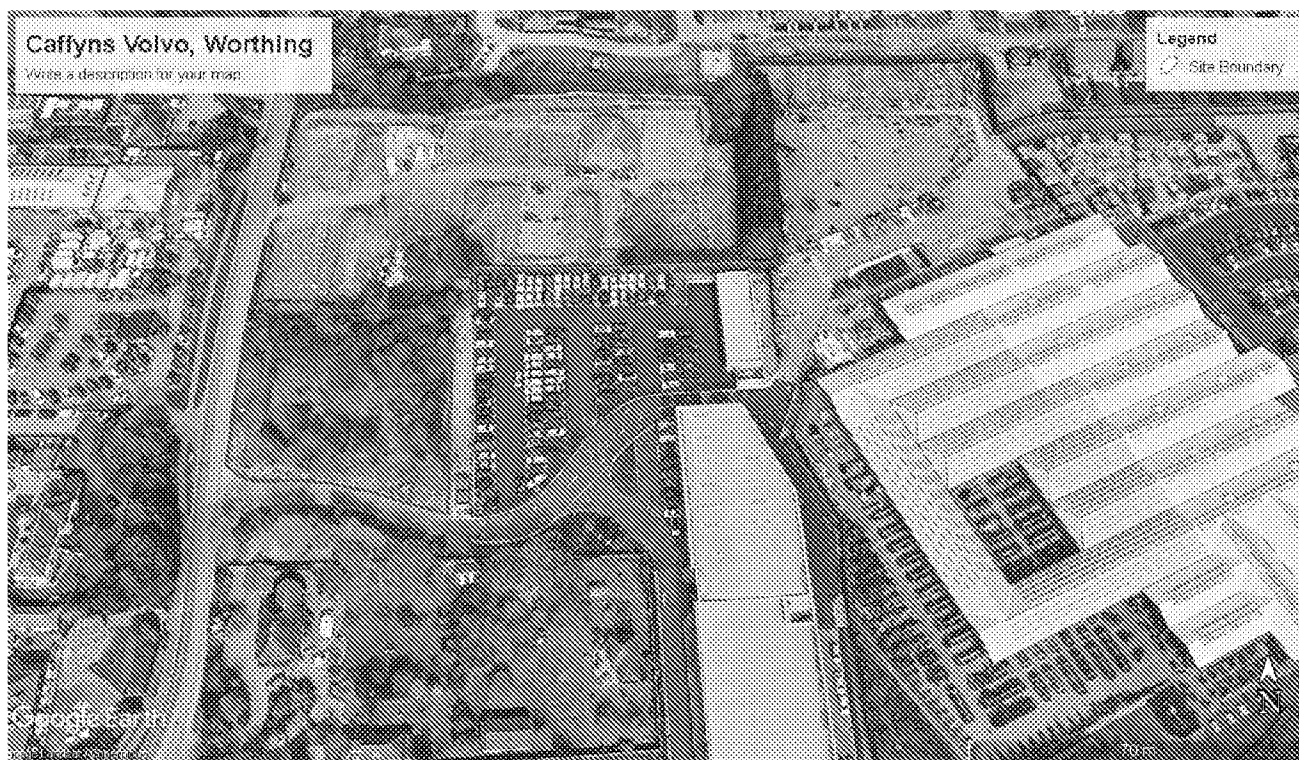


**PHASE 1
GEOTECHNICAL AND GEO-ENVIRONMENTAL
SITE INVESTIGATION**

**CAFFYNS VOLVO
WORTHING**

FOR

CAFFYNS PLC (EASTBOURNE)



46357-001

16 December 2021

**PHASE 1
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CAFFYNS PLC (EASTBOURNE)

ISSUE 1

Job No. : 46357
Report Status : Final
Document Date : 30 November 2021

Approved :

