

PHASE 1 PRELIMINARY RISK ASSESSMENT AND PHASE 2 GEO-ENVIRONMENTAL AND GEOTECHNICAL SITE INVESTIGATION REPORT

St Columba's Close, Gravesend, Kent DA12 4AJ



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REPORT

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EXECUTIVE SUMMARY

RPS Consulting Services Ltd (RPS) was commissioned by Gravesham Borough Council to undertake a Phase 1 Preliminary Risk Assessment and a Phase 2 Geo-Environmental and Geotechnical Site Investigation of St Columba's Close, Gravesend, Kent, DA12 4AJ.

The site covers approximately 1.07 hectares and comprises four residential housing blocks with some open landscaping and trees. The surrounding land use is predominantly residential. The development proposals comprise the demolition of 26 homes (including caretaker's facility) and construction of 46 new homes (including re-provision of the caretaker's facility) within two blocks of flats and two house and maisonette terraces with associated carparking and cycle storage.

The Phase 1 Preliminary Risk Assessment carried out for the site (comprising a desk study and site reconnaissance) has identified potential, albeit limited, for pollutant linkages to be active upon completion of the proposed redevelopment. These potential pollutant linkages mainly concern the potential presence of Made Ground, both on site and within the surrounding area, which may act as source of contaminants of concern and/or ground gas. Potentially sensitive receptors have been identified as both on and off-site human health receptors and the underlying Principal Aquifer contained within the chalk bedrock at depth.

An intrusive site investigation has been carried out to provide preliminary assessment of whether pollutant linkages identified as part of the Phase 1 Preliminary Risk Assessment will be made active upon redevelopment of the site. The investigation also provided information on ground conditions and data for the assessment geotechnical properties of strata underlying the site.

The site investigation was carried out between 27th and 29th June 2022 and comprised: two cut-down cable percussion boreholes to a depth of 10m below ground level (bgl); five window sample boreholes to depths of between 1.00m and 3.00m bgl; excavation of three trial pits to depths of between 2.00m and 2.80m bgl, with soil infiltration testing in all locations; excavation of five foundation inspection pits to depths up to 1.2m bgl using hand tools; and dynamic cone penetrometer (DCP) testing at 11 locations.

Ground conditions comprised Topsoil and/or Made Ground to a maximum depth of 1.90m bgl, overlying superficial Head to a maximum depth of 2.10m bgl, overlying Seaford Chalk Formation to the maximum investigation depth. No groundwater was encountered during intrusive investigation works or during subsequent monitoring visits.

Geo-Environmental Assessment

The proposed development is for a residential end use, with the inclusion of some private gardens within the north of the site. When compared against assessment criteria for a residential end use with plant uptake, the concentration of three Polycyclic Aromatic Hydrocarbon (PAH) species within samples from two locations exceeded the relevant assessment criteria and, as such, it is considered that a potentially unacceptable risk to future site users may be present within areas of proposed private gardens. However, when compared against assessment criteria for residential public open space no concentrations of contaminants of concern exceed the relevant screening, and as such it is considered that no significant risk to future site users will be present within areas of proposed public open space. The pathway for dermal contact and ingestion would be broken in areas of proposed building cover and hardstanding.

Whilst it was not possible to sample groundwater during the investigation, it is considered that the given the depth to groundwater (c. 20m bgl) and the relatively low levels of contamination encountered within the shallow soils, it is unlikely that any significant risk to groundwater is present.

Ground gas monitoring undertaken on site as part of the current investigation indicates CIRIA CS1 is applicable to the site, whereby no ground gas protection measures are required for new buildings.

Geotechnical Assessment

The precise development levels of the site are yet to be confirmed, but it is likely that only limited earthworks will be required to prepare development platforms for new buildings.

Due to the inherent textural, compositional variability and compressibility of the Made Ground, this is considered unsuitable as a bearing stratum for shallow foundations.

A presumed bearing value of about 150 kN/m² is likely to be suitable for shallow foundations of not greater than 1m width bearing on firm clays of the Head Deposits Foundations should penetrate at least 300mm within Head Deposits.

The Seaford Chalk Formation is considered to comprise a grade D_c or D_m material, and as such based on the guidelines in CIRIA PG11 and CIRIA C574, an allowable bearing capacity of 225kN/m² is anticipated for shallow foundation that installed on D_c or D_m chalk.

Based on the setting of the site and ground conditions, it is anticipated that bored or rotary bored or Continuous Flight Auger (CFA) piles, terminating in the underlying Seaford Chalk Formation would be most suitable on the subject site for more heavily loaded structures. Preliminary Pile Capacities have been calculated for a range of pile depths and diameters for both bored and CFA piles.

Given the depth of Made Ground on the site, consideration should be given to designing and constructing suspended floor slabs.

For pavement design, a California Bearing Ratio (CBR) value of not greater than 2% is recommended for the subgrade between 0.2m to 0.6m bgl.

It is considered that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC-1 would be appropriate for all buried concrete structures.

Soil infiltration rate varying from 3.49 x 10⁻⁶ m/s to 3.94 x 10⁻⁵ m/s were calculated from soil infiltration testing undertaken. The variable test results are indicative of the nature of the remoulded chalk matrix and are to be expected.

Further Considerations

It is recommended that a site specific Remediation Strategy incorporating Validation Plan and protocols for managing any contamination encountered during redevelopment is produced. The Remediation Strategy should include details of the covers systems required in areas of soft landscaping.

There is the potential that soil and groundwater contamination that has not been previously identified will be encountered during the development phase and therefore a discovery strategy should be included as part of the Remediation Strategy.

Any soil imported for soft landscaping to be incorporated as part of the redevelopment should be analysed to confirm suitability for use.

Any specific soils that are to be disposed of off-site should be subject to waste characterisation prior to removal from site.

Given their age, it is possible that asbestos containing material is present within the buildings on site. A formal Asbestos Refurbishment / Demolition Survey should be carried out prior to any demolition work commencing.

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1 INTRODUCTION

1.1 Preamble

- 1.1.1 RPS Consulting Services Ltd (RPS) was commissioned by Gravesham Borough Council to undertake a Phase 1 Preliminary Risk Assessment and a Phase 2 Geo-Environmental and Geotechnical Site Investigation of St Columba's Close, Gravesend, Kent, DA12 4AJ. A site location plan is provided as Figure 1.
- 1.1.2 The site covers approximately 1.07 hectares and comprises four residential housing blocks with open landscaping and trees. The surrounding land use is predominantly residential. A site boundary plan is provided as Figure 2.
- 1.1.3 The development proposals comprise the demolition of 26 homes (including caretaker's facility) and construction of 46 new homes (including re-provision of the caretaker's facility) within two blocks of flats and two house and maisonette terraces with associated carparking and cycle storage. A proposed development plan is presented as Figure 3.
- 1.1.4 The Desk Study assessment is based upon a review of published information available from local, regional, and national agencies. The desk study information is derived from Enviro and Geo Insight Reports provided by Groundsure, Ref. GS-8623587 which are presented as Appendix C. **Error! Reference source not found..** Please note the terms and conditions to the supply of data from Groundsure.

1.2 Objectives

- 1.2.1 The principal objectives of this assessment were as follows:
- To assess potential sources of contamination, associated with historical and current land uses both on site and in the surrounding area;
 - To review the environmental setting to assess the sensitivity of the surrounding area to contamination/pollution;
 - To produce an outline Conceptual Site Model (CSM) detailing how any contamination may impact the identified receptors via pollutant linkages;
 - Carry out targeted intrusive ground investigation to provide preliminary assessment of whether pollutant linkages identified within the outline CSM are currently active or could potentially be made active upon future redevelopment; and
 - Present a revised CSM along with recommendations for further works and/or mitigation of identified ground risks, where considered necessary; and
 - To determine the engineering properties of the underlying soils and to provide geotechnical parameters to assist preliminary foundation, ground slab and basement design.

1.3 Legislation and Guidance

- 1.3.1 This report has been produced in general accordance with:
- Contaminated Land (England) Regulations 2006 (as amended);
 - DEFRA Environmental Protection Act 1990: Part 2A - *Contaminated Land Statutory Guidance (2012)*;
 - Environment Agency (2020) Land Contaminated: Risk Management (LCRM 2020);
 - National Planning Policy Framework (2021);

- CIRIA Document C665: *Assessing Risks Posed by Hazardous Ground Gases to Buildings* (2007);
- CIRIA Document C574 : *Engineering in Chalk* (2002);
- CIRIA Project Report PR11: *Foundations in Chalk*, (1994)
- British Standard requirements for the '*Investigation of potentially contaminated sites - Code of practice*' (ref. BS10175:2011+A1:2017);
- British Standard requirements for the '*Code of practice for ground investigations*' (ref. BS5930:2015+1:2020);
- British Standard requirements for the '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*' (ref BS8485:2015+A1:2019);
- EN 1997-1 (2004): *Eurocode 7: Geotechnical design - Part 1: General rules*; and
- EN 1997-2 (2007): *Eurocode 7: Geotechnical design - Part 2: Ground investigation and testing*.

1.3.2 Details of the limitations of this type of assessment are described in Appendix A.

2 SITE RECONNAISSANCE AND DESK STUDY

2.1 Site Reconnaissance

- 2.1.1 This section of the report is based upon observations made during a site visit carried out on 22nd July 2022. Selected photos are shown in Appendix B.

The Site

Table 2-1: Summary of on Site Activities

Section	Description
Background:	The site is located in St Columba's Close, Gravesend, Kent, DA12 4AJ and the at National Grid Coordinates 565980E 172131N. It is roughly rectangular in shape and occupies an area of approximately 1.07 ha.
Site Layout:	At the time of the walkover, the site was located in a predominantly residential area, comprising approximately 40% residential building cover, 55% grassed soft landscaping and 5% concrete hardstanding. Access to the site was gained from Valley Drive, St Patrick's Gardens and the central northern footpath. The site was bordered by Valley Drive to the west and St Patrick's Gardens to the south. Access was gained from these roads and also by a footpath in the central northern portion of the site.
Activity / Operations:	The site comprised occupied residential buildings. A maintenance building was present in the south-eastern portion of the site, which was used by the site maintenance team, where cleaning products were present.
Building Structure(s):	The site was part of a wider residential area, with the majority of buildings being composed of brick which were 3 storeys' high. There were two older residential blocks in the northern portion of the site, which were two storeys' high. An associated areas of carparking was located in the eastern portion of the site.
Surface Cover:	The majority of the soft landscaping was grassed, with several large trees and shrubs present across the site. The hardstanding predominantly comprised the carparking area and various footpaths traversing the site and at the building peripheries. The carparking are comprised tarmac of poor condition and the footpaths mainly comprised concrete in reasonable condition with occasional cracking.
Drainage:	Several manholes and surface water drains were observed across the site.
Bulk Storage / Tanks:	No evidence of bulk storage / tanks was observed during the site walkover.
Waste:	There was a general waste area in the south-eastern portion of the site, where eight large refuse bins were located. Two more were located in the central southern portion.
Electricity Substations /Transformers:	No electricity substations or transformers were observed on site.
Visual Evidence of Contamination:	No visual evidence of contamination was observed on site.
Other Geo-Environmental Issues:	No Japanese Knotweed or Giant Hogweed (invasive plant species) were readily identified on or adjacent to the site at the time of the survey. (It should be noted that the identification can be limited by the seasons and in areas of dense vegetation growth).

The Surrounding Area

- 2.1.2 The site is located in an area of predominantly residential land use. At the time of the site inspection, neighbouring land consisted of the following:

Table 2-2: Neighbouring Land Uses

Direction	Description
North:	St Columba's Close and residential housing beyond.
East:	Residential housing was immediately adjacent to the site with St Dunstan's Drive beyond.
South:	St Patrick's Gardens was immediately south with the recently developed residential housing block and associated playground. Residential housing was observed beyond.
West:	Valley Drive bordered the western boundary of the site with roads and residential housing beyond.

2.2 Proposed Development

- 2.2.1 The development proposals comprise the demolition of 26 homes (including caretaker's facility) and construction of 46 new homes (including reprovision of the caretaker's facility) within two blocks of flats and two house and maisonette terraces with associated carparking and cycle storage. Block A is to consist of three and four storeys; Block B three storeys; Terrace 01 (houses) two and a half storeys; and Terrace 02 (Maisonettes) three storeys.
- 2.2.2 A proposed development plan is provided as Figure 3.

2.3 Site History

Historical Map Review

- 2.3.1 The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1863 to 2022. Historical maps are provided in Appendix C.

Table 2-3: Historical Site Uses

On-site Land Use and Features	Dates
The site comprises undeveloped land in rural setting.	1863 to 1938
Residential buildings have been constructed in the current configuration in all but the far north of the site.	1953 to present
The central eastern portion of the site has undergone landscaping.	1960 to c. 1978
Two additional residential units have been constructed in the far north of the site in the current configuration.	c. 1970 to present

Table 2-4 – Historical Neighbouring Site Uses

Surrounding Land Uses	Orientation	Distance	Dates	
			From	To
Residential housing with associated roadways and landscaping.	North / south / east / west	Adjacent and beyond	1953	Present
Park (St Patrick's Gardens)	South	10m	1953	c. 2020*
Electrical substations	South North-west	160m 180m	1953	1993
Council yard. Then redeveloped into a depot of unknown use.	South	150m	1960 1986	1969 1993
Parrock Farm.	South-west	200m	1953	2022

* - site walkover indicates that a residential development is approaching completion in this area.

- 2.3.2 Planning records for the site on Gravesham Borough Council's planning website have been reviewed and no application or documents pertinent to the assessment of potentially contaminated land at the site have been readily identified.

2.4 Previous Reports

- 2.4.1 No previous reports have been provided to RPS for review.

2.5 Environmental Setting

Geology

- 2.5.1 Based on British Geological Survey (BGS) mapping (1:50,000-scale) and the Environment Agency (EA) Groundwater Vulnerability mapping (1:100,000-scale), the stratigraphic sequence and aquifer classifications beneath the site are indicated to be as follows:

Table 2-5: Descriptions of Geological Strata

Stratum	Description & approximate thickness	Aquifer Classification
Bedrock: Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated)	Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large. Thickness up to 70m	Principal Aquifer

- 2.5.2 Superficial Head (clay, silt and sand), which is classified as a secondary undifferentiated aquifer, is indicated to be present just to the west of the site.

Hydrogeology

- 2.5.3 The chalk bedrock comprises a Principal Aquifer. These formations provide a high level of water storage and may support water supply and / or river base flow on a strategic scale. A review of BGS borehole record (BGS ref. TQ67SE148), located approximately 850m to the north-west of the site indicates that groundwater is present at c. 37m below ground level (bgl).
- 2.5.4 According to EA data, the site is located in a groundwater Source Protection Zone (SPZ):
- Zone 2 (Outer protection zone) - The outer zone covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area, whichever area is the biggest. This travel time is the minimum amount of time that pollutants need to be diluted, reduced in strength, or delayed by the time they reach the borehole.
- 2.5.5 Information provided by the EA indicates that there are three records of active licensed groundwater abstractions within 2km of the site as detailed within Table 2.5 below.

Table 2.5 – Licensed Groundwater Abstractions

Licence Holder	Distance and Direction from Site	Source	Use
Southern Water Services Ltd Licence No: 9/40/01/0511/G	1371m north-west	Groundwater	Potable Water Supply - Direct
Mid Kent Golf Club Limited Licence No: SO/040/0001/019	1617m west	Groundwater	Spray Irrigation - Storage

Licence Holder	Distance and Direction from Site	Source	Use
Mid Kent Golf Club Limited Licence No: 9/40/01/0508/G	1939m north	Groundwater	General Washing/Process Washing

Surface Water

- 2.5.6 There are no readily identifiable watercourses within 1km of the site which are classified within a River Basin Management Plan published by the EA under the European Water Framework Directive (2000).
- 2.5.7 Information provided by the EA indicates that there are no records of licensed surface water abstractions within 2km of the site.

Ecologically Sensitive Sites

- 2.5.8 Natural England data indicates that there are no ecologically sensitive sites, that constitute environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), located within a 1km radius of the site.

Radon

- 2.5.9 According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the British Geological Survey, the site is located in an area at risk from radon gas as it is situated in an area between 1% and 3%.

Coal Authority

- 2.5.10 The Interactive Map Viewer on the Coal Authority website indicates that the site is not located in a coal mining reporting area.

Non-Coal Mining

- 2.5.11 Records from the British Geological Survey indicate that there are no records for potential non-coal mining to have occurred within 250m.
- 2.5.12 The nearest records of non-coal mining activity associated with chalk wells or deneholes are located c. 800m to the north-east of the site. It should be recognised that Gravesend has a prior history generally of such workings in the wider area and whilst there is no evidence of recorded instances in the close vicinity of the site the absence of such data should not be treated as being absolute. However, based on a review of the geological setting of the site it is considered that the risk of historical mining activity at the site is low.

BGS Ground Stability Hazard Ratings

- 2.5.13 British Geological Survey Ground Stability Hazard ratings for the site are summarised as follows.

Table 2-6 – BGS Ground Stability Hazard Ratings

Ground Stability Hazard	BGS Risk rating
Collapsible ground	Low
Compressible ground	Negligible
Ground dissolution	Very low
Landslide	Negligible
Running sand	Negligible

2.6 Authorised Processes and Pollution Incidents

Landfills and Waste Sites

- 2.6.1 Data provided by the EA, Local Authority and BGS indicates that there are no recorded licensed or known historical landfill sites located within 250m of the site.

Environmental Permits

- 2.6.2 EA and Local Authority data indicates that there is one process regulated by an Environmental Permit (under the Environmental Permitting Regulations 2010) within 500m of the subject site. The permitted activity is dry cleaning, and the licence holder is Valley Dry Cleaners, situated approximately 464m north of the site.

COMAH Sites

- 2.6.3 There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations 1999 located within 500m of the site.

Pollution Incidents

- 2.6.4 Environment Agency data indicates that there are no records of 'major' or 'significant' pollution incidents within 500m of the site.

2.7 Unexploded Ordnance

- 2.7.1 CIRIA Report C681 (stone et al 2009) outlines recommendations for dealing with the potential risk associated with the legacy of Unexploded Ordnance Risk, largely relating the WWII bombing and military sites.
- 2.7.2 A Detailed UXO Risk Assessment has been carried out by Fellows (ref. 3133R, dated March 2022) which concluded that there is a **medium** risk of encountering deep buried German aerial unexploded bombs. The report recommended that a UXO Awareness Brief (UXOAB) should be delivered to all site personnel, and that intrusive magnetometer Cone Penetration Testing (CPT) to the maximum bomb penetration depth based for any piling or deep excavations within the site areas marked as medium risk, and that a site-specific emergency response plan (ERP) should be produced to provide clear and precise guidance on what to do should UXO be encountered, and / or detonated as part of the site works.

2.8 Regulatory Consultations

- 2.8.1 The Environmental Health Department at Gravesham Borough Council was consulted regarding any known contamination issues at the site, and the following response was provided:

"We have reviewed the records and historical data that this Service holds and can find no records which relate directly to the property. This service cannot confirm whether or not any precautionary measures were taken when the property was constructed.

The site has not been designated as contaminated land under Part 2A of the Environmental Protection Act 1990, and we do not currently have any plans to investigate it under this legislation. We do not hold any information/data regarding contamination within the immediate area in subject outside of our planning portal."

3 OUTLINE CONCEPTUAL SITE MODEL

3.1 Background

3.1.1 A preliminary conceptual site model (CSM) consists of an appraisal of the *source-pathway-receptor* 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.

- **Source** referring to the source of contamination (Hazard).
- **Pathway** for the contaminant to move/migrate to receptor(s).
- **Receptor** (Target) that could be affected by the contaminant(s).

3.1.2 Receptors include human beings, other living organisms, crops, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A. Further details on the Part 2A regime are presented within Appendix D.

3.2 Potential Pollutant Linkages

3.2.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.

Potential Contaminant Sources

On Site – Current

- 3.2.2 No potentially significant point sources of contamination have been identified on site.
- 3.2.3 Made Ground is likely to be present beneath the site. Where present, this could represent a potential for contaminants of concern and/or ground gas.

On Site – Historical

- 3.2.4 No potentially significant point sources of contamination have been identified off site.

Off-Site – Current

3.2.5 The following current off-site potentially contaminative sources of contamination have been identified:

- Dry cleaners located 464m north of the site and identified as a permitted activity.
- Electricity substations, the nearest of which is located 162m south-west of the site.
- Gas Governor recorded located 170m south of the site.

Due to their distance from the site, none of the above are considered to represent potentially significant sources of contamination.

Off-Site – Historical

- 3.2.6 A depot of unspecified use historically located 150m south of the site represents a potential historical off-site contamination source. However, similarly to above, this is not considered likely to pose a potentially significant risk to the site given its distance.

Potential Pathways

- 3.2.7 In areas of the site covered by buildings or hardstanding the risks to future on site human health receptors via the pathways of dermal contact and ingestion will be mitigated. However, in areas of soft landscaping, the pathways of dermal contact and ingestion could still be active. In addition, there would be potential for the airborne migration of soil/dust from these areas.
- 3.2.8 Although the inhalation pathway in indoor areas will be active for future site users, no potentially significant sources of volatile contamination have been identified either on or off-site.
- 3.2.9 Given the anticipated depth to groundwater within the chalk (c. 37m bgl) the potential on or off-site migration of contaminants of concern via groundwater to impact controlled waters receptors or on/off-site human health receptors via the dermal contact and ingestion pathways is considered to be limited.

Potential Receptors

- 3.2.10 Potential post development human health receptors include future site users and off-site human health receptors.
- 3.2.11 The Principal Aquifer contained within the chalk bedrock at depth represents a sensitive receptor.
- 3.2.12 Providing construction workers adopt appropriate levels of hygiene and personal protective equipment, they are not considered to be at significant risk from potential contaminants of concern and have not been considered further as part of this assessment.

3.3 Outline Conceptual Site Model

- 3.3.1 An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site post development and is summarised in the table below.

Table 3-1 – Outline Conceptual Site Model

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes
On site – current: Made Ground	Metals, hydrocarbons and asbestos	Soil	Direct contact/ingestion	✓	Future site users	Low to Moderate	Limited thickness of Made Ground likely to be present.
			Inhalation of volatiles	✗		N/A	No on-site sources of potentially volatile contamination identified.
			Airborne migration of soil or dust	✓	Off-site users	Low to moderate	Potential for contaminants to be present in any Made Ground on site.
			Leaching of mobile contaminants	✓	Principal Aquifer	Low to Moderate	Potential for limited leaching via fissures in the chalk bedrock, however aquifer is anticipated to be at significant depth.
		Groundwater	Direct contact/ingestion	✗ ✗	Future site users Off-site users	Low	Groundwater beneath the site is anticipated to be at significant depth.
			Inhalation of volatiles	✗ ✗	Future site users Off-site users	N/A	No significant on-site sources of potentially volatile contamination identified. Groundwater beneath the site is anticipated to be at significant depth.
			Vertical and lateral migration in permeable strata	✓	Principal Aquifer	Low to Moderate	Potential for limited leaching via fissures in the chalk bedrock, however aquifer is anticipated to be at significant depth.
On and off-site – Made Ground / natural strata	Carbon dioxide and methane	Ground Gas	Inhalation of ground gas	✓ ✓	Future site users Off-site users	Low to Moderate	Limited thickness of Made Ground likely to be present and no significant off-site sources of ground gas identified.
			Explosive risks	✓ ✗	Future site users Off-site users	Low	Chalk bedrock is a potential source of carbon dioxide.
					Future and off-site Structures	N/A	

Note The Qualitative Risk Rating does not consider the potential for the pathway to be active. In the event that a Moderate or High Qualitative Risk Rating is identified further assessment is recommended.

3.3.2 Based on the identified potential sources and the site setting there is not considered to be a significant risk to ecological receptors, crops/vegetation or archaeological receptors.

4 INTRUSIVE SITE INVESTIGATION

4.1 Introduction

- 4.1.1 Potential pollutant linkages have been identified as associated with the site within the CSM presented as Table 3.1. An intrusive site investigation has been carried out in order to provide preliminary assessment of whether pollutant linkages identified within the outline CSM are currently active or will be made active upon redevelopment of the site.
- 4.1.2 The investigation also provided information on ground conditions and data for the assessment geotechnical properties of strata underlying the site.

4.2 Description of Works

- 4.2.1 The site investigation was carried out between 27th and 29th June 2022 and comprised:
- Drilling of two cut-down cable percussive boreholes to a depth of 10m bgl (CP01 and CP02) with installation of monitoring wells at each location.
 - Drilling of five window sample boreholes to depths of between 1.00m and 3.00m bgl (WS01, WS02, WS02A, WS04, and WS05A), with installation of monitoring wells at three locations (WS01, WS02A, WS05A).
 - In-situ geotechnical testing throughout the depth of boreholes and window samples.
 - Excavation of three trial pits to depths of between 2.00m and 2.80m bgl using a JCB 3CX, with soil infiltration testing in general accordance with BRE365 in all locations.
 - Five foundation inspection pits to depths up to 1.2m bgl using hand tools (FP01 to FP04).
 - Dynamic cone penetrometer (DCP) testing within eleven locations using a TRL probe (DCP01 to DCP11).
- 4.2.2 An exploratory hole location plan is provided as Figure 4.
- 4.2.3 The soil arisings from each exploratory hole were carefully examined for visual and olfactory evidence of contamination. Headspace testing was undertaken on site for ionisable volatile organic compounds (iVOCs) using a portable Photo-Ionisation Detector (PID).
- 4.2.4 A return visit for groundwater sampling was carried out on 8th July 2022. Each monitoring well was inspected for the presence of free-phase hydrocarbon product using an oil/water interface probe and the depth to groundwater was recorded. No groundwater samples were collected due to absence of groundwater.
- 4.2.5 Ground gas monitoring was undertaken on three occasions, on 8th, 21st and 28th July 2022. The installations were monitored for concentrations of methane, carbon dioxide, carbon monoxide, hydrogen sulphide, oxygen and iVOCs. In addition, the flow rate and barometric pressure were recorded.

4.3 Investigation Rationale

- 4.3.1 The rationale behind each of the site investigation locations is summarised in the table below.

Table 4-1: Exploratory Location Rationale

Exploratory Location ID	Location on Site	Rationale
CP01	Western boundary of site	To provide geo-environmental and geotechnical coverage of the site and to enable installation of groundwater monitoring wells.
CP02	North-eastern boundary of site	
WS01	West of site	To provide geo-environmental and geotechnical coverage of the site.
WS02	North-west of site	To provide geo-environmental and geotechnical coverage of the site.
WS02A	North-west of site	Relocation of WS02 due to early termination.
WS04	Centre of site	To provide geo-environmental and geotechnical coverage of the site.
WS05A	North-east of site	To provide geo-environmental and geotechnical coverage of the site and to enable installation of groundwater monitoring well.
TP01A	North-west of site	To provide geo-environmental and geotechnical coverage of the site and to carry out soil infiltration testing.
TP02	North-east of site	
TP03	East of site	
FP01	Adjacent to existing building within west of site.	To obtain information regarding existing foundations.
FP01/A		Relocation of FP01 due to early termination.
FP02	Adjacent to existing building within north of site.	To obtain information regarding existing foundations.
FP03		
FP04	Adjacent to existing building within centre of site.	

4.4 Site Restrictions

- 4.4.1 Investigations were limited to external locations as the existing buildings were occupied. Access was particularly limited around the existing buildings in the north of the site, preventing any boreholes from being completed in this area.
- 4.4.2 TP02 was relocated due to elevated magnetometer signal indicating the presence of subsurface ferrous object.

