.1 Preliminary Geoenvironmental Conceptual Site Model

4.1.1 Approach

A risk-based approach is used in the UK to assess contaminated or potentially contaminated land. For a potential risk to exist, there must be a contaminant linkage in place, i.e. there must be a source of contamination, a potential receptor, and a pathway linking the two. The purpose of this preliminary conceptual site model (CSM) was to systematically identify all of the potential contaminant linkages using the information provided in Section 3 of this report.

4.1.2 Potential Sources of Contamination

Based on a review of the available information discussed in Section 3 of this report, including the previous investigations carried out onsite, **Table 1** provides a summary of the potential plausible current and historical on- and off-site sources with the anticipated nature and distribution of the sources:

Table 1: Potential Plausible Sources of Contamination

Potential Source	Potential Contaminants of Concern	Anticipated Distribution
Onsite		
Made Ground	Wide range of contaminants possible, including asbestos, metals, polycyclic aromatic hydrocarbons (PAH), petroleum hydrocarbons, ground gases.	Shallow thickness of made ground previously encountered with no significant contamination. Further contamination may be present outside of previous investigation locations, and beneath existing structures and areas of hard surfacing.
Former above ground storage tanks in northwest of site	Petroleum hydrocarbons.	Not within the accessible region of the site for this investigation. Localised to area of the tank where there is potential for leaks and spills from the tank. No hydrocarbon contamination previously encountered in this area.
Pesticides associated with previous and historic land use.	Organochlorine, organophosphorus and triazine pesticides	Potentially sitewide, specifically around nursery areas where plants were grown. No pesticides at significant concentrations previously encountered.
Pump house containing diesel powered pump	Petroleum hydrocarbons, polycyclic aromatic hydrocarbons, solvents.	Not within the accessible region of the site for this investigation. Localised to pump house and its immediate vicinity.

Potential Source	Potential Contaminants of Concern	Anticipated Distribution
Mounded soils in stockpile M1	Asbestos, metals, polycyclic aromatic hydrocarbons (PAH), petroleum hydrocarbons.	Arsenic exceedance previously encountered, potential for further contamination to be present.
Mounded waste plant/tree container arisings in stockpile M2	Pesticides.	No exceedances previously encountered, potential for further contamination to be present
Building in west of site	Asbestos – chrysotile and crocidolite were identified by the TAKESTOCK asbestos survey.	Not within the accessible region of the site for this investigation. Potential for localised contamination of soils within the vicinity of the building or wider spread contamination of soils due to tracking.
Silt trap/sump in washdown area outside workshop in west of site	Petroleum hydrocarbons, polycyclic aromatic hydrocarbons, solvents.	Not within the accessible region of the site for this investigation. Localised to area around silt trap/sump and associated pipework.
Off-Site		
Historic Inert Landfill 243 m to the north.	Ground gases including methane, carbon dioxide, trace volatile organic compounds (VOCs). Leachates including ammonia, nitrate,	Separated from site by railway cutting and not considered to pose a significant risk to the site.
Electrical Substation 43 m to the southwest.	PCBs	Localised to substation and not considered to pose a significant risk given the distance.

The off-site historic landfill and electrical substation are discounted from further assessment based on distance from site. The off-site historic landfill is separated from the site by the railway cutting and there is not considered to be a plausible contamination pathway.

The on-site heating oil tank in the northwest of the site had been removed prior to the most recent investigations and was not accessible due to the asbestos related exclusion zone. The tank was the subject of earlier targeted investigation with no petroleum hydrocarbons identified during the investigation (GRM/P7298/F.2 2020). Given the absence during the site reconnaissance/walkover carried out by LEAP in 2024 of olfactory or visual evidence of hydrocarbon contamination within the vicinity of the tank and the wider storage area, and that the tank appeared to be empty, in and in generally good condition there is not considered to be a significant risk of hydrocarbon contamination associated with the tank and no further investigation is considered necessary.

4.1.3 Potential Receptors

In the context of the proposed future land use, the following potential receptors of ground contamination have been identified:

4.1.3.1 Human health

- Future residents / site users
- Construction workers

4.1.3.2 Controlled waters

- Superficial Head Deposits (Secondary A aquifer)
- Hythe Formation (Principal aquifer)
- Drains around the boundary of the site

4.1.3.3 Other

- Material construction of buildings and infrastructure
- Neighbouring properties

4.1.4 Potential Contaminant Linkages

Preliminary risk levels were determined following a review of the available desk-based information with the significance of particular contaminant linkages being dependant both upon the likelihood of exposure occurring and the severity of that exposure.

4.1.4.1 Human health

The proposed development comprises residential housing with private gardens and public open space. Therefore, all the generic Contaminated Land Exposure Assessment (CLEA)⁶ exposure linkages between humans and potential contaminants in the ground are plausible i.e. direct ingestion of soil, ingestion of homegrown produce, and inhalation of indoor and outdoor vapours and dusts. Groundworkers could be potentially exposed via all these pathways, except for those involving edible plants. Whilst contamination not previously encountered may be present, it is considered unlikely that high concentrations of contaminants will be present on site. However, because of the presence of asbestos in the current buildings (in the western region of the site) and the overall high severity associated with contact with asbestos fibres the overall potential for unacceptable risks to human health via these pathways is considered to be low to moderate.

The assessment of future on-site users is considered to be protective of the surrounding off-site residents and off-site commercial workers.

4.1.4.2 Ground gases (excluding mine gas)

The following potential ground gas generating source has been identified for the site:

- Shallow made ground with low degradable organic content (e.g. <5% organic material such as pieces of wood, paper or wood, no food and no easily degradable waste)

⁶ Environment Agency 'Updated technical background to the CLEA model' Science Report: SC050021/SR3. January 2009.

Reference to The Local Authority Guide to Ground Gas (CIEH 2008) identifies shallow made ground with low degradable organic content as having a very low gas generation potential which poses a very low level of risk for an onsite development and a negligible risk of lateral migration.

The gas monitoring carried out during the previous ground investigations recorded the following data for monitoring wells installed within the made ground:

- Maximum gas flow below limit of detection,
- Methane concentration 0% (all wells except WS202) to 5% v/v (WS202),
- Carbon dioxide concentration 2.3% to 2.5% v/v, and
- Oxygen concentration 16.1% to 17.4% v/v.

The following data was recorded for monitoring wells installed within the natural strata;

- Maximum gas flow -0.4 l/hr (this is a negative gas flow, no positive gas flows were recorded),
- Methane concentration below limit of detection,
- Carbon dioxide concentration 0.0% to 7.3% v/v, and
- Oxygen concentration 7.7% to 20.3% v/v.

The ground gas risk assessment based on the previous GRM investigations places the site in Characteristic Situation CS1 requiring no gas protection measures. As such the overall risk from ground gases at this stage is considered to be low.

4.1.4.3 Controlled waters

The site is underlain by a bedrock Principal aquifer (Hythe Formation) with a superficial Secondary A aquifer (Head Deposits) located in the south of the site. The water table is anticipated to be greater than 2-3 m bgl due to minimal superficial deposits recorded on site and the distance to the River Arun approximately 770 m to the southwest of the site.. No natural surface water features are present onsite however, drains are present around the site boundaries, and an open lined reservoir is present in the centre of the site.

Based on leachability testing carried out as part of the GRM investigations there was considered to be a negligible risk posed by contaminants within the made ground to controlled water, either beneath or adjacent to the site. Whilst further previously unencountered contamination may be present which could impact controlled water receptors, this is considered unlikely. There is therefore considered to be a very low risk to both the aquifers onsite and the surface water features identified, in particular the reservoir which is lined and is unlikely to be in hydraulic continuity with the groundwater beneath the site.

4.1.4.4 Below ground infrastructure

Based on the previous investigations and the site history, the potential for unacceptable impacts to below ground infrastructure, including concrete and plastic pipework is considered to be very low.

4.2 Sustainability considerations

The geological, geotechnical and hydrological conditions of the site along with the potential for contamination can significantly influence the suitability of sustainable options on site.

The mapped ground conditions indicate the ground conditions will be predominantly granular and therefore shallow strip foundations may be the less carbon intensive option, although in the south where cohesive Head Deposits may be identified, piled foundations may be the less carbon intensive option.

The site slopes gradually to the south / southwest. The effect of potential adverse effects of climate change on slope stability may present a risk to the proposed development with anticipated dryer summers and more intense winter rainfall events. However, at present the proposal is to level the site via major earthworks, which will reduce this existing slope angle.

The conceptual site model has indicated a low risk of contamination on site as such it is anticipated subject to testing that the soils will be suitable for reuse onsite and caution should be taken to limit the disturbance of natural soils.

5 PHASE IV - INTRUSIVE INVESTIGATION

This intrusive investigation section details the specifics associated with the most recent phase of intrusive works carried out by LEAP but also summarises the intrusive works conducted by GRM (2016 and 2022) and LEAP (2024) within the site area as referenced in Section 2.3.

5.1 Investigation rationale

The main purpose of the most recent site investigation was to collect supplementary geo-environmental and geotechnical information to support the redevelopment of the site including additional information to aid drainage design and to allow for a preliminary pile design to be produced.

To achieve the investigation rationale, the scope of works comprised a total of 57 No. investigation locations across the site: 6 No. rotary core boreholes to 20.00m depth, 24 No. machine excavated trial pits to 2.00 – 3.00 m depth, 8 No. BRE365 soakage tests to 2.00m depth, and 19 No. hand excavated pits to 0.60 – 1.20 m depth. Sampling of 2 No. waste stockpiles in the northeastern region of the site was also undertaken however that exercise and those results have been commented on separately in a standalone waste classification report.

The proposed locations of the machine excavated and hand dug trial pits were established by looking to fill in any gaps from the previous investigations (areas which were previous inaccessible due to former polytunnels) and to provide general coverage across the site on a herringbone grid, at approximately 50m spacing. The spacing is consistent with the recommended density of 25 to 50m for an exploratory level investigation after BS10175 Section 7.7.

Some of the intrusive locations were targeted, including the rotary boreholes which were positioned to target areas of the site where deeper foundations / piled foundations were anticipated to be required. This was established using the Client provided 'Found Strategy Redrow Option 1', Drawing No. BR31251-JNP-XX-XX-SK-S-0009, included in **Appendix B**.

In addition, the BRE soakage testing pits were positioned to target the four proposed attenuation ponds along the southern boundary of the site as shown on the Client provided 'Planning Layout', Drawing No. H9376-GPA-XX-XX-DR-UD-203001-C01, included in **Appendix B**.

Also, investigation locations SP1-1 to SP1-3 and SP2-1 to SP2-3, were taken from the two waste stockpiles in the northeastern corner of the site formerly referred to as M1 and M2, as shown in drawing no. 3750966-LW-222-XX-D-G-22204-C01.

The site investigation locations are shown in drawing no. 3750966-LW-112-XX-D-G-22201-C01, **Appendix B** and **Table 2** provides a summary of the rationale, proposed scope and what was achieved in the field:

Table 2: Rationale and Scope for Investigation Locations

Trial Hole/Test Location	Rationale	Proposed Depth (m bgl)	Achieved Depth (m bgl)	Additional Comments
BH401 - BH406	Provide information on ground conditions. Provide information on ground conditions and geotechnical parameters for pile design. Investigate potential soil contamination.	20.00	19.50 – 20.00	
TP401 - TP424	Provide information on ground conditions. Investigate potential soil contamination.	2.00 – 3.00	1.50 – 3.00	Some trial pits terminated early due to rock being encountered between 2.00 – 3.00m.
SA401 - SA408	Provide information on ground conditions. Carry out BRE365 soakage test in the vicinity of proposed drainage.	2.00 – 3.00	1.90 – 2.00	
HP401 - HP420	Provide information on ground conditions. Collect samples of the topsoil and subsoil for assessment to determine reuse purposes.	0.60 – 1.20	0.20 – 1.10	
SP1 (1 – 3) SP2 (1 – 3)	Sampling of the 2 No. waste stockpiles in the northeast to allow for waste classification testing and assessment	-	0.30 – 0.45	

5.2 Site work

This section refers to the intrusive works undertaken within LEAP's most recent phase of investigation unless otherwise specified.

5.2.1 Date and weather conditions

The intrusive investigations were undertaken in a single phase between 6 August 2025 and 21 August 2025. At the time of the investigations, the weather was largely dry and sunny.

The Met Office Climate summaries have been reviewed for information pertaining to the three months prior to the investigation. The summaries indicate that May, June, and July 2025 were drier than average, with England receiving 57%, 80% and 89% for May, June and July respectively compared to the UK national average.