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Site Photographs

Envirocheck

1.0 EXECUTIVE SUMMARY

1. The approximately 0.25 hectare site is located to the east of Roundstone Lane on the southern side of Angmering in West Sussex.
2. The site currently comprises an unoccupied area of scrubland.
3. Historically, other than possibly planting beds or the base for a greenhouse no development has occurred on site. The surrounding area has been a combination of residential and commercial/industrial uses.
4. The geology across the site comprises superficial River Terrace Deposits overlying the New Pit Chalk Formation.
5. The superficial deposits comprise a Secondary A Aquifer, while the underlying chalk is classified as a Principal Aquifer. The site does not lie within a groundwater Source Protection Zone.
6. No radon precautions are required. There are no landfill sites or areas of potentially infilled land have been identified within 250 m of the site and significant depths of made ground are not anticipated. Therefore no ground gas precautions are considered necessary.
7. The ground conditions are expected to comprise a minimal amount of made ground over silty and or sandy clay over more granular soil before progressing to chalk bedrock at between around 3.5 and 5.5 m bgl.
8. The most appropriate foundation solution for any future development is likely to be strip or pad foundations in the natural clay. Foundations within the cohesive soils are likely to require deepening when within influencing distance of trees.
9. A ground bearing floor slab will be appropriate providing there is less than 600 mm of made ground. If this is not the case a reinforced suspended or pre-cast concrete floor with a minimum 150 mm ventilated void will be necessary.
10. The risk of contamination at the site is considered to be low. This will however need to be confirmed as part of an intrusive investigation.
11. An intrusive investigation, ideally comprising mechanically excavated trial pits, will be required in order to confirm the ground conditions for geotechnical design as well as to confirm the status of any contamination and determine the requirement for any remediation.

12. The conclusions made in this report are based on a desk-based study of available environmental information and a site walkover. No intrusive investigation has been undertaken at the site.

2.0 INTRODUCTION

2.1 Terms of Reference

This report presents the findings of a Phase 1 Geotechnical and Geo-environmental Site Investigation carried out by Eastwood & Partners (Consulting Engineers) Limited for, and on the instructions of Caffyns PLC (Eastbourne). Any other parties using the information in this report do so at their own risk and any duty of care is excluded.

2.2 Context

Eastwood & Partners have not been provided with information from any previous investigations undertaken at the site. We do however have copies of reports relating to the adjacent Audi showroom:

- Ashdown Site Investigation Ltd's 'Combined Geotechnical and Ground Contamination Risk Assessment' ref LW26140, dated June 2015; and
- E&P's 'Report on Infiltration Tests' ref SJE/RAN/01/40923, dated 23 August 2017.

Information within these reports has been used to inform this current Phase 1 report.

2.3 Aims and Objectives

The aims and objectives of this investigation were as follows:

- To assimilate and review information extracted from published documentation to derive an outline conceptual model identifying potential contaminants, pathways and receptors, as well as possible linkages between these;
- To detail the expected ground conditions and their geotechnical properties; and
- To outline proposals for a Phase 2 intrusive investigation, the purpose of which would be to obtain information to test the conceptual model and assess the risks to receptors as well as to confirm the foundation proposals.

2.4 Scope of Investigation

This document constitutes the findings of the Phase 1 investigation. This involved a review of information extracted from published documentation. Information regarding the current and former land uses both on and surrounding the site, as well as the environmental sensitivity of the location as determined by factors including geology, hydrogeology and hydrology have been examined.

Information analysed has been obtained from a variety of sources and included the following:

- A Landmark Envirocheck;
- A Coal Authority mining report;
- British Geological Survey maps and memoirs; and
- A site walkover

2.5 Limitations of Investigation

This report is based on the assumption that the site will be developed as a car sales showroom and workshop. If this is not the case, then the advice given in this report may not be appropriate.

Where assessments of site areas affected in particular ways are given, these are approximate. All information, comments and opinions given in this report are based on the documentary information examined. This report considers the ground and groundwater and does not cover any buildings or their fabric or the constituents of any existing hardstanding. Risks to ecological receptors, such as bats, have not been considered.

3.0 THE SITE

3.1 Description

The approximately 0.25 hectare site is located to the east of Roundstone Lane on the southern side of Angmering in West Sussex. The site is approximately square on plan and is centred on grid reference 507440, 103310.

