

Project Name	Care home, Central Avenue, Gravesend		
Project Number	22 026	Note reference	22 026/JAB/PD10
Date	23rd March 2023	Prepared by	J. Bowkett
Subject	Surface Water Discharge – Planning Condition 10 Discharge		

INTRODUCTION

A planning application 20220207 has been made to construct a 62 Bed Care Home for the proposed development at Central Avenue, Gravesend. The site has been previously developed with a public house centre with associated parking. All existing structures are to be demolished.

This document is intended to provide sufficient information to allow the discharge of planning condition 10.

The planning condition required the following:

‘Where infiltration is to be used to manage the surface water from the development hereby permitted, it will only be allowed within those parts of the site where information is submitted to demonstrate to the Local Planning Authority's satisfaction that there is no resultant unacceptable risk to controlled waters and/or ground stability. The development shall only then be carried out in accordance with the approved details.

Reason: To protect vulnerable groundwater resources and ensure compliance with the National Planning Policy Framework (NPPF), 2021.’

GROUND WATER VULNERABILITY

A review of the ground water vulnerability mapping indicated that the site is located within a source protection zone.



Figure 1 – Source Protection Zones (Site Extents in Red within Source Protection Zone II)

The site is within a Zone II outer protection area and is indicated to be within a drinking water Safeguard area.

A further review of the Hydrology of the site indicated that the site is located within a Principal Aquifer Area for the bed rock.

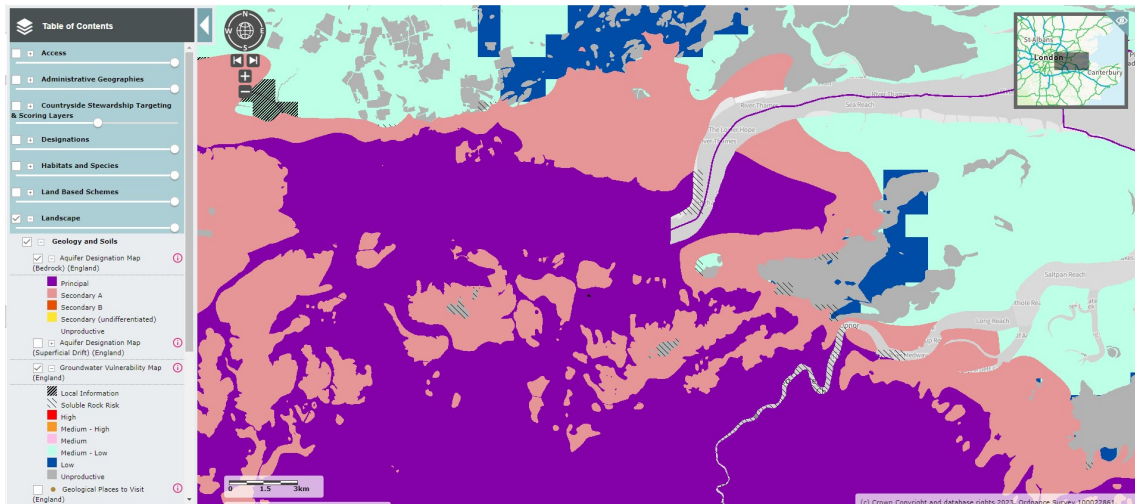


Figure 2 – Aquifer Designation Map (Bedrock) (Site Extents In Black within principal Aquifer)

The site is also located within a high ground water vulnerability area, with an additional note that the site is located within an area where there is a soluble Rock Risk. This is due to the underlying Chalk Strata within the Area.