5.2.2 Site work methods

5.2.2.1 Borehole drilling

Boreholes were drilled using dynamic sampling to the rock head, followed by rotary core borehole drilling technique. A hand pit was excavated to 1.20 m using insulated hand tools. Dynamic sampling technique was used from 1.20 m to the rock head, with a rotary coring technique used beyond this, recovering 1.50 m long core samples. In addition, a water flush or air flush was utilised as the borehole progressed.

5.2.2.2 Trial pitting

Trial pits were dug by a backhoe excavator. The trial pits had a target depth of 2.00 - 3.00 m bgl and were typically 0.6 m wide by 1.6 m long. Trial pit dimensions are shown on the trial pit logs, included as **Appendix D**. Spoil was placed on plastic sheeting to prevent cross-contamination and was replaced in reverse order. Trial pits were left mounded to allow for future settlement.

5.2.2.3 Hand pitting

Hand pits were excavated using hand tools. Spoil was placed on plastic sheeting to prevent cross contamination and was reinstated in reverse order.

5.2.2.4 Soil logging and sampling

Soil samples were recovered from the boreholes and trial pits for field screening, logging and sampling.

Boreholes were logged in general accordance with the requirements of BS 5930⁷ and BS EN ISO 14688⁸. Borehole logs are presented in **Appendix D**.

Visual and olfactory evidence of contamination was noted if encountered. These observations were used to aid scheduling of samples for chemical laboratory analyses and are included on the borehole logs in **Appendix D** and summarised in Section 5.3.1.2.

Samples were collected with a clean sampling trowel or by hand (using dedicated nitrile gloves for each sampling location). Samples were placed into laboratory supplied sampling containers, specific to the type of analyses required.

All sample containers were sealed and labelled with a unique location identity, depth and date of sampling.

⁷ BS5930:2015+A1:2020 Code of Practice for Ground Investigation

⁸ BS EN ISO 14688 Parts 1-2 (2018) Geotechnical Investigation and Testing. Identification and classification of soil

5.2.3 Sampling and Field Tests

5.2.3.1 Soil sampling

Geoenvironmental soil samples were selected to ensure that near-surface exposure of human health via direct contact was targeted, as well as to spatially and vertically delineate possible sources of contamination.

Geotechnical soil samples were targeted to characterise the geological sequence, and to obtain characteristic soils properties and specific geotechnical design parameters as per the proposed development.

5.2.3.2 Standard Penetration Tests

Standard penetration tests (SPT) were undertaken in rotary core boreholes BH401 – BH406. SPTs were undertaken at 1.00 m intervals to 5.00 m bgl and then at 1.50 m intervals thereafter until the rock head was encountered (blow counts above 50). Testing was carried out in accordance with BS EN ISO 22476-3:2005. Uncorrected blow counts, 'N values', are recorded on the borehole logs in **Appendix D**.

5.2.3.3 BRE365 soakage tests

8 No. soakage tests have been carried out in trial pits SA401 - SA408 in general accordance with BRE Digest 365⁹. 2 No. tests (SA401 and SA407) were not able to be completed fully in line with the guidance as it was not possible to repeat the tests three times in the time available on site.

5.2.4 Laboratory analysis

5.2.4.1 Geotechnical laboratory testing

Selected samples of the soils have been classified by laboratory analysis for geotechnical design and earthworks design purposes. The laboratory testing has been carried out by Ian Farmer Associates at its laboratories in Watford, in accordance with BS1377¹⁰ and BS EN ISO17892¹¹. The sampling technique, type, storage and transport and the number of laboratory tests have been undertaken where possible in accordance with BS EN 1997-2:2007 and BS EN ISO 22475¹². The following laboratory tests have been undertaken during the most recent investigation:

⁹ Building Research Establishment DG365 Digest Soakaway Design (2016)

¹⁰ BS1377 Parts 1-9:1990 Methods of test for Soils for Civil Engineering Purposes

¹¹ BS EN ISO 17892 Parts 1-12 Geotechnical Investigation and Testing. Laboratory testing of soil

¹² BS EN ISO 22475 Parts 1-3 Geotechnical Investigation and Testing. Sampling methods and groundwater measurements

Table 3: Geotechnical Laboratory Testing

Test	Number of tests		
	Head Deposits	Hythe Formation (Weathered)	Hythe Formation (Bedrock)
Moisture Content	1	1	-
Atterberg Limit Test	1	1	-
Particle Size Distribution Test (Wet sieve) with sedimentation by pipette	-	3	
Compaction Tests (OMC: MDD) (2.5kg Rammer 1L mould)	-	3	
BRE Suite A (pH and sulphates)	-	2	3
Unconfined Compressive Strength (UCS) on rock	-	-	18
Point load Index	-	-	30
Unconsolidated Undrained Triaxial Compression Test	1	1	-
Laboratory soaked CBR on remoulded specimen (2.5kg rammer)	-	3	-

The geotechnical laboratory test results are provided in **Appendix F**.

5.2.4.2 Chemical soil analysis

Selected samples of soil were subjected to laboratory testing. The suite of soil and contaminant analysis took into account the contamination identified previously, and the potential contaminants of concern identified in the CSM (heavy metals, PAHs, asbestos, petroleum hydrocarbons, herbicides and pesticides). Soil samples were also analysed for pH and total organic carbon (TOC) to support the selection of assessment criteria in the subsequent quantitative risk assessment (QRA) for human health. The laboratory testing also included selected samples for waste classification purposes to support the Client with future materials management options and the results of this assessment will be included in a separate waste classification report.

Sampling techniques and storage have been undertaken as per BS 10175:2011+A1:2013 Code of Practice for Investigation of Potentially Contaminated Sites. The laboratory testing was carried out by Envirolab. Where available, the tests for soils procedures were UKAS and MCERTS accredited.

The following analyses were completed on selected soil samples from the intrusive investigation (not the stockpile sampling), based on field observations and for general vertical and lateral coverage:

- 20 No. Metals (As, Cd, Cr, Cr VI, Cu, Pb, Hg, Ni, Se, Zn)

- 20 No. USEPA 16 PAHs
- 7 No. Total Petroleum Hydrocarbons (TPH CWG method)
- 7 No. Pesticide Suite (Organochlorine / Organophosphorus Pesticides, and Triazine Herbicides)
- 21 No. pH
- 20 No. Total Organic Carbon (TOC)
- 20 No. Asbestos Identification
- 15 No. Topsoil / Subsoil Quality Assessment (10 No. BS3882:2015 Topsoil Quality Assessment & 5 No. BS3882:2015 Subsoil Quality Assessment). Results included and commented on in separate LEAP Soil Resource Report (Report ref: 3750966/SM-RS/1)
- 5 No. WAC Acceptance Criteria Tests

Asbestos quantification was carried out on soil samples where asbestos was identified. In this case, 1 No. test was completed (TP420 at 0.20m).

The laboratory test results are summarised in Section 8.2 and **Appendix G**, and the laboratory analytical certificates are provided in **Appendix H**.

5.2.5 Constraints to the scope

It was not possible to do any intrusive investigation within the Ecology Translocation Zone, in the northeastern corner of the site, or near the New Southern Water Main, which runs through the northern half of the site from east to west. These are shown on the constraints plan in **Appendix B**, Drawing No. 3750966-LW-113-XX-D-G-11302-C02.

A large area in the west and a small area in the central region of the site were not included within this investigation as the area in the west was inaccessible due to hard standing and buildings, and the area in the central region was inaccessible due to the man-made reservoir, which was fenced off with Heras fencing. The location of these inaccessible areas are illustrated in yellow on the constraints plan in **Appendix B**, Drawing No. 3750966-LW-113-XX-D-G-11302-C02.

5.3 Ground conditions

The ground conditions are described in detail in exploratory logs included in **Appendix D**. **Table 4** provides a summary table of the soils encountered during this investigation and the previous site investigations by LEAP and GRM.

Table 4: Summary of Strata Encountered

Depth From (m)	Depth To (m)	Strata	Description
0.00	0.10 / 0.70	TOPSOIL / REWORKED TOPSOIL	Brown slightly gravelly silty SAND or sandy SILT with localised wood fragments, rootlets and organic material. Sand is fine to medium. Gravel is fine to coarse, angular to subangular flint, sandstone, and or limestone. Occasional brick and plastic.
0.00	0.15 / 0.60	MADE GROUND	Light brown sandy, silty GRAVEL or gravelly silty SAND. Sand is fine to medium. Gravel is medium to coarse, subangular concrete. Or Light brown sandy gravelly SILT / slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is angular to subrounded, fine to medium flint and sandstone with brick, concrete, charcoal, and rare metal and charcoal. (Only identified in TP413, TP415, HA407, HA409, HA410, HA412, HA414, HA415, and HA420 during this investigation)
0.00 / 0.50	0.10 / 0.70	MADE GROUND (REWORKED HEAD DEPOSITS / HYTHE FORMATION)	MADE GROUND: Light greyish brown silty, gravelly SAND, or gravelly or sandy SILT. Gravel is fine to coarse, angular to rounded flint, limestone, and sandstone with occasional plastic, rope, brick, chalk, tarpaulin, and concrete.
0.00 / 0.70	0.40 / 3.00*	HEAD DEPOSITS	Yellow-brown gravelly, clayey SAND or gravelly, sandy, silty CLAY. Gravel is fine to coarse, angular to subrounded sandstone and mudstone. (Only identified in SA401, SA402, BH401, and BH402 during this investigation and WS305, WS310 and WS314 in the previous 2024 LEAP investigation)
0.00 / 0.70	0.80 / 3.65	HYTHE FORMATION (WEATHERED)	Light brown silty SAND with varying gravel content comprising sandstone, mudstone and limestone.
0.60 / 3.65	20.00*	HYTHE FORMATION (BEDROCK)	Interbedded extremely weak to medium strong light orangish brown and light grey medium grained SANDSTONE and medium strong light grey fine-grained LIMESTONE.

*Maximum depth of excavation

The soils encountered during the current phase of investigation were generally similar to the previous investigations by LEAP and GRM, consisting of sandy topsoil or made ground over silty sand of the Hythe Formation. Head Deposits were encountered in the southeast of the site.

It is noted in the LEAP 2024 investigation that GRM recorded that much of the site was covered by re-laid topsoil, which was interpreted to have been historically reworked due to historical use of the site as a nursery, and typically included fragments of sandstone, flint, mudstone, brick and rare plastic. In this investigation, the reworked topsoil was found to contain concrete, brick, and ceramic in BH402, rare brick in TP404, and chalk and plastic in SA404.

Due to the demolition and clearance activities which have been undertaken across a large portion of the site between the previous LEAP 2024 investigation and the most recent August 2025 LEAP investigation, which included the removal of the former polytunnels and geotextile membranes, it is considered likely that the shallow ground conditions encountered onsite will differ from those encountered previously in 2024. During the most recent investigation, topsoil or reworked topsoil was identified in 30 No. of the 58 No. intrusive investigation locations and very little topsoil was identified in the central eastern region of the site, as illustrated in the 'Topsoil Location Plan' in **Appendix B**, Drawing No. 3750966-LW-113-XX-D-G-11303-C01. The average topsoil thickness recorded onsite during the most recent LEAP investigation is 0.28 m.

Where topsoil was not identified, made ground was commonly present. The majority of this made ground has been described as reworked natural soil (either reworked Head Deposits or reworked weathered Hythe Formation). These reworked soils have likely been generated because of the previous demolition and clearance activity that has been undertaken onsite.

Within SA401, SA402, BH401, and BH402 during this investigation and WS305, WS310 and WS314 in the previous 2024 LEAP investigation, the surface cover (topsoil / made ground) was underlain by silty sand and sandy clay soils, considered to form part of the Head Deposits, due to the inclusions of flint gravel. These investigation locations are located sporadically across the southern half of the site. In contrast, GRM and the LEAP 2025 Groundwater Monitoring report interpreted that there are Head Deposits present in more trial holes across the wider site, including the north of the site. However, it should be noted that they found a greater thickness of Head Deposits in the southern portion of the site, for example, within WS402, in the southern central region of the site, clay was described from 0.30 – 3.00 m bgl, with a band of sand between 1.80 – 2.00 m.

Underlying the topsoil and made ground, sand of the weathered Hythe Formation was generally encountered, which typically comprised slightly gravelly silty sand. The boundary between the weathered Hythe Formation soils and underlying Hythe Formation bedrock is extremely variable with the shallowest depth in TP401 at 0.60 m, in the northwest corner of the site and the deepest depth in BH401 at 3.65 m in the southeast corner of the site. The weathered Hythe Formation, comprises interbedded, sometimes calcareous, extremely weak to medium strong sandstone and medium strong limestone with the strength of the sandstone increasing with depth.