4.5 Laboratory Testing

Geo-Environmental Laboratory Testing - Soil

- 4.5.1 One sample of Made Ground, and one sample of the London Clay Formation, were submitted to a UKAS/MCERTS accredited laboratory and analysed for a number of determinands including;
- Inorganic Determinands:**
- 4.5.2 pH, organic matter, arsenic, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, sulphide, total cyanide, sulphate, sulphur, selenium, zinc and asbestos.
- Organic Determinands:**
- 4.5.3 Speciated polyaromatic hydrocarbons (PAH), speciated total petroleum hydrocarbons (TPH CWG) including benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tert-butyl ether (MTBE), and monohydric phenol.

Geotechnical Laboratory Testing

- 4.5.4 Samples of the Made Ground and the underlying chalk were submitted to a UKAS accredited geotechnical testing laboratory and analysed for Moisture Content, Atterberg Limit, Sieve Analysis, saturated moisture content, intact dry density, BRE Suite B, and calcium carbonate content.

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5 SITE INVESTIGATION FINDINGS

5.1 Geology

5.1.1 The strata encountered during the intrusive investigation are summarised in the table below and described in the following section.

Table 5-1: Encountered Strata

Strata	Depth to Top of Strata (m bgl) [mAOD]	Thickness (m)
Topsoil	Ground Level [31.4 to 24.34]	0.0 to 0.2
Made Ground	Ground Level to 0.2 [31.20 to 23.07]	0.40 to 1.90
Head Deposits	0.75 to 0.90 [25.35 to 22.32]	0.20 to 2.10
Seaford Chalk Formation	0.60 to 2.90 [30.8 to 21.44]	Proven to 9.4

5.1.2 General descriptions of the strata encountered during the intrusive investigation are summarised below. Reference should be made to the exploratory hole logs within Appendix E of this report for full descriptions of ground conditions underlying the site.

5.1.3 Geotechnical laboratory results are provided as Appendix F.

Made Ground

5.1.4 Made Ground was generally present throughout the site, ranging in thickness from approximately 0.40m to 1.90m.

5.1.5 The stratum was variable, consisting of sandy silt in the western sections and sand to sandy gravel in the eastern sections. The gravel portion comprised rounded to angular fine to coarse flint, concrete, and glass with varying portions of rootlets.

5.1.6 One Standard Penetration Test (SPTs) was undertaken within the Made Ground.

5.1.7 The N_{60} values have been converted from SPT N values using an energy ratio of 69.0%. A graph showing SPT N_{60} vs depth is presented as Figure 5.

5.1.8 Moisture content testing was undertaken on one sample of Made Ground collected at 0.5m bgl (23.84 m AOD) gave value of 15.3%.

Head Deposits

5.1.9 Head Deposits were encountered beneath the Made Ground only within the exploratory holes in the western and southwestern sections of the site at depths ranging from approximately 0.75m to 0.90m bgl (25.35m to 22.32m AOD). The stratum comprised brown gravelly sandy silt. The sand inclusions were fine to medium, and gravel was angular to subrounded fine to coarse of flint and chalk fragments.

5.1.10 Four SPT's undertaken within the Head Deposits at depths ranging from 1.00m to 2.50m bgl gave N_{60} values ranging from 10 to 52. A graph showing SPT N_{60} vs depth is presented as Figure 5.

5.1.11 Atterberg limit testing was undertaken on a single sample collected from the Head Deposits at 2.00m bgl (22.34m AOD) which gave a Liquid Limit (LL) of 31%, Plastic Limit (PI) of 19%, and a corresponding Plasticity Index (PI) of 12%. The moisture content testing was undertaken on this sample which gave a result of 13.9%. As such the results suggest that the Head Deposits are a low plasticity clay. A calculated modified PI of 8% is indicated the Head Deposit falls in low volume

change potential category. One moisture content test was also undertaken on Head Deposit sample collected at 1.00m bgl (23.34m AOD) gave value of 16.9%.

Seaford Chalk Formation

- 5.1.12 The Seaford Chalk Formation was encountered beneath the Made Ground and Head Deposits (where encountered) throughout the site within the exploratory holes at depths ranging from 0.60m to 2.90m bgl (30.80m to 21.44m AOD). The stratum comprised structureless chalk off-white cream and brown with rare orange staining sandy silty angular to subrounded gravel. Sand is fine to coarse. Clasts are extremely weak to weak low to medium density. In accordance with CIRIA C574 Engineering in Chalk (2002) the chalk is considered as Grade D_c and D_m.
- 5.1.13 14 SPTs were undertaken within the Seaford Chalk Formation at depth ranging from 1.50m to 10.00m bgl (29.90m to 14.34 m AOD) gave the N₆₀ values ranging from 11 to 29. A graph showing SPT N₆₀ vs depth is presented as Figure 5. As such, given that the majority of SPT results are less than 25 it is not possible to distinguish a relative weathering profile within the chalk vs depth. In addition, it is possible that higher blow counts may be affected by the presence of flints.
- 5.1.14 Particle Size Distribution (PSD) testing were undertaken on 15 samples taken from Seaford Chalk Formation in ranging of 1.00m to 9.00m bgl (30.40m to 15.34m AOD). Since the weight of the small samples collected from borehole CP01 and CP02 were not suitable for undertaking PSD testing, samples with the same description were mixed to generate three adequate samples. PSD testing was also undertaken on a bulk sample collected from TP02 at 1.50m to 2.00m bgl (28.95m to 28.45m AOD).
- 5.1.15 Saturated Moisture Content and intact bulk/dry density testing were undertaken on three samples collected at depth ranging from 0.50m to 2.00m bgl gave the saturation moisture content ranging from 27% to 28% and dry density from 1.53 mg/m³ to 1.56 mg/m³. Intact dry density results indicated medium density chalk which is compliant with chalk grade D_m. Natural moisture content of samples ranged from 20% to 28%.
- 5.1.16 Calcium Carbonated Content (CCC) tests were undertaken on nine samples collected at depth of ranging from 1.00m to 9.75m bgl gave the CCC values in ranging from 49% to 99%.
- 5.1.17 Infiltration testing was undertaken as part of the previous ground investigation in 2012 and as part of the recent investigation. Tests were carried out in general accordance with the guidance presented in BRE DG 365 (2016). Tests were repeated where possible. The infiltration rates were calculated and are presented in Appendix J. The base of all the test pits was in the Seaford Chalk Formation. The test results are summarised in Section 9 below.

5.2 Groundwater

- 5.2.1 No groundwater was not encountered within the exploratory holes during drilling.
- 5.2.2 Groundwater monitoring recorded during subsequent visits to site similarly recorded dry conditions. This is summarised in the table below:

Table 5-2: Groundwater Level Data

Monitoring Well ID	Well Screen Depth (m bgl) [m AOD]	Strata	Depth to Water (m bgl) [m AOD]		
			08/07/2022	21/07/2022	28/07/2022
WS02A	1.50 to 2.00 [24.65 to 24.15]	Seaford Chalk Formation	Dry	Dry	Dry
WS05A	0.80 to 2.40 [28.88 to 27.28]	Seaford Chalk Formation	Dry	Dry	Dry
CP01	2.00 to 10.00	Seaford Chalk Formation	Dry	Dry	Dry

Monitoring Well ID	Well Screen Depth	Strata	Depth to Water (m bgl) [m AOD]		
	(m bgl) [m AOD]		08/07/2022	21/07/2022	28/07/2022
	[22.34 to 14.34]				
CP02	1.0 to 10.00 [30.40 to 21.40]	Seaford Chalk Formation	Dry	Dry	Dry

- 5.2.3 It is noted that based on BGS borehole records in the general vicinity of the site (BGS Ref TQ67SE148 – located at Whitehall Road to the north of the site, that groundwater within the chalk is likely to be located at circa 4.00m AOD, i.e. around 20m bgl at the site's lowest recorded elevation.

5.3 Field Evidence of Contamination

Visual and Olfactory Evidence of Contamination

- 5.3.1 No visual or olfactory evidence of contamination were noted within groundwater during the intrusive investigation and subsequent monitoring visits.

Photo-Ionisation Detector (PID) Readings

- 5.3.2 Soil arisings from each exploratory hole were screened for the presence of iVOCs using a PID.
- 5.3.3 A PID reading of 0.8ppm was recorded at 0.80m bgl within FP04. All other PID readings were 0.1ppm or below the limits of detection (<0.1ppm).
- 5.3.4 Full records of PID readings are presented on the exploratory logs within Appendix E.
- 5.3.5 During the subsequent monitoring, readings were recorded ranging from below the instrument limit of detection (<0.1ppm) to 6.7ppm (CP02).

5.4 Ground Gas Monitoring

- 5.4.1 Ground gas monitoring has been undertaken on three occasions on 8th, 21st and 28th July 2022. Installations were monitored for concentrations of methane, carbon dioxide and oxygen. In addition, the flow rate and barometric pressure were recorded. The results of the ground gas monitoring are presented in Appendix G.
- 5.4.2 Methane was not recorded at concentrations above the instrument limit of detection (<0.1% v/v) on any of the monitoring visits. Carbon dioxide was recorded at a maximum concentration of 2.1% v/v within monitoring wells WS02A, screened within the chalk, on 21st July 2022.
- 5.4.3 All flow rates recorded were below the limit of detection (0.1l/h).
- 5.4.4 The lowest recorded oxygen concentration was 19.4% v/v within monitoring well WS02A on 21st July 2022. Atmospheric pressure ranged from 1014mb to 1030mb during the three monitoring periods.
- 5.4.5 The CIRIA Report C665 '*Assessing risks posed by hazardous ground gases to buildings*' outlines indicative guideline concentrations for carbon dioxide and methane in association with gas flow rates for which gas protection measures may be required in new residential or commercial developments. The methodology is based on the Modified Wilson and Card approach that characterises the gas regime into a series of Characteristic Situations (1 to 5), with corresponding indicative gas protection measures. Using this methodology, the ground gas regime at this site corresponds to Characteristic Situation 1, whereby no specific gas protection measures are required.

6 HUMAN HEALTH ASSESSMENT CRITERIA

6.1 Soil Assessment

- 6.1.1 In order to assess risks to future site users, concentrations of contaminants of concern have been compared to Suitable 4 Use Levels (S4UL) published by Land Quality Management: Chartered Institute of Environmental Health (LQM:CIEH) in 2015. *In accordance with the copyright notice the Publication Number for RPS Group is S4UL3177.*
- 6.1.2 Given the proposed redevelopment of the site is for a residential properties with inclusion of private gardens within the north of the site, the assessment has been based on acceptance criteria values for a residential development with plant uptake.
- 6.1.3 It is considered that areas of soft landscaping outside of the private gardens assessment criteria for residential public open space would be more appropriate and as such assessment has also been made using these screening criteria.
- 6.1.4 Soil Organic Matter (SOM) for samples of Made Ground and Chalk collected on site ranged from 0.2% to 5.8%. Concentrations of contaminants of concern have been compared to worst case scenario S4UL (1% SOM) values.
- 6.1.5 A notable exclusion from the S4ULs is lead. In the absence of a S4UL for lead, the Category 4 Screening Level (C4SL) has been selected, published by DEFRA in 2014. It is noted that the C4SL are based on the acceptance of a low level of toxicological concern, rather than the more conservative standard adopted in the derivation of S4ULs, which are based on a tolerable or minimal level of risk.
- 6.1.6 The potential risk posed to controlled waters from contaminants of concern within soils beneath the site is not addressed by these screening criteria.

Comparison of Soil Analyses to Assessment Criteria

- 6.1.7 Chemical analysis by a UKAS/MCERTS accredited laboratory was undertaken on 11 samples of Made Ground and two samples of Chalk. A comparison of soil analyses to the relevant generic assessment criteria (AC) is summarised below and presented as Appendix H. Analytical certificates for soils are presented in Appendix I.

Made Ground

- 6.1.8 The table below provides a summary of the contaminants of concern recorded at concentrations above their respective AC for a residential with plant uptake scenario within the soil samples collected from the Made Ground.

Table 6-1: Summary of Contaminants in Made Ground at Concentrations Exceeding the Residential with Plant Uptake AC

Contaminant of Concern	Location	Assessment Criteria (mg/kg)	Concentration (mg/kg)
Benzo(a)pyrene	TP03 (0.30m)	2.2	3.69
	CP01 (0.50m)		2.27
Dibenz(a,h)anthracene	TP03 (0.30m)	0.24	0.49
	CP01 (0.50m)		0.28
Benzo(b)fluoranthene	TP03 (0.30m)	2.6	4.87
	CP01 (0.50m)		3.08

- 6.1.9 When compared against AC for a residential public open space scenario (with 1% SOM), no concentrations of contaminants of concern exceed the relevant AC.

- 6.1.10 Ten samples of Made Ground were submitted for an asbestos screen. Asbestos was not identified in any of the samples submitted for screening.

Natural Strata

- 6.1.11 Three samples of the Chalk were submitted for testing. There were no contaminants of concern recorded at concentrations above their respective AC for a residential with plant uptake scenario within the soil samples collected from natural strata.

Summary of Soil Contamination

- 6.1.12 Concentrations of two PAH species were recorded above the relevant AC for a residential with plant uptake scenario within CP01, located within the west of the site and TP03 located within the east of the site. No concentrations of contaminants of concern exceed the relevant AC for a residential public open space scenario.

6.2 Groundwater Assessment

- 6.2.1 No groundwater was encountered during drilling or during subsequent monitoring visits and as such it was not possible to collect groundwater samples for subsequent analysis.

7 REVISED CONCEPTUAL SITE MODEL

7.1 Introduction

- 7.1.1 The potential pollutant linkages identified as part of the outline CSM (shown in Table3-1) have been assessed in light of the findings of the site investigation and are discussed below for each of the potential post development individual receptors identified in the outline CSM.

7.2 Human Health Receptors

Future Site Users and off-site Receptors

- 7.2.1 The development proposals comprise the construction of 46 new homes . Based on the current proposed development plans, it is understood that private gardens are proposed for the terrace of houses to be developed in the north of the site.
- 7.2.2 Concentrations of two PAH species were recorded above the relevant assessment criteria for residential with plant uptake within CP01, located within the west of the site and TP03 located within the east of the site. As such it is considered that a risk is posed to future site users within private gardens, and this should be mitigated via either source removal (removal of Made Ground) or installation of a clean cover system within these areas.
- 7.2.3 When compared to less conservative assessment criteria for residential public open space no concentrations of contaminants of concern exceed the relevant assessment criteria and as such it is considered that no significant risk is posed to future site users within external areas considered as public open space. On this basis, the concentrations are also not considered to pose a significant risk to off-site human health receptors via the airborne migration of dust.
- 7.2.4 Within areas of proposed hard standing the pathway for dermal contact and ingestion would be broken.
- 7.2.5 No potentially significant concentrations of ground gas were recorded during monitoring undertaken as part of the investigation that could be considered to pose a potentially significant risk to future site users.

Construction/ Maintenance Workers

- 7.2.6 S4ULs or C4SLs cannot be used to assess the acute (short term exposure) risk that personnel in close contact with exposed soils may experience during demolition, redevelopment or site maintenance duties.
- 7.2.7 Potential risks to construction workers can easily be controlled in most site areas by the use of appropriate personal protective equipment (disposable coveralls, gloves, and particulate/vapour masks) and by adopting high levels of personal hygiene.

7.3 Controlled Waters Receptors

Principal Aquifer

Whilst it was not possible to sample groundwater during the investigation, it is considered that the given the depth to groundwater (anticipated at c. 20m bgl at the lowest site elevation) and the relatively low levels of contamination encountered within the shallow soils, it is unlikely that any significant risk to groundwater is present.

7.4 Structures and Infrastructure

Buildings (on site and off-site)

- 7.4.1 Based on ground gas monitoring undertaken on site as part of the current investigation, CIRIA CS1 is applicable to the site, whereby no ground gas protection measures are required for new buildings.

Polymeric Utility Pipes

- 7.4.2 No significantly elevated concentrations of hydrocarbon contaminants were recorded within samples collected from Made Ground and natural soil beneath the site. As such it is considered that standard polymeric utility pipes would therefore be unsuitable for the proposed development.
- 7.4.3 Requirements for buried utility pipes should be confirmed with service providers before the development stage.

7.5 Revised Conceptual Model

- 7.5.1 The potential source-pathway-receptor linkages and associated risks upon completion of the proposed development at the site, as identified following completion of the assessment, are summarised in the revised CSM below.

Table 7-1: Revised Conceptual Site Model

Remaining Contaminants of Concern Posing a Potential Risk	Via	Potential Pathways	Potentially Active Linkages	Receptors
PAH	Soil	Direct contact/ingestion	✓ ¹	Future site users
		Inhalation of volatiles	✗	
		Airborne migration of soil or dust	✗	Off-site users
		Leaching of mobile contaminants	✗	N/A
None identified	Groundwater	Direct contact/ingestion	✗	Future site users
		Inhalation of volatiles	✗	Future site users
		Vertical and lateral migration in permeable strata	✗	Principal Aquifer
Carbon dioxide and methane	Ground gas	Inhalation of ground gas	✗	Future site users
		Explosive risks	✗	Future site users

¹ To be mitigated with either source removal (removal of Made Ground) or installation of a clean cover system within areas of private gardens.

- 7.5.2 The risk assessment is based upon the available information relating to the site and recommended mitigation measures being implemented. Should ground conditions inconsistent with those outlined in this report be encountered RPS should be contacted to enable further assessment.

8 GEOTECHNICAL ANALYSIS

8.1 Introduction

- 8.1.1 The development proposals comprise the demolition of 26 homes (including caretaker's facility) and construction of 46 new homes (including reprovision of the caretaker's facility) within two blocks of flats and two house and maisonette terraces with associated carparking and cycle storage. Block A is to consist of three and four storeys; Block B three storeys; Terrace 01 (houses) two and a half storeys; and Terrace 02 (Maisonettes) three storeys.
- 8.1.2 A proposed development plan is provided as Figure 3.
- 8.1.3 No preliminary structural loads have been received. Therefore, the preliminary recommendations below will need to be reviewed in light of subsequent detailed design.

8.2 Preliminary Geotechnical Risk Register

- 8.2.1 The table below summarises the potential geotechnical hazards associated with the development. The table provides an assessment of whether the site is likely to be affected by the hazard and the possible consequences and engineering considerations.

Table 8-1: Preliminary Geotechnical Risk Register

Hazard Description	Potential for Hazard (High / Medium / Low / NA)	Comments / Possible Engineering Requirements
Sudden lateral / vertical changes in ground conditions	L	The ground conditions from existing ground level are generally consistent with Made Ground of shallow depth overlying a limited thickness of Head Deposits at the western and eastern sections of the site respectively overlying the Seaford Chalk Formation. The Head deposits and Seaford Chalk Formation will provide a suitable bearing stratum for low to moderate loads, where this is at least medium dense silt or white chalk grade D _c or D _m . For more heavily loaded structures, piled foundations, terminating in the deeper layers of the Seaford Chalk Formation will be required.
Highly compressible / low bearing capacity soils, (including peat and soft clay)	L	A limited thickness of Made Ground and Head Deposits were encountered across the site, up to 2 m in depth.
Ground dissolution features / natural cavities	M	Based on BGS database potential natural cavities around the site is low and the potential of chalk dissolution is considered low.
Shrinking and swelling clays	M	Based on the Atterberg Test results the Seaford Chalk Formation LL is 31% and since the content of the caly in the chalk is greater than 60%, chalk is liable to be shrinkable.
Slope stability issues	L	Whilst no significant slopes are present on site, any temporary excavations created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.
High groundwater table (including waterlogged ground)	L	No groundwater encountered during the site investigations and subsequent site visit. Groundwater is anticipated to at c. 20m depth below current ground levels based on BGS records. Therefore, groundwater exclusion and control measures are not likely to be required, and any water ingress into

Hazard Description	Potential for Hazard (High / Medium / Low / NA)	Comments / Possible Engineering Requirements
		excavations should not be excessive and likely to be controllable via localised sump and pumping.
Filled and Made Ground (including embankments)	L/M	Made Ground was encountered to a maximum depth of up to 2.00m bgl beneath the site and was generally between 1.00m and 2.00m in thickness.
Obstructions (including foundations, services, basements, tunnels and adjacent sub-structures)	M	The site has no significant development history and relic structures were not encountered during the investigation, but it could be present within the footprint of former structures, which may require removal to enable the construction of the proposed development. It is likely these obstructions, if encountered may be removed using standard construction plant.
Collapsible Ground / Underground mining	L	Based on Groundsure database searches including the Stantec Natural Cavities and non coal mining databases and in consideration of the topography and geological setting of the site the risk of voided or collapsible ground as a result of mining activity is low.
Concrete classification	L	Testing has indicated a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC-1 would be appropriate for all buried concrete structures.
Seismic Activity	L	The Eurocode 8 seismic hazard zoning maps for the UK (Musson and Sargeant, 2007) indicate that horizontal Peak Ground Acceleration (PGA) values with 10% probability of being exceeded in 50 years (475 year return period) are between 0.00 and 0.02g, which is considered very low.

8.3 Preliminary Geotechnical Parameters

8.3.1 The following table shows the ground model and geotechnical parameters based on the findings of the intrusive investigation and subsequent testing.

Table 8-2: Ground Model and Geotechnical Parameters

Stratum	Depth to Top of Stratum (m bgl) [m AOD]	Unit Weight, γ_b Bulk [Dry] (kN/m ³)	Cohesion, C' (kPa)	Angle of Friction, ϕ' (°)	Young's Modulus, E (MPa)	Yielding Young's Modulus, E_y (MPa)
Made Ground	0.00 to 0.20 [31.2 to 23.07]	18	-	28 ^(a)	10 ^(a)	-
Head Deposits	0.75 to 0.90 [25.35 to 22.32]	18	-	28 ^(a)	10 ^(a)	-
Seaford Chalk Formation ($D_{c/m}$)	0.60 to 2.90 [30.8 to 21.44]	18.9 [15.5]	10 ^(b)	31 ^(b)	6 ^(c)	19 ^(c)

a. Conservative estimate

b. Lord J.A., Clayton C.R.I. and Mortimore R.N. - Engineering in Chalk_CIRIA C574, 2002

c. Lord J.A., Twine D. and Yeow H. - Foundations in Chalk_CIRIA Project Report PR11, 1994

8.4 Site Preparation

- 8.4.1 The precise development levels of the site are yet to be confirmed, but it is likely that only limited earthworks will be required to prepare development platforms for new buildings. It is anticipated that the shallow soils will be readily excavated using conventional plant.

8.5 Foundation Solutions

Traditional Foundations

- 8.5.1 Due to the inherent textural, compositional variability and compressibility of the Made Ground, this is considered unsuitable as a bearing stratum for shallow foundations.
- 8.5.2 At the time of writing this report no structural loading were provided by the Structural Engineer. Based on the SPTs value undertaken on Head deposits and Seaford Chalk Formation, these strata are suitable to bear the low to moderate superstructure loads.
- 8.5.3 A presumed bearing value of about 150 kN/m² is likely to be suitable for shallow foundations of not greater than 1m width bearing on firm clays of the Head Deposits Foundations should penetrate at least 300mm within Head Deposits.
- 8.5.4 The Seaford Chalk Formation is considered to comprise a grade D_c or D_m material, and as such based on the guidelines in CIRIA PG11¹ and CIRIA C574², an allowable bearing capacity of 225kN/m² is anticipated for shallow foundation that installed on D_c or D_m chalk.

Piled Foundations

- 8.5.5 Based on the setting of the site and ground conditions, it is anticipated that bored or rotary bored or Continuous Flight Auger (CFA) piles, terminating in the underlying Seaford Chalk Formation would be most suitable on the subject site for more heavily loaded structures.
- 8.5.6 Preliminary pile capacities for a range of pile diameters between 450mm to 750mm are presented in the Table 8-3, based on CFA or bored cast in place piles constructed on site.
- 8.5.7 The preliminary pile capacities provided are based on the parameters outlined in Table 8-2 and the following:
- CFA/Bored piles with no pile tests;
 - Maximum shaft resistance $\bar{\tau} = 0.8 \bar{\sigma}_v'$ for bored piles;
 - Maximum shaft resistance $\bar{\tau} = 0.45 \bar{\sigma}_v'$ for CFA piles; and
 - Maximum allowable base resistance of q_b=600kN/m² for both CFA and bored piles.

Table 8-3: Preliminary Pile Resistance Assessment (kN)

Pile Toe Level (m bgl)	Load Type	Pile Type and Diameter (mm)					
		Bored			CFA		
		450 (mm)	600 (mm)	750 (mm)	450 (mm)	600 (mm)	750 (mm)
6	Compression	160	225	327	263	363	469
	Tension	133	177	221	236	314	393

¹ Lord J.A., Twine D. and Yeow H. – Foundations in Chalk_CIRIA Project Report PR11, 1994

² Lord J.A., Clayton C.R.I. and Mortimore R.N. - Engineering in Chalk_CIRIA C574, 2002

8	Compression	311	427	579	532	722	917
	Tension	284	379	473	505	673	841
10	Compression	519	705	926	902	1215	1534
	Tension	492	656	820	875	1166	1458

- 8.5.8 Partial safety factors have been applied to the calculated pile capacities above in accordance with CIRIA PG11 are adopted as 1.5 against shaft resistance and 3.5 against base resistance respectively.
- 8.5.9 The loads provided in the tables should be compared against appropriately factored actions.
- 8.5.10 Loads are based on single piles only and do not take into account the action of groups of piles. This should be considered at the detailed design stage. The pile capacity estimates presented above are preliminary and are based on a conservative soil profile derived from exploratory holes undertaken onsite.
- 8.5.11 Early consultation with an appropriate piling contractor is recommended to confirm pile working capacities and to ensure the contractor can achieve the required depths and capacities. Specialist piling contractors may potentially show greater load capacities than those shown above based on specific knowledge of their piling equipment, supported by testing evidence that may be acceptable to the Local Authority.
- 8.5.12 An appropriate piling platform should be designed and constructed in accordance with BRE Digest 470 (Working Platforms for Tracked Plant).

8.6 Ground Floor Slabs

- 8.6.1 Given the depth of Made Ground on the Site consideration should be given to designing and constructing the floor slabs to be suspended.

8.7 Pavements

- 8.7.1 Eleven Dynamic Cone Penetrometer (DCP) tests were performed throughout the proposed internal access road and car parks as shown in Figure 4. DCPs are performed in accordance with TRL Report 277³ up to depth of 1.40m bgl and results of the tests shown in Appendix K. A graphical presentation of cumulative blows versus the depth is shown in Figure 6.
- 8.7.2 Based on the results of DCP01, 02, 06, 09 along the proposed internal access road, and with reference to CIRIA C574, a CBR value of not greater than 2% is recommended for the subgrade between 0.20m to 0.60m bgl.
- 8.7.3 Pavements carried on a suitable depth of capping/sub-base should prove adequate provided the exposed deposits are compacted by a heavy smooth wheeled roller and any soft or degradable materials removed and replaced with compacted granular fill. Similarly any remains of walls, foundations or exposed pieces of demolition material would need to be removed to prevent any development of concentrations of stress in the pavement.
- 8.7.4 It should be noted that the geotechnical tests results indicate that the Head deposits are shrinkable, and the underlying Chalk Formation is also susceptible to frost heave. As such a minimum pavement thickness of 0.75m should be adopted to protect against frost heave.

³ Jones C – Dynamic Cone Penetrometer tests and analysis: Technical Information Note, TRL Project Report PR/INT/277/04 (R8157), (2004)

8.8 Chemical Attack on Buried Concrete

8.8.1 Samples collected from the Made Ground and Head Deposits were tested for pH and for sulphate content. The results are presented below:

Table 8-4: pH and Sulphate Analytical Data

Strata	No. of samples	pH Range	Characteristic pH	Sulphate Range (mg/l)	Characteristic Sulphate (mg/l)	Design Sulphate Class	ACEC Class
Made Ground	2	8.2 to 8.6	8.6	10	10	DS-1	AC-1
Head Deposits	1	8.7	8.7	<10	10	DS-1	AC-1

8.8.2 The data was used to assess appropriate classification for buried concrete in accordance with BRE Special Digest 1, based on the following assumptions:

- Brownfield ground conditions; and
- Mobile groundwater conditions.