The site is covered with shrub vegetation. In the middle of the site are macadam covered pathways, with soft landscaped/gravel covered areas in between. A number of trees are present both within the site and around the site boundaries

The site is relatively level at around 10 m Above Ordnance Datum (AOD).

The site is bordered by residential properties to the north and south, Caffyns Audi car dealership to the east and a combination of residential properties and further commercial/industrial units to the west on the far side of Roundstone Lane.

In the south east corner of the site is a green box structure which is assumed to house a gas governor serving the adjoining Audi dealership.

Photos of the site are included in the Appendix.

3.2 History

Historical Ordnance Survey maps have been reviewed in the Envirocheck to assess the previous use of the site and surrounding area. These can be found in the Appendix.

3.2.1 The Site

A review of the historical maps has shown that the site has remained undeveloped since the earliest maps dated 1878-1882. Aerial photography dated from 1999 indicates that the majority of the site was possibly used as growing beds associated with the plant nursery located on the land immediately to the east of the site, or possibly the feature is the base of a former greenhouse which is no longer present. There was not however, any evidence of a greenhouse being present on the site on the historical maps.

3.2.2 The Surrounding Area

The earliest historical maps show the area surrounding the site is predominantly agricultural. A railway line is present running east/west around 250 m south of the site,

In 1932, a number of nurseries are shown in the surrounding area, including on land to the south of the site. The number of nurseries increases by the following map of 1943, including West End Nursery which borders the east of the site. Residential development of the surrounding area is also being undertaken at this time. This development continues throughout the remainder of the 20th Century. From 2000 onwards, the number of nurseries decreases and are replaced by a combination of housing and commercial/industrial land uses.

Aside from general urban redevelopments no significant changes are noted up to the present day.

3.3 Geology

The British Geological Survey (BGS) Geology of Britain Viewer and map sheet 317/332 Chichester & Bognor (1:50,000 scale) have been consulted. These indicate the solid geology at the site to comprise strata of the New Pit Chalk Formation, referred to as Middle Chalk on the map sheet. The Middle Chalk is noted to comprise the New Pit Chalk Member and the Holywell Nodular Chalk Member. This is indicated to be overlain by superficial deposits noted as being River Terrace Deposits comprising sands, silts and clays on the online map viewer, whereas the map sheet indicates the superficial deposits to comprise 'Aeolian Deposits ('Brickearth'), described as mainly silts, in part contaminated with gravel'.

The site is shown to be located on the northern flank of the Littlehampton Anticline and therefore the strata are assumed to dip toward the north. No dip arrows are however included on the map to confirm this.

No faults or other lines of weakness are indicated to cross the site.

Two BGS boreholes are listed within 250 m of the site. Borehole TQ00SE37 is located around 180 m southwest of the site. Borehole TQ00SE10 is located 150 m northeast of the site. These indicate clay or sandy clay, noted to comprise 'Brickearth' to between 1.2 and 2.4 m over sand or gravelly clay of the 'Brighton Raised Beach' to between 3.5 and 5.5 m before reaching the Middle Chalk, which is variously described as marl & flints, chalk & flints, marl and chalk. The boreholes terminate at depths of 45.7 and 76.2 m below ground level (bgl) respectively.

The Envirocheck notes that the potential for ground dissolution stability hazards, i.e. dissolution features, on the site is 'very low'.

3.4 Hydrogeology

The Envirocheck identifies the New Pit Chalk Formation as a Principal Aquifer. This is defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage.

The superficial deposits are classed as a Secondary A Aquifer. This is defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The Envirocheck shows that the site does not lie within a groundwater Source Protection Zone.

3.5 Hydrology

According to the Envirocheck, the nearest surface water feature is located 236 m west of the site. Reference to Ordnance Survey maps suggests that this is a small drain.

3.6 Extractive Industries

The site is not within an area affected by coal mining industries.

There are no BGS mineral sites within 1 km and no quarries or pits were identified on the historical maps. Therefore the site is not considered to be affected by former or current extractive industries.

3.7 Ground Gas

The Envirocheck states that the site is in an intermediate probability radon area where 1 to 3% of homes are estimated to be at or above the Action Level. No radon protective measures are however necessary in the construction of new dwellings or extensions.