5.3.1.1 Groundwater

No groundwater strikes were recorded within the soils during this intrusive investigation or the previous 2024 LEAP site investigation. However, during the LEAP groundwater monitoring in 2024 and 2025, the following resting groundwater levels were recorded:

Table 5: Groundwater Monitoring Results – May to June 2024

Monitoring Well	Depth to Groundwater (m bgl)		
	02/05/2024	20/05/2024	03/06/2024
WS207	1.27	1.30	Dry
WS301	0.61	0.52	0.32

Table 6: Groundwater Monitoring Results – October 2024 to March 2025

Monitoring Well	Depth to Groundwater (m bgl)					
	29/10/2024	21/11/2024	20/12/2024	23/01/2025	21/02/2025	19/03/2025
WS7	Dry	Dry	Dry	Dry	Dry	Dry
WS201	Dry	Dry	Dry	Dry	Dry	Dry
WS202	Dry	Dry	Dry	Dry	Dry	Dry
WS203	*	*	*	*	*	*
WS204	Dry	Dry	Dry	Dry	Dry	*
WS207	Dry	Dry	0.94	Dry	0.60	Dry
WS301	Dry	Dry	Dry	Dry	Dry	Dry
WS315	Dry	0	0	0	Dry	Dry**
WS401	Dry	Dry	Dry	1.89	1.42	Dry
WS402	Dry	Dry	Dry	Dry	Dry	Dry
WS403	Dry	Dry	Dry	Dry	Dry	Dry
WS404	Dry	1.71	1.66	1.80	1.55	Dry
WS405	Dry	Dry	Dry	Dry	Dry	Dry
WS406	Dry	Dry	Dry	Dry	*	Dry

* No data recorded, well damaged or unable to be accessed and unable to be monitored

** WS315 was monitored on the 27th of March 2025.

Due to the shallow depths of the gas and groundwater monitoring installations installed by LEAP in 2024 and 2025, it was not possible to provide an estimation of the groundwater flow direction. The monitoring confirmed the findings of the previous GRM site investigations that there is a general absence of shallow groundwater beneath the site, with small quantities recorded intermittently at

some locations which is likely to be perched water above the cohesive Head Deposits or Hythe Formation soils.

5.3.1.2 Visual and olfactory evidence of contamination

Discounting the presence of shallow made ground with some anthropogenic materials including brick, concrete and road plannings, and at one location in the LEAP 2024 investigation, HA303 in the northwest of the site where some black fibrous material was encountered, no visual or olfactory evidence of contamination was encountered.

However, it should be noted that a natural gas odour was noted during the rotary core borehole drilling in two boreholes. To mitigate the risk, gas monitoring was carried out with a GFM430 at regular intervals for the remainder of the excavation, however no elevated readings were recorded. It is thought that the gas odour identified was being released from pockets within the Hythe Formation. The gas odour was identified in the boreholes listed in **Table 7**.

Table 7: Olfactory Evidence of Ground Gas

Monitoring Well	Depth at which Olfactory Evidence of Gas was Detected (m bgl)
BH402	18.00
BH406	9.50

6 GEOTECHNICAL INFORMATION

This intrusive investigation section details the specifics associated with the most recent phase of intrusive works carried out by LEAP but also summarises the intrusive works conducted by GRM (2016 and 2022) and LEAP (2024) within the site area as referenced in Section 2.3.

6.1 Strata encountered

6.1.1 Made ground

Localised parts of the site are underlain by made ground to a maximum recorded depth of 0.80 m, increasing to 1.6 m depth in the vicinity of the reservoir. Generally, the made ground consists of reworked natural soils (Head Deposits or Hythe Formation), which comprises gravelly, silty sand and gravelly, sandy silt/clay.

Made ground or fill is by nature highly variable in both composition and bearing capacity and can be subject to large differential settlements when loaded. It is therefore generally unsuitable for use as a bearing stratum. In addition, made ground may contain contaminated and/or putrescible material. It can therefore be potential source of contamination and landfill gas. In this case no significant quantities of organic or putrescible material were found

6.1.2 Head Deposits

Limited extents of cohesive Head Deposits were identified in the southeast of the site during the most recent LEAP intrusive investigation and generally comprised gravelly sandy silty clay. Head Deposit soils were encountered at shallow depth across much of the southern half of the site during the 2024 LEAP investigation and across the wider site in the previous GRM investigations, although some of these clay soils have been named as weathered Hythe Formation soils in the 2024 LEAP report. Therefore, the assessment of cohesive soils in this section incorporates both Head Deposit and Hythe Formation cohesive soils from the different phases of investigation

The results of the geotechnical laboratory testing are summarised in **Table 8**.

Table 8: Summary of Geotechnical Test Results for Head Deposits

Test	Range
SPT 'N value' (SPT values from the 2025 LEAP investigation have been limited to an N value of 50)	50 (1 – 16)
SPT N ⁶⁰ value corrected (Hammer energy ratio 68% for this investigation and 68.97% for LEAP 2024 investigation)	57 (3 – 14)
SPT Cu Correlation (kN/m ²) ¹	21 - 97
Insitu Hand penetrometer UCS (kPa)	190 – 320
Shear Strength (Hand vane) (kN/m ²)	55 – 60 (20 – 52)
Shear Stress (Unconsolidated Undrained Multistage Triaxial Compression) (kN/m ²)	27 – 75

Test	Range
Moisture Content (%)	23.9 (15 – 23.6)
Percentage passing 425 µm sieve	(86 – 99)
Liquid Limit (%)	36 (25 – 34)
Plastic Limit (%)	20 (16 – 20)
Plasticity Index (%)	16 (7 – 16)
Sulphate Content (g/l)	(<0.010)
pH	(7.3)

() Data from previous investigations

¹ Calculated from the SPT N^{60} values, adopting an f_1 value of 6.9 (Stroud 1975)

The results of Atterberg Limit testing undertaken on the cohesive clay soils in the LEAP 2024 investigation indicate predominantly low plasticity clays. Two samples submitted for Atterberg Limit testing from the LEAP 2024 investigation returned as non-plastic. In addition, 1 No. Atterberg limit test was undertaken in the cohesive Head Deposits (BH402 at 1.50 m) during this investigation. The result indicates that the sample is an intermediate plasticity clay. The Atterberg Limit testing for the other Head Deposit sample tested (SA401 at 0.40 m) returned as non-plastic. The results are presented in an A Line plot in Figure 1 **Appendix B**.

In the LEAP 2024 investigation, 12 No. standard penetration tests were completed within the sandy clay soils the results ranged from $N^{60}=3$ to $N^{60}=14$ indicating soft to stiff sandy clays. During this investigation, two SPT's undertaken in the Head Deposit strata within BH402 in the southeast of the site returned values of $N^{60}=57$ and it is possible that rock or gravel bands were the cause of these high values.

The SPT results plotted against depth are included as Figure 2 in **Appendix B**.

Two undrained multistage triaxial tests undertaken within the shallow cohesive soils recorded undrained shear strengths of between 67 and 75 kN/m² in SA401 at 0.4 m and between 27 and 32 kN/m² in TP411 at 0.90 m. These compare with undrained shear strengths recorded using a hand shear vane in the range 55 to 60 kN/m² and based on the SPT N^{60} values in the range 21 to 97 kN/m² adopting an f_1 value of 6.9 (based on an average plasticity of 11%) but excluding the anomalous N^{60} values of 57. The undrained shear strength values plotted against depth are included as Figure 3 in **Appendix B**.

6.1.1 Weathered Hythe Formation

The topsoil, the made ground, and any Head Deposits are underlain by generally silty gravelly sand to a maximum depth of 3.65 m bgl. The results of the geotechnical laboratory testing are summarised in **Table 9** and **Table 10** below.

Table 9: Summary of Particle Size Distribution Tests for Sand/Gravels

Strata	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Cobbles (%)
Hythe Formation	9.0 – 14.0 (7.7 – 16.7)	10 – 22 (10.2 – 13.8)	54 – 65 (40.8 – 68.6)	5 – 22 (2.7 – 44.6)	0.0 (0.0)

() Data from previous investigations

Table 10: Summary of Geotechnical Test Results for Granular Weathered Hythe Formation

Test	Range
SPT 'N Value' (SPT values from this investigation have been limited to an N value of 50)	6 – 50 (1 - 80)
SPT N ⁶⁰ value corrected (Hammer energy ratio 68% for this investigation and 68.97% for LEAP 2024 investigation)	9 - 57 (1 - 92)
Sulphate Content (g/l)	<0.010 (<0.010 - 0.071)
pH	6.89 – 7.79 (6.5 - 9.8)
Laboratory CBR Tests on Remoulded Specimen (2.5kg rammer) (%)	1.8 - 7.1
Maximum Dry Density (Mg/m ³)	1.63 – 1.74
Optimum Water Content (%)	16 - 18

() Data from previous investigations

In the LEAP 2024 investigation, 45 No. standard penetration tests were completed within the granular weathered Hythe Formation. The tests returned N⁶⁰ values ranging from 1 to 92 indicating loose to very dense soils. Loose to very loose sandy soils were found in WS303 (N⁶⁰ = 4) from 0.40 – 1.60 m, WS312 (N⁶⁰ = 7 - 10) from 0.40 – 2.00 m, WS313 (N⁶⁰ = 7) at 1.20m, WS317 (N⁶⁰ = 7) at 2.00m, WS319 (N⁶⁰ = 1) at 2.00, WS320 (N⁶⁰ = 7) at 1.20 m, WS324 (N⁶⁰ = 7) at 2.00m, and WS324 (N⁶⁰ = 8 - 10) from 2.00 – 3.00 m. In contrast, in this investigation 11 No. SPT tests were undertaken in the granular weathered Hythe Formation, returning N⁶⁰ values of 9 to 57, with all apart from three returning N⁶⁰ values above 50, indicating that the majority of the granular soils are mainly very dense sand. However, an N⁶⁰ value of 9 was recorded in BH403 located in the centre south of the site at a depth of 1.2 m bgl indicating loose soils.

In the LEAP 2024 investigation, 9 No. particle size distribution tests were completed within the granular weathered Hythe Formation, and a further 3 No. particle size distribution tests were completed as part of this investigation. The results indicate that the weathered granular soils generally comprise a clayey, silty, gravelly sand.

6.1.2 Hythe Formation (Bedrock)

The weathered, predominantly granular horizons of the Hythe Formation onsite were underlain by the bedrock of the Hythe Formation, which comprises interbedded extremely weak to moderately strong sandstone and very strong limestones to maximum recorded depths during the investigation

of 20.00m bgl, . The results of the geotechnical laboratory testing are summarised in Table 11 below.

Table 11: Summary of Geotechnical Test Results for the Hythe Formation bedrock

Test	Range
SPT 'N Value' (SPT values have been limited to an N value of 50)	45 – 50
SPT N ⁶⁰ value corrected (Hammer energy ratio 68%)	50 – 57
Unconfined Compressive Strength (UCS) (MPa)	1.6 – 33.0
Point Load Strength Index, Is (50) (MPa)	0.02 – 3.33
Sulphate Content (g/l)	<0.010 – 0.013
pH	7.17 – 8.55

16 No. SPT tests were undertaken in the upper horizons of the bedrock of the Hythe Formation returning N⁶⁰ values in the range of 50 – 57 where all tests were terminated prior to achieving the full test depths.

18 No. uniaxial compression tests were performed on samples of rock returning UCS results ranging between 1.6 – 33.0 MPa. This indicates that the bedrock varies in strength between very weak and medium strong with no significant increase with depth.

A plot which shows the UCS values vs depth is included as Figure 4, **Appendix B** and indicates that the majority of the UCS results range between 1.6 and 7.1 MPa for sandstone and between 25.2 Mpa and 33.0 MPa for limestone. Point load tests undertaken on bedrock samples show results in the range 0.02 MPa to 0.72 MPa for sandstone and 1.25 MPa to 3.3 MPa for limestone with no significant increase with depth. A plot showing the point load strength index vs depth is included as Figure 5, **Appendix B**.

7 GEOTECHNICAL APPRAISAL

7.1 Geotechnical design

The foregoing geotechnical appraisal does not constitute a Geotechnical Design Report in accordance with BSEN1997. The following recommendations are for preliminary design purposes only.

For the detailed design, the short-term and long-term design situations must be considered. Where relevant, the following limit states should be considered:

- Loss of equilibrium of the structure or the ground, considered as a rigid body, in which the strengths of structural material and the ground are significant in providing resistance (EQU)
- Internal failure or excessive deformation of the structure or structural elements in which the strength of structural materials is significant in providing resistance (STR)
- Failure or excessive deformation of the ground, in which the strength of soil or rock is significant in providing resistance (GEO)
- Loss of equilibrium of the structure or the ground due to uplift by water pressure or other vertical actions (UPL)
- Hydraulic heave, internal erosion and piping in the ground caused by hydraulic gradients (HYD).