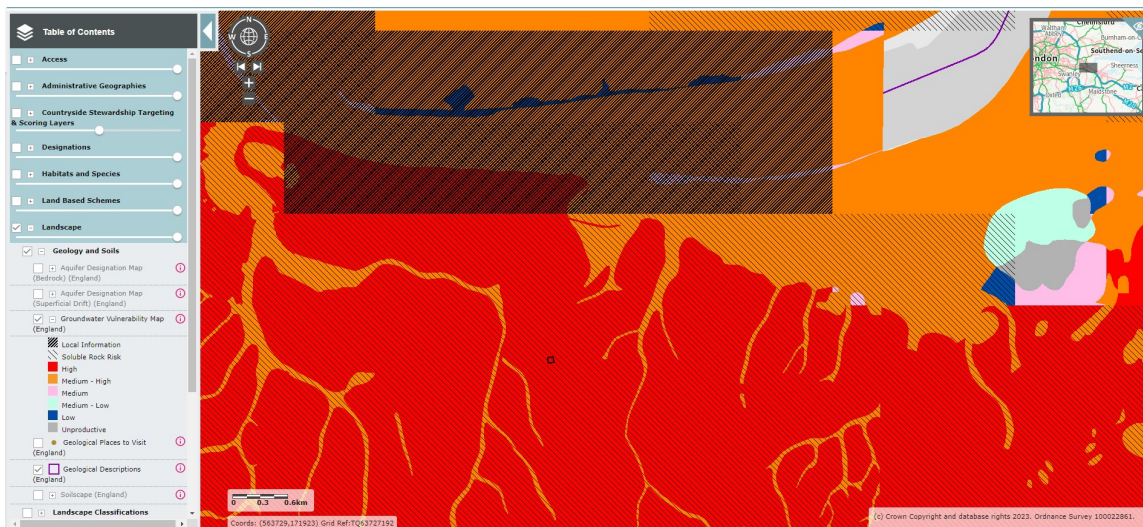


Figure 3 – Ground Water Vulnerability Map (Site Extents in Black within High Area)

In summary this site is in a Sensitive area with regards to the ground water and appropriate treatments should be provided for the discharge of surface water to the underlying ground water.

GROUND WATER LEVELS

The current proposal is for surface water discharge to a deep bore soakaway. The current Scheme drawing is contained within **Appendix A**.

Following further site investigation the proposed deep bore soakaways are to be taken to a depth of 16m as a requirement of the design.

SURFACE WATER DISCHARGE



During the investigation works no water strikes were made the investigation states that ground water levels may vary due to seasonal conditions and antecedent weather conditions.

The SI report is contained within **Appendix B**.

However, the works completed in early February when the water table would be near its peak. It is also noted from Environment Agency Report Water Situation: January 2023 Summary that

‘The wettest hydrological area was Kent in south-east England which received 159% of LTA rainfall for January’

‘At the end of January, groundwater levels increased at all but 4 of the reported indicator sites as wet soils and above average rainfall in many areas helped aquifers continue their seasonal recharge’

The full report can be found at: <https://www.gov.uk/government/publications/water-situation-national-monthly-reports-for-england-2023/water-situation-january-2023-summary#rainfall>

We therefore consider that the water table would have been at or near its peak level during the works.

The min depth of infiltration from the base of the Soakaway bore hole to the known base of ground investigation would be 4.0m below ground level, at which no water strikes occurred. The discharge from the soakaway is very unlikely to be discharging to directly to the ground water, without percolating through subsoils for at least 2-3m with a reasonable additional allowance for ground water variations.

SuDS WATER QUALITY ASSESSMENT

The proposed scheme involves some SuDS items to manage any potential contamination from the site entering the ground water.

With respect to Table 26.2 of the CIRIA SuDS Manual, the two principal areas of the site are considered as noted in the table .

Land Use	Pollution Hazard Level
Residential Roofs	VERY LOW
Low Traffic Roads and non-residential car parking with infrequent change (eg offices) < 300 traffic movements / day	LOW

Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

Extract of table 26.2 from The SuDS Manual (CIRIA Report C753)

Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.8 ⁴	0.8	0.8
Proprietary treatment systems ^{5, 6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Extract of table 26.4 from The SuDS Manual (CIRIA Report C753)

The water quality assessment have been completed using the above pollution indices and migration indices and direct by The SuDS Manual (CIRIA Report C753)

RESIDENTIAL ROOF AREAS

HAZARD INDEX	Total SS	Metals	Hydrocarbons
ROOF	0.2	0.2	0.05
TOTAL HAZARD INDEX	0.2	0.2	0.05
MITIGATION MEANS			
A SOIL WITH GOOD CONTAMINATION ATTENUATION POTENTIAL	0.4	0.3	0.3

- Mitigation index scores are higher than hazard index scores.
- Proposed means of SuDS to catchment areas is appropriate.