Information obtained from the Envirocheck shows that there are no active or historical landfills or areas of potentially infilled land within 250 m of the site.

Due to the lack of development at the site there is no reason to suspect that significant depths of made ground are present.

Therefore, at this stage ground gas precautions are not considered to be required.

3.8 Pollution Incidents to Controlled Waters

One pollution incident has been recorded within 250 m of the site. The incident had occurred on the 11th July 1995 128 m north west of the site. It involved fire water/foam as a result of a tyre fire. The receiving water was not provided and the severity of the incident was considered to be a Category 3 – Minor incident. This is not considered to have significantly affected the groundwater below the site.

3.9 Discharge Consents

There are four discharge consents listed within 250 m of the site, two of which appear to remain active. These are located 81 m west and 107 m north of the site and relate to sewage discharges of

final/treated effluent onto land or soakaway. This is also the case for the discharges which are no longer active. These are not expected to have any impact on the proposed development.

3.10 Local Authority Pollution Prevention and Controls

One Local Authority Pollution Prevention and Controls (LAPPC) was recorded within 250 m of the site. It is located and registered to Town and Country Paving Ltd for blending, packing, loading and use of bulk cement. This LAPPC was dated on 19th March 1997 and its current authorisation is revoked.

3.11 Flooding

Information provided in the Envirocheck shows that the site does not lie within a flood zone relating to flooding from rivers or the sea. No areas of the site are indicated to be at risk of surface water flooding and the site is located in an area where there is limited potential for groundwater flooding to occur..

3.12 Soil Geochemistry

The soil geochemistry maps included in the Envirocheck estimate the following concentrations of arsenic, cadmium, chromium, nickel and lead to be present in the natural soil at the site:

Contaminant	Estimated Concentration (mg/kg)	Assessment Value (mg/kg)*
Arsenic	15 to 25	37
Cadmium	<1.8	11
Chromium	60 to 90	910
Lead	<100	200
Nickel	15 to 30	180

*Conservative assessment criteria relating to a residential end use with home grown produce have been used as an initial screening value.

The concentrations of these contaminants are therefore not expected to be elevated within the natural ground.

3.13 Contemporary Trade Directory Entries and Fuel Station Entries

There are eighteen contemporary trade directory entries recorded within 250 m of the site, the closest active entry is for Love Cars Sussex Ltd (car dealers) and P H N Motors (garage services), both listed to be located 26 m west of the site. The closest inactive entry is for Kayjay Motors, a Garage Services, located the same distance west of the site. The majority of the contemporary trade directory entries in the surrounding area relate to garage services or car dealers.

There are no fuel station entries within 1 km of the site.

4.0 EXPECTED GROUND CONDITIONS

4.1 Surface Covering

The site is currently predominantly covered by scrubby vegetation with hardstanding pathways and limited soft landscaping areas. It is unknown whether or not the hardstanding continues below the scrubby ground between the pathways.

4.2 Made Ground

A significant thickness of made ground is not expected to be present across the site, however limited thicknesses are expected to be present at a minimum below the pathways, and possibly below the wider area of possible plant beds indicated on historical aerial photographs.

4.3 Natural Ground

Beneath the surface cover and made ground, the natural ground below the site is expected to comprise of silty clays progressing with depth to more sandy and gravelly with depth towards chalk bedrock. Based on information from the nearby BGS boreholes, as well as intrusive investigation on the adjacent site, the depth to the chalk is anticipated to be between around 3.5 m and 5.5 m below ground level (bgl).

4.4 Groundwater

Groundwater is not expected to be encountered at shallow depth below the site. It should be noted however, that groundwater levels can vary in the long term as well as in response to seasonal changes.

5.0 OUTLINE CONCEPTUAL MODEL

The site is proposed to be re-developed as a car dealership.

5.1 Potential Sources of Contamination

Historically, there has been no development observed on the site, however from the late 1990's a large area of the site is shown to be surfaced with pathways dissecting it. This is thought to be either planting beds associated with the adjacent nursery, or possibly a base for a greenhouse.