The following factors should also be considered:

- Overall stability and ground movements
- Nature and size of the proposed construction including the design life
- Conditions with regards to the surroundings (e.g. neighbouring structures, traffic, utilities, vegetation, contamination etc.)
- Ground and groundwater conditions
- Influence of the environment.

7.2 Geotechnical appraisal

7.2.1 Swelling and shrinkage

Based on the laboratory test results carried out on the cohesive Head Deposits and cohesive Hythe Formation carried out onsite to date, summarised in Section 6, an overall classification of NHBC **LOW** Volume Change Potential (VCP) is recommended for the cohesive Head Deposits.

Foundations will therefore require deepening in accordance with NHBC Chapter 4.2 where clay soils are encountered near trees. Foundation depths should be calculated based on the mature height of the tree, however, the existing height is relevant for trees which are to be removed.

Deepening may be terminated where the competent sand/gravel soils are encountered and therefore in the majority of locations across the site where clay soils were found to terminate <1.0 m bgl deepening is not likely to be required. Where clay soils are present that are deeper than this it was rare for them to be present at >2.0 m depth.

The BGS GeoClimate study (UKCP18)¹³ indicates the potential change in subsidence due to changes in climate. The results project a 6.5% of properties will be affected by swelling and shrinkage by 2030, rising to 11% by 2070 (compared to 3% in 2020).

7.2.2 Sulphates

Previous testing carried out during the LEAP 2024 investigation, which consisted of 9 No. samples of the sand/gravels and clays, found that both the sulphate content and oxidisable sulphides were low and therefore the soils were classified as Design Sulphate Class DS-1 and assuming mobile groundwater, the ACEC class is AC-1. This was consistent with the testing and assessment by GRM during the previous investigations.

For the recent LEAP investigation 5 No. samples of the Hythe Formation were tested for pH and water-soluble sulphate (BRE Suite A). 4 No. of the water-soluble sulphate results were below the limit of detection with 1 No. samples marginally above (13 mg/l for BH406 at 3.4 m); however, all results were well below 500mg/l (the threshold for DS1). These results are consistent with previous testing carried out by LEAP which classified the site, assuming mobile groundwater, as design sulphate class DS1 and ACEC class AC-1.

7.2.3 Groundwater

The groundwater monitoring results/observations are given in Section 5.3.1.1. During both of the LEAP 2024 and 2025 site investigations, groundwater strikes were not observed within any of the boreholes.

Of the 8 No. wells monitored in the LEAP 2024 investigation and the 14 No. wells monitored following the LEAP winter groundwater monitoring investigation, only 2 No. recorded groundwater in the LEAP 2024 investigation monitoring (WS207 and WS301) and only 4 No. recorded groundwater in the LEAP winter groundwater monitoring investigation (WS207, WS315, WS401, and WS404). These locations are across the southern half of the site, and the groundwater is considered likely to be perched. Therefore, on the basis of these results, variable groundwater levels should be anticipated, but any groundwater encountered during excavation works should be manageable by sump pumping.

Long-term groundwater monitoring was beyond the scope of works and would be required to fully assess the groundwater regime.

Winter groundwater levels are anticipated to rise in some areas of Southern England. Storage on site may be reduced and may make conventional soakaways inappropriate for this development.

Where groundwater is encountered, excavations in the granular soils below the water table would be unstable and running sands/gravels should be anticipated. Excavations extending below the water table will require dewatering.

¹³ <https://www.bgs.ac.uk/news/maps-show-the-real-threat-of-climate-related-subsidence-to-british-homes-and-properties/>

7.2.4 Soakage potential

7.2.4.1 Test results

Eight soakage tests were undertaken near the southern margins of the site in general accordance with BRE365¹⁴. Where the infiltration rate allowed, three tests were carried out per position. A plan which shows the location and reference of each attenuation pond is included in **Appendix B**, Drawing No. 3750966-LW-112-XX-D-G-22201-C01. The results are attached in **Appendix E** and are summarised below:

Table 12: Summary of Soakage Test Results

Test Location	Soakage Rate (m/s)	Targeted Geology	Comments
Attenuation Pond 1			
SA401	*Test 1: Test failed	Head Deposits & Hythe Formation	Test ran for three days, and the pit failed to reach 25% of max water depth. Data suggests a soakage rate of $<10^{-7}$ m/s. The incomplete test is likely associated with the presence of Head Deposits in this location, with stiff sandy clay identified between 0.20 – 0.60m.
SA402	#Test 1: 3.64×10^{-6} Test 2: 3.60×10^{-6} Test 3: 3.16×10^{-6}	Head Deposits & Hythe Formation	Three tests were carried out. Test 1 not taken to completion; however, Test 1 was close to 75% max water depth. Test 2 and 3 nearly emptied at the end of testing.
Attenuation Pond 2			
SA403	#Test 1: 3.64×10^{-6} #Test 2: 3.27×10^{-6} #Test 3: 2.54×10^{-6}	Hythe Formation	Three tests were carried out although results are not fully compliant with BRE365 requirement since water levels did not fall to 25% of max water depth.
SA404	#Test 1: 3.72×10^{-5} Test 2: 3.31×10^{-5} Test 3: 2.83×10^{-5}	Hythe Formation	Three tests completed. Test 1 was not taken to completion; however, Test 1 was close to 75% max water depth. Tests 2 and 3 were completed in accordance with BRE365. Pit was emptied at the end of test 2 and nearly emptied at the end of test 3.
Attenuation Pond 3			
SA405	Test 1: 4.99×10^{-5} Test 2: 2.00×10^{-5}	Hythe Formation	Three tests completed in accordance with BRE365. Pit was nearly emptied by the end of each test.

¹⁴ Building Research Establishment DG365: 2016. Digest Soakaway Design

Test Location	Soakage Rate (m/s)	Targeted Geology	Comments
	Test 3: 1.98×10^{-5}		
SA406	#Test 1: 8.51×10^{-6} Test 2: 5.36×10^{-6} Test 3: 4.83×10^{-6}	Hythe Formation	Three tests completed. Test 1 was not taken to completion; however, Test 1 was close to 75% max water depth. Tests 2 and 3 were completed in accordance with BRE365.
Attenuation Pond 4			
SA407	*Test 1: Test Failed *Test 2: Test Failed	Hythe Formation	Two tests were carried out across three days, both tests were incomplete. Testing not in accordance with BRE365. Data suggests a soakage rate of $<10^{-7}$ m/s.
SA408	Test 1: 3.94×10^{-5} Test 2: 2.16×10^{-5} Test 3: 2.31×10^{-5}	Hythe Formation	Three tests completed in accordance with BRE365. Pit was nearly emptied by the end of each test.

*Italics = Test not carried out fully in accordance with BRE365

In general where a test has not been able to be taken to completion – i.e. water levels have not dropped to <25% of the maximum water depth during the test period, then it is not possible to provide an infiltration rate compliant with BRE DG365 and the test is deemed to have failed. This is the case for the tests which were carried out in SA401 and SA407.

For some or all of the tests in SA402 and SA403 the quantity of water added to the pit raised water levels above the top of the gravel infill and measurements were taken from this higher level. In some tests this has meant that the test was stopped slightly before water levels dropped to 25% of the water depth within the gravel filled section of the pit, though had fallen to <25% of the maximum water depth. For conservatism the calculation which has been completed has been based upon the water drop within the gravel filled section of the pit only. If calculations are carried out based on the full depth of water placed in the pit (including the water above the gravel infill) then the results show a similar calculated soakage rate.

In comparison to the previous investigation findings, the results of previous soakage testing by GRM (Section 2.3) indicated potential but variably good performance in the Hythe Formation, and generally poor but variable performance in the Head Deposits, with rates that might not be generally feasible for the use of soakaways.

7.2.4.2 Recommendations

Based on the above results, none of the proposed attenuation ponds have a full set of testing which is fully compliant with BRE365. However, the results obtained are considered suitable for preliminary design. The lowest rate recorded at each location should be adopted for soakaway design purposes.

It is not known as to what assumptions have been made with regards to soakage rates with regards to the current preliminary drainage solution design. For Attenuation Pond 1 and Attenuation Pond

4, due to the poor soakage rates ($\times 10^{-7}$), these proposed locations may not be suitable for the proposed drainage solution, and if an alternative location cannot be found, allowance should be made for surface water to be piped off site at this stage. For Attenuation Ponds 2 and 3, whilst soakage rates are low ($\times 10^{-6}$), they may be considered appropriate for the current proposed drainage design. However, for each attenuation pond, additional testing which is fully in accordance with BRE DG 365 may be required in order to provide accurate information for final design and ensure regulatory approval.

As an alternative to additional testing, it may be possible to amend the proposed drainage design to allow for slower soakage, such as changing the size or the location of the proposed attenuation ponds.

The Head Deposits are classified as a Secondary A Aquifer and the underlying Hythe Formation is classed as a Principal Aquifer and therefore all attenuation should penetrate the made ground and drain freely into the natural soils to ensure leaching of any potential contaminants from the made ground does not occur as a result of attenuation construction. The Environment Agency and/or Local Authority should be consulted during the planning of attenuation to establish any restrictions or control measures that may be required.

An assessment of the peak groundwater levels across the winter months (October to March) may be required by the local authority to further assess the potential of groundwater elevation where attenuation is proposed.

The risk of “gulls” or swallow holes being present onsite is low. However, water ingress into gulls is the most common cause of ground instability and collapse on such sites. In addition, discharge of surface water into gulls can cause abnormal increases in groundwater levels or springs downslope. It is therefore recommended that soakaways are installed within competent rock at depths in excess of 2.0m below ground level and any gulls identified are avoided for such installations.

Due to the underlying geology (Hythe Formation) and therefore given the potential for gulls to remain undiscovered on site and the instability induced in such features from water ingress, it is also recommended that soakaways are kept remote from all proposed structures, at a minimum distance of 15 m.

7.2.4.3 Sustainable considerations for soakage design

Winter groundwater levels are anticipated to rise in some areas of southern England. Storage on site may be reduced and may make conventional soakaways inappropriate for this development.

Design of a SUDS scheme which can incorporate biodiversity net gain into the development and will support the NPPF requirement for multifunctionality managing water quality and design while improving diversity.

7.2.5 Bearing capacity and foundations

7.2.5.1 Shallow foundations

Allowable Bearing Capacity or Pressure is a conservative estimate of the ultimate bearing resistance of the ground, selected on the basis of the soil/rock description, and taking a presumed degree of settlement into account. It has traditionally been used to check simple foundation designs.

The use of this method is acceptable under BS EN 1997-1¹⁵ as a “prescriptive method”, with the allowable bearing pressures now termed “presumed bearing resistance”.

The presumed bearing resistance is highly dependent on proposed depth of foundation, width of foundation and the structure’s tolerance for settlement. The following section provides a preliminary presumed bearing resistance assuming a stated depth and width of foundation and assumes that settlements of up to 25 mm can be tolerated by the structure. Should alternative foundation depths and dimensions be required, or the proposed structure have different long term movement requirements then the following assessment should be re-evaluated.

All loads should be transferred beneath any topsoil, made ground, loose, soft, low strength, desiccated or disturbed soils and transferred onto the medium dense to dense sands at 1.2 m depth. On the basis of the findings of the intrusive investigation to date, a preliminary presumed bearing resistance of 150 kN/m² may be assumed for a 600 mm wide foundation on the medium dense to very dense sands. However, if foundation excavations are still found to be within clay soils at this depth, then they should be deepened until they encounter sands/gravels due to the variable strength of the surficial clay soils recorded across the site.

Further information may be required for the detailed design stage, including the foundation design details and further investigation to meet the requirements of BS EN 1997 and BS 8004¹⁶.

Further assessment of the ground conditions below the existing reservoir in the centre of the site will be required in order to finalise foundation design in this location.

Where foundations are stepped or span different soil types, allowance should be made for nominal reinforcement.

Whilst no significant evidence of the presence of gulls across the site have been detected there remains the risk, albeit low, that these could be located within the area. As such it may be prudent to consider precautions against the presence of undetected gulls. These could include the following:

- Probing of the proposed building footprint to establish the nature and extent of any loose/soft zones.
- Cruciform shaped, reinforced foundations, extending at least 1m beyond the proposed building corner in both directions and designed to span a minimum of 3m.
- Proposed buildings should be limited to low rise structures, with proposed footprints kept as square as possible. Long terraces and linked buildings should be avoided.