8.8.3 Based on the results indicated in Table 8-4, it is considered that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC-1 would be appropriate for all buried concrete structures.

8.9 Ground Infiltration Assessment

8.9.1 To evaluate the infiltration potential of the shallow ground across the site three soakage tests were undertaken in TP01, TP02 and TP03. The results of the tests are presented in Appendix J and a summary of the results are shown in Table 8-5 below:

Table 8-5: Summary of the Soakage test results

Trial Pit ID	Soil Infiltration Rate by Interpolation (m/s)				Soil Infiltration Rate by Regress Analysision (m/s)			
	1st test	2nd test	3rd test	Average	1st test	2nd test	3rd test	Average
TP01	3.76E-06	-	-	-	3.49E-06	-	-	-
TP02	6.19E-05	3.8E-05	3.94E-05	4.66E-05	6.98E-05	4.85E-05	4.76E-05	5.53E-05
TP03	6.00E-05	4.6E-05	4.95E-05	5.18E-05	6.85E-05	5.33E-05	5.65E-05	5.94E-05

8.9.2 As can be seen in Table 8-5, the soil infiltration rate varies from 3.49×10^{-6} m/s to 3.94×10^{-5} m/s. The variable test results are indicative of the nature of the remoulded chalk matrix and are to be expected.

8.9.3 It should be noted however that chalk stratum is highly variable and higher values of infiltration may be possible should more competent fractured material be encountered at depth.

8.9.4 Consideration may be given to deeper borehole soakaways in this regard but would be critically subject to confirmation and further details of soakage method be determined.

8.9.5 Should soakaways be considered for the infiltration drainage of the site the recommendations of CIRIA C574 should be followed and as such concentrations of rainwater percolating into the ground should be avoided by careful detailing of the structure. Soakaways should be avoided if at all possible. If unavoidable, they should be sited at least 5.00m to 10.00m away from any structure.

8.10 Temporary Works and Excavations

- 8.10.1 The site has development history and relic structures could be present within the footprint of former structures, which may require removal to enable the construction of the proposed development.
- 8.10.2 Groundwater was not encountered during the site investigation works and subsequent monitoring visits. Therefore, groundwater exclusion and control measures are not likely to be required, and any water ingress into excavations should not be excessive and likely to be controllable via localised sump and pumping. If stronger inflows are encountered, recourse to a temporary groundwater exclusion system may be required, such as sheet piling.
- 8.10.3 If groundwater is encountered during excavation, degradation of the formation may occur. The formation should therefore be adequately protected from seepages and protected from adverse weather conditions. If the formation layer becomes wet resulting in loosening of the surface materials, then excavation may have to be taken deeper in order to find a suitable bearing layer. Instability of excavations in granular material should be expected, especially during periods of adverse weather. Suitable shoring measures or battering back of slopes may be required for any excavations greater than 1.20m bgl. All temporary excavations should be undertaken in accordance with CIRIA Report 97 – Trenching Practice.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Environmental

- 9.1.1 The development proposals comprise the construction of 46 new homes . Based on the current proposed development plans, it is understood that private gardens are proposed for the terrace of houses to be developed in the north of the site with areas of external public open space elsewhere.
- 9.1.2 Within areas of proposed private gardens it is considered that PAH contamination will pose an unacceptable risk to future site users which will be should be mitigated via source removal (removal of Made Ground) or installation of clean cover.
- 9.1.3 It is considered that no significant risk is posed to futures site users within areas of proposed hard standing or public open space, or to off site human health receptors.
- 9.1.4 It is not considered that the relatively low levels of contaminants of concern encountered within the Made Ground soils is unlikely to pose a significant risk to the underlying aquifer which is anticipated to be present at significant depth.
- 9.1.5 Ground gas monitoring undertaken on site as part of the current investigation indicates CIRIA CS1 is applicable to the site, whereby no ground gas protection measures are required for new buildings.

9.2 Geotechnical

- 9.2.1 Ground conditions comprised a variable depth of Made Ground (up to 1.90m thick) over the Head Deposits underlaid with Seaford Chalk Formation. No groundwater was encountered during intrusive site investigation and subsequent monitoring visits.
- 9.2.2 It is anticipated that pad or strip shallow foundation installed on Head Deposits or Seaford Chalk Formation will be suitable for low to medium superstructure loads. Should higher superstructure loads be anticipated then the bored or CFA pile foundation sufficiently penetrating in the Seaford Chalk Formation should be considered. Preliminary assessments of bearing capacity of shallow foundation and pile resistance are presented.
- 9.2.3 It is considered that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC-1 would be appropriate for all buried concrete.
- 9.2.4 CBR assessment based on the DCPs undertaken throughout the site was provided and a preliminary CBR value of 2% is recommended. Results of Atterberg Limit and PSD testing indicated that Head deposits are considered as being a shrinkable soil , and the Seaford Chalk would be considered as being frost susceptible. As such pavement construction should be a minimum 0.75m to protect against frost heave and shrinkage..
- 9.2.5 Three Infiltration tests undertaken largely in accordance with BRE report 365 were undertaken across the site and calculated soil infiltration rates vary between 1×10^{-5} m/s and 1×10^{-6} m/s. It should be noted however that chalk stratum is highly variable and higher values of infiltration may be possible should more competent fractured material be encountered at depth. Consideration may be given to deeper borehole soakaways in this regard but would be critically subject to confirmation and further details of soakage method be determined. Any soakaways should be site at least 5 to 10m from any structures.
- 9.2.6 it is considered that a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Classification of AC-1 would be appropriate for all buried concrete structures.

9.3 Further Considerations

- 9.3.1 During construction activities, personnel working in areas of exposed impacted soils could potentially be at risk. Appropriate health and safety risk assessment should be undertaken and mitigation measures, including PPE, should be implemented.
- 9.3.2 There is the potential that soil and groundwater contamination that has not been previously identified will be encountered during the development phase. Should visual evidence of the presence of asbestos (or any other soil contaminant) be identified during the development phase, work in that area of the site should be halted and specialist advice should be sought.
- 9.3.3 It is recommended that a site specific Remediation Strategy incorporating Validation Plan and protocols for managing any contamination encountered during redevelopment is produced. The Remediation Strategy should include details of the covers systems required in areas of soft landscaping.
- 9.3.4 Any soil imported for soft landscaping to be incorporated as part of the redevelopment should be analysed to confirm suitability for use.
- 9.3.5 Any specific soils that are to be disposed of off-site should be subject to waste characterisation prior to removal from site.
- 9.3.6 Given their age, it is possible that asbestos containing material is present within the buildings on site. A formal Asbestos Refurbishment / Demolition Survey should be carried out prior to any demolition work commencing.

FIGURES





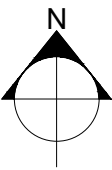
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Client Gravesham Borough Council

Project St Columba's Close

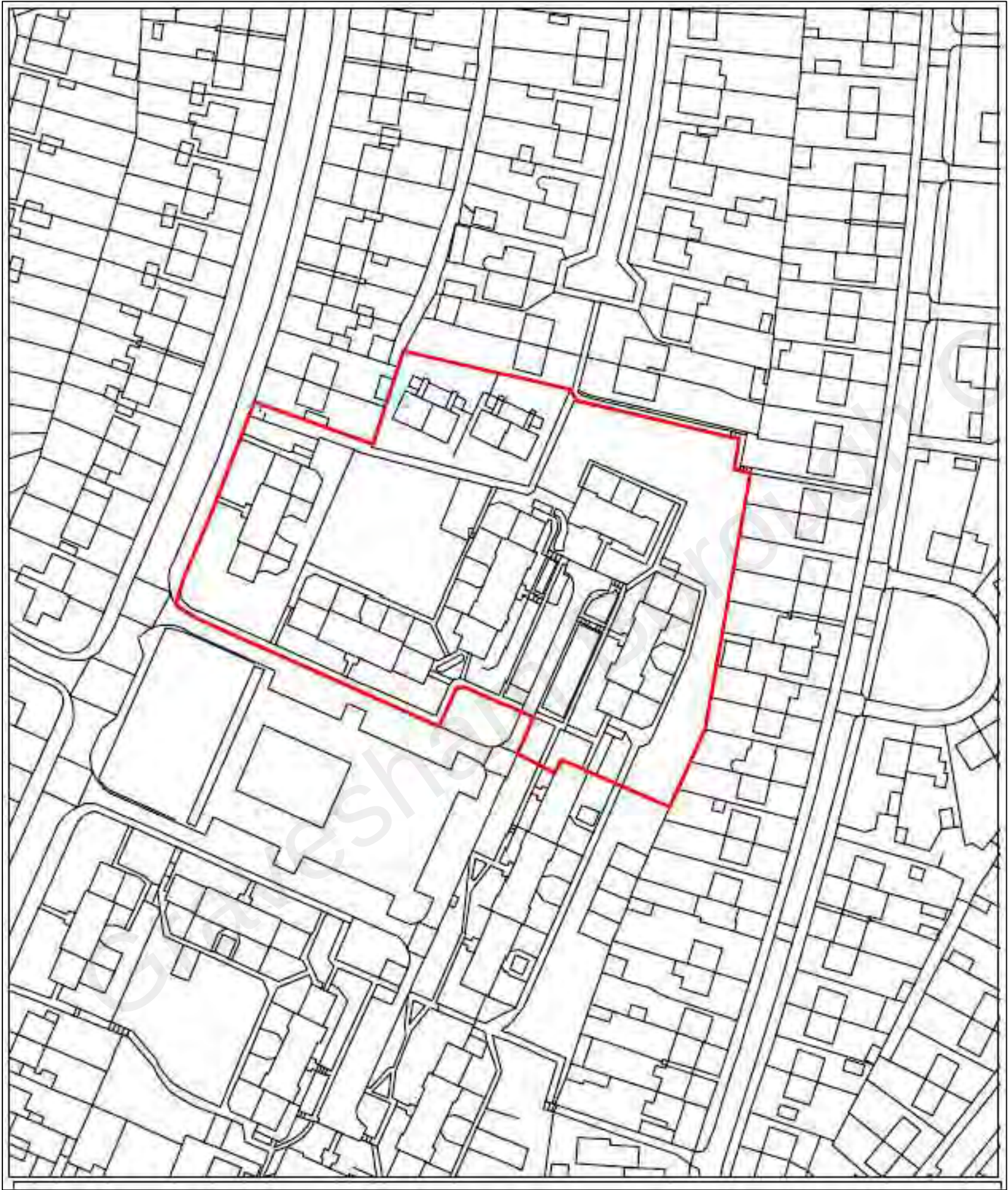
Title Site Location Plan

Status	Drawn By	PM/Checked by
Draft	NW	-

Job Ref	Scale @ A3	Date Created
JER9191	NTS	July 22

RPS Drawing / Figure Number	Rev
1	0

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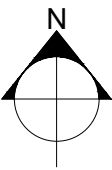
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Title **Site Boundary Plan**

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Job Ref	Scale @ A3	Date Created
JER9191	NTS	July 22

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2	0

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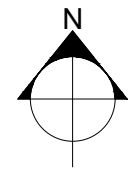


Aerial View - South West - Proposed

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Project **St Columba's Close**

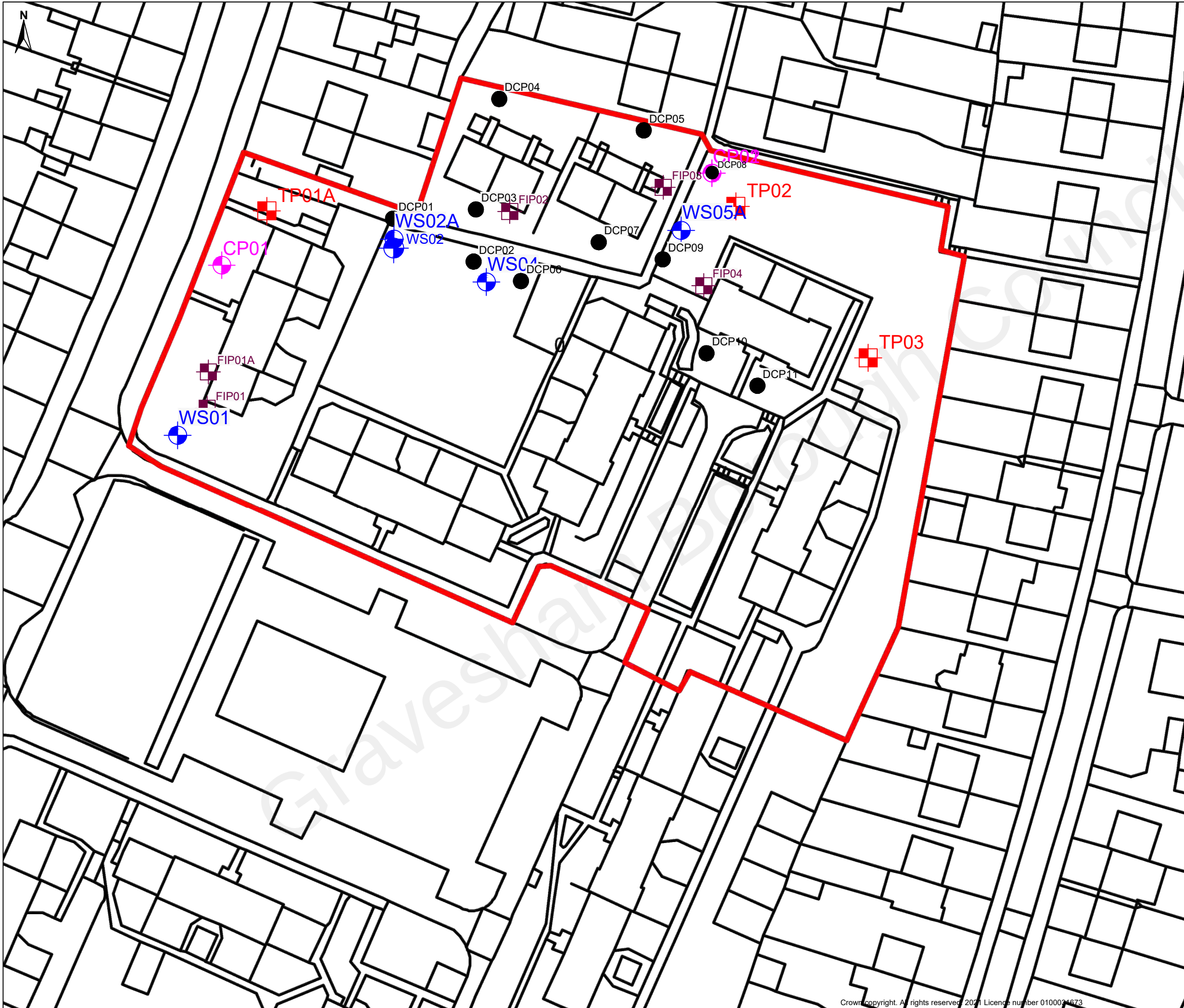
Title **Proposed Development Plan**

Status	Drawn By	PM/Checked by
Draft	NW	TC

Job Ref	Scale @ A3	Date Created
JER9191	NTS	Aug 22

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TP

WS

CP

FIP

Site Boundary

DCP

TP

Trial Pit
(~3.50m bgl)

WS

Window Sample Borehole
(5m bgl)

CP

Cable Percussive Borehole
(10m bgl)

FIP

Foundation Inspection Pit

Site Boundary

DCP

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Client

Gravesham Borough Council

Project

St Columba's Close

Title

As-Built Exploratory Hole
Location Plan

Status

Draft

Drawn By

SD

PM/Checked by

JL

Job Ref

JER9191

Scale @ A3

NTS

Date Created

July 2022

Figure Number

1

Rev

02

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Figure 5

Location:

Date Reported: 04/08/2022

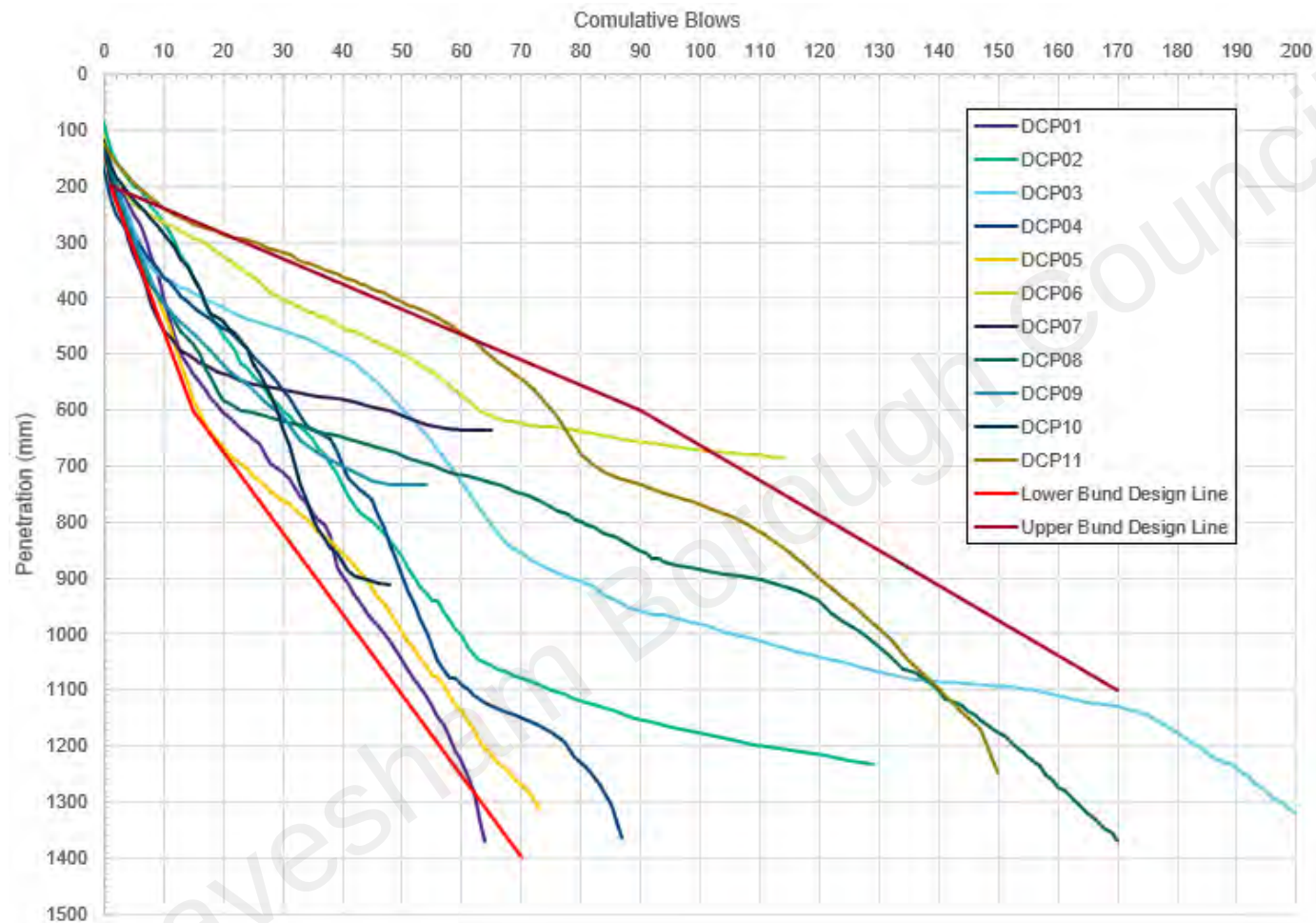


Figure 6: Summary of DCPs test – Cumulative blows against penetration

APPENDICES

Gravesham Borough Council

Appendix A

General Notes

Gravesham Borough Council

RPS Consulting Services Ltd

Phase 1 - Environmental Risk Assessment / Desk Study Environmental Review

General Notes

1. A "desk study" means that no site visits have been carried out as any part thereof, unless otherwise specified.
2. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the Client.
3. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.
4. The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.
5. No sampling or analysis has been undertaken in relation to this desk study.
6. Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation".
7. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
8. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.
9. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual licence to the Client deemed to be granted on payment in full to the RPS Company by the Client of the outstanding amounts.
10. The report is provided for sole use by the Client and is confidential to them, their professional advisors, no responsibility whatsoever for the contents of the report will be accepted to any person other than the Client. [Unless otherwise agreed]
11. These terms apply in addition to the RPS "Standard Terms & Conditions" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms & Conditions the said Standard Terms & Conditions shall prevail.) In the absence of such a written contract the Standard Terms & Conditions will apply.

RPS Consulting Services Ltd

Phase 2 – Site Investigations

General Notes

1. The assessments made in this report are based on the ground conditions as revealed by intrusive investigations, together with the results of any field or laboratory testing or chemical analysis undertaken and other relevant data which may have been obtained including previous site investigations. In any event, ground contamination often exists as small discrete areas of contamination ("hot spots") and there can be no certainty that any or all such areas have been located and/or sampled.
2. There may be special conditions appertaining to the site which have not been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.
3. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS Companies for inaccuracies within the data supplied by other parties.
4. Whilst the report may express an opinion on possible ground conditions between or beyond trial pit or borehole locations, or on the possible presence of features based on either visual, verbal or published evidence this is for guidance only and no liability can be accepted for the accuracy thereof.
5. Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. Groundwater conditions may vary due to seasonal or other effects.
6. This report is prepared and written in the context of the agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or part after its original submission.
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Appendix B

Photographs

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Plate 01: Northern Two-storey Block to be Demolished



Plate 02: Central Soft Landscaped Area



Plate 03: North-eastern Three-storey Building Block



Plate 04: North-eastern Soft Landscaped Area

Appendix C

Desk Study Information

Gravesham Borough Council

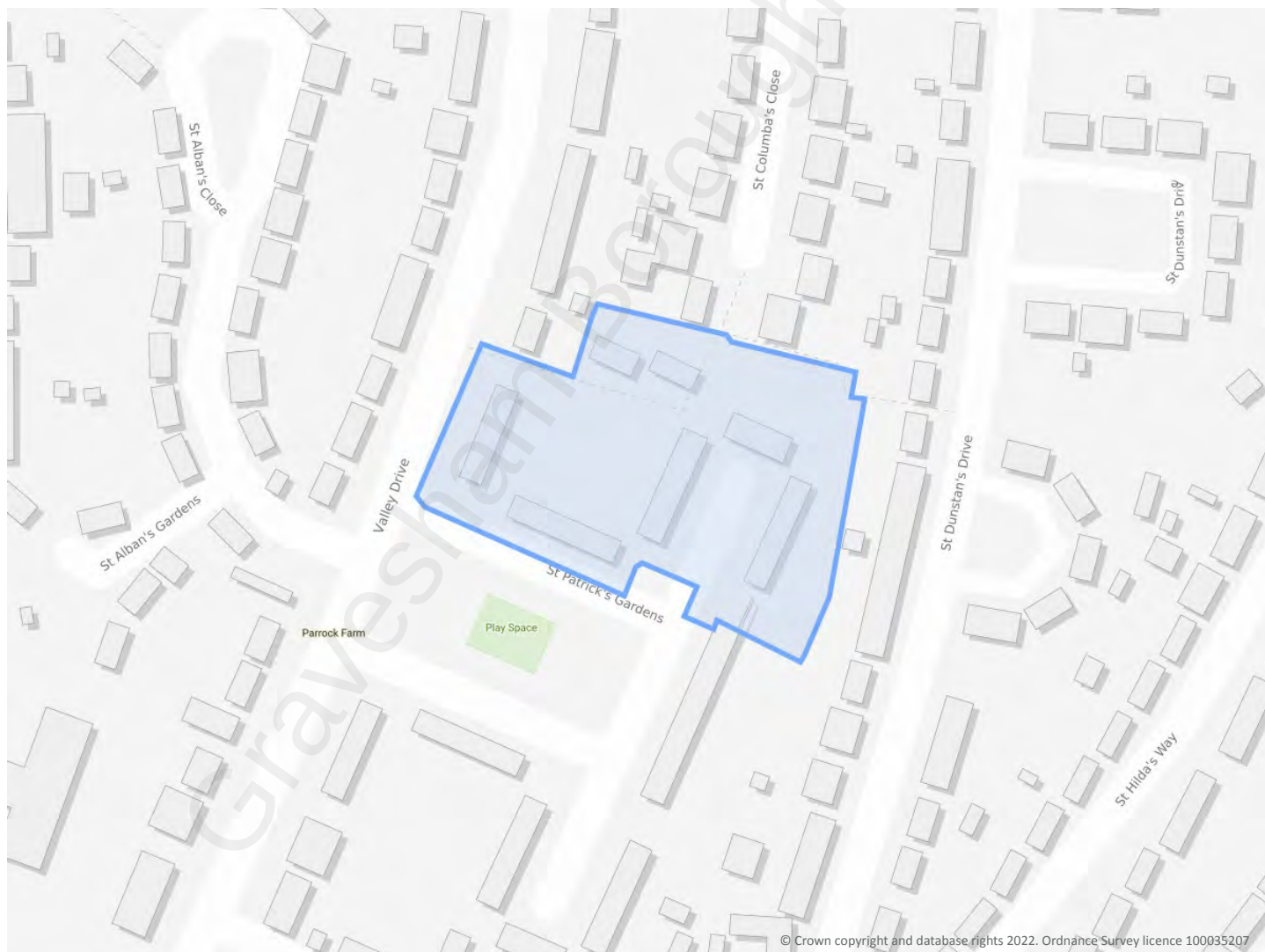
LAND AT, ST COLUMBAS CLOSE, GRAVESEND, DA12 4AJ

Order Details

Date: 25/03/2022
Your ref: JER9191
Our Ref: GS-8623587
Client: Team Admin

Site Details

Location: 565980 172131
Area: 1.07 ha
Authority: [Gravesham Borough Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

p.13

groundsure.com/insightuserguide

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	Historical industrial land uses	0	0	0	10	-
15	1.2	Historical tanks	0	0	0	2	-
15	1.3	Historical energy features	0	0	4	5	-
16	1.4	Historical petrol stations	0	0	0	0	-
16	1.5	Historical garages	0	0	0	2	-
17	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
18	2.1	Historical industrial land uses	0	0	0	14	-
19	2.2	Historical tanks	0	0	0	3	-
20	2.3	Historical energy features	0	0	6	7	-
20	2.4	Historical petrol stations	0	0	0	0	-
21	2.5	Historical garages	0	0	0	3	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
22	3.1	Active or recent landfill	0	0	0	0	-
22	3.2	Historical landfill (BGS records)	0	0	0	0	-
23	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
23	3.4	Historical landfill (EA/NRW records)	0	0	0	1	-
23	3.5	Historical waste sites	0	0	0	0	-
23	3.6	Licensed waste sites	0	0	0	0	-
24	3.7	Waste exemptions	0	1	0	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
25	4.1	Recent industrial land uses	0	0	4	-	-
26	4.2	Current or recent petrol stations	0	0	0	1	-
26	4.3	Electricity cables	0	0	0	0	-
26	4.4	Gas pipelines	0	0	0	0	-
26	4.5	Sites determined as Contaminated Land	0	0	0	0	-