The surrounding area has comprised a combination of residential and commercial developments. It is considered that as part of this process of building developments, the land would have had to have been returned to a 'clean' state and as such any contamination present would have been remediated to agreed clean-up criteria.

Any made ground which is present on the site may contain elevated concentrations of metals/metalloids, polycyclic aromatic hydrocarbons (PAHs), asbestos and sulphates.

5.2 Ground Gas

No radon protective measures are necessary in the construction of new dwellings or extensions.

There are no active or historical landfill sites within 250 m of the site.

Significant amounts of made ground are not anticipated to be present.

Ground gas precautions are therefore considered unlikely to be required.

5.3 Potential Pollutant Linkages

The table below details the possible sources and associated contaminants of concern, pathways and receptors:

Source	Potential Contaminants	Potential Pathways	Potential Receptors
Made ground	Heavy metals/metalloids Asbestos PAHs Sulphates	Ingestion, inhalation, direct contact Root Uptake Migration through ground Direct Contact	Site users Principal Aquifer Below ground concrete Water supply pipes
Topsoil	Heavy metals/metalloids		
Natural Ground	Sulphates	Direct Contact	Below ground concrete

5.4 Remedial Measures

As the proposed end use of the site is a car dealership, the site will be covered by hard-standing and the pathways of ingestion, inhalation and direct contact will be broken. Therefore it is unlikely that there will be a risk to end users from contamination in the soil.

The sulphate content of the soil will need to be determined as part of an intrusive site investigation, and appropriate sulphate precautions will be recommended based on the results.

Significant levels of contamination are not anticipated based on the historical use of the site and surrounding area and therefore the risk to the Principal Aquifer is considered negligible.

6.0 GEOTECHNICAL APPRAISAL

6.1 General

Made ground is not anticipated to extend to significant depths across the site due to the lack of previous development. Underlying any made ground, the natural ground is expected to comprise firm to stiff silty clay, becoming more sandy and gravelly with depth, progressing to bedrock of the New Pit Chalk Formation at depths of between 3.5 m and 5.5 m bgl. Groundwater is not expected to be present at shallow depth.

6.2 Foundations

The most appropriate foundation solution for any future development is likely to be strip or pad footings taken through any soft/loose soils or made ground onto undisturbed competent natural ground below. Assuming a medium volume change potential for cohesive soils, the minimum footing depth is likely to be 900 mm. The volume change potential would need to be determined as part of an intrusive investigation.

All foundations should bear on to similar material to minimise the effects of differential settlement, otherwise they should be thickened and reinforced.

The River Terrace Deposits are known to have a variable nature and therefore problems may arise. To avoid problems with differential settlement, it is recommended that foundations should include reinforcement.

As clay soils are expected to be encountered, foundations will need to be deepened in accordance with NHBC Standards, Chapter 4.2 where past, present or proposed trees are within influencing distance of the foundation. Heave precautions will be required where the footing depth due to past or present trees is in excess of 1500 mm. For trenchfill footings, an allowance should be made for placing a 50 mm thickness of low density polystyrene from the top of the footing down to a depth of 500 mm above the formation levels against the inside face of the perimeter footings. The trenches will need to be dug wider to accommodate this. A smooth vertical face is required for the external side of the footings.

6.3 Ground Slabs

If made ground is less than 600 mm thick a ground bearing floor slab will be appropriate. If made ground is found to be deeper, a reinforced suspended or precast concrete floor with an underlying minimum 150 mm ventilated void would be required. The void height will need to be increased where heave precautions are required, with the height of the void being dependent on the volume change potential of the clay.

6.4 Dissolution Features

Dissolution features could potentially be present in the chalk deposits of the New Pit Chalk Formation, however the likelihood of them being encountered is considered to be very low as detailed within the Envirocheck. If however, they are encountered, or suspected, a suitably qualified geotechnical engineer should be contacted to inspect any identified features and advise on appropriate mitigation measures.

6.5 Superstructure Precautions

Additional superstructure precautions are not considered be required based on the expected ground conditions.