7.2.5.2 Construction supervision

Foundation excavations should be inspected by a suitably qualified engineer prior to pouring concrete to ensure competent soils, in this case medium to very dense sands are encountered at formation level.

¹⁵ BS EN 1997-1(2004)+A1:2013 Eurocode 7:Geotechnical Design: General Rules

¹⁶ BS 8004:2015+A1:2020 Code of Practice for foundations

7.2.5.3 Piling

Where foundations need to be deepened, as per the Client provided 'Found Strategy Redrow Option 1', Drawing No. BR31251-JNP-XX-XX-SK-S-0009, included in **Appendix B**, a piled foundation solution may be more appropriate. It is anticipated that despite the moderately shallow rock across the site, due to the proposed engineered fill across the south of the site, the depth to the rock head might increase to a point where piled foundations are more viable than strip foundations, to avoid the need to found in the engineered fill.

For the ground conditions encountered on site, suitable pile types for this site include bored cast-in-situ piles with a permanent casing.

It should be noted that for bored piles in dense granular soils, the method of installation can have a significant effect on the density of the surrounding soils and therefore the angle of shearing resistance that may be used for design. A reduction in angle of shearing resistance of in the region of 10-30% may occur, depending on the drilling techniques selected. The direct use of in-situ testing for design should therefore be carefully considered, particularly in accordance BS EN 1997. The most reliable method to obtain compliance with BS EN 1997 would be to use static load tests to obtain the ULS resistance.

Allowance should be made for negative skin friction loads where ground levels are to be raised.

No trees were noted on site during the most recent LEAP investigation, however if any trees are to be removed, consideration of the effects of swelling of the clay soils and the potential for uplift should be considered. Allowance should be made for reinforcement of the upper half of the piles if uplift forces are anticipated. This is likely to not be an issue as few cohesive horizons were noted during the previous investigations.

Extremely weak to moderately strong sandstone should be anticipated, and allowance should be made for drilling at least 1.0 m into bedrock to install a rock socket into the competent unweathered Hythe Formation interbedded sandstone and limestone. From approximately 2.0 m to 4.0 m below existing ground levels rock should be anticipated.

Discussions should be held with the specialist piling contractors to assess the technical and financial merits of their various systems for the ground conditions encountered, and the depth and size of pile required, with an adequate safety margin.

The final pile design will be determined by the selected piling contractor as the method of pile formation will affect the bearing capacity. For the purpose of preliminary design, the following ground model may be adopted. For this conservative design the weak sandstone is assumed to be the rock that the pile is socketed into.

Table 13: Ground Model for Preliminary Pile Design

Depth to base (m)	Soil Type	Unconfined Compressive Strength (MPa)
4.0	Made Ground / Head Deposits / Weathered Hythe Formation	n/a

Depth to base (m)	Soil Type	Unconfined Compressive Strength (MPa)
<20.0	Hythe Formation bedrock (Interbedded Sandstone and Limestone)	1.6

Adopting the above model, the piled foundations should be installed as a rock socket 1.0 m into the competent Hythe Formation bedrock. The allowable unconfined compressive strength of the Hythe Formation at this depth is 1.6MPa.

The final design must be carried out by the specialist contractor in accordance with their preferred method of formation

7.2.6 Floor slabs

With reference to NHBC Standard 5.1, ground bearing floor slabs may be applicable on site provided:

- Trenches are backfilled with suitable material and fill is properly compacted
- Infill is less than 600 mm in depth and properly compacted
- Bearing capacity and nature of the soils encountered are consistent across the proposed development
- Foundations are not affected by trees.

Therefore, ground bearing slabs may be appropriate in some areas of the site. However, with reference to NHBC Standard 5.2, suspended floor slabs are recommended:-

- Where the depth of fill exceeds 600 mm
- Where foundations are deepened below 1.5 m in accordance with NHBC Standards Chapter 4.2
- Where desiccated soils are encountered
- Where soils at high risk of swelling are encountered
- Where vibratory ground improvement techniques have been used
- On sloping sites
- Where foundations have been piled.

The site has been assessed as low risk from Radon gas, land gas and vapours. Special precautions are not likely to be required in the floor slab design.

7.2.7 Roads

7.2.7.1 Test results

Three laboratory CBR tests were undertaken on samples of the shallow weathered Hythe Formation clay, silt and soils and returned CBR values in the range of 1.8% to 7.1% but are generally in the range 1.8% to 3.3%. The results are attached in **Appendix F**.

Given the high silt content of the silty sands, detailed in Section 6.1.3 with silt contents up to 22%, allowance should also be made for a frost susceptible subgrade.

7.2.7.2 Recommendations

A design CBR value of 1.5% is recommended for a silty sand clay subgrade. However, further confirmatory testing may be required if the proposed roads are to be adopted.

Made ground soils are highly variable and therefore if such soils are encountered at formation level, over excavation to, say 1.00 m below ground level, proof rolling and then controlled back filling to formation level with a suitable granular fill is recommended.

7.2.8 Excavations

Excavations in made ground and loose superficial soils are likely to be unstable and subject to collapse. Close lateral support will be required in all excavations where man entry is required.

Excavations in the silty clays should be stable in the short term. However, groundwater seepages should be anticipated along the more granular horizons and long-term groundwater levels at or above 1m below ground level should be anticipated. Excavations will therefore be unstable in the long-term and should be backfilled as soon as possible. Allowance should be made for light pumping.

Appropriate Health and Safety precautions must be adhered to where man entry into excavations is required. Even stiff clay soils at shallow depth can collapse, particularly following wet weather. Alternative foundation methods may need to be adopted where trench footings cannot be safely or satisfactorily constructed.

7.2.9 Filling

LEAP understands that earthworks comprising cut and fill activities for the purpose of creating level construction platforms are proposed as part of the development, , as detailed on Client provided drawing 'Earthworks Assessment', Drawing No. H9376-RSK-XX-XX-DR-C-361051 Rev T04, **Appendix B**. The total proposed volume of cut is 35,400.6 m³ and total proposed volume of fill is 17,901.5 m³ with material cuts of up to 2.8 m depth and fill depths of up to 2.4 m.

Raising of ground levels may induce significant settlement, particularly across the areas of deep made ground and soft compressible clays, which could adversely affect foundation design, drainage etc. Where significant changes in ground levels are proposed then further investigation will likely be required to assess the impact of such earthworks on the above recommendations. Investigation beneath the existing reservoir will be required following dewatering to determine the thickness and condition of the liner, and whether it will require removal prior to filling activities in this area.

Further guidance on the technical requirements and recommendations for using engineered fill on the development is given in NHBC Standards Chapter 4.6¹⁷.

7.2.10 Slope stability

The site slopes gently down to the south, with a change in level of up to 20 m. The northern part of the site also slopes gently downwards to the north/northwest into a stream valley / railway line with some retaining structures observed. Significant cut and fill activities are planned as part of the proposed development which have the potential to cause slope instability

General recommendations for developing on slopes include the following:

- Care must be taken to ensure that any cut and fill operations do not destabilise the slope or surrounding neighbouring slopes such as the adjacent railway line. As a general principal, loading at the crest and cutting at the toe would have such an effect
- Retaining walls should be avoided, if possible, kept to a maximum height of 600mm where necessary, and include adequate drainage. Retaining walls exceeding 600mm in height should be designed by a suitably qualified engineer
- Filling of subfloor voids should be avoided
- Drainage of the site will be crucial
- All drains should be laid at twice the normal fall to accommodate any local ground movement
- Where houses include partial basements, allowance should be made for the design of the walls as retaining structures
- Vegetation will have stabilising effect and should be maintained for as long as possible
- Introduction of water into the slope must be avoided. Soakaways should be kept remote from slopes and services at the slope crest should be designed accordingly, with, for example, clay breaks in the surround
- Excavations across the slope should be avoided if possible. Where necessary, they should be kept to short lengths, say 5m, and backfilled immediately.

Caution should be taken to ensure that proposed slope designs factor in climate resilience. Climate change modelling indicates drier summers and more intense wet weather periods in future.

With the significant level changes anticipated as a result of the proposed earthwork activities, a global stability check is recommended at the location of all proposed slopes.

7.2.11 Retaining walls

At this stage, details of proposed retaining walls have not been provided. By way of general comment, care should be taken to ensure any retaining walls are founded on competent soils and do not upset the overall stability of the slope. Low retaining walls up to 600mm high may be used providing the overall safe slope is not exceeded. Retaining walls exceeding 600mm in height should be designed by a suitably qualified engineer.

¹⁷ NHBC Standards Chapter 4.6 Engineered Fill

Care must be taken to ensure any loads are kept remote from the retaining walls or extend below the base of the retained soils.

Retained soils must be adequately drained to prevent the build up excess porewater pressures. For smaller retaining structures, alternatives such as gabion walls, soil nailing or the use of ground improvement techniques may be considered as an alternative.

7.2.12 Settlement

Based on the presumed bearing resistance given in Section 7.2.5, settlements should be within typical tolerable limits for the low-rise development proposed.

If soft clays are encountered at formation level or below, significant settlement should be anticipated, and serviceable limit state analyses will be required. For Geotechnical Category 2 structures, detailed settlement analyses are usually required.

At this stage it is assumed that proposed ground levels will vary significantly to existing ground levels across much of the site which may induce significant settlement in the natural soils, particularly where fill activities are proposed, and detailed settlement analyses will be required.

Where foundations are stepped or span different soil types, differential settlement should be anticipated, and allowance should be made for nominal reinforcement.

7.2.13 Heave and uplift

In accordance with NHBC Standards Chapter 4.2, precautions against heave should be used where foundations are within the influence of trees and the resulting foundation depth is greater than 1.5m. Compressible material must be provided against the inside faces of all external wall foundations greater than 1.5 m in depth. For pier and beam foundations, additional voids are required below ring beams.

Heave may also occur where shrinkable soils are unloaded, such as during earthworks cuts. To avoid uplift pressures, voids or buffer zones should be left beneath floor slabs. As a preliminary guide, allowance should be made for a 300mm void for highly shrinkable clays, reducing for lower plasticity soils. This should be confirmed at the detailed design stage.

For piled foundations, the effect of uplift induced by heave must be included in the pile design. Piles should be reinforced for the length of pile governed by the heave design, and allowance should be made for the inclusion of void former or similar on the underside of ground beams.

7.2.14 Swallow holes

The site is situated within a low risk area for swallow holes. However, due to the underlying geology (Hythe Formation), this risk must still be considered. The risk of gulls and swallow holes opening within the wider site, away from structures, is possible where significant discharge of water into the underlying sands could occur, for instance in the location of soakaways or from a burst water main. As such the potential for gulls/swallow holes to occur onsite cannot be discounted or designed against and the reputational (and possibly financial) impact of any such occurrence should not be underestimated. It is essential that **all efforts to minimise surface water migration into sand soils are adhered to**. In particular, the design of water supply and sewer pipes should take into account the potential for relatively large settlements to occur where ground levels are raised and be designed accordingly.

7.3 Geotechnical recommendations

Further assessment including a geotechnical design report will be required once the details of the proposed construction are known.

Further assessment of the ground conditions below the existing reservoir will be required in order to finalise foundation design for these locations.

Discussions should be held with specialist piling contractors to assess the technical and financial merits of their various systems for the ground conditions encountered.

Consideration should be given as to the need for additional confirmation regarding the absence of gulls across the site, including the potential for probing at foundation locations. Alternatively, the proposed foundation solution may be considered adequate to address the potential risk.

Further assessment of the stability of the slopes and retaining wall requirements will be required to inform detailed design.

Further consideration regarding the proposed drainage design and soakage rates should be made to determine whether additional testing is necessary.

Detailed settlement analyses will be required where fill activities are proposed.

An assessment of the peak groundwater levels across the winter months (October to March) is recommended to further assess the potential of groundwater elevation and may be required by the local authority where attenuation basins are proposed.

8 GEO-ENVIRONMENTAL QUANTITATIVE RISK ASSESSMENT

8.1 Revised Conceptual site model

Following completion of this phase of site investigation, no revisions to the previously derived CSM are considered necessary before carrying out the generic quantitative risk assessment (GQRA). Section 4.1 sets out the details of the CSM including identified sources, pathways and receptors.

8.2 Human health risk assessment

8.2.1 Rationale and approach

The generic quantitative risk assessment (GQRA) for human health was conducted in line with the CLEA methodology by comparing the soil analytical results from the ground investigation with Generic Assessment Criteria (GAC). The GACs were selected using the rationale and assumptions provided in **Appendix I**.