27	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
27	4.7	Regulated explosive sites	0	0	0	0	-
27	4.8	Hazardous substance storage/usage	0	0	0	0	-
27	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
27	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
28	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	0	1	-
28	4.12	Radioactive Substance Authorisations	0	0	0	0	-
28	4.13	Licensed Discharges to controlled waters	0	0	0	0	-
28	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
29	4.15	Pollutant release to public sewer	0	0	0	0	-
29	4.16	List 1 Dangerous Substances	0	0	0	0	-
29	4.17	List 2 Dangerous Substances	0	0	0	0	-
29	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
29	4.19	Pollution inventory substances	0	0	0	0	-
30	4.20	Pollution inventory waste transfers	0	0	0	0	-
30	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
31	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
32	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
33	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
34	5.4	<u>Groundwater vulnerability- soluble rock risk</u>	Identified (within 0m)				
35	5.5	Groundwater vulnerability- local information	None (within 0m)				
36	5.6	<u>Groundwater abstractions</u>	0	0	0	0	3
37	5.7	Surface water abstractions	0	0	0	0	0
38	5.8	<u>Potable abstractions</u>	0	0	0	0	1
38	5.9	<u>Source Protection Zones</u>	1	0	2	0	-
38	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
40	6.1	Water Network (OS MasterMap)	0	0	0	-	-



40	6.2	Surface water features	0	0	0	-	-
41	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
41	6.4	WFD Surface water bodies	0	0	0	-	-
41	6.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
43	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
43	7.2	Historical Flood Events	0	0	0	-	-
43	7.3	Flood Defences	0	0	0	-	-
44	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
44	7.5	Flood Storage Areas	0	0	0	-	-
45	7.6	Flood Zone 2	None (within 50m)				
45	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
46	8.1	<u>Surface water flooding</u>	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding					
48	9.1	<u>Groundwater flooding</u>	Moderate (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
49	10.1	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	0	2
50	10.2	<u>Conserved wetland sites (Ramsar sites)</u>	0	0	0	0	1
50	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
51	10.4	Special Protection Areas (SPA)	0	0	0	0	0
51	10.5	National Nature Reserves (NNR)	0	0	0	0	0
51	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
51	10.7	<u>Designated Ancient Woodland</u>	0	0	0	0	2
52	10.8	Biosphere Reserves	0	0	0	0	0
52	10.9	Forest Parks	0	0	0	0	0
52	10.10	Marine Conservation Zones	0	0	0	0	0
52	10.11	<u>Green Belt</u>	0	0	0	0	1
53	10.12	Proposed Ramsar sites	0	0	0	0	0



53	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
53	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
53	10.15	Nitrate Sensitive Areas	0	0	0	0	0
54	10.16	<u>Nitrate Vulnerable Zones</u>	0	0	0	0	3
55	10.17	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
56	10.18	<u>SSSI Units</u>	0	0	0	0	2
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
59	11.1	World Heritage Sites	0	0	0	-	-
59	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
59	11.3	National Parks	0	0	0	-	-
59	11.4	Listed Buildings	0	0	0	-	-
60	11.5	Conservation Areas	0	0	0	-	-
60	11.6	Scheduled Ancient Monuments	0	0	0	-	-
60	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
61	12.1	<u>Agricultural Land Classification</u>	Urban (within 250m)				
62	12.2	Open Access Land	0	0	0	-	-
62	12.3	Tree Felling Licences	0	0	0	-	-
62	12.4	Environmental Stewardship Schemes	0	0	0	-	-
62	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
63	13.1	Priority Habitat Inventory	0	0	0	-	-
63	13.2	Habitat Networks	0	0	0	-	-
63	13.3	Open Mosaic Habitat	0	0	0	-	-
63	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
64	14.1	<u>10k Availability</u>	Identified (within 500m)				
65	14.2	<u>Artificial and made ground (10k)</u>	0	0	0	3	-
66	14.3	<u>Superficial geology (10k)</u>	1	0	0	0	-

67	14.4	Landslip (10k)	0	0	0	0	-
68	14.5	<u>Bedrock geology (10k)</u>	1	0	0	0	-
69	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
70	15.1	<u>50k Availability</u>	Identified (within 500m)				
71	15.2	<u>Artificial and made ground (50k)</u>	0	0	0	3	-
72	15.3	Artificial ground permeability (50k)	0	0	-	-	-
73	15.4	<u>Superficial geology (50k)</u>	0	1	0	0	-
74	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
74	15.6	Landslip (50k)	0	0	0	0	-
74	15.7	Landslip permeability (50k)	None (within 50m)				
75	15.8	<u>Bedrock geology (50k)</u>	1	0	0	0	-
76	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
76	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
77	16.1	BGS Boreholes	0	0	0	-	-
Page	Section	Natural ground subsidence					
78	17.1	<u>Shrink swell clays</u>	Very low (within 50m)				
80	17.2	<u>Running sands</u>	Very low (within 50m)				
82	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
83	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
84	17.5	<u>Landslides</u>	Very low (within 50m)				
86	17.6	<u>Ground dissolution of soluble rocks</u>	Low (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
88	18.1	Natural cavities	0	0	0	0	-
89	18.2	BritPits	0	0	0	0	-
89	18.3	Surface ground workings	0	0	0	-	-
89	18.4	Underground workings	0	0	0	0	0
89	18.5	Historical Mineral Planning Areas	0	0	0	0	-



89	18.6	<u>Non-coal mining</u>	1	0	0	0	8
91	18.7	<u>Mining cavities</u>	0	0	0	0	2
91	18.8	JPB mining areas	None (within 0m)				
91	18.9	Coal mining	None (within 0m)				
91	18.10	Brine areas	None (within 0m)				
92	18.11	Gypsum areas	None (within 0m)				
92	18.12	Tin mining	None (within 0m)				
92	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
93	19.1	<u>Radon</u>	Between 1% and 3% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
95	20.1	<u>BGS Estimated Background Soil Chemistry</u>	3	2	-	-	-
95	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
96	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
97	21.1	Underground railways (London)	0	0	0	-	-
97	21.2	Underground railways (Non-London)	0	0	0	-	-
97	21.3	Railway tunnels	0	0	0	-	-
97	21.4	Historical railway and tunnel features	0	0	0	-	-
97	21.5	Royal Mail tunnels	0	0	0	-	-
98	21.6	Historical railways	0	0	0	-	-
98	21.7	Railways	0	0	0	-	-
98	21.8	Crossrail 1	0	0	0	0	-
98	21.9	Crossrail 2	0	0	0	0	-
98	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 31/05/2021

Site Area: 1.07ha



Recent site history - 2018 aerial photograph



Capture Date: 21/10/2018

Site Area: 1.07ha



Recent site history - 2012 aerial photograph



Capture Date: 25/05/2012

Site Area: 1.07ha



Recent site history - 2009 aerial photograph



Capture Date: 27/09/2009

Site Area: 1.07ha



Recent site history - 1999 aerial photograph



Capture Date: 03/09/1999

Site Area: 1.07ha



OS MasterMap site plan

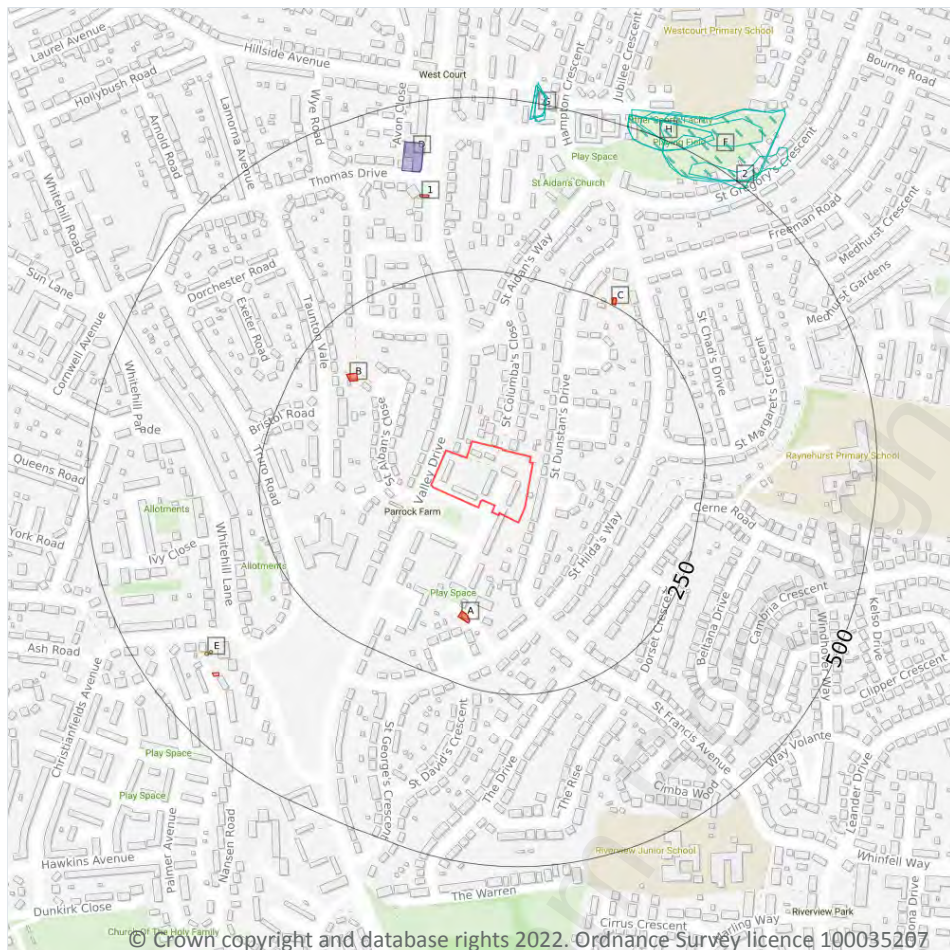


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Site Area: 1.07ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

1.1 Historical industrial land uses

Records within 500m

10

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
F	463m NE	Refuse Heap	1938	2230152



ID	Location	Land use	Dates present	Group ID
F	464m NE	Refuse Heap	1932	2227506
2	471m NE	Refuse Heap	1946	2285996
G	474m N	Old Chalk Pit	1888 - 1895	2244788
G	475m N	Unspecified Pit	1946	2126185
G	475m N	Unspecified Quarry	1907 - 1932	2227073
G	480m N	Unspecified Quarry	1938	2274648
H	482m N	Refuse Heap	1907	2254749
H	482m N	Shale Tip	1907	2217028
F	495m NE	Refuse Heap	1946	2180058

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

2

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
E	399m SW	Unspecified Tank	1953	409072
E	405m SW	Unspecified Tank	1936	369290

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

9

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.



Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
A	149m S	Electricity Substation	1953	262790
A	150m S	Electricity Substation	1973	277429
B	164m NW	Electricity Substation	1953	269270
B	164m NW	Electricity Transformer	1974	250922
C	252m NE	Electricity Transformer	1970	250906
C	252m NE	Electricity Substation	1953 - 1955	260774
C	252m NE	Electricity Substation	1953	270160
1	360m N	Electricity Substation	1979 - 1987	286729
E	411m SW	Electricity Transformer	1973	250916

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

2

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
D	399m N	Garage	1961 - 1979	82638



ID	Location	Land use	Dates present	Group ID
D	400m N	Garage	1987	75693

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

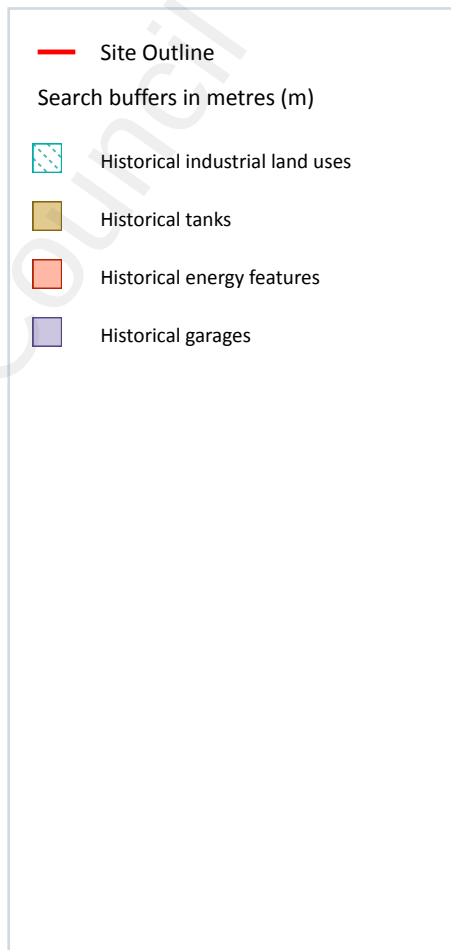
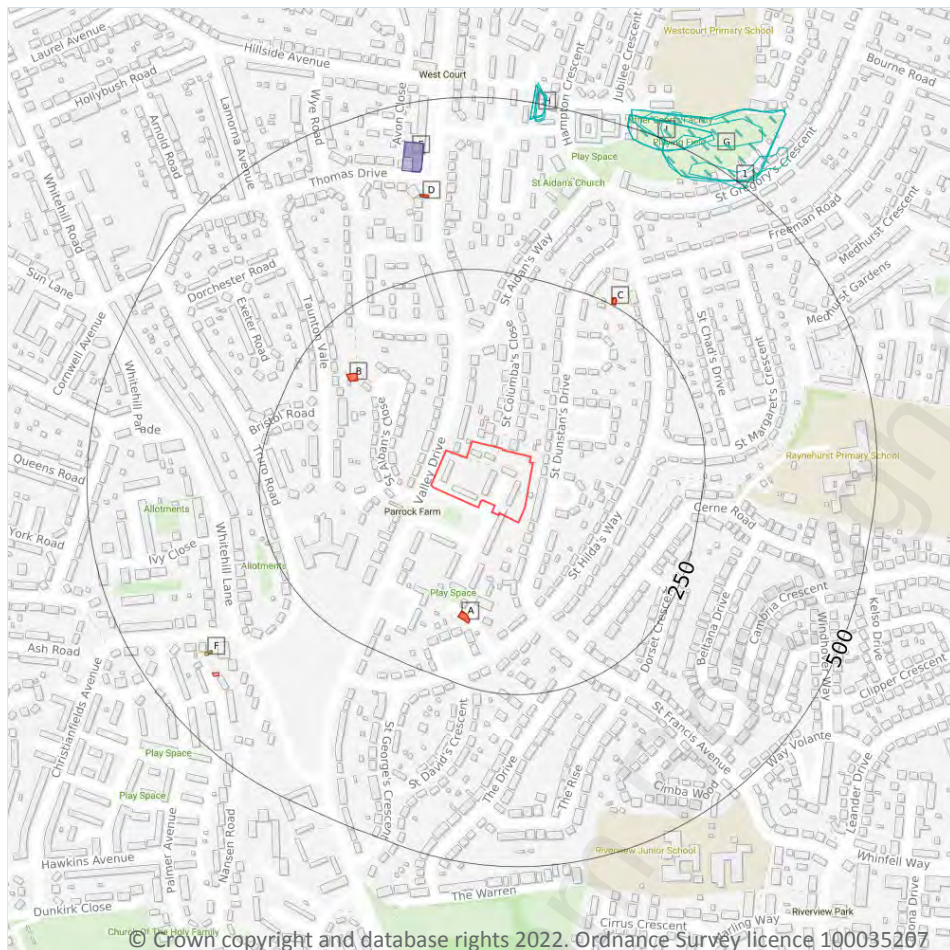
0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.



2 Past land use - un-grouped



2.1 Historical industrial land uses

Records within 500m

14

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18**

ID	Location	Land Use	Date	Group ID
G	463m NE	Refuse Heap	1938	2230152
G	463m NE	Refuse Heap	1938	2230152
G	464m NE	Refuse Heap	1932	2227506

ID	Location	Land Use	Date	Group ID
1	471m NE	Refuse Heap	1946	2285996
H	474m N	Old Chalk Pit	1888	2244788
H	475m N	Unspecified Pit	1946	2126185
H	475m N	Unspecified Quarry	1932	2227073
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H	480m N	Unspecified Quarry	1938	2274648
I	482m N	Refuse Heap	1907	2254749
I	482m N	Shale Tip	1907	2217028
I	482m N	Shale Tip	1907	2217028
G	495m NE	Refuse Heap	1946	2180058

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

3

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18**

ID	Location	Land Use	Date	Group ID
F	399m SW	Unspecified Tank	1953	409072
F	400m SW	Unspecified Tank	1953	409072
F	405m SW	Unspecified Tank	1936	369290

This data is sourced from Ordnance Survey / Groundsure.



2.3 Historical energy features

Records within 500m

13

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18**

ID	Location	Land Use	Date	Group ID
A	149m S	Electricity Substation	1953	262790
A	150m S	Electricity Substation	1973	277429
A	150m S	Electricity Substation	1953	262790
B	164m NW	Electricity Substation	1953	269270
B	164m NW	Electricity Transformer	1974	250922
B	164m NW	Electricity Substation	1953	269270
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C	252m NE	Electricity Substation	1955	260774
C	252m NE	Electricity Substation	1953	270160
D	360m N	Electricity Substation	1979	286729
D	361m N	Electricity Substation	1987	286729
F	411m SW	Electricity Transformer	1973	250916

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.



2.5 Historical garages

Records within 500m

3

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18**

ID	Location	Land Use	Date	Group ID
E	399m N	Garage	1979	82638
E	399m N	Garage	1961	82638
E	400m N	Garage	1987	75693

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Historical landfill (EA/NRW)
- Waste exemptions

3.1 Active or recent landfill

Records within 500m

0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m

0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.



3.3 Historical landfill (LA/mapping records)

Records within 500m

0

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m

1

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 22**

ID	Location	Details		
2	472m NE	Site Address: Gregory's Crescent, Gravesend Licence Holder Address: -	Waste Licence: Yes Site Reference: GR16 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 01/01/1976 Licence Surrender: -	Operator: - Licence Holder: - First Recorded - Last Recorded: -

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m

0

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m

0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m

1

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

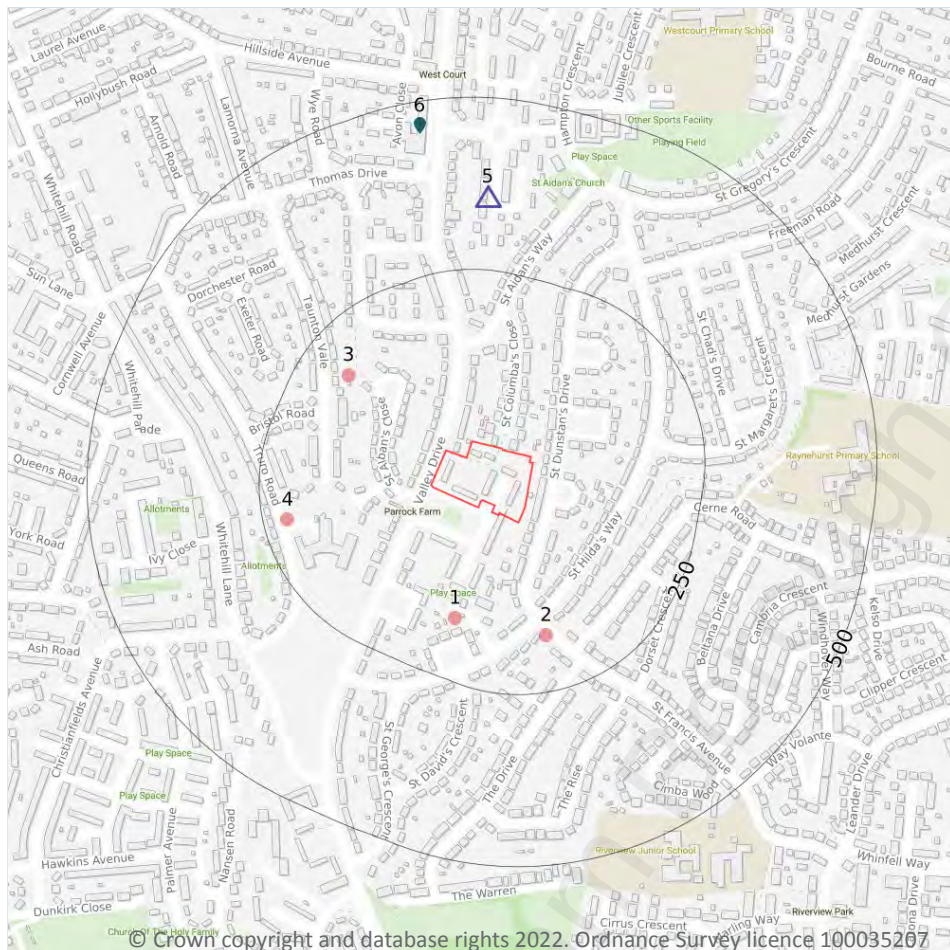
Features are displayed on the Waste and landfill map on **page 22**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	25m SW	-	WEX282151	Using waste exemption	Not on a farm	Use of waste in construction

This data is sourced from the Environment Agency and Natural Resources Wales.



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- △ Current or recent petrol stations
- Licensed pollutant release (Part A(2)/B)

4.1 Recent industrial land uses

Records within 250m

4

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Company	Address	Activity	Category
1	162m SW	Electricity Sub Station	Kent, DA12	Electrical Features	Infrastructure and Facilities
2	169m S	Gas Governor	Kent, DA12	Gas Features	Infrastructure and Facilities
3	179m NW	Electricity Sub Station	Kent, DA12	Electrical Features	Infrastructure and Facilities



ID	Location	Company	Address	Activity	Category
4	215m W	Electricity Sub Station	Kent, DA12	Electrical Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	1
----------------------------	----------

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Company	Address	LPG	Status
5	356m N	OBSOLETE	Valley Drive, Gravesend, Kent, DA12 5RT	Not Applicable	Obsolete

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0
----------------------------	----------

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0
----------------------------	----------

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0
----------------------------	----------

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m**0**

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m**0**

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m**0**

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m**0**

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m**0**

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

1

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Address	Details	
6	464m N	Valley Dry Cleaners, 8 The Parade, Valley Drive, Gravesend, DA12 5RT	Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m

0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m

0

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m

0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m**0**

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m**0**

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m**0**

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m**0**

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m**0**

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory radioactive waste

Records within 500m

0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer



- Site Outline**
- Search buffers in metres (m)**
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive
 - Unknown

5.1 Superficial aquifer

Records within 500m

1

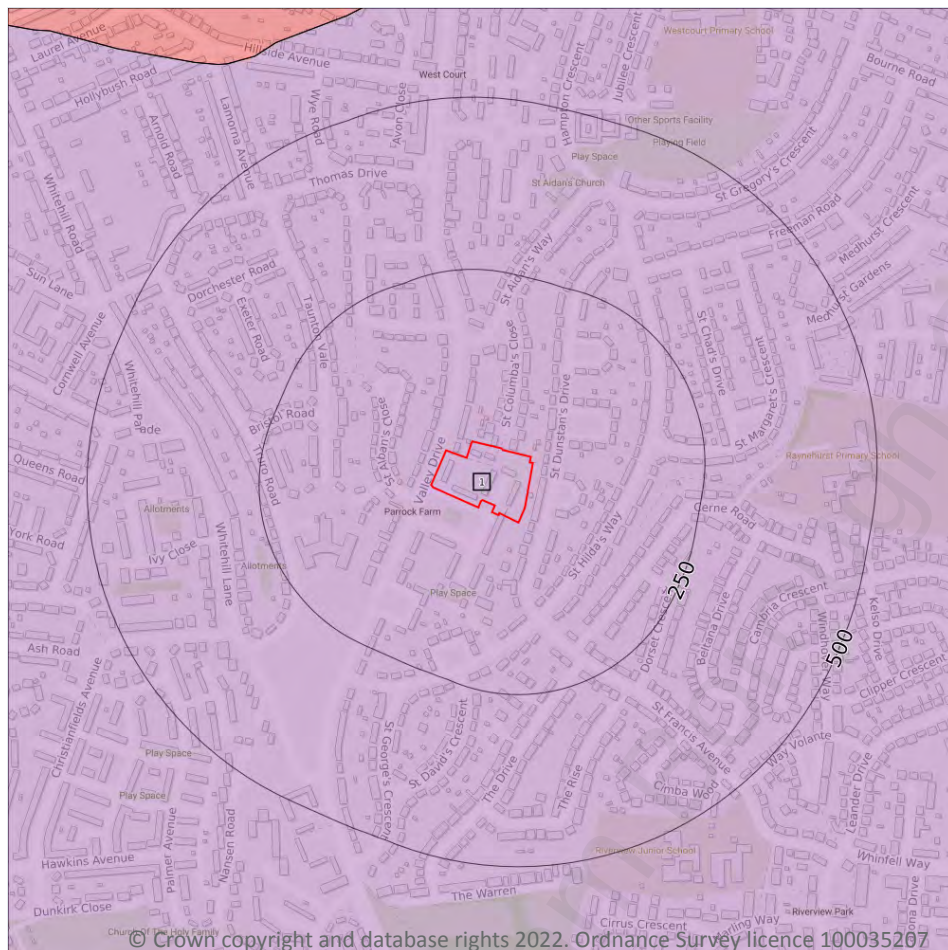
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 31**

ID	Location	Designation	Description
1	4m NW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



- Site Outline**
- Search buffers in metres (m)**
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive

5.2 Bedrock aquifer

Records within 500m

1

Aquifer status of groundwater held within bedrock geology.