6.6 Excavation Problems and Obstructions

Based on the expected ground conditions, it is expected that the trial pits will remain relatively stable during excavation, however any made ground or granular strata may experience some instability, particularly if excavations are left open for a prolonged period of time.

Temporary support will be required in accordance with current Health & Safety Regulations wherever access is required to trenches deeper than 1.2 m or less where there is risk of collapse.

Shallow groundwater is not expected to be present. It must be appreciated however, that groundwater levels can vary in the long term as well as in response to seasonal changes.

6.7 Roads

A CBR value of at least 2% is expected to be appropriate for road design. The ground should be assumed to be frost susceptible and a minimum construction thickness of 450 mm will therefore apply. It is recommended that CBR tests are undertaken along any proposed roads prior to construction so that accurate CBR values can be obtained.

6.8 Surface Water Drainage

Due to the heterogenous nature of the River Terrace Deposits (RTD), it is expected that infiltration rates will vary considerably across the site based on how granular the deposits are. Infiltration testing on the adjacent site recorded variable infiltration rates, however soakaway drainage was considered viable. This would indicate discharge via traditional chamber soakaways may be a viable means of surface water disposal at the subject site.

7.0 RECOMMENDATIONS FOR FURTHER WORK

If more definite information regarding the properties of the ground and any contamination present is required, an intrusive ground investigation would be needed. Investigation by mechanically dug trial pits would be the preferred method of investigating the soils on site, as this allows a larger volume of soil to be viewed. Infiltration testing will need to be assessed on site to determine if traditional chamber soakaways will be a viable method of drainage for the proposed development.

The potential pollutant linkages presented in Section 5.3 would need to be investigated by means of soil analysis. The chemical testing suite should be chosen to cover the range of potential contaminants indicated. Geotechnical testing should be carried out on any clay soils to determine their volume change potential.

APPENDIX

Site Photographs

Envirocheck



View of site directly opposite Mayflower Way West of site



Entrance of site from Bottom Eastern Corner

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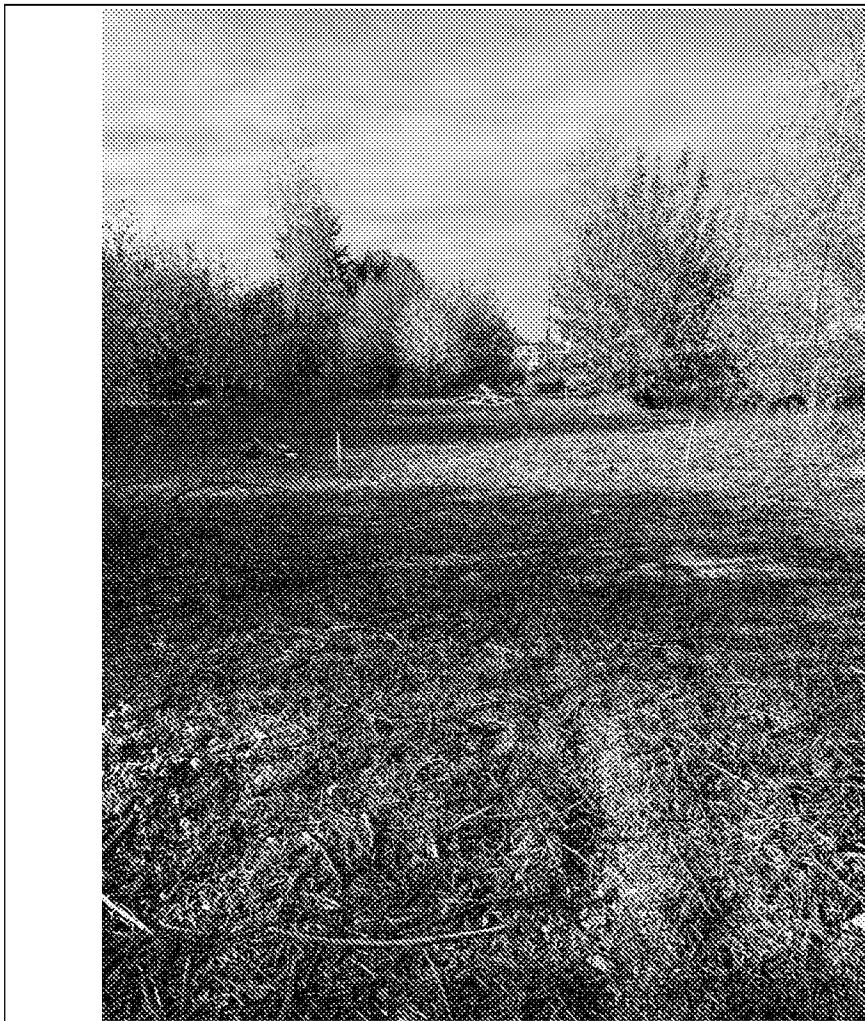
St Andrew's House
 23 Kingfield Road
 Sheffield S11 9AS