Sets of soil GACs are available for SOMs of 1%, 2.5% and 6%. Using the conversion of SOM = TOC x 1.72. Table 14 below gives the range of total organic carbon and soil organic ranges from both this and the 2024 **LEAP** investigations, however, excludes the testing on the waste stockpiles which is being commented on in a separate waste classification report.

Table 14: Total Organic Carbon and Soil Organic Matter Ranges for Soil Populations

Population	No. of Samples	TOC Range (%)	SOM Range (%)
Topsoil	12 (10)	0.41 – 2.15 (0.28 – 2.7)	1.1 – 3.7 (0.48 – 4.64)
Made Ground	6 (26)	0.31 – 1.72 (0.09 – 4.3)	0.5 – 3.0 (0.15 – 7.4)
Natural	1 (8)	0.74 (0.09 – 0.51)	1.3 (0.15 – 0.88)

(i) Results from 2024 **LEAP** investigation

As a conservative approach and given the number of samples tested, GACs have been selected based on 1% SOM for each soil population.

For some contaminants of concern, direct contact will be the dominant pathway for exposure. In order to support with development options, human exposure to all unsaturated soils, irrespective of depth, has been considered for the purpose of this assessment. This will maximise the information available to the design team on the suitability of all unsaturated material and can support with their materials management options.

Whilst the number of samples which have been tested across both this investigation and previous investigations are sufficient to enable statistical analysis in accordance with CL:AIRE 2020¹⁸ the nature of the results has meant that this has not been thought necessary to complete for this risk assessment.

The focus of the GQRA was chronic risks to human health because these often occur at lower doses than acute responses to exposure. Groundworkers during construction and future maintenance may be exposed to unacceptable levels of contamination. The CLEA assessment approach is designed to evaluate long term chronic exposure to contaminants and therefore, this approach is not appropriate for groundworkers who will be exposed for short durations on a site. As such, a GQRA was not undertaken to evaluate the potential for unacceptable exposure to groundworkers and future maintenance workers. A qualitative evaluation is however, provided in Section 8.2.3.

8.2.2 Evaluation of potential risks to future residents

The soils that were analysed comprised topsoil, made ground, and the underlying subsoil. The laboratory analytical results were assessed to determine the potential risks to future site users under a generic residential land use scenario assuming that homegrown produce are consumed (RES_{HGP}). The quantitative risk assessment for the LEAP 2024 and 2025 investigations is provided in **Appendix G** and the laboratory certificates are provided in **Appendix H**. A summary table for the LEAP 2025 and 2024 intrusive investigation results is provided in **Table 15** below. Only detected metals and hydrocarbons have been included within the table. This table excludes the testing on the waste stockpiles (SP1 and SP2) which are being commented on in a separate waste classification report.

Table 15: Summary of soil contamination test results

Determinand	Number of samples	Number >LOD	Maximum Conc. (mg/kg unless otherwise stated)	Generic Assessment Criteria (mg/kg)	Number of Exceedances
METALS					
Arsenic	20 (44)	20 (18)	7 (36.1)	37	0 (0)
Cadmium	20 (44)	3 (27)	5 (2.2)	22	0 (0)
Chromium	20 (44)	20 (41)	14 (81.8)	910	0 (0)
Hexavalent Chromium	20 (44)	0 (0)	<1 (0)	21	0 (0)
Copper	20 (44)	20 (44)	30 (88.5)	2400	0 (0)
Lead	20 (44)	20 (44)	33 (276)	200	0 (1)

¹⁸ CL:AIRE, 2020 'Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration.' CL:AIRE, Buckinghamshire. ISBN 978-1-905046-35-5.

Determinand	Number of samples	Number >LOD	Maximum Conc. (mg/kg unless otherwise stated)	Generic Assessment Criteria (mg/kg)	Number of Exceedances
Mercury ¹	20 (44)	0 (20)	0.18 (0.7)	40	0 (0)
Nickel	20 (44)	20 (44)	11 (28.8)	130	0 (0)
Selenium	20 (44)	0 (0)	<1 (0)	250	0 (0)
Zinc	20 (44)	20 (44)	75 (476)	3700	0 (0)
ASBESTOS					
Asbestos	20 (44)	1 (0)	<0.001%	Presence	1 (0)
HYDROCARBONS					
Benzo(a)pyrene	20 (44)	3 (26)	0.24 (39.7)	5.0	0 (1)
Naphthalene	20 (44)	0 (4)	<0.03 (10.6)	2.3	0 (1)
Total PAHs	20 (44)	2 (21)	0.7 (576)	n.v. ³	n/a
Total petroleum hydrocarbons	(4)	5 (0)	75 (<42)	n.v.	n/a

Notes to table

1. () = LEAP 2024 investigation results
2. Assessment criterion based on methyl mercury
3. As n.v. – no appropriate value

8.2.2.1 Metals

Of the 20 No. samples tested for metals in the recent LEAP investigation, all were below their relevant screening criteria for RESI_{HGP}.

In the LEAP 2024 investigation, one sample of made ground taken from HA301 at 0.2 m bgl in the storage area in the northwest of the site, recorded a lead concentration of 276 mg/kg, which is in exceedance of the GAC of 200 mg/kg for the RESI_{HGP} end-use. There were no other exceedances for metals in the LEAP 2024 investigation.

8.2.2.2 Asbestos

20 No. samples were tested for asbestos in the recent LEAP investigation and loose chrysotile fibres were identified in 1 No. sample from the topsoil at 0.20m bgl in TP420 in the north of the site. The asbestos quantification result for this sample was below the limit of detection (<0.001% by weight) indicating a very low quantity of chrysotile.

No asbestos was identified in any of the tested samples collected during the LEAP 2024 investigation.

8.2.2.3 Hydrocarbons

Of the 20 samples tested for polyaromatic hydrocarbons in the LEAP 2025 investigation, all were below the screening values for RESI_{HGP}. However, of the 44 No. samples tested for polyaromatic hydrocarbons in the LEAP 2024 investigation, 1 No. sample of the made ground from HA303 at 0.25 m bgl, identified concentrations of PAH compounds in exceedance of the GAC for RESI_{HGP} end-use. Specifically, benzo(a)pyrene, with a concentration of 39.7 mg/kg compared with the GAC of 5 mg/kg, and naphthalene, with a concentration of 10.6 mg/kg compared with the GAC of 2.3 mg/kg. The benzo(a)pyrene concentration also exceeded the GAC for POS_{RESI} of 10 mg/kg.

There were no exceedances for petroleum hydrocarbons in either the LEAP 2024 or 2025 investigations.

8.2.2.4 Pesticides and Herbicides

There have been no exceedances of pesticides or herbicides against their respective screening values for RESI_{HGP} during this investigation or the previous LEAP 2024 investigation.

DDT (dichlorodiphenyltrichloroethane) is a persistent organochlorine insecticide commonly used in agriculture from the 1930s to the 1980s, however was banned in the late 1980s due to the adverse toxicological effects on human health. DDT exists as several stable isomers however is more commonly detected as p,p-DDT. Over time DDT breaks down into DDE (dichlorodiphenyldichloroethylene) and further into DDD (dichlorodiphenyldichloroethane). DDT may have been used as an insecticide when the site was first active as agricultural land, however, is more likely to have been used when the site became a nursery. At present there are no published GACs for which to assess the concentrations of DDT, DDE and DDD in the soils, however in the LEAP 2025 investigation DDD and DDT concentrations were all below limit of detection and DDE was only marginally above limit of detection in one location (0.02mg/ml in HA416 at 0.1m bgl).

8.2.2.5 Summary

In the LEAP 2024 investigation two samples taken from hand excavated pits in the northwest of the site exceeded the respective GACs for Benzo(a)pyrene, Naphthalene and Lead for a RESI_{HGP} end-use scenario. During this investigation one topsoil sample was found to contain asbestos at a level below the quantification limit of 0.001% from a trial pit in the northwestern region of the site. None of the other samples tested from exploratory positions elsewhere across the site during the current and previous LEAP investigations contained any of the contaminants of concern in exceedance of their respective GACs for a RESI_{HGP} end-use scenario.

8.2.3 Evaluation of potential risks to groundworkers

There is a legal duty for employers to ensure that suitable health and safety controls should be in place to protect groundworkers and they should evaluate the potential for exposure including using data provided in this report which should be included in any future Health and Safety file for the site under The Construction (Design and Management) Regulations 2015.

In this case, employers should consider, amongst others: exposure to asbestos containing materials in the western region of the site associated with the existing buildings and direct contact with potentially contaminated soils with loose asbestos fibres in the north of the site.

8.3 Controlled waters risk assessment

The previous investigations by GRM identified a negligible risk to controlled waters based on low concentrations of contaminants within the made ground soils, and leachability testing producing no results in exceedance of their respective threshold values. With the exception of samples of made ground in HA301 and HA303 located within the northwest of the site and which contained concentrations of lead at HA301 in exceedance of its GAC, and two PAH compounds at HA303 in exceedance of their GAC, none of the other samples tested onsite contained any leachable contaminants of concern at concentrations above their respective GAC for the proposed RESI_{HGP} end-use scenario. At the concentrations encountered, the current assessment maintains that the risk to controlled waters is negligible.

8.4 Ground gas risk assessment

Ground gas monitoring and risk assessment was undertaken during the previous investigations undertaken by GRM and LEAP as summarised in Section 3.3 and considered a Characteristic Situation of CS1 (very low gas risk) to be appropriate for the site. Following the findings of the recent LEAP investigation, no additional sources or pathways have been identified and therefore no revisions to the CSM are required.

8.5 Limitations and gaps in information

The previous third-party (GRM) Phase I and II ground investigations supplied by the Client were used as the starting point for the preliminary risk assessment with further investigation undertaken by LEAP to fill gaps in the data and reduce risk.

It should be noted that only the accessible regions of the site were investigated by LEAP, and demolition work is still outstanding in the western region of the site which is fenced off due to asbestos risk from existing buildings. The fenced off reservoir in the centre of the site will require further investigation once dewatered. These inaccessible areas are shown on the constraints plan in **Appendix B**, Drawing No. 3750966-LW-113-XX-D-G-11302-C02. The instructed reduced scope investigation does not meet the BDW standard requirement for ground investigation of a brownfield site which specifies 10 m spacing of exploratory holes and additional investigation to fulfil this requirement may be required.

Access to parts of the site have been limited due to the presence of buildings and other structures, areas of hardstanding and dense undergrowth. As such, there remains the potential for contamination to be present which has not been identified during the previous and current phases of works.

8.6 Geo-environmental conclusions

A geo-environmental assessment has been completed based on the intrusive works and chemical analysis completed for this recent investigation phase and also by assessing the information from the previous investigations carried out onsite. The investigation works carried out to date recorded that the majority of the site consists of topsoil / reworked topsoil over reworked natural (made ground), over the superficial Head Deposits in the south, overlying the Hythe Formation, consisting predominantly of gravelly, silty sand over sandstone and limestone bedrock at depth.

In the LEAP 2024 report, it was noted that the investigation works recorded a shallow depth of made ground associated with trackways and access route, with a shallow thickness of concrete underlain by subbase materials in storage areas and around buildings in the northwest and west of the site. However, in the recent investigation the made ground encountered was predominately reworked natural soils associated with the demolition activities which took place between the LEAP 2024 and LEAP 2025 investigations, and therefore comprised reworked weathered Hythe Formation (gravelly, silty sand) and reworked Head Deposits (interbedded sand and clay). No visual or olfactory evidence of contamination was found in the topsoil, reworked natural, or made ground in either of the LEAP investigations.

Chemical analysis of samples detected two made ground samples in the northwest corner of the site with concentrations of contaminants in exceedance of their respective GACs for a RESI_{HGP} end-use scenario, with an exceedance of lead in HA301, and an exceedance of naphthalene and benzo(a)pyrene in HA303. Loose asbestos fibres were identified in one sample of topsoil in TP420 in the north, however the quantification result was below the limit of detection. No further contamination was encountered in the in-situ made ground or topsoil across the wider site, nor was any contamination encountered in the underlying natural soils.

The concentrations of lead, naphthalene, and benzo(a)pyrene in the made ground in the northwestern region of the site represent an unacceptable risk to human health if private gardens are proposed, and at the concentrations recorded in HA303 both benzo(a)pyrene and naphthalene also represents an unacceptable risk if this area is proposed public open space within a wider residential development, where direct contact pathways are feasible. Naphthalene also presents a potential vapour risk if present beneath residential dwellings however, based on the proposed layout provided to us by the Client we understand that houses are not proposed in the northwest of the site.

Based on the findings of this assessment the risk to controlled waters is considered to be negligible.

Ground gas monitoring and a subsequent ground gas risk assessment has placed the site within a Characteristic Situation CS1.