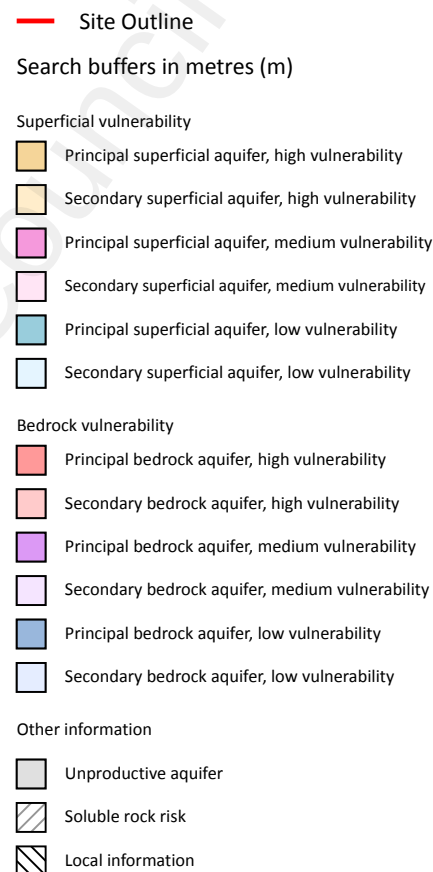
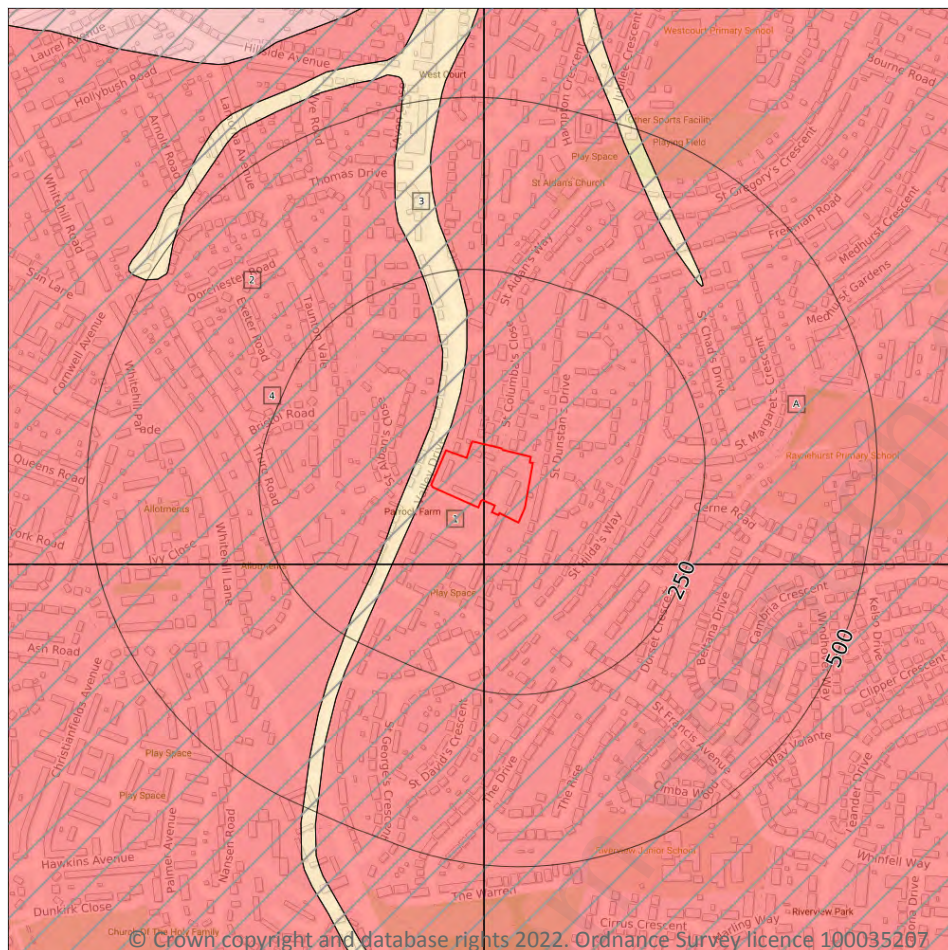
Features are displayed on the Bedrock aquifer map on **page 32**

ID	Location	Designation	Description
1	On site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Groundwater vulnerability



5.3 Groundwater vulnerability

Records within 50m

4

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 33**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Principal bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Principal Flow mechanism: Well connected fractures
A	On site	Summary Classification: Principal bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Principal Flow mechanism: Well connected fractures
3	4m NW	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: High Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Principal Flow mechanism: Well connected fractures
4	33m W	Summary Classification: Principal bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Principal Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site

2

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

ID	Maximum soluble risk category	Percentage of grid square covered by maximum risk
2	Very significant soluble rocks are likely to be present with a high possibility of localised subsidence or dissolution-related degradation of bedrock occurring naturally, especially in adverse conditions such as concentrated surface or subsurface water flow.	2.0%
A	Very significant soluble rocks are likely to be present with a high possibility of localised subsidence or dissolution-related degradation of bedrock occurring naturally, especially in adverse conditions such as concentrated surface or subsurface water flow.	0.0%



This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

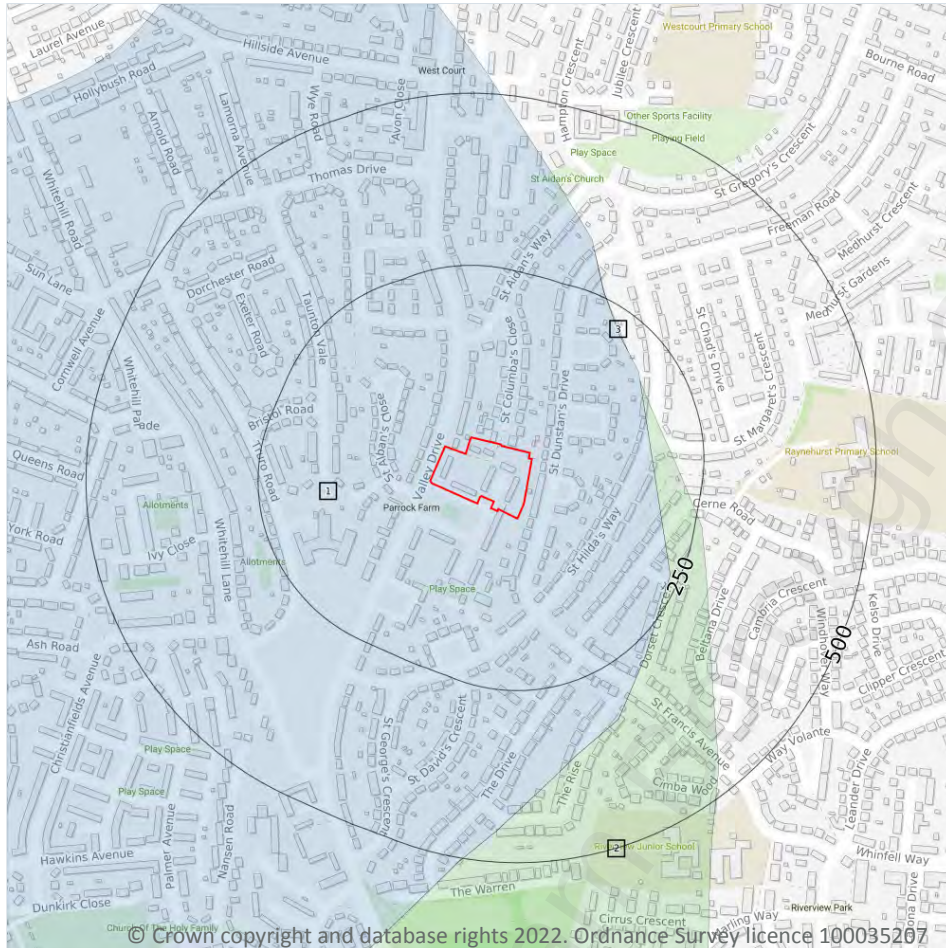
Records on site

0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



- Site Outline
- Search buffers in metres (m)**
- Source Protection Zone 1
Inner catchment
- Source Protection Zone 2
Outer catchment
- Source Protection Zone 3
Total catchment
- Source Protection Zone 4
Zone of Special Interest
- Source Protection Zone 1c
Inner catchment - confined aquifer
- Source Protection Zone 2c
Outer catchment - confined aquifer
- Source Protection Zone 3c
Total catchment - confined aquifer
- Drinking water abstraction licences
Polygon features
- Drinking water abstraction licences
Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m

3

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 36**

ID	Location	Details	
-	1371m NW	Status: Active Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: BOREHOLES, ADITS AND CATCHPITS AT WINDMILL HILL PS Data Type: Poly4 Name: Southern Water Services Ltd Easting: 565060 Northing: 173270	Annual Volume (m ³): 17,700,000 Max Daily Volume (m ³): 92,000 Original Application No: 169/0639D Original Start Date: 24/03/1986 Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date: -
-	1617m W	Status: Active Licence No: SO/040/0001/019 Details: Spray Irrigation - Storage Direct Source: Southern Region Groundwater Point: MID KENT GOLF CLUB BOREHOLE Data Type: Point Name: Mid Kent Golf Club Limited Easting: 564325 Northing: 171869	Annual Volume (m ³): 10,000 Max Daily Volume (m ³): 50 Original Application No: NPS/WR/013047 Original Start Date: 29/10/2014 Expiry Date: 31/03/2024 Issue No: 1 Version Start Date: 29/10/2014 Version End Date: -
-	1939m N	Status: Active Licence No: 9/40/01/0508/G Details: General Washing/Process Washing Direct Source: Southern Region Groundwater Point: POINT 1, BOREHOLE AT GRAVESEND SEWAGE WORKS IN KENT. Data Type: Point Name: Southern Water Services Ltd Easting: 566670 Northing: 174000	Annual Volume (m ³): 55,000 Max Daily Volume (m ³): 340 Original Application No: 169/0449 Original Start Date: 23/03/1989 Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	0
-----------------------------	----------

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m

1

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 36**

ID	Location	Details	
-	1371m NW	Status: Active Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: BOREHOLES, ADITS AND CATCHPITS AT WINDMILL HILL PS Data Type: Poly4 Name: Southern Water Services Ltd Easting: 565060 Northing: 173270	Annual Volume (m ³): 17,700,000 Max Daily Volume (m ³): 92,000 Original Application No: 169/0639D Original Start Date: 24/03/1986 Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m

3

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

Features are displayed on the Abstractions and Source Protection Zones map on **page 36**

ID	Location	Type	Description
1	On site	2	Outer catchment
2	173m E	3	Total catchment
3	205m NE	3	Total catchment

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m

0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.



This data is sourced from the Environment Agency and Natural Resources Wales.

Gravesham Borough Council



6 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)
- ⋯ WFD River, canal and surface water transfer water bodies
- WFD Lake water bodies
- WFD Transitional and coastal water bodies
- WFD Surface water body catchments boundaries
- WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m

0

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m

0

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.



This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	1
------------------------	----------

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 40**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
A	On site	Coastal Catchment	Not part of a river WB catchment	130	Lower Medway	Medway

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	0
---------------------------	----------

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	1
------------------------	----------

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 40**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
A	On site	North Kent Medway Chalk	<u>GB40601G500300</u>	Poor	Poor	Poor	2019



This data is sourced from the Environment Agency and Natural Resources Wales.

Gravesham Borough Council



7 River and coastal flooding

7.1 Risk of flooding from rivers and the sea

Records within 50m

0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m

0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m

0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m

0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 Flood Storage Areas

Records within 250m

0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m
0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

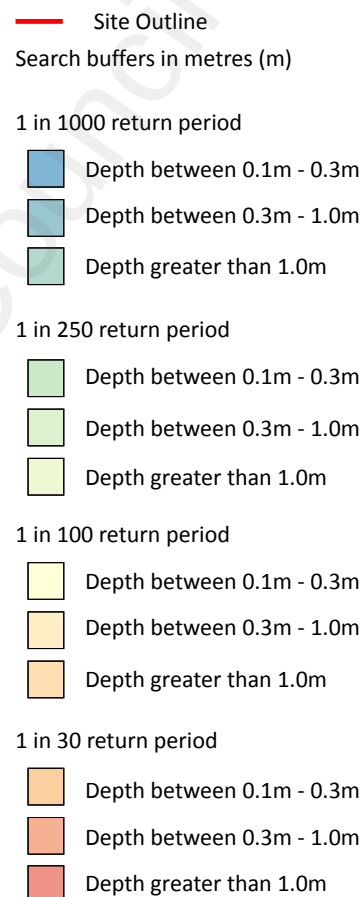
7.7 Flood Zone 3

Records within 50m
0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



8.1 Surface water flooding

Highest risk on site

1 in 30 year, 0.3m - 1.0m

Highest risk within 50m

1 in 30 year, 0.3m - 1.0m

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 46**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

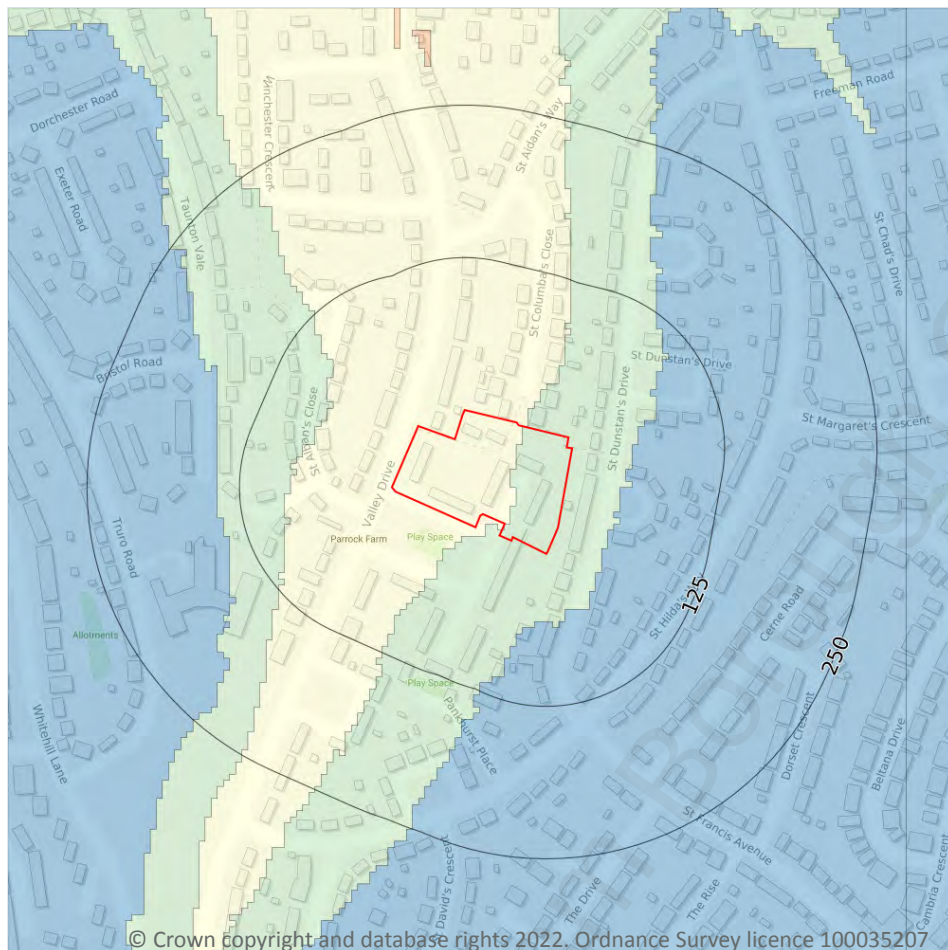
The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.3m and 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.3m and 1.0m

This data is sourced from Ambiental Risk Analytics.



9 Groundwater flooding



— Site Outline
Search buffers in metres (m)

- High
- Moderate - High
- Moderate
- Low
- Negligible

9.1 Groundwater flooding

Highest risk on site

Moderate

Highest risk within 50m

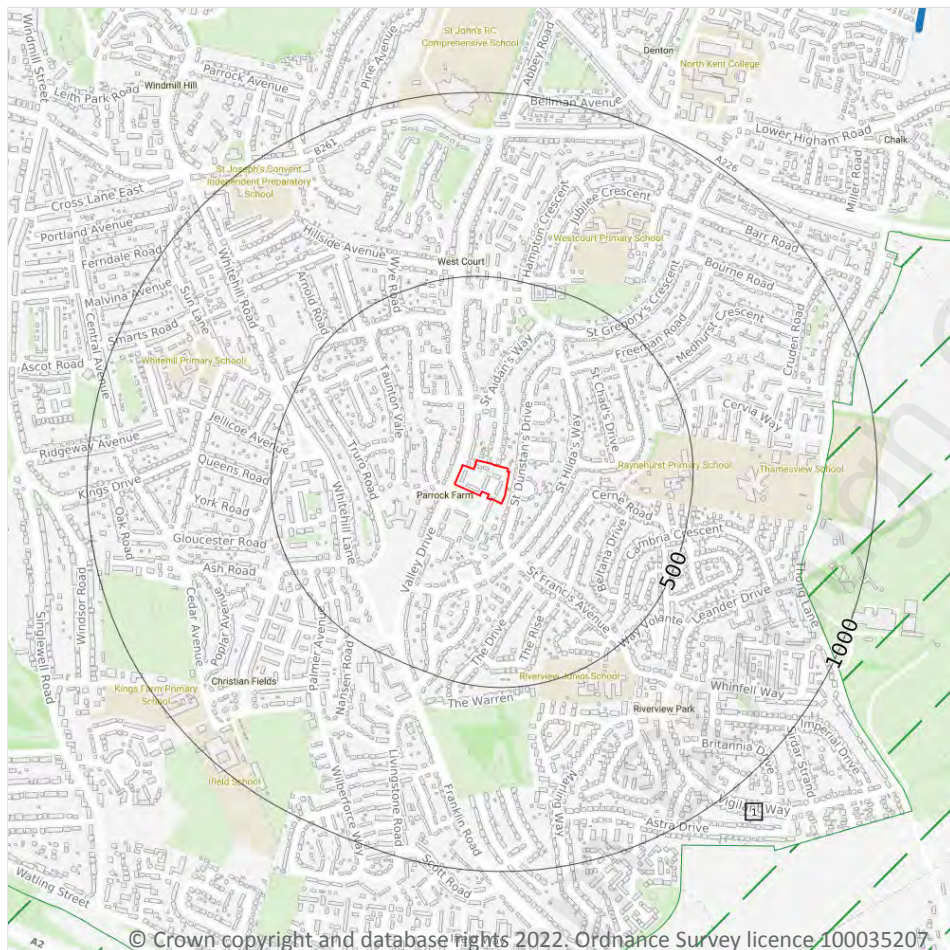
Moderate

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 48**

This data is sourced from Ambiantal Risk Analytics.

10 Environmental designations



- Site Outline
- Search buffers in metres (m)
- Sites of Special Scientific Interest (SSSI)
- X Conserved wetland sites (Ramsar sites)
- Designated Ancient Woodland
- Green Belt

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

2

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on **page 49**

ID	Location	Name	Data source
3	1630m NE	South Thames Estuary and Marshes	Natural England



ID	Location	Name	Data source
-	1757m SE	Shorne and Ashenbank Woods	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	1
-----------------------------	----------

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

Features are displayed on the Environmental designations map on **page 49**

ID	Location	Site	Details
4	1629m NE	Name: Thames Estuary & Marshes Site status: Listed Data source: Natural England	Overview: A complex of brackish, floodplain grazing marsh ditches, saline lagoons and intertidal saltmarsh and mudflat. These habitats together support internationally important numbers of wintering waterfowl. The saltmarsh and grazing marsh are of international importance for their diverse assemblages of wetland plants and invertebrates. Ramsar criteria: Ramsar criterion 2 The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0
-----------------------------	----------

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m

0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m

0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m

0

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m

2

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 49**

ID	Location	Name	Woodland Type
-	1418m S	Claylane Wood	Ancient & Semi-Natural Woodland
-	1757m SE	Unknown	Ancient & Semi-Natural Woodland

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.



10.8 Biosphere Reserves

Records within 2000m

0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m

0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m

0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m

1

Areas designated to prevent urban sprawl by keeping land permanently open.

Features are displayed on the Environmental designations map on **page 49**

ID	Location	Name	Local Authority name
1	828m E	London	Gravesham

This data is sourced from the Ministry of Housing, Communities and Local Government.



10.12 Proposed Ramsar sites

Records within 2000m**0**

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m**0**

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m**0**

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m**0**

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.



10.16 Nitrate Vulnerable Zones

Records within 2000m**3**

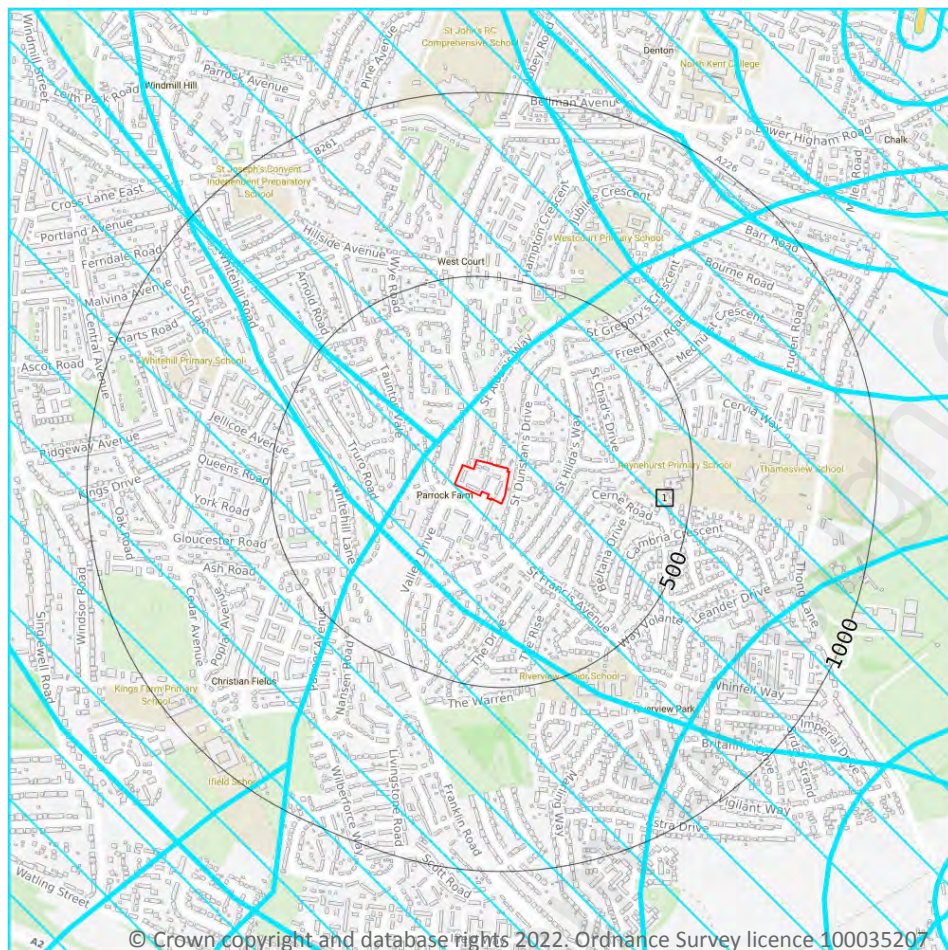
Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status
827m SE	North Kent	Groundwater	65	Existing
827m E	COASTAL STREAMS TO LOWER THAMES NVZ	Surface Water	665	Existing
1999m W	North Kent	Groundwater	65	Existing

This data is sourced from Natural England and Natural Resources Wales.



SSSI Impact Zones and Units



- Site Outline
- Search buffers in metres (m)
- SSSI Impact Risk Zones
- SSSI Units
- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site

1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 55**

ID	Location	Type of developments requiring consultation
1	On site	Infrastructure - Pipelines, pylons and overhead cables. any transport proposal including road, rail and by water (excluding routine maintenance). airports, helipads and other aviation proposals. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, review of minerals permissions (romp), extensions, variations to conditions etc. oil & gas exploration/extraction. Rural non-residential - Large non residential developments outside existing settlements/urban areas where footprint exceeds 1ha. Residential - Residential development of 500 units or more. Rural residential - Any residential development of 100 or more houses outside existing settlements/urban areas. Air pollution - Any industrial/agricultural development that could cause air pollution (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons & digestate stores > 200m², manure stores > 250t). Combustion - General combustion processes >20mw energy input. incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion. Waste - Landfill. incl: inert landfill, non-hazardous landfill, hazardous landfill. Composting - Any composting proposal with more than 75000 tonnes maximum annual operational throughput. incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management. Discharges - Any discharge of water or liquid waste of more than 5m³/day to ground (ie to seep away) or to surface water, such as a beck or stream. Water supply - Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m² or more. Notes: For new residential development in this area financial contributions are required to mitigate increased recreational disturbance on coastal spas and ramsar sites. check with local planning authority.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	2
-----------------------------	----------

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

Features are displayed on the SSSI Impact Zones and Units map on **page 55**

ID: 22
 Location: 1630m NE
 SSSI name: South Thames Estuary and Marshes
 Unit name: Westcourt And Great Clane Marshes
 Broad habitat: Neutral Grassland - Lowland
 Condition: Unfavourable - No change
 Reportable features:

Feature name	Feature condition	Date of assessment
Aggregations of breeding birds - Bearded tit, <i>Panurus biarmicus</i>	Not Recorded	01/01/1900
Aggregations of breeding birds - Garganey, <i>Anas querquedula</i>	Not Recorded	01/01/1900
Aggregations of breeding birds - Pintail, <i>Anas acuta</i>	Unfavourable - Declining	03/03/2021
Aggregations of breeding birds - Shoveler, <i>Anas clypeata</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Avocet, <i>Recurvirostra avosetta</i>	Favourable	02/03/2021
Aggregations of non-breeding birds - Black-tailed godwit, <i>Limosa limosa islandica</i>	Favourable	03/03/2021
Aggregations of non-breeding birds - Curlew, <i>Numenius arquata</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Dunlin, <i>Calidris alpina alpina</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Gadwall, <i>Anas strepera</i>	Favourable	03/03/2021
Aggregations of non-breeding birds - Greenshank, <i>Tringa nebularia</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Grey plover, <i>Pluvialis squatarola</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Hen harrier, <i>Circus cyaneus</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Knot, <i>Calidris canutus</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Pintail, <i>Anas acuta</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Redshank, <i>Tringa totanus</i>	Unfavourable - Declining	03/03/2021
Aggregations of non-breeding birds - Ringed plover, <i>Charadrius hiaticula</i>	Favourable	03/03/2021
Aggregations of non-breeding birds - Shelduck, <i>Tadorna tadorna</i>	Not Recorded	01/01/1900
Aggregations of non-breeding birds - Shoveler, <i>Anas clypeata</i>	Favourable	03/03/2021
Aggregations of non-breeding birds - Teal, <i>Anas crecca</i>	Favourable	03/03/2021
Aggregations of non-breeding birds - White-fronted goose, <i>Anser albifrons albifrons</i>	Unfavourable - Declining	03/03/2021
Assemblages of breeding birds - Lowland damp grasslands	Not Recorded	01/01/1900
Ditches	Not Recorded	01/01/1900
Vascular plant assemblage	Not Recorded	01/01/1900

ID: -
 Location: 1757m SE
 SSSI name: Shorne and Ashenbank Woods
 Unit name: Randall Wood
 Broad habitat: Broadleaved, Mixed And Yew Woodland - Lowland



Condition: Favourable

Reportable features:

Feature name	Feature condition	Date of assessment
Invert. assemblage W211 open water on disturbed sediments	Favourable	15/10/2010
Lowland mixed deciduous woodland	Favourable	15/10/2010

This data is sourced from Natural England and Natural Resources Wales.



11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m

0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.



This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m

0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.7 Registered Parks and Gardens

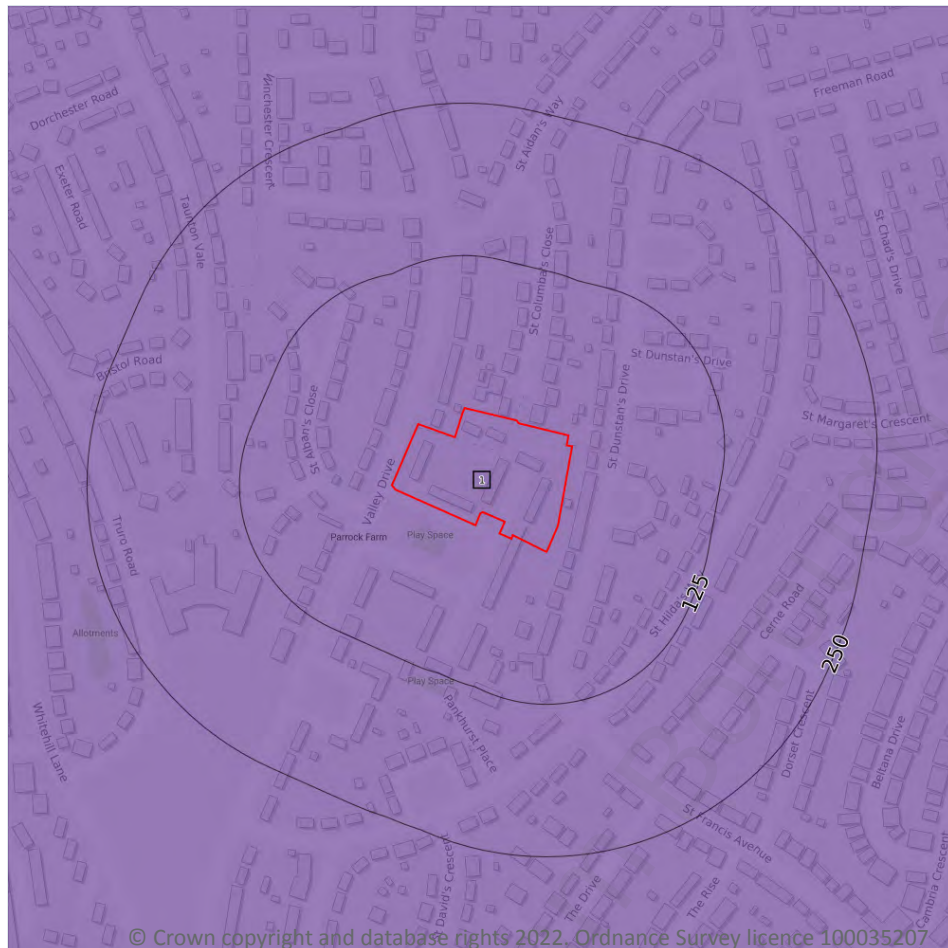
Records within 250m

0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12 Agricultural designations



- Site Outline
- Search buffers in metres (m)
- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m

1

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 61**

ID	Location	Classification	Description
1	On site	Urban	-

This data is sourced from Natural England.