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SITE PHOTOS - 16 DECEMBER 2021

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16.12.2021



Inside of the site immediately west of the entrance



Photo facing southeast towards the entrance

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White coloured gas pipe spotted next to the entrance spotted east of the site

Gas Pipe leads directly to a green Gas Box northeast of the site

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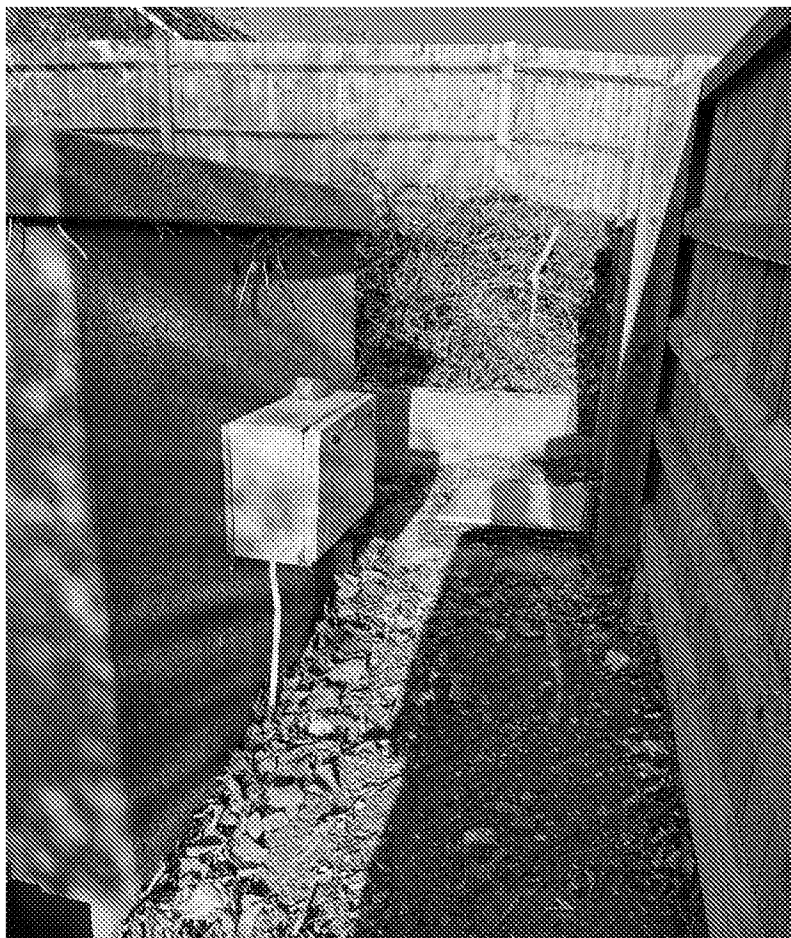
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Gas Pipe leading off from the green Gas Box



Green Gas Box located northeast of the site

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Paths of tarmac covered by dense grass vegetation in the centre of the site



One of the tarmac paths trending north of the site (facing east)

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Path covered by dense vegetation on the western portion of the site



Dense vegetation in the northwest region of the site

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Central Tarmac path. Photo taken from the west of site



Birch trees and grass present in the centre. (Facing south)

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