Investigation was not possible in and around the existing buildings in the west, nor in and around the existing reservoir in the centre of the site. Therefore, further investigation into these areas is required and if significant made ground or organic material is encountered in these areas then further gas risk assessment may be required.

8.7 Geo-environmental recommendations

The majority of the made ground onsite, and the topsoil and natural soils, are considered to be free from significant contamination and are suitable for reuse as part of the proposed residential development onsite.

The made ground in the northwest of the site has been found to be impacted with benzo(a)pyrene, naphthalene and lead. Based on the lack of contamination encountered in other trial holes in the vicinity of HA301 and HA303 in the northwest, it is considered that the exceedances encountered in HA301 and HA303 are likely to be localised hotspots of contamination, as opposed to representing wider contamination issues. It is recommended that further investigation is carried out in these areas in order to delineate the extent of this contamination. In addition, where asbestos was found in the topsoil in the north of the site, further investigation is recommended to determine

if it is an isolated exceedance or an indication that wider asbestos contamination is present. It is possible that the asbestos is associated with the demolition of the structures that existed in this area.

It is noted that both HA301 and HA303 are located in areas where residential housing is not currently proposed and based on this end use, the lead contamination in HA301 is not considered to pose a risk to end users and can remain insitu. However, the benzo(a)pyrene concentration exceeds the GAC for a public open space end use and the impacted soils in this area will require removal. A remediation strategy should be prepared to deal with the hotspots, including details of excavation areas and verification requirements.

Further investigation will be required in the footprint of the buildings in the west following demolition of the structures and in the footprint of the reservoir. Any contamination encountered should be included in the remediation strategy.

Whilst ground gas monitoring to date identified a low risk from ground gases and characterised the site as CS1, it is noted that the presence of buildings and dense vegetation limited the spacing of the monitoring well installation at the time of the LEAP 2024 investigation. Should any further made ground or organic rich soils be encountered in these areas then further gas risk assessment may be required.

The findings of this report should be revisited if the development scheme changes significantly, for example if the layout of the site changes significantly, to ensure that they remain valid.

8.8 Waste reduction

8.8.1 Soil retention

Soil contains approximately three times as much carbon as the atmosphere. As such minimising its disturbance on site not only minimises the loss of soil for carbon storage but retaining as much soil as possible allows for biodiversity net gain and reduces the risk of surface flooding.

Where possible disturbance of soil functionality during earthworks needs to be minimised. Poorly managed soils that has been compacted in storage will have a degraded physical structure and reduced capacity to maintain above and below ground biodiversity.

The proposed layout indicates public open space and where possible the excavation from soils in these areas should be avoided.

8.8.2 Soil reuse

Prior to development, consideration should be given to any on-site materials and their potential for re-use as part of, or during construction of, the proposed development.

8.8.3 Topsoil re-use

Site-won topsoil is a resource and should, where possible, be treated as such to prevent damage to the soil structure. Where topsoil is to be stripped, stockpiled and re-used such activities should be undertaken during dry weather (generally June to September). Once stockpiled, topsoil should be kept dry. Significant working of topsoil whilst wet can damage the soil structure, reducing the soils' ability to drain and resulting in anaerobic rather than aerobic soil conditions.

Anaerobic soil conditions can have a negative impact on plants and their roots, which will impact the ability of plants to take root once the soil has been placed for its proposed end use. Machinery tracking over recently placed topsoil should be avoided. Should prolonged poor storage result in degradation of the soil some treatment is likely to be required. This may include sand amelioration to improve the soil structure or the addition of composts to reduce nutrient deficiency.

Re-use of made ground and contaminated natural materials at the site, as well as importation of uncontaminated natural materials will require a Materials Management Plan (MMP) to be produced and a declaration made to CL:AIRE under DoWCoP. The declaration is required before any material movements are made and requires the RMS to have been approved through planning.

8.9 Waste disposal

Where there are no further options for reuse and soils are to be disposed off-site, it is the duty of the waste producer, in this case BDW Southern Counties, to ensure that all waste is disposed of appropriately and that any that is sent to landfill is sent to an appropriately licensed one. All waste sent to landfill must be classified and must be pre-treated. There are various forms of pre-treatment that are acceptable. In this case it could include “reduction in volume”, which could be achieved by segregating the made ground and re-using part of it on site.

Where made ground soil is to be re-used on site then it is recommended that this is carried out under the CL:AIRE Definition of Waste Industry Code of Practice (DoWCoP) for re-use of soils¹⁹.

Even though a full waste classification was not carried out for the soils on this site, a preliminary HASWASTE assessment has been carried out from a selection of recovered made ground (reworked Hythe Formation) samples, topsoil samples, and a natural subsoil sample onsite and it all indicates that the recovered arisings onsite can all be classified as non-hazardous. This HASWASTE assessment is included in **Appendix J**. In addition, 5 No. WAC tests were carried out on this material and are summarised in the table below.

It must be noted that this testing is preliminary, and more testing will be required in order to comply with WM3 guidance.

Table 16: Summary of WAC Testing Results

Location and Depth of Sample	Material Type	Acceptable Landfill
HA408 (0.50m)	Made ground (Reworked Hythe Formation)	Inert
HA416 (0.10m)	Topsoil	Inert
HA420 (0.50m)	Hythe Formation	Inert
TP405 (0.20m)	Topsoil	Inert

¹⁹ The Definition of Waste: Development Industry Code of Practice. Version 2 2011. CL:AIRE

Location and Depth of Sample	Material Type	Acceptable Landfill
TP418 (0.15m)	Made Ground (Reworked Hythe Formation)	Inert

A separate preliminary waste classification report for the 2 No. stockpiles in the northeastern corner of the site was produced by LEAP in November 2025, report ref: 3750966/PWC, summarised in Section 3.3.1. Please refer to this report for more information.

It is strongly advised that detailed discussions be held with remediation/groundworks contractors and that receiving landfill sites are identified in advance of commencing any waste removal.

APPENDIX A – SERVICE CONSTRAINTS

APPENDIX A

SERVICE CONSTRAINTS

1. Service Constraints

1.1. This Report (the "Report") and any study, inspection, investigation, sampling, testing and or interpretation carried out in connection with the Report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) trading as Leap Environmental or RSK Geosciences, for the Client named in the first paragraph of the Report (the "Client") in accordance with the terms of an RSK Fee Proposal including RSK Environment Standard Terms and Conditions (the "Appointment") between RSK and the Client, unless otherwise stated in the first paragraph of the Report. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by a geo-environmental consultant at the time the Services were performed. Nothing in this Report shall be construed as imposing any fitness for purpose obligation. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.

1.2 Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services. RSK shall not be liable in respect of any action or proceedings arising out of or in connection with this Report whether in contract, in tort, for breach of statutory duty or otherwise after the expiry of six (6) years from either (i) the date of the Report or (ii) such earlier date as prescribed by law, unless varied in the terms of the Appointment.

1.3 Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent, or condone any party, other than the Client relying upon the Services. Should this Report or any part of this Report, or details of the Services or any part of the Services, be made known to any such party, and such party relies thereon, that party does so wholly at its own and sole risk, and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent geo-environmental consultant and/or lawyer.

1.4 The Client shall not, without the prior written consent of RSK, assign, transfer, charge, mortgage, subcontract, or deal in any other manner with all or any of the benefits provided in this Report. Unless specified in the Appointment, RSK shall not be obliged to assign the benefit of the Report whether by collateral warranty, third party rights pursuant to the Contracts (Rights of Third Parties) Act 1999, letter of reliance or otherwise. If RSK agrees to any assignment of the benefit of this Report, in whatever form, benefits to third parties through collateral warranties, third party rights or letters of reliance shall not be provided unless a fee for each right, warranty or letter is agreed. The form of wording used in the warranty or letter shall be provided by RSK for agreement by the Client. Any reasonable changes to the form of wording will be implemented by mutual agreement, however the terms in the warranty or letter cannot offer the third party any greater benefit than the Appointment offered to the Client.

1.5 It is the understanding of RSK that this Report is to be used for the purpose described in the introduction to the Report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the Report is used, or the proposed use of the site change, this Report may no longer be valid and any further use of or reliance upon the Report in those circumstances by the Client without the review and advice of RSK shall be at the Client's sole and own risk. RSK shall not be liable for any use of this Report for any purpose other than that for which it was provided.

1.6 The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions contained in this Report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the Report in the future shall be at the Client's own and sole risk.

1.7 The observations and conclusions described in this Report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out, or required by the Appointment between the Client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this Report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, fuel storage, persistent bio-accumulative or toxic chemicals (including PFAS and related compounds) or other radioactive or hazardous materials, unless specifically identified in the Services.

1.8 The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of desk based publicly available information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services and the limitations below:

- a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services.
- d. The Client has identified in writing to RSK, the information, reports, findings, surveys and preliminary works RSK may not rely upon when providing the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK, and including the doing of any independent investigation of the information provided to RSK, save as otherwise provided in the terms of the Appointment between the Client and RSK.

1.9 Any site drawing(s) provided in this Report is (are) not meant to be an accurate base plan for scale measurement but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for accurate setting out and should be considered indicative only.

1.10 Should RSK be requested to review the Report after the date of issue of this Report, RSK shall be entitled to additional payment at the existing rates, or such other terms as agreed between RSK and the Client.

2. Service Constraints where the Report provides an intrusive assessment of ground conditions:

2.1 The intrusive environmental ground investigation aspects of the Services are a limited sampling of soil from the site, at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this Report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent

of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope agreed between the Client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species (not tested) are not present.

2.2 The comments given in this Report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development, site usage, timescales or the Client's specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an indicative assessment of ground conditions on site. There may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

2.3 Where the Services include Investigation of an exploratory nature or relating to physical ground works, any costings and prices provided in the Report are estimated and provided for guidance purposes only. The actual cost and time quantities shall be remeasured and shall be dependent upon the ground or other conditions, constraints present, and number and depth of the investigation locations, which shall influence the number of samples and tests required, and the quantities of soil being classified.

2.4 Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works. However, this Report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

2.5 Unless stated otherwise, only preliminary geotechnical recommendations are presented in this Report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed. Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this Report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7, although this is subject to the restrictions imposed on the investigation, as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this Report will not meet the requirements of a Geotechnical Design Report (GDR) and should therefore be used for preliminary guidance only.

3. Service Constraints where the Report relates to Surface Water Management:

3.1 The Surface Water Management Inspection (SWMI) Report, documents provided, observations, actions, and recommendations, with respect to the management of potential pollution issues to surface waters, made during the site Inspection visit, are those present at the time of the visit, and may not represent those recorded by others on the same day.

3.2 The comments given in this Report and the opinions expressed are based on the weather, ground and ground water conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the inspection and therefore could not be taken into account. In addition, groundwater levels and flows, may vary from those Reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

3.3 RSK places a degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this Report was prepared.

3.4 This Report is a live document, to be continually reviewed and updated as the development progresses or other changes occur on site. RSK can only maintain the currency of this Report through the Client requesting support with supplementary site visits or attendance at meetings ahead of key stages of the development in relation to surface water management. Our risk rating assesses a number of risk factors in line with the source-pathway- receptor model and is therefore subject to constant change.

3.5 Standard design drawings are indicative. Material types, dimensions and construction details will need to be adjusted by the Client to suit the specific conditions / flows on Site.

3.6 The full responsibility for implementing the site-specific protection and maintenance measures to protect the surface water system as stated in this Report, remains with the Client and their site management team. Additional control measures may be required to achieve the objectives set out in the Surface Water Management Plan to be implemented and financed by the Client.

4. Service Constraints where the Report relates to Waste Management:

4.1 In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not necessarily become waste until the criteria above are met. Excavation arisings from the development may therefore be classified as waste if surplus to requirements and/or unsuitable for re-use.

4.2 It is the duty of the waste producer, to ensure that all waste is accurately classified prior to waste disposal. Technical Guidance WM3 (EA, 2018) sets out in its Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. Unless otherwise stated, the waste assessment presented in this Report should be considered as preliminary and further testing and assessment of the waste under the provisions of a Waste Sampling Plan may be required to obtain the necessary level of data required for basic characterisation of the waste in support of disposal.

4.3 Unless stated otherwise in the Report, information relating to historical operations at the site was not reviewed as part of the assessment by RSK. In addition, unless otherwise stated in the Services, RSK was not present during the collection of the samples nor had any input on the chemical testing suite. Therefore, the waste assessment and classification detailed in this Report are based solely on any information that were provided to RSK (e.g., laboratory chemical data, exploratory hole records) and were completed without prejudice for our Client.