12.2 Open Access Land

Records within 250m

0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m

0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m

0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m

0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m

0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m

0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m

0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

13.4 Limestone Pavement Orders

Records within 250m

0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.



14 Geology 1:10,000 scale - Availability



— Site Outline
Search buffers in metres (m)

- Full coverage
- Partial coverage
- No coverage

14.1 10k Availability

Records within 500m

1

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

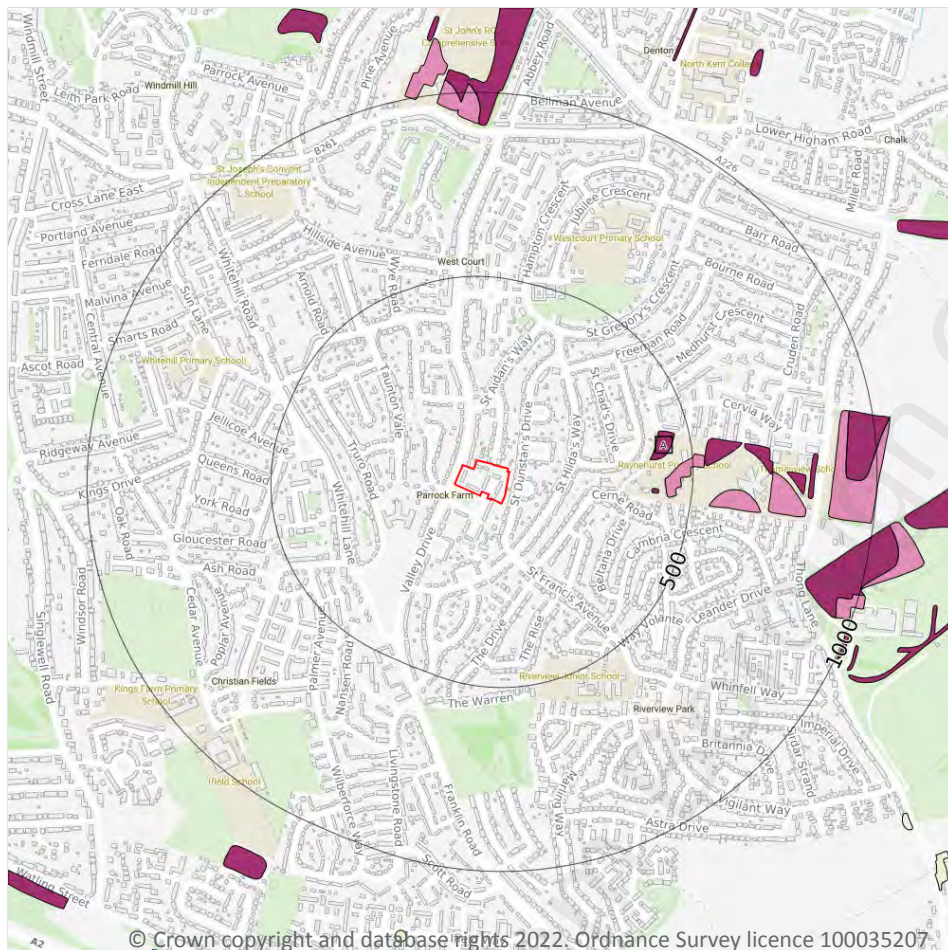
Features are displayed on the Geology 1:10,000 scale - Availability map on **page 64**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	No coverage	TQ67SE

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Artificial and made ground



— Site Outline
Search buffers in metres (m)

- Reclaimed ground
- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

14.2 Artificial and made ground (10k)

Records within 500m

3

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 65**

ID	Location	LEX Code	Description	Rock description
A	385m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
A	391m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
A	424m E	WGR-VOID	Worked Ground (Undivided)	Void

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Superficial



- Site Outline
- Search buffers in metres (m)
- Landslip (10k)
- Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m

1

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 66**

ID	Location	LEX Code	Description	Rock description
1	On site	HEAD-DMTN	Head - Diamicton	Diamicton

This data is sourced from the British Geological Survey.



14.4 Landslip (10k)

Records within 500m

0

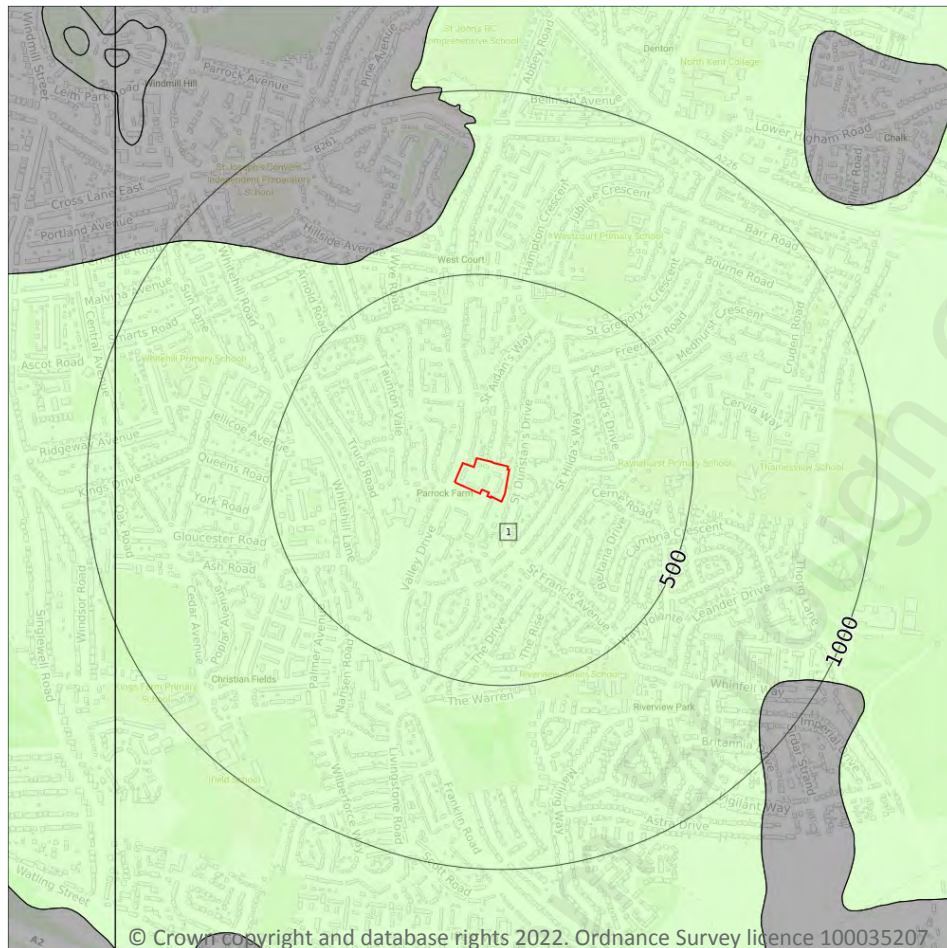
Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Gravesham Borough Council



Geology 1:10,000 scale - Bedrock



- Site Outline
- Search buffers in metres (m)
- Bedrock faults and other linear features (10k)
- Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m

1

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 68**

ID	Location	LEX Code	Description	Rock age
1	On site	SECK-CHLK	Seaford Chalk Formation - Chalk	Santonian Age - Coniacian Age

This data is sourced from the British Geological Survey.



14.6 Bedrock faults and other linear features (10k)

Records within 500m

0

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

This data is sourced from the British Geological Survey.

Gravesham Borough Council



15 Geology 1:50,000 scale - Availability



- Site Outline
- Search buffers in metres (m)
- Geological map tile

15.1 50k Availability

Records within 500m

1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

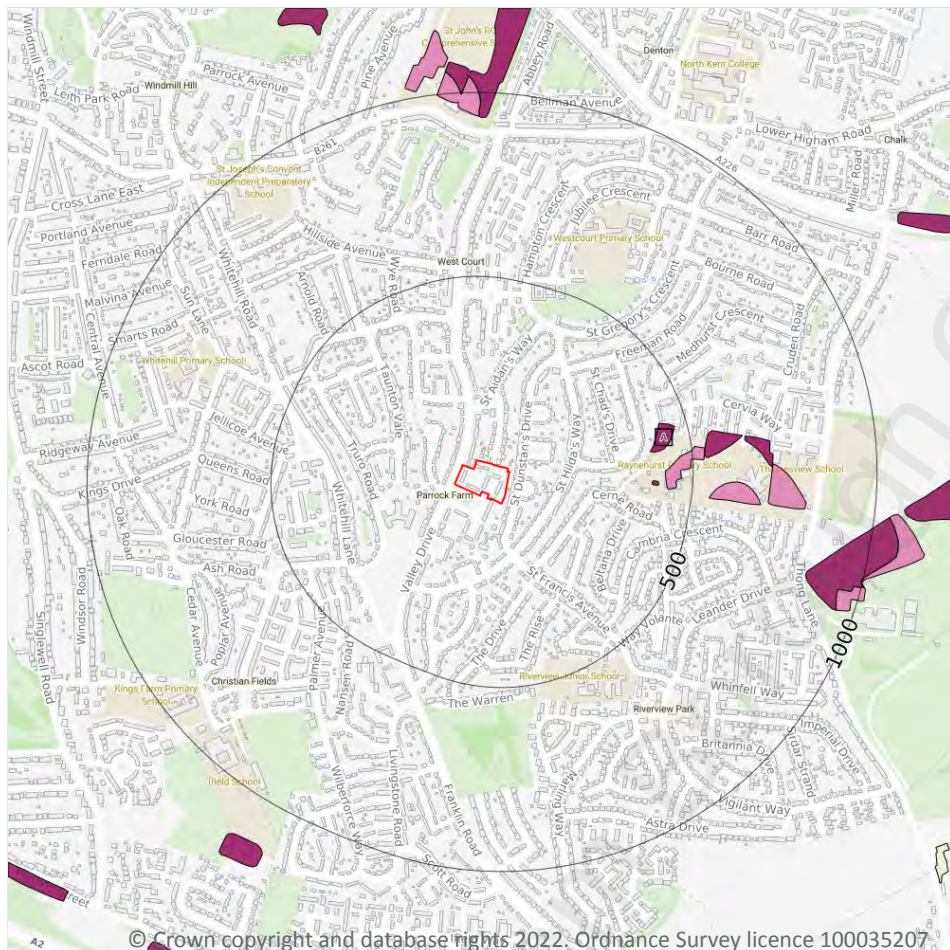
Features are displayed on the Geology 1:50,000 scale - Availability map on **page 70**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	Full	EW271_dartford_v4

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Artificial and made ground



- Site Outline
- Search buffers in metres (m)
- Made ground
 - Worked ground
 - Infilled ground
 - Disturbed ground
 - Landscaped ground

15.2 Artificial and made ground (50k)

Records within 500m

3

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 71**

ID	Location	LEX Code	Description	Rock description
A	387m E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
A	390m E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
A	424m E	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

This data is sourced from the British Geological Survey.



15.3 Artificial ground permeability (50k)

Records within 50m

0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Gravesham Borough Council



Geology 1:50,000 scale - Superficial



- Site Outline
- Search buffers in metres (m)
- Landslip (50k)
- Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m

1

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 73**

ID	Location	LEX Code	Description	Rock description
1	4m NW	HEAD- XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL

This data is sourced from the British Geological Survey.



15.5 Superficial permeability (50k)

Records within 50m

1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
4m SE	Mixed	High	Very Low

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m

0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

15.7 Landslip permeability (50k)

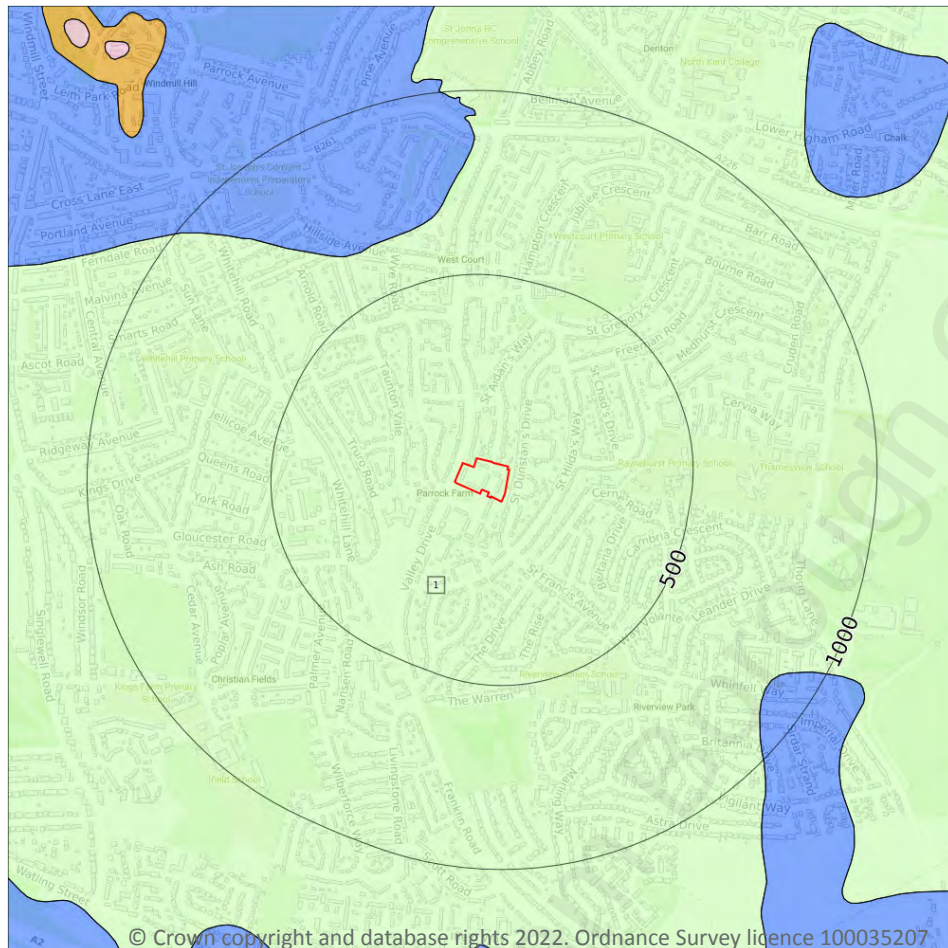
Records within 50m

0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



- Site Outline
- Search buffers in metres (m)
- Bedrock faults and other linear features (50k)
- Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m

1

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 75**

ID	Location	LEX Code	Description	Rock age
1	On site	LSNCK-CHLK	LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK	TURONIAN

This data is sourced from the British Geological Survey.



15.9 Bedrock permeability (50k)

Records within 50m

1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Fracture	Very High	Very High

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m

0

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

This data is sourced from the British Geological Survey.



16 Boreholes

16.1 BGS Boreholes

Records within 250m

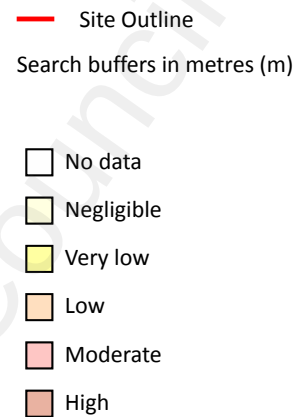
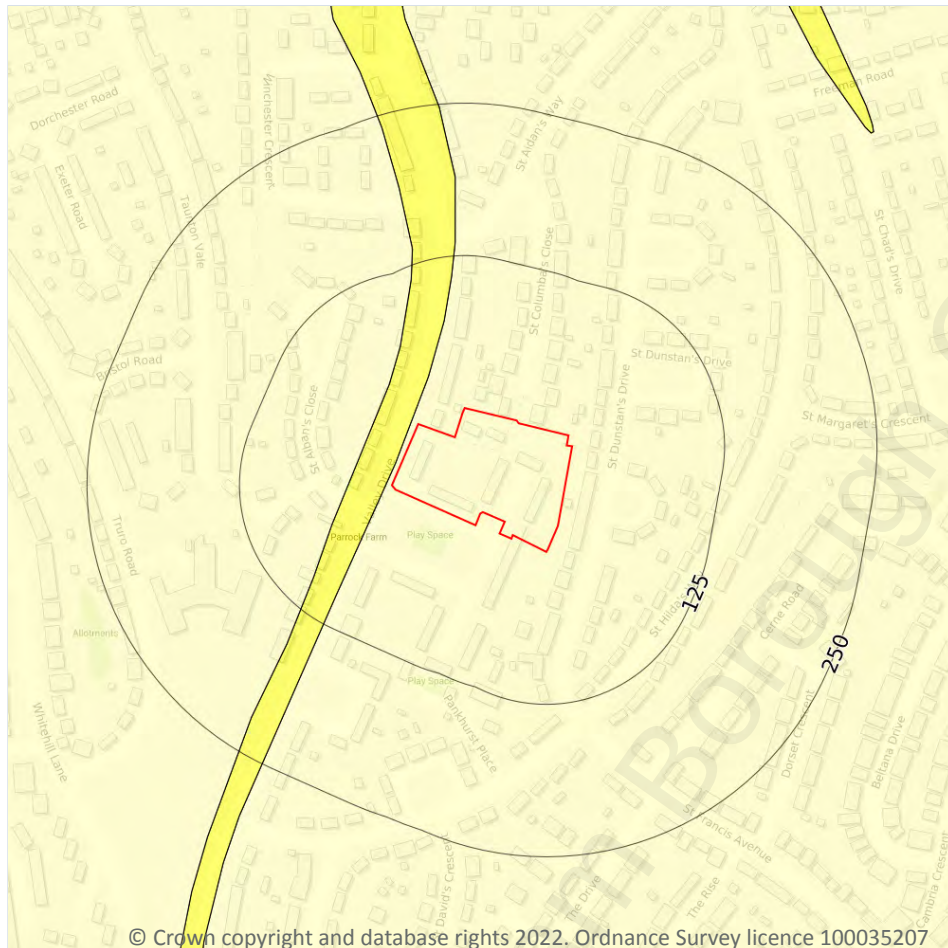
0

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

This data is sourced from the British Geological Survey.



17 Natural ground subsidence - Shrink swell clays



17.1 Shrink swell clays

Records within 50m

3

The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 78**

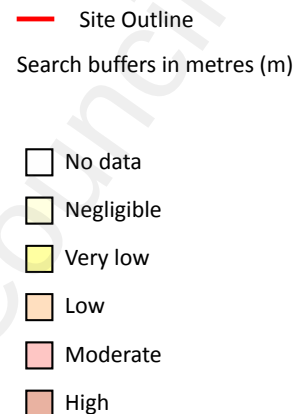
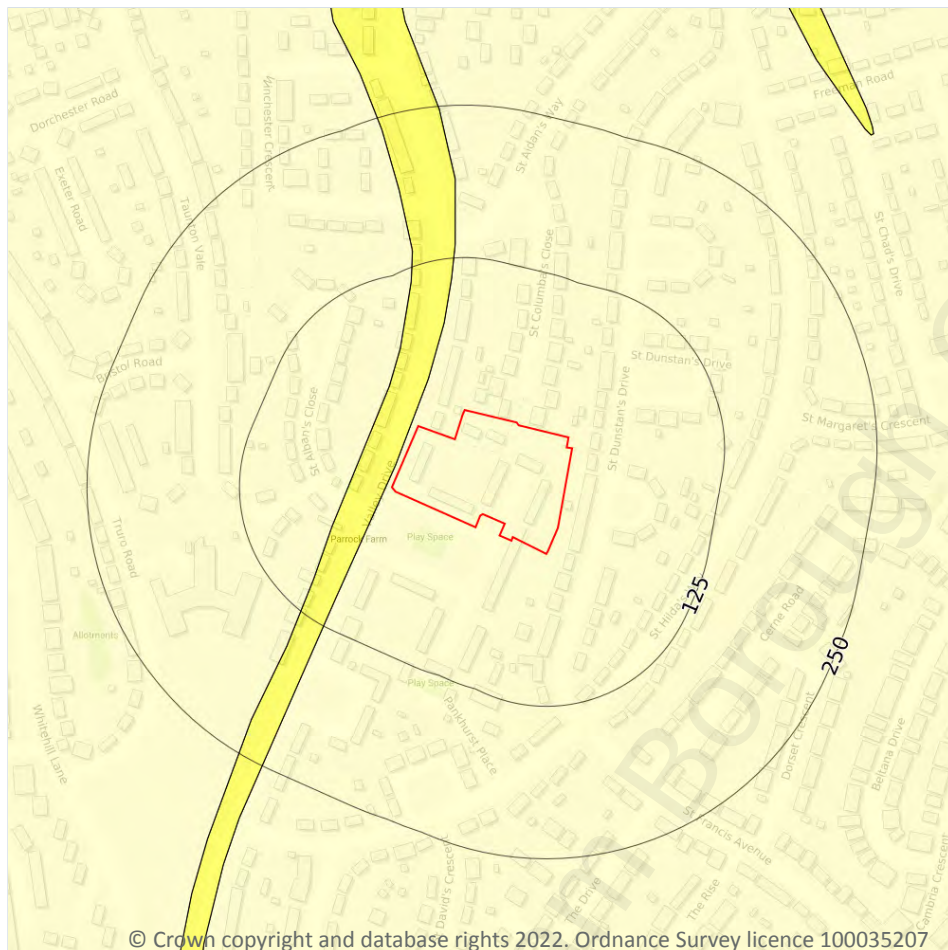
Location	Hazard rating	Details
On site	Negligible	Ground conditions predominantly non-plastic.
4m NW	Very low	Ground conditions predominantly low plasticity.
33m W	Negligible	Ground conditions predominantly non-plastic.

This data is sourced from the British Geological Survey.

Gravesham Borough Council



Natural ground subsidence - Running sands



17.2 Running sands

Records within 50m

3

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 80**

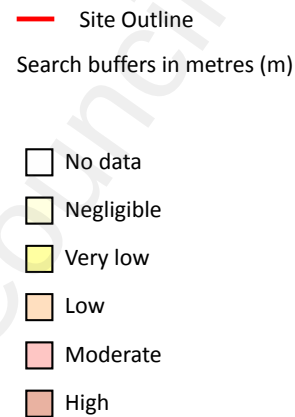
Location	Hazard rating	Details
On site	Negligible	Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.

Location	Hazard rating	Details
4m NW	Very low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.
33m W	Negligible	Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Compressible deposits



17.3 Compressible deposits

Records within 50m

1

The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

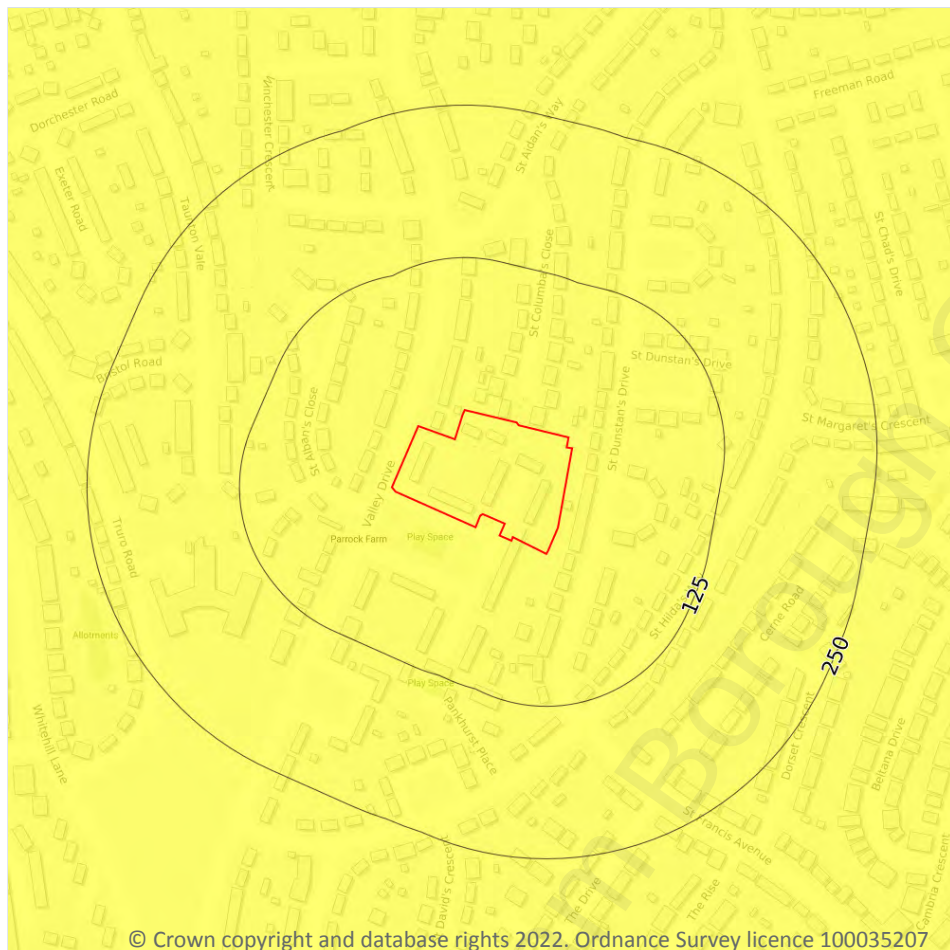
Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 82**

Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Collapsible deposits



- Site Outline
- Search buffers in metres (m)
- ☐ No data
 - ☐ Negligible
 - ☒ Very low
 - ☐ Low
 - ☐ Moderate
 - ☐ High

17.4 Collapsible deposits

Records within 50m

1

The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

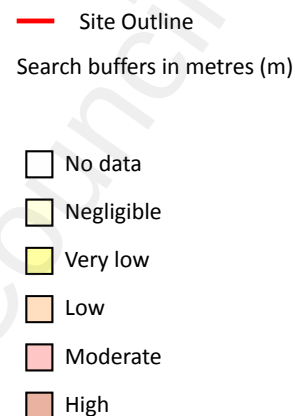
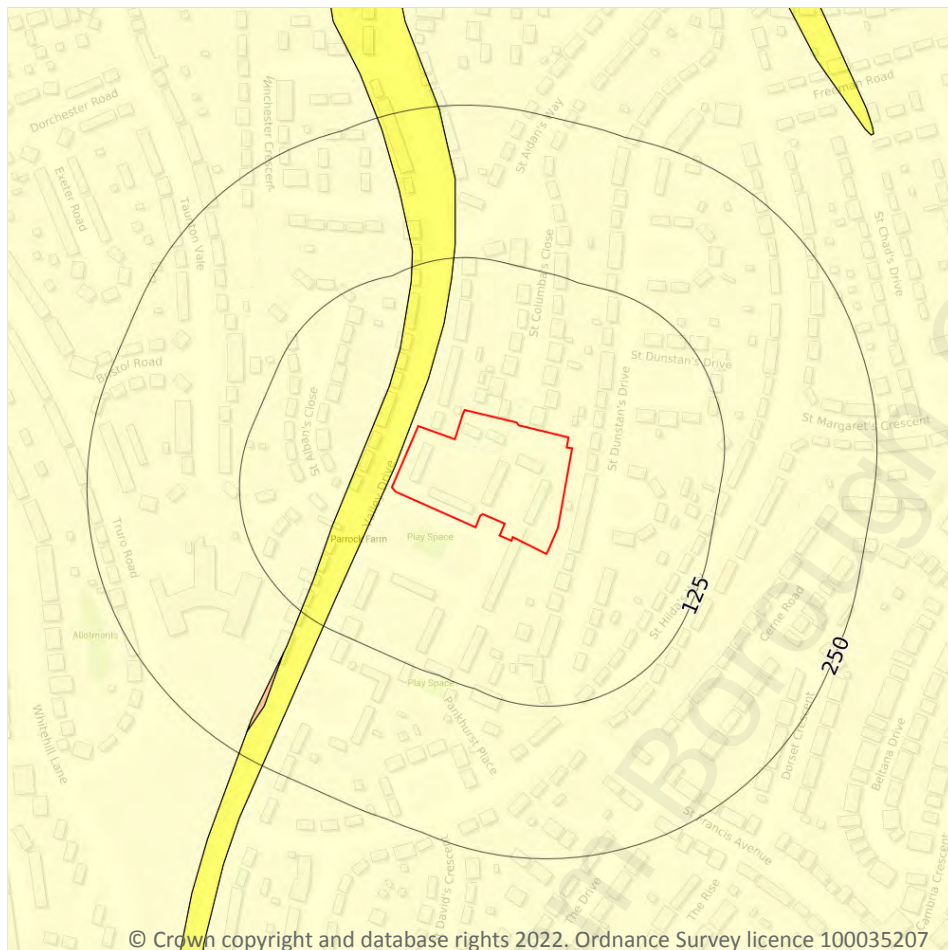
Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 83**