4.4 RSK assumes that any ground investigation data, chemical testing results etc., that were provided by the Client to inform the waste assessment and supporting review were carried out in accordance with current best practice and relevant guidance/ standards, where applicable. Thus, the

comments given in this Report and the opinions expressed are based solely on the information provided by the Client. However, it is noted that there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account as part of the RSK assessment.

5. Service Constraints for Construction Environmental Management Plan Reports:

5.1 This Report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

5.2 The measures and comments outlined in this Report and any opinions expressed are based on the plans provided at the time and discussions with relevant parties. However, there may be conditions pertaining to the site that have not been disclosed by investigations and therefore could not be taken into account.

5.3 This CEMP is a live document and is subject to change throughout the project, as and when necessary, to ensure management of environmental aspects remains relevant, and to ensure continued compliance with legislation and commitments as they may change. RSK understands that this CEMP will be reviewed by the Client every six months and updated as and when necessary.

5.4 It is the full responsibility of the Principal Contractor/ Client to ensure that their works do not contravene legal requirements, and adherence to this CEMP alone cannot be a full defence regarding legal action against the Principal Contractor.

6. Service Constraints where the Report relates to Ground Gas Membrane Verification:

6.1 This Report is limited to the verification of the gas resistant membrane/vapour membrane/radon barrier after installation and no inspections were undertaken of the substrate (i.e. prepared ground). The Report therefore does not constitute as a full verification of ground gas protection system.

6.2 The comments given in this Report and the opinions expressed, are based on the condition of the ground gas membrane as encountered at the time of inspection by suitably qualified personnel. RSK cannot accept liability for any subsequent change to the status of the gas membrane by follow-on trades or other construction activity.

6.3 Where not designed by RSK, the verification of protection measures is carried out with reference to the gas protection design provided by the Client. RSK assume the scope of gas protection measures as determined by third parties to be correct and to have achieved any required approval from authorities.

6.4 The Ground Gas Design Report/Remediation Strategy and Verification Plan contains details of the procedures to be adopted for inspection and validation of the works. However, it should be noted that responsibility for the correct implementation of the strategy lies with the appointed contractor. RSK cannot be held responsible for any remedial works that are carried out without the agreed procedures involving either direct supervision by RSK, or inspection and validation of the works by a representative from RSK.

7. Service Constraints for Environmental Due Diligence (EDD) Reports:

7.1 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the site, therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information.

7.2 This Report describes the results of the EDD exercise. The scope of this EDD Report, where appropriate, covers legal or regulatory compliance with respect to UK or international regulations associated with environmental matters.

7.3 As with any EDD exercise, there is a certain degree of dependence upon information provided by the target company. The EDD does not include a site walkover / visit or liaison with site representatives unless identified in the Services. Therefore, the assessment is based on the available desk study information. Also, there is a certain degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this EDD exercise was performed.

7.4 This Report, including all supporting data and notes (collectively referred to hereinafter as "information"), was prepared or collected by RSK for the benefit of its Client.

7.5 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment and the site inspection visit. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the Site therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information and observations collected during the site inspection visit.

8. Service Constraints for Ground source heat energy Reports:

8.1 It is understood that this is a desktop survey only and that there are no requirements for a site walkover, service utility survey, or provision of service plans. These services can be provided upon request if required.

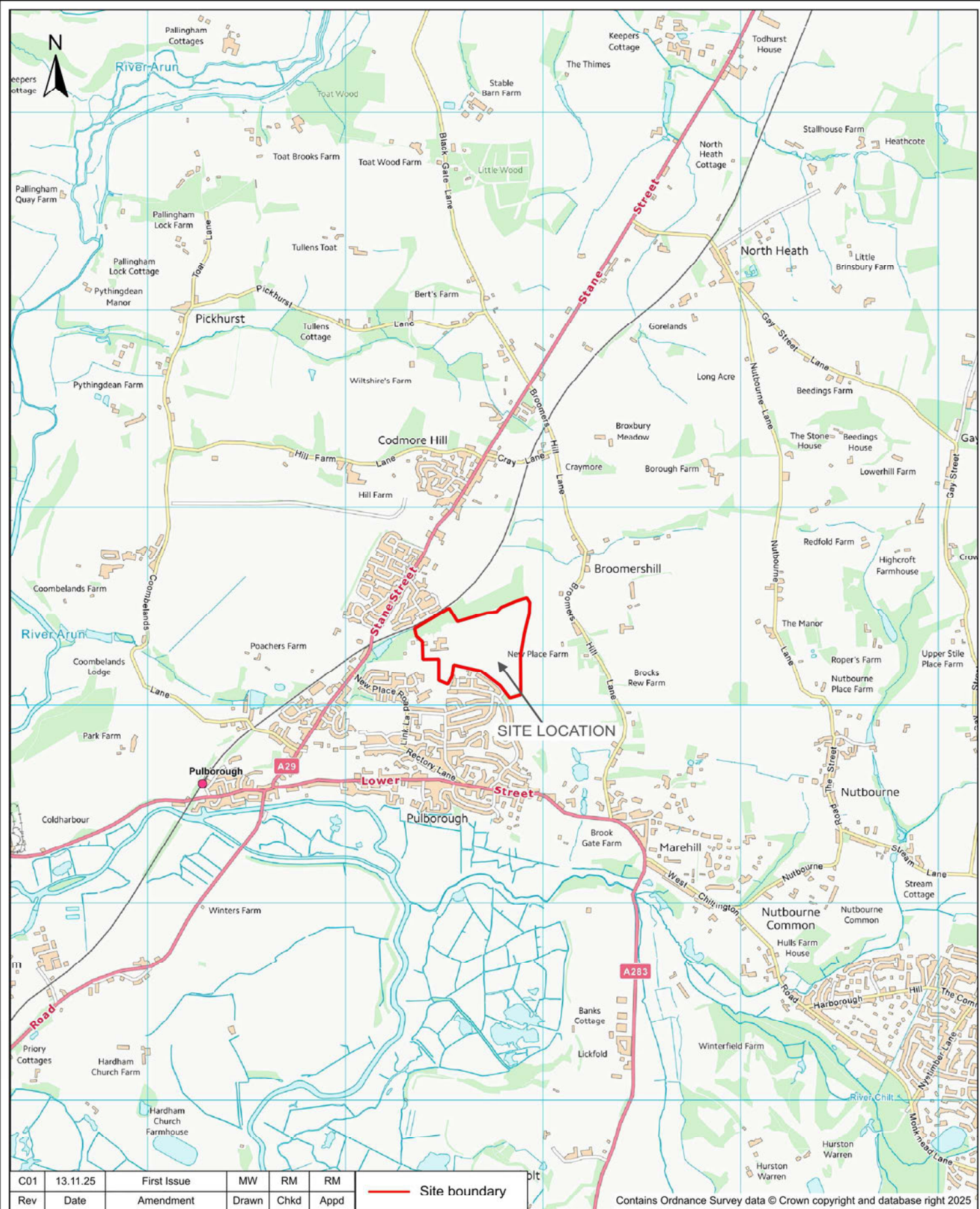
8.2 At a later stage, it is possible that a thermal response test (TRT) will need to be completed, for which a test borehole will have to be drilled, and these would be costed at the time. RSK can provide all aspects of subsequent site work for a GSHP system if required.

9. Service Constraints for Water Abstraction Borehole Reports:

9.1 The Report aims principally to only identify and assess the suitability of the site for a water abstraction borehole. This Report should be considered in the light of any changes in legislation, statutory requirements, and industry practices, that have occurred subsequent to the date of the Report.

9.2 Unless stated in the Report, the opinions expressed in this Report including all comments and recommendations provided are on the basis of the information obtained from a desk-based assessment.

APPENDIX B – FIGURES AND DRAWINGS



1 Forest Park Way, Pease Pottage,
West Sussex, RH11 9ZG

Client

BDW

Project Name

New Place Farm

Description

Site Location Plan

Dimension	Size	Scale	Geolocation	Project ID	Drawing no	Rev	File name
m	A4	1:25,000	505666,119327	3750966	11102	C01	3750966-LW-111-XX-D-G-11102-C01



DO NOT SCALE FROM THIS DRAWING

LEGEND

- Site Boundary
- Previous Site Investigation Locations**
 - Cable Percussion Borehole
 - Hand Dug Trial Pit
 - Machine Excavated Trial Pit
 - Soakaway Test
 - Window Sample Borehole
- Site Investigation Locations**
 - Cable Percussion Borehole
 - Hand Dug Trial Pit
 - Soakaway Test
 - Machine Excavated Trial Pit

Notes:
Base plan provided by the client.
Drawing Ref: 18076-09A-XX-UD-23001-C01-Planning Layout
Sheet 1 of 2

C01	18.11.25	First Issue	RT	RMD	RMD
Rev	Date	Amendment	Drawn	Chkd	Appd



Client
Barratt Redrow Southern Counties

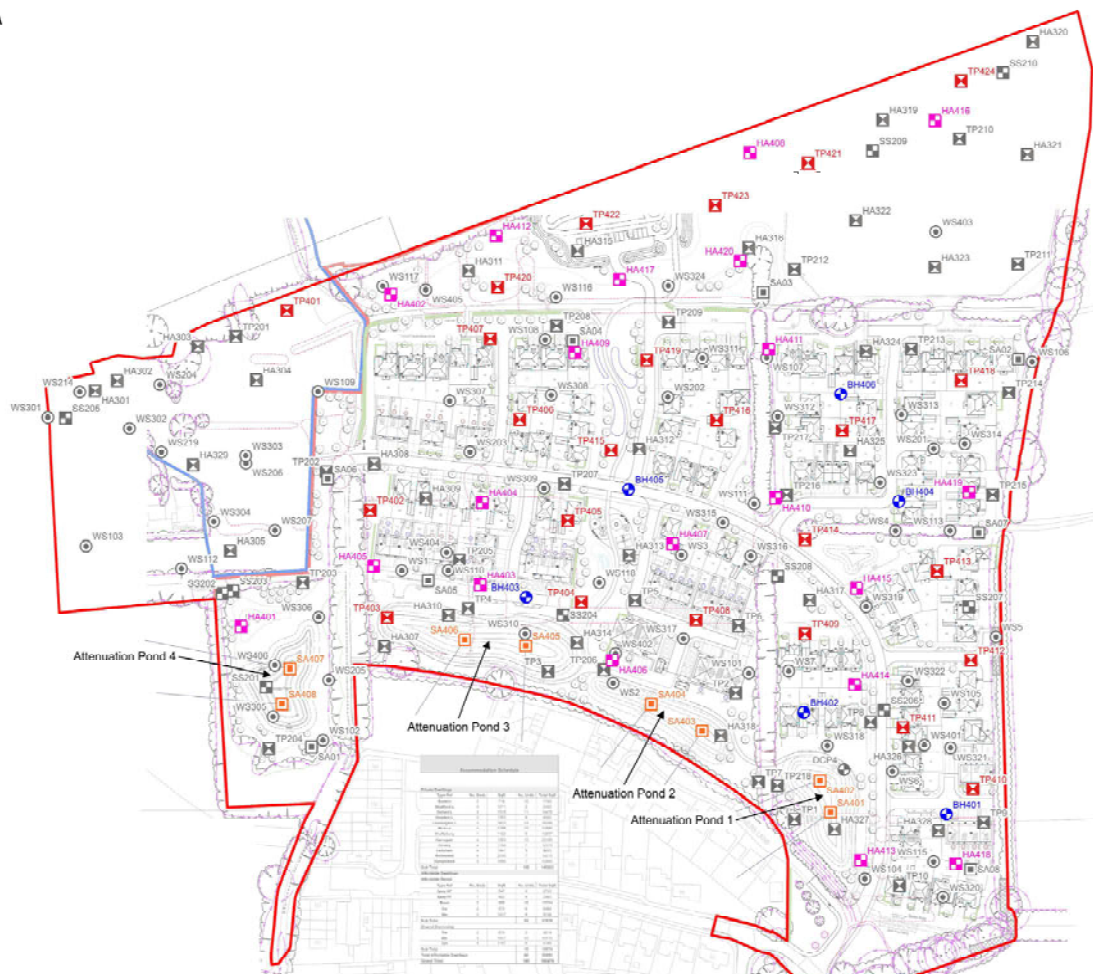
Project Name
New Place Farm

Description
Exploratory Hole Location Plan

Project ID	Drawing no.	Revision
3750966	22201	C01

File name
3750966-LW-112-XX-D-G-22201-C01

Dimensions	Scale	Size
m	1:2,000	A3



Recommendation Schedule

Activity	Start Date	End Date	By	Status
Site Investigation	18.11.25	18.11.25	RT	RMD
Exploratory Hole Location Plan	18.11.25	18.11.25	RT	RMD