Location	Hazard rating	Details
On site	Very low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Landslides



17.5 Landslides

Records within 50m

3

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 84**

Location	Hazard rating	Details
On site	Negligible	Slope instability problems are not thought to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

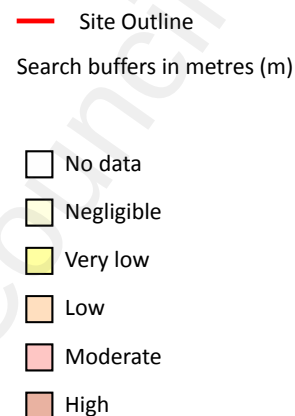
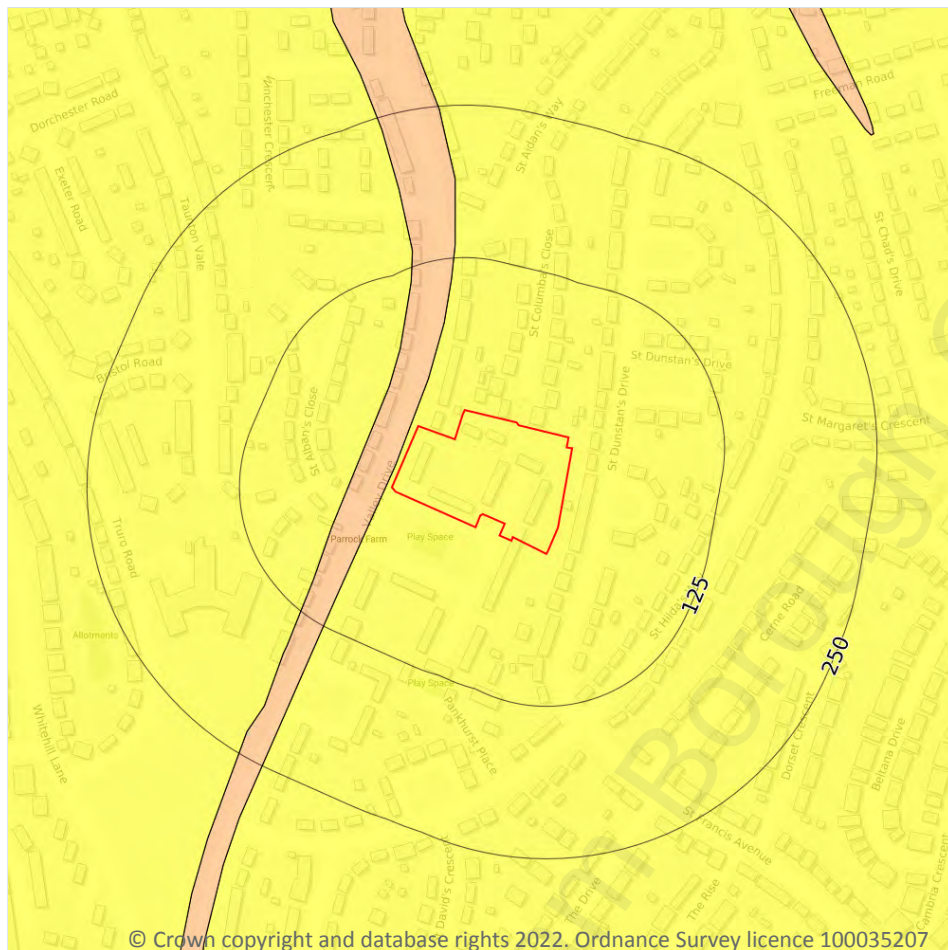
Location	Hazard rating	Details
4m NW	Very low	Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.
33m W	Negligible	Slope instability problems are not thought to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

This data is sourced from the British Geological Survey.

Gravesham Borough Council



Natural ground subsidence - Ground dissolution of soluble rocks



17.6 Ground dissolution of soluble rocks

Records within 50m

3

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 86**

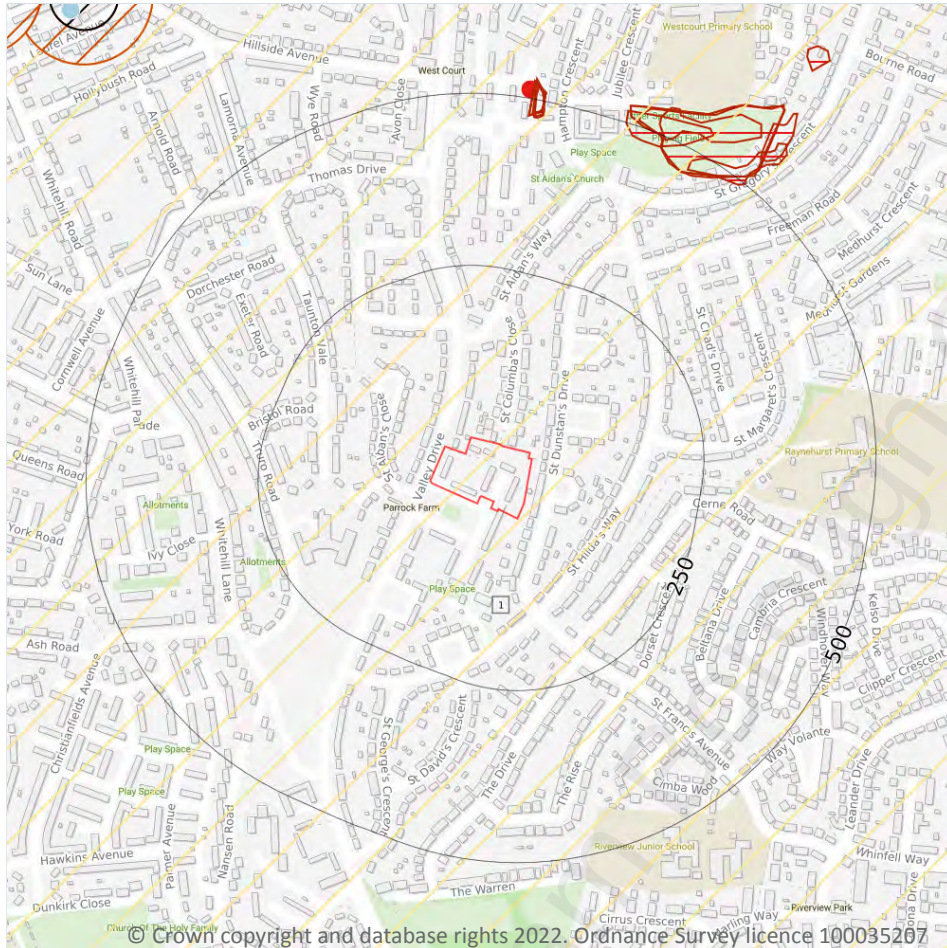
Location	Hazard rating	Details
On site	Very low	Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.

Location	Hazard rating	Details
4m NW	Low	Soluble rocks are present within the ground. Some dissolution features may be present. Potential for difficult ground conditions are at a level where they may be considered, localised subsidence need not be considered except in exceptional circumstances.
33m W	Very low	Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.

This data is sourced from the British Geological Survey.



18 Mining, ground workings and natural cavities



- Site Outline
- Search buffers in metres (m)
- Natural cavities (Area)
- Natural cavities (Point)
- BritPits
- Surface ground workings
- Underground workings
- Historical Mineral Planning Areas
- Mining Cavities
- Non Coal Mining
- Sporadic underground mining of restricted extent possible
- Localised small scale underground mining possible
- Small scale mining possible
- Underground mining known or likely within or in close proximity
- Underground mining known within or in very close proximity

18.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

18.2 BritPits

Records within 500m

0

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m

0

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

This data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m

0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m

0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m

9

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining, ground workings and natural cavities map on **page 88**

ID	Location	Name	Commodity	Class	Likelihood
1	On site	Not available	Chalk	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
C	739m NW	Not available	Chalk	D	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered
C	789m NW	Not available	Chalk	E	Underground mining is known to have occurred within or very close to the area. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered
D	856m NW	Not available	Chalk	D	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered
-	906m NW	Not available	Chalk	E	Underground mining is known to have occurred within or very close to the area. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered
-	923m W	Not available	Chalk	C	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
-	930m W	Not available	Chalk	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
-	941m E	Not available	Chalk	C	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
-	982m NW	Not available	Chalk	D	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered

This data is sourced from the British Geological Survey.



18.7 Mining cavities

Records within 1000m

2

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

Features are displayed on the Mining, ground workings and natural cavities map on **page 88**

ID	Location	Mine Address	Mineral	Data source	Publisher
C	836m NW	Gravesend, Kent	Chalk	-	Chelsea Speleological Society
-	905m NW	Gravesend, Kent	Chalk	-	Chelsea Speleological Society

This data is sourced from Stantec UK Ltd.

18.8 JPB mining areas

Records on site

0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site

0

Areas which could be affected by past, current or future coal mining.

This data is sourced from the Coal Authority.

18.10 Brine areas

Records on site

0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.11 Gypsum areas

Records on site	0
-----------------	---

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0
-----------------	---

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

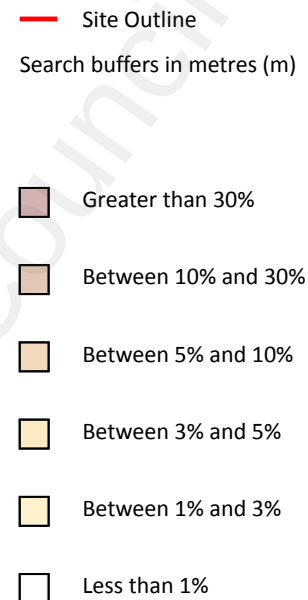
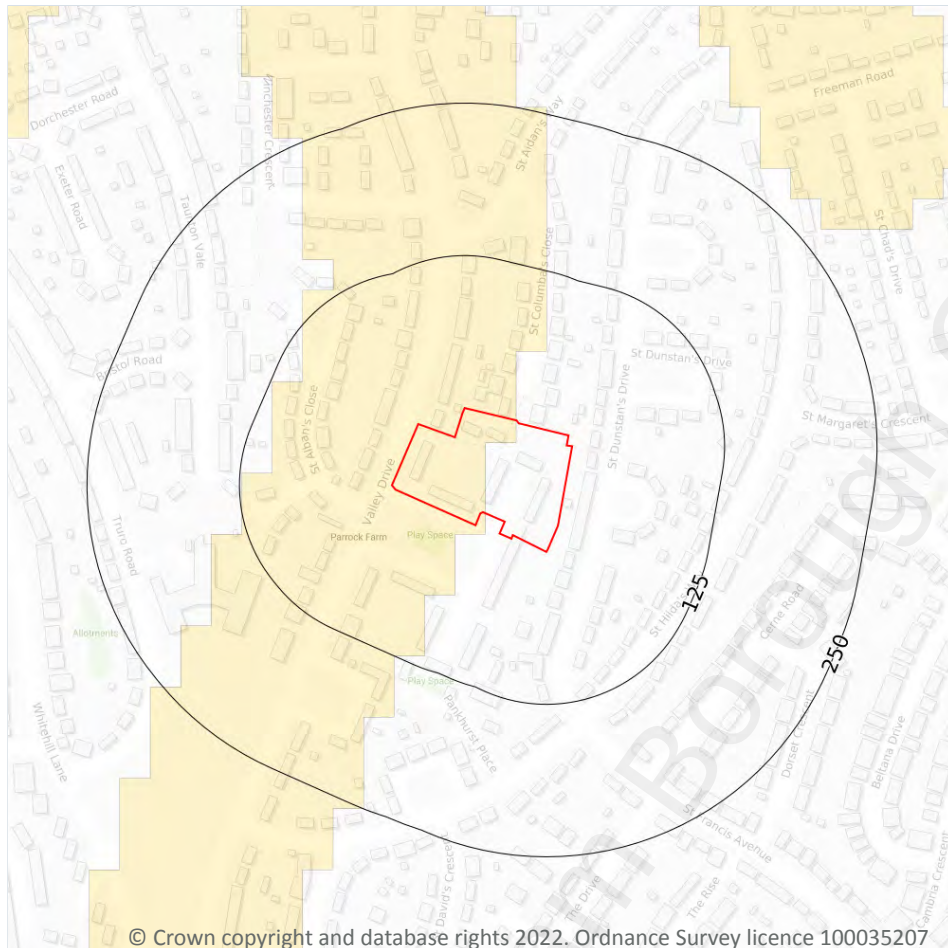
18.13 Clay mining

Records on site	0
-----------------	---

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Radon



19.1 Radon

Records on site

2

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 93**

Location	Estimated properties affected	Radon Protection Measures required
On site	Between 1% and 3%	None
On site	Less than 1%	None**



This data is sourced from the British Geological Survey and Public Health England.

Gravesham Borough Council



20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m

5

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km². In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km²; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	No data	200 - 300 mg/kg	120 - 240 mg/kg	1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	200 - 300 mg/kg	120 - 240 mg/kg	1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	200 - 300 mg/kg	120 - 240 mg/kg	1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg
4m NW	15 - 25 mg/kg	No data	200 - 300 mg/kg	120 - 240 mg/kg	1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg
33m NW	15 - 25 mg/kg	No data	200 - 300 mg/kg	120 - 240 mg/kg	1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

20.2 BGS Estimated Urban Soil Chemistry

Records within 50m

0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km²).

This data is sourced from the British Geological Survey.



20.3 BGS Measured Urban Soil Chemistry

Records within 50m

0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km².

This data is sourced from the British Geological Survey.

Gravesham Borough Council



21 Railway infrastructure and projects

21.1 Underground railways (London)

Records within 250m

0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

21.2 Underground railways (Non-London)

Records within 250m

0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

21.3 Railway tunnels

Records within 250m

0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m

0

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

This data is sourced from Ordnance Survey/Groundsure.

21.5 Royal Mail tunnels

Records within 250m

0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.

21.6 Historical railways

Records within 250m

0

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m

0

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m

0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m

0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m

0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 Ltd.



Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference>.

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Gravesham Borough Council

Site Details:

LAND AT, ST COLUMBAS
CLOSE, GRAVESEND, DA12
4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: County Series

Map date: 1863

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1863
Revised 1863
Edition N/A
Copyright N/A
Levelled N/A

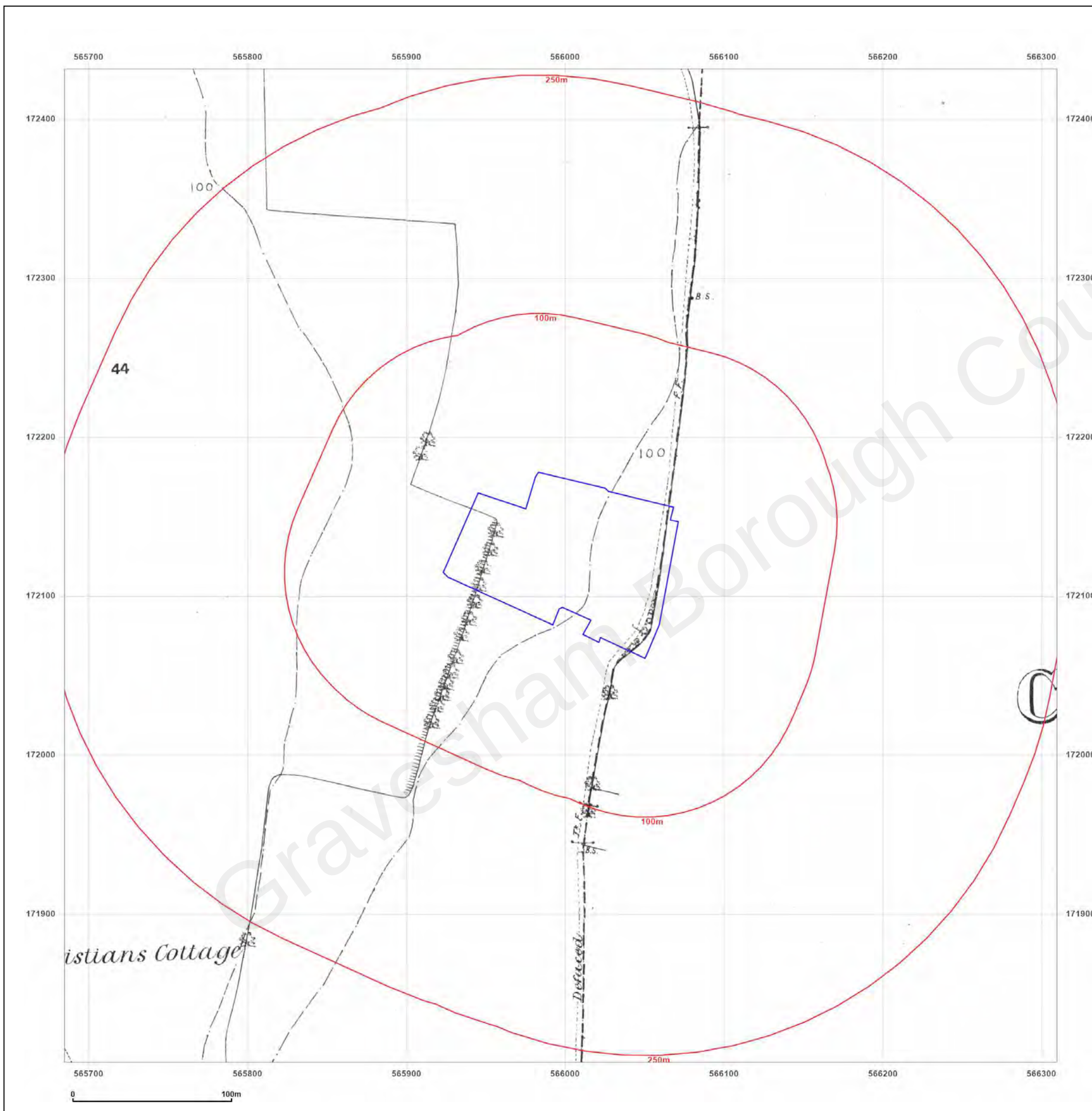


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Site Details:

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CLOSE, GRAVESEND, DA12
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Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: County Series

Map date: 1897

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1897
Revised 1897
Edition N/A
Copyright N/A
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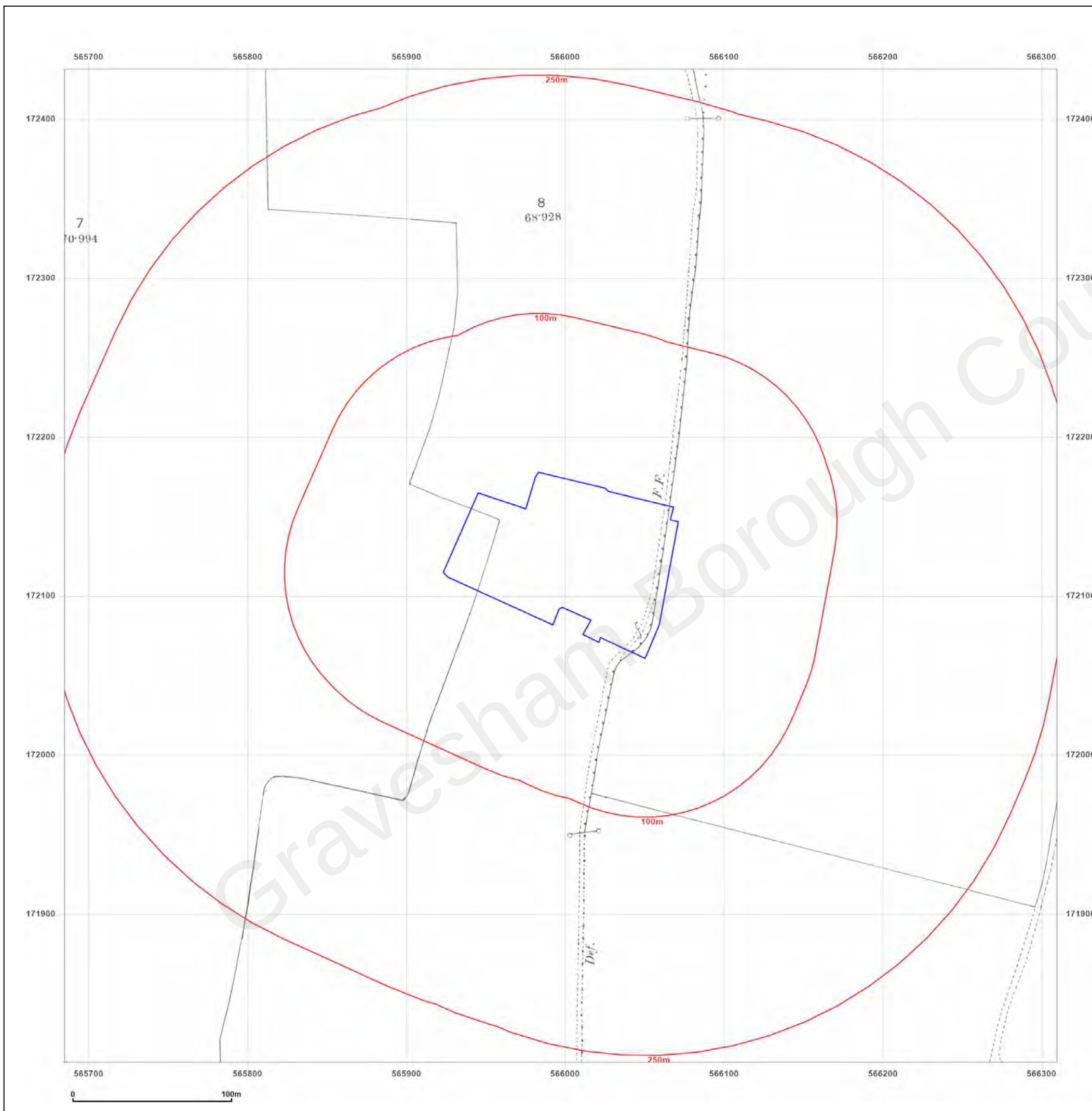


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4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: County Series

Map date: 1936

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1936
Revised 1936
Edition N/A
Copyright N/A
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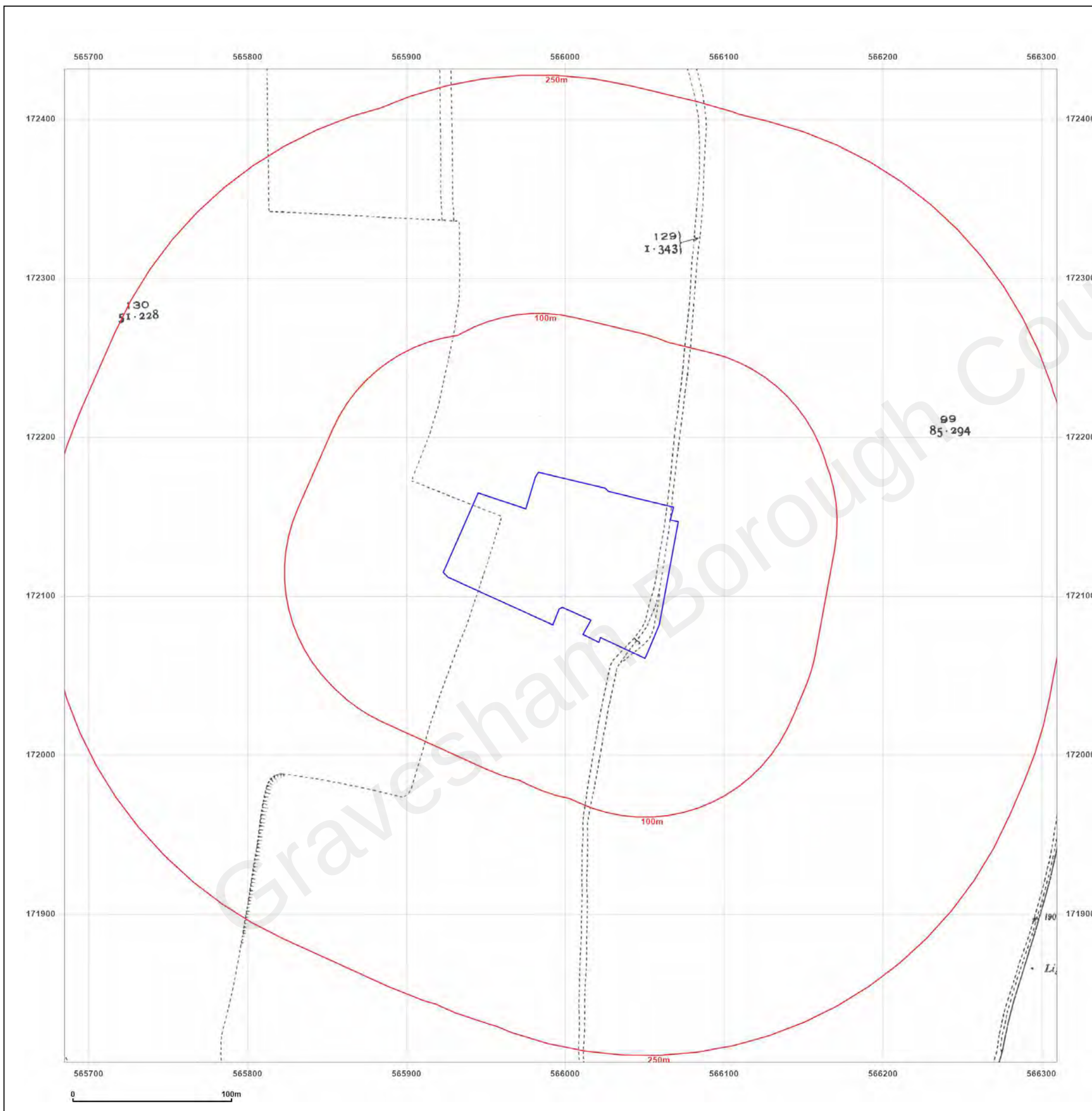


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4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: National Grid

Map date: 1953

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1953
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Edition N/A
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Surveyed 1953
Revised 1953
Edition N/A
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4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: National Grid

Map date: 1954-1955

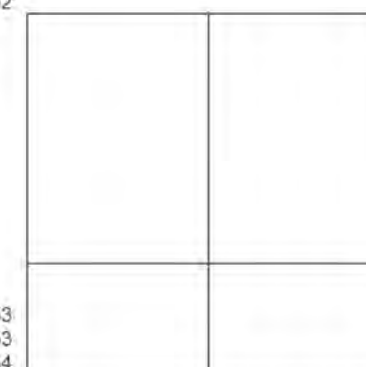
Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1953
Revised 1953
Edition 1955
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Levelled 1952

Surveyed 1953
Revised 1953
Edition 1955
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4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: National Grid

Map date: 1956-1961

Scale: 1:1,250

Printed at: 1:2,000



		Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A
Surveyed 1953 Revised 1960 Edition N/A Copyright 1961 Levelled 1952		



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Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: National Grid

Map date: 1969-1974

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1953
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Surveyed 1953
Revised 1970
Edition N/A
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Surveyed 1959
Revised 1972
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Copyright 1973
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Surveyed 1962
Revised 1968
Edition N/A
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Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: National Grid

Map date: 1993

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
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Revised N/A
Edition N/A
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Site Details:

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4AJ

Client Ref: JER9191
Report Ref: GS-8623586
Grid Ref: 565997, 172119

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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Appendix D

Part 2A (The Contaminated Land Regime)

Gravesham Borough Council

Contaminated Land Definition

Under Section 57 of the Environmental Act 1995, Part 2A was inserted into the Environmental Protection Act 1990 to include provisions for the management of contaminated land.

Subsequent regulations were first implemented in England in April 2000, Scotland in July 2000 and Wales in July 2001⁴, providing a definition of 'contaminated land' and setting out the nature of liabilities that can be incurred by owners of contaminated land and groundwater.

According to the Act, contaminated land is defined as 'any land which appears to the local authority in whose area the land is situated to be in such a condition, by reason of substances in, on or under the land that:

- a) *significant harm* is being caused or there is a *significant possibility* of such harm being caused; or
- b) *significant pollution* of controlled waters⁵ is being caused or there is a significant possibility of such pollution being caused⁶

The guidance on determining whether a particular possibility is significant is based on the principles of risk assessment and in particular on considerations of the magnitude or consequences of the different types of significant harm caused. The term 'possibility of significant harm being caused' should be taken, as referring to a measure of the probability, or frequency, of the occurrence of circumstances that could lead to significant harm being caused.

The following situations are defined where harm is to be regarded as significant:

- i. Chronic or acute toxic effect, serious injury or death to humans
- ii. Irreversible or other adverse harm to the ecological system
- iii. Substantial damage to, or failure of, buildings
- iv. Disease, other physical damage or death of livestock or crops
- v. The pollution of controlled waters⁷.

⁴ In England by The Contaminated Land (England) Regulations 2000, updated by The Contaminated Land (England) (Amendment) Regulations 2012; in Scotland by The Contaminated Land (Scotland) Regulations 2000, updated by the Contaminated Land (Scotland) Regulations 2005; and in Wales by The Contaminated Land (Wales) Regulations 2001, updated by the Contaminated Land (Wales) Regulations 2006.

⁵ In Scotland the term "controlled water" has been updated to "water environment" under the Contaminated Land (Scotland) Regulations 2005 in line with the Water Environment and Water Services (Scotland) Act 2003.

⁶ The definition was amended in 2012 by implementation of the Water Act 2003.

⁷ Groundwater in this context does not include waters within underground strata but above the saturated zone.

With regard to radioactivity, contaminated land is defined as 'any land which appears to be in such a condition, by reason of substances in, on or under the land that harm is being caused, or there is a *significant possibility of such harm being caused*⁸ .

The Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected with the hazard via one or several exposure pathways (e.g. the pathway of direct contact). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

The Risk Assessment

By considering where a viable pathway exists which connects a source with a receptor, this assessment will identify where pollutant linkages may exist. A pollutant linkage is the term used by the DEFRA in their standard procedure on risk assessment. If there is no pollutant linkage, then there is no risk. Therefore, only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. Risk should be based on a consideration of both:

- The likelihood of an event (probability) - takes into account both the presence of the hazard and receptor and the integrity of the pathway.
- The severity of the potential consequence - takes into account both the potential severity of the hazard and the sensitivity of the receptor.

For further information please see the Contaminated Land section on the DEFRA website (www.defra.gov.uk).

⁸ The Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 and Contaminated Land (Wales) Regulations 2006.

Appendix E

Exploratory Hole Logs

Gravesham Borough Council

	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Borehole ID: CP01			
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 3			
Cable Percussion Borehole Log	Easting: 565942.5	Northing: 172144.7	Ground Level: 24.34mOD	Plant Used: Dando 1500	Logged By: NW	Scale: 1:25			
	Weather: Sunny			Termination: Design depth.		SPT Hammer: N/R, Energy Ratio: 73%			
Samples & In Situ Testing				Strata Details			Groundwater		
Depths	Type/Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.50	D1		PID 0.50m, 0.1ppm	24.14	0.20		Grass over desiccated brown gravelly SILT with frequent rootlets throughout. Gravel is angular to rounded fine to coarse of flint, glass and concrete.		
					(0.60)		TOPSOIL Desiccated brown gravelly SILT. Gravel is angular to rounded fine to coarse of flint, glass and concrete.		
1.00	D2			23.54	0.80		Desiccated brown gravelly sandy SILT. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of flint and chalk fragments.	1	
					(2.10)		HEAD		
2.00	D3	SPT(S) 1.50m, N=14 (2,4/3,3,4,4)						2	
									
3.00	D4	SPT(S) 2.50m, N=50 (6,9/15,20,15)	PID 3.00m, 0.1ppm	21.44	2.90		Structureless CHALK composed of off-white and cream slightly gravelly SILT. Gravel is weak and medium density. Frequent angular to rounded fine to coarse gravel of flint. (Grade Dm). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	3	
									
4.00	D5	SPT(S) 3.50m, N=26 (5,6/6,5,6,9)						4	
									
		SPT(S) 4.50m, N=20 (3,2/4,5,5,6)						5	
									
Start & End of Shift Observations				Installation				Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Dia (mm)
					1	0.00	2.00	PLAIN	
					1	2.00	10.00	SLOTTED	
1. No visual or olfactory signs of contamination.									
2. No groundwater encountered.									
Water Strikes									
Chiselling		Borehole Diameter		Casing Diameter		Strike (m)		Casing (m)	Sealed (m)
From (m)	To (m)	Duration	Remarks	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Time (mins)	Rose to (m)
RPS CP Template Issue Number: 1 Issue Date: 13/09/2017									

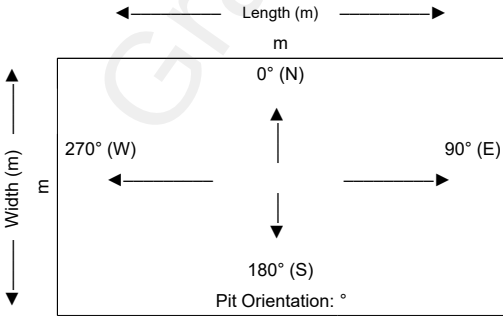
	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Borehole ID: CP01							
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 2 of 3							
Cable Percussion Borehole Log	Easting: 565942.5	Northing: 172144.7	Ground Level: 24.34mOD	Plant Used: Dando 1500	Logged By: NW	Scale: 1:25							
Weather: Sunny		Termination: Design depth.			SPT Hammer: N/R, Energy Ratio: 73%								
Samples & In Situ Testing				Strata Details				Groundwater					
Depths	Type/ Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation				
5.25	D6	SPT(S) 6.00m, N=13 (2,3/2,3,4,4)						6					
6.75	D7												
		SPT(S) 7.50m, N=15 (3,4/3,3,4,5)		17.34	7.00		Structureless CHALK composed of off-white slightly gravelly SILT. Gravel is weak and medium density. (Grade Dm). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	7					
8.25	D8	SPT(S) 9.00m, N=13 (2,2/3,3,3,4)			(3.00)			8					
9.75	D9			14.34	10.00			9					
								10					
Start & End of Shift Observations				Installation				Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Dia (mm)	1. No visual or olfactory signs of contamination. 2. No groundwater encountered.			
					1	0.00	2.00	PLAIN					
					1	2.00	10.00	SLOTTED					
Chiselling				Borehole Diameter		Casing Diameter		Water Strikes					
From (m)	To (m)	Duration	Remarks	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
RPS CP Template Issue Number: 1 Issue Date: 13/09/2017													

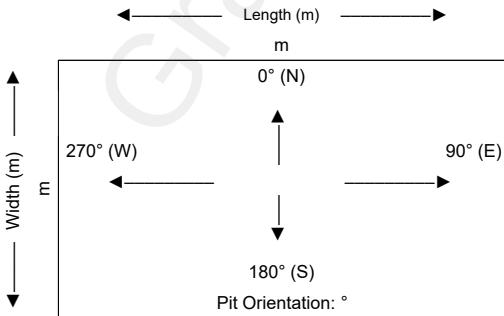
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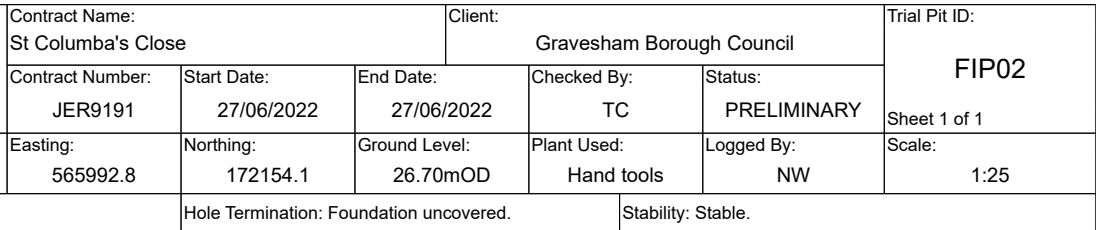
	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Borehole ID: CP02							
	Contract Number: JER9191	Start Date: 28/06/2022	End Date: 29/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 3							
Cable Percussion Borehole Log	Easting: 566049.2	Northing: 172147.3	Ground Level: 31.40mOD	Plant Used: Dando 1500	Logged By: NW	Scale: 1:25							
Weather: Sunny		Termination: Design depth.			SPT Hammer: N/R, Energy Ratio: 73%								
Samples & In Situ Testing				Strata Details			Groundwater						
Depths	Type/ Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation				
0.50	D		PID 0.25m, 0.0ppm	31.20	0.20		Grass over brown slightly sandy silty angular to subrounded fine to coarse GRAVEL of brick, concrete and chalk fragments. Sand is fine to coarse.						
			PID 0.40m, 0.1ppm	31.10	0.30		TOPSOIL						
				(0.30)		Brown slightly sandy silty angular to subrounded fine to coarse GRAVEL of brick, concrete and chalk fragments. Sand is fine to coarse.							
1.00	D						MADE GROUND	1					
										Brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of flint and chalk fragments.			
2.00	D						MADE GROUND	2					
										Structureless CHALK composed of silty angular to subrounded GRAVEL. Clasts are medium strong to strong, low and medium density. Matrix is off-white and light brown. Frequent angular to rounded fine to coarse gravel of flint. (Grade Dm).			
3.00	D						SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	3					
4.00	D							4					
								5					
Start & End of Shift Observations				Installation				Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Dia (mm)	1. No visual or olfactory signs of contamination. 2. No groundwater encountered.			
					1	0.00	1.00	PLAIN					
Chiselling				Borehole Diameter		Casing Diameter		Water Strikes					
From (m)	To (m)	Duration	Remarks	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
RPS CP Template Issue Number: 1 Issue Date: 13/09/2017													

		Contract Name: St Columba's Close			Client: Gravesham Borough Council			Borehole ID: CP02					
		Contract Number: JER9191	Start Date: 28/06/2022	End Date: 29/06/2022	Checked By: TC	Status: PRELIMINARY		Sheet 2 of 3					
Cable Percussion Borehole Log		Easting: 566049.2	Northing: 172147.3	Ground Level: 31.40mOD	Plant Used: Dando 1500	Logged By: NW	Scale: 1:25						
Weather: Sunny				Termination: Design depth.			SPT Hammer: N/R, Energy Ratio: 73%						
Samples & In Situ Testing				Strata Details				Groundwater					
Depths	Type/Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/Installation			
5.25	D												
		SPT(S) 6.00m, N=24 (3,4/6,5,6,7)		25.40	6.00		Structureless CHALK composed of gravelly SILT. Gravel is very weak and weak, low and medium density. Matrix is off-white and light brown. (Grade Dm). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)		6				
6.75	D								7				
		SPT(S) 7.50m, N=19 (3,5/4,4,6,5)											
8.25	D				(4.00)				8				
		SPT(S) 9.00m, N=31 (4,7/7,9,7,8)	PID 9.00m, 0.0ppm						9				
9.75	D			21.40	10.00				10				
Start & End of Shift Observations				Installation				Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Dia (mm)	1. No visual or olfactory signs of contamination. 2. No groundwater encountered.			
					1	0.00	1.00	PLAIN					
Chiselling				Borehole Diameter		Casing Diameter		Water Strikes					
From (m)	To (m)	Duration	Remarks	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
RPS CP Template Issue Number: 1 Issue Date: 13/09/2017													

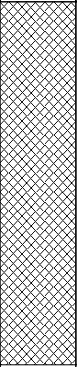
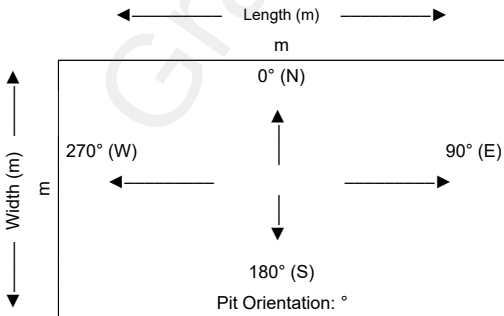
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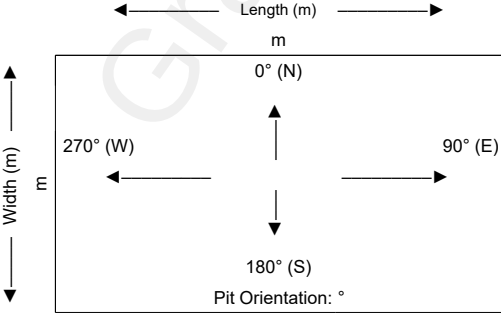
	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: FIP01		
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 27/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 565939.4	Northing: 172130.9	Ground Level: 23.24mOD	Plant Used: Hand tools	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Electrical cable found at 0.40m bgl.		Stability: Stable.		
Samples & In Situ Testing				Strata Details			Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.20	ES1		22.84	(0.40) 0.40		Desiccated brown slightly gravelly SILT with occasional rootlets. Gravel is angular to subrounded fine to coarse of flint, concrete and wood. Low cobble content of concrete. MADE GROUND End of Trial Pit at 0.40m		
							1	
							2	
							3	
Dimensions:						General Remarks:		
Final Depth: 0.40m						1. No visual or olfactory signs of contamination. 2. No groundwater encountered.		
								
						Water Strikes		
						Strike (m)	Remarks	
						RPS TP Template Issue Number: 1 Issue Date: 13/09/2017		

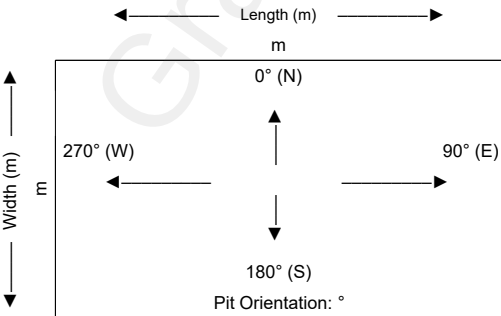
	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: FIP01A		
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 27/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 565941.1	Northing: 172127.3	Ground Level: 23.24mOD	Plant Used: Hand tools	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Foundation uncovered.		Stability: Stable.		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.30	ES1	PID 0.80m, 0.1ppm	23.14	0.10		Grass over desiccated brown slightly gravelly SILT with rootlets throughout. Gravel is angular to subrounded fine to coarse of flint, concrete, charcoal and wood. Low cobble content of concrete.		
0.80	ES2		(0.90)			TOPSOIL Desiccated brown slightly gravelly SILT with occasional rootlets. Gravel is angular to subrounded fine to coarse of flint, concrete, charcoal and wood. Low cobble content of concrete.		
			22.24	1.00		MADE GROUND End of Trial Pit at 1.00m	1	
							2	
							3	
Dimensions:						General Remarks:		
Final Depth: 1.00m						1. No visual or olfactory signs of contamination. 2. No groundwater encountered.		
								
						Water Strikes		
						Strike (m) Remarks		
						RPS TP Template Issue Number: 1 Issue Date: 13/09/2017		

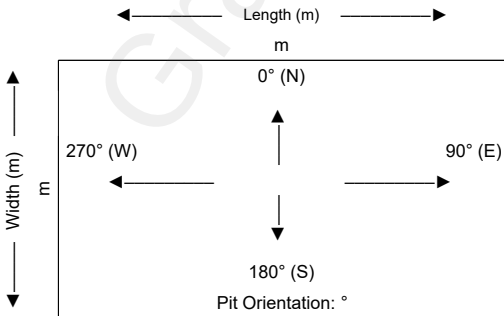


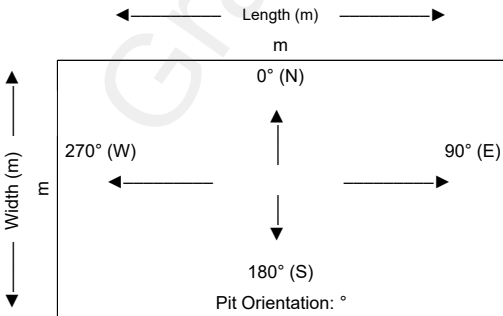
Dimensions: Final Depth: 1.10m Length (m) m 0° (N) 270° (W) 90° (E) 180° (S) Pit Orientation: °	General Remarks: 1. No visual or olfactory signs of contamination. 2. No groundwater encountered.
Water Strikes	
Strike (m)	Remarks
RPS TP Template Issue Number: 1 Issue Date: 13/09/2017	

	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: FIP03		
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 27/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 566024.8	Northing: 172142.6	Ground Level: 30.37mOD	Plant Used: Hand tools	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Design depth.		Stability: Stable.		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.50	ES1	PID 0.50m, 0.0ppm		(1.20)		Desiccated greyish white slightly sandy gravelly SILT. Gravel is angular to subrounded fine to coarse of flint, chalk and wood. MADE GROUND	1	
			29.17	1.20		End of Trial Pit at 1.20m	2	
							3	
Dimensions:						General Remarks:		
Final Depth: 1.20m						1. No visual or olfactory signs of contamination. 2. No groundwater encountered.		
								
						Water Strikes		
						Strike (m) Remarks		
						RPS TP Template Issue Number: 1 Issue Date: 13/09/2017		

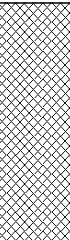
	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: FIP04		
	Contract Number: JER9191	Start Date: 28/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 566018.6	Northing: 172159.3	Ground Level: 29.13mOD	Plant Used: Takeuchi TB125	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Foundation uncovered.		Stability: Stable.		
Samples & In Situ Testing				Strata Details			Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.30	ES1	PID 0.30m, 0.0ppm		(0.60)		Light grey sandy angular to rounded fine to coarse GRAVEL of concrete, brick, metal, glass, plastic and flint. Frequent cobbles of concrete throughout. MADE GROUND		
0.80	ES2	PID 0.80m, 0.8ppm	28.53	0.60		Structureless CHALK composed of off-white silty angular to subrounded GRAVEL. Clasts are weak and medium density. Frequent cobble content of flint.		
			28.23	0.90		SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) End of Trial Pit at 0.90m	1	
							2	
							3	
Dimensions:				General Remarks:				
Final Depth: 0.90m				1. No visual or olfactory signs of contamination. 2. No groundwater encountered.				
								
				Water Strikes				
				Strike (m) Remarks				
				RPS TP Template Issue Number: 1 Issue Date: 13/09/2017				

	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: TP01A		
	Contract Number: JER9191	Start Date: 28/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 565952.6	Northing: 172155.7	Ground Level: 24.45mOD	Plant Used: Takeuchi TB125	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Excavator unstable.		Stability: Stable.		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.40	D1		23.45	(1.00)		Grass over desiccated brown slightly sandy gravelly SILT. Gravel is angular to rounded fine to coarse of brick, flint, concrete, ceramic, organic material and chalk fragments. MADE GROUND	1	
1.40	D2			(1.00)		Brown slightly gravelly SILT. Gravel is angular to rounded fine to coarse of flint and brick. Low cobble content of brick. MADE GROUND		
1.80	B1		22.45	2.00		Between 1.70 to 2.00m bgl: Band of flint cobbles.	2	
2.60	D3			(0.80)		Structureless CHALK composed of white and light brown gravelly SILT. Gravel is very weak to medium strong, low density angular to subrounded. Frequent cobbles of flint throughout. (Grade Dm). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)		
2.70	ES1		21.65	2.80		End of Trial Pit at 2.80m	3	
Dimensions:						General Remarks:		
Final Depth: 2.80m						1. No visual or olfactory signs of contamination. 2. No groundwater encountered.		
								
						Water Strikes		
						Strike (m) Remarks		
RPS TP Template Issue Number: 1 Issue Date: 13/09/2017								

	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: TP02		
	Contract Number: JER9191	Start Date: 28/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 566032.4	Northing: 172155.0	Ground Level: 30.48mOD	Plant Used: Takeuchi TB125	Logged By: NW	Scale: 1:25		
	Weather: Sunny			Hole Termination: Excavator unstable.		Stability: Stable.		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.10 - 0.50	B1					Grass over brown slightly sandy silty angular to subrounded fine to coarse GRAVEL of brick, concrete, plastic, metal and chalk fragments with occasional rootlets. Sand is fine to coarse. MADE GROUND		
0.30	ES1			(0.70)				
0.50	D1							
0.50 - 1.00	B2							
			29.78	0.70		Structureless CHALK composed of silty angular to rounded GRAVEL. Clasts are very weak and weak, low and medium density. Matrix is off-white and light brown. (Grade Dc). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	1	
				(0.40)				
			29.38	1.10		At 1.00m bgl: Band of flint cobbles.		
						Structureless CHALK composed of silty angular to subrounded GRAVEL and COBBLES. Clasts are weak and medium strong, medium and high density. Matrix is off-white. (Grade Dc). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)		
1.50 - 2.00	B3							
1.70	D2						2	
				(1.50)				
2.60	D3		27.88	2.60		End of Trial Pit at 2.60m	3	
Dimensions:			General Remarks:					
Final Depth: 2.60m			1. No visual or olfactory signs of contamination. 2. No groundwater encountered.					
								
			Water Strikes					
			Strike (m) Remarks					
			RPS TP Template Issue Number: 1 Issue Date: 13/09/2017					

	Contract Name: St Columba's Close			Client: Gravesham Borough Council		Trial Pit ID: TP03		
	Contract Number: JER9191	Start Date: 28/06/2022	End Date: 28/06/2022	Checked By: TC	Status: PRELIMINARY	Sheet 1 of 1		
Trial Pit Log	Easting: 566055.5	Northing: 172128.5	Ground Level: 31.68mOD	Plant Used: Takeuchi TB125	Logged By: AA	Scale: 1:25		
	Weather: Sunny			Hole Termination: Excavator unstable.		Stability: Stable.		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Type/Ref	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.30	ES1	PID 0.30m, 0.0ppm	30.98	(0.70)		Grass over brown slightly sandy silty angular to subrounded fine to coarse GRAVEL of brick, concrete, plastic, metal and chalk fragments with occasional rootlets. Sand is fine to coarse. MADE GROUND	1	
0.50	ES2	PID 0.50m, 0.0ppm		0.70		Structureless CHALK composed of silty angular to rounded GRAVEL. Clasts are very weak and weak, low and medium density. Matrix is off-white and light brown. (Grade Dc) SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)		
				1.20		Structureless CHALK composed of silty angular to subrounded GRAVEL and COBBLES. Clasts are weak and medium strong, medium and high density. Matrix is off-white. (Grade Dc). SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)		
2.00	ES3	PID 2.00m, 0.1ppm	29.68	2.00		End of Trial Pit at 2.00m	2	
							3	
Dimensions:						General Remarks:		
Final Depth: 2.00m						1. No visual or olfactory signs of contamination. 2. No groundwater encountered.		
								
						Water Strikes		
						Strike (m) Remarks		
						RPS TP Template Issue Number: 1 Issue Date: 13/09/2017		

	Contract Name: St Columba's Close			Client: Gravesham Borough Council			Borehole ID: WS01		
	Contract Number: JER9191	Start Date: 27/06/2022	End Date: 27/06/2022	Checked By: TC	Status: PRELIMINARY		Sheet 1 of 1		
Windowless Borehole Log	Easting: 565934.8	Northing: 172115.0	Ground Level: 23.07mOD	Plant Used: Dart 312	Logged By: NW	Scale: 1:25			
	Weather: Sunny			Termination: Refused at 1.70m bgl.		SPT Hammer: N/R, Energy Ratio: 69%			
Samples & In Situ Testing				Strata Details				Groundwater	
Depths	Type/ Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.25	ES		PID 0.25m, 0.1ppm	22.77	(0.30)		Dark grey gravelly silty fine to coarse SAND. Gravel is angular to subangular of flint and chalk fragments. MADE GROUND		
					0.30				
					(0.45)		Dark grey gravelly silty fine to coarse SAND. Gravel is angular to rounded fine to coarse of flint, brick and concrete. Low cobble content of flint. MADE GROUND		
0.80	ES		PID 0.80m, 0.2ppm	22.32	0.75		Dark brown gravelly slightly sandy SILT. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of flint and chalk fragments. HEAD <i>At 0.80m bgl: Becoming slightly sandy.</i>	1	
		SPT(C) 1.00m, N=11 (1,1/1,1,3,6)			(0.95)				
							<i>Between 1.50 to 1.70m bgl: Dense flint band.</i>		
		SPT(C) 1.70m, N=60 (10,12/14,16,16,14)		21.37	1.70		End of Borehole at 1.70m	2	
								3	
								4	
								5	
Start & End of Shift Observations				Installation				Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Diameter (mm)
					1	0.00	0.70	PLAIN	
					1	0.70	1.70	SLOTTED	
Windowless Sample Run Details				Casing				Water Strikes	
Test Number	Diameter (mm)	Depth Top (m)	Depth Base (m)	Recovery (%)	Depth (m)	Diameter (mm)	Strike (m)	Casing (m)	Sealed (m)
								Remarks	
RPS WLS Template Issue Number: 2 Issue Date: 02/01/2018									

	Contract Name: St Columba's Close			Client: Gravesham Borough Council			Borehole ID: WS02						
	Contract Number: JER9191		Start Date: 27/06/2022		End Date: 27/06/2022		Checked By: TC		Status: PRELIMINARY				
Windowless Borehole Log		Easting: 565972.6		Northing: 172147.7		Ground Level: 26.15mOD		Plant Used: Dart 312		Logged By: AA		Sheet 1 of 1 Scale: 1:25	
Weather: Sunny				Termination: Magnetometer picked up signal at 1.00m bgl.									
Samples & In Situ Testing				Strata Details						Groundwater			
Depths	Type/ Ref	SPT	Testing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description					Water Strike	Backfill/ Installation
0.30	ES1				(0.80)		Dark grey gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint, brick, chalk and concrete fragments. MADE GROUND						
				25.35	0.80		Desiccated dark brown slightly sandy gravelly SILT. Gravel is angular to subrounded fine to coarse flint and chalk fragments.						
				25.15	1.00		HEAD					1	
							End of Borehole at 1.00m						
												2	
												3	
												4	
												5	
Start & End of Shift Observations				Installation				Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Ref	Top (m)	Base (m)	Type	Diameter (mm)	1. No visual or olfactory signs of contamination. 2. No groundwater encountered.			
Windowless Sample Run Details				Casing				Water Strikes					
Test Number	Diameter (mm)	Depth Top (m)	Depth Base (m)	Recovery (%)	Depth (m)	Diameter (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	
RPS WLS Template Issue Number: 2 Issue Date: 02/01/2018													