Further to this it should be noted that the Environment Agency will allow a discharge of clean roof Water into a Deep bore Soakaway without an Environmental permit, even with a Source Protection Zone 1. The site is located within a Source Protection Zone 2.

LOW TRAFFIC ROADS

HAZARD INDEX	Total SS	Metals	Hydrocarbons
EXTERNALS	0.5	0.4	0.4
TOTAL HAZARD INDEX	0.5	0.4	0.4
MITIGATION MEANS			
CONSTRUCTED PERMEABLE PAVING	0.7	0.6	0.7

- Mitigation index scores are higher than hazard index scores.
- Proposed means of SuDS to catchment areas is appropriate.

The discharge of the surface water from the Low Traffic Roads is subject to an Environment Agency Permit. They have been contacted in relation to the use and requirement of a deep bore soakaway and the relevant advice and documentation will be adhered to.

Given the time it takes for an the Environment Agency Permit to discharge to the ground we intend to include this within the Verification report for the drainage which is a requirement of Planning Condition 9, prior to occupation of the building.

CONTAMINATION ASSESSMENT CONTROLLED WATERS

The original Ground Investigation completed by asl in April 2022 to assess the risks to controlled waters from the recorded concentrations in soil. The following is taken directly from that report:

8 CONTAMINATION ASSESSMENT – CONTROLLED WATERS

8.1 Introduction

To assess the potential risk to controlled waters from the recorded concentrations in soils, the use of leachability is generally used to determine contaminant mobility within the ground with the results of these tests compared to the determinants respective environmental quality standards (EQS) or other applicable standards such as UK drinking water standards (DWS). As groundwater has been identified as potentially at risk, the DWS is used in this assessment where available. For organic determinants, the use of leachability is not considered reliable. These determinants are assessed using half the inert WAC criteria. Exceedances of these criterion are considered to require further assessment.

8.2 Summary of Results - Soils

Table 3 presents a summary of the screening criteria compared with the recorded concentrations of determinants at the site. Only those determinants recorded in excess of their relevant laboratory detection limits are assessed here.

The chemical test results are presented in full in Appendix III.

Table 3 Summary of Soils Data with Respect to Controlled Waters (Tier 1)

Determinant	Max Conc. (mg/l)	Tier 1 Value (mg/l)	No. of Exceedances
Arsenic	0.0043	0.01	0 (3)
Beryllium	0.0002	0.004	0 (3)
Boron	0.038	1	0 (3)
Chromium	0.0016	0.05	0 (3)
Copper	0.047	2	0 (3)
Lead	0.0046	0.01	0 (3)
Nickel	0.0083	0.02	0 (3)
Vanadium	0.0071	0.06	0 (3)
Zinc	0.016	5	0 (3)
TPH (C10-C40)	28	250	0 (5)
PAH total	18.4	50	0 (5)

Notes 1. Numbers in brackets denote the number of tests undertaken.
2. Organic determinant concentrations in mg/kg.

None of the contaminants of concern summarised in Table 3 are recorded in excess of their relevant screening criteria.

Based on the findings of this contamination assessment, no further assessment of the potential risk to controlled waters from contamination present in soil is considered necessary. No remediation of soil to be protective of controlled waters is considered necessary.

Figure 4 - Extract From asl Geotechnical Report April 2022

It is therefore considered that no further works are required in relation to contamination of the existing site soil.

RISK TO CONTROLLED WATER

PROPOSED DISCHARGE

Given the level of the ground water below the site and the SuD's mitigation for the run off from the site prior to discharge into the ground. We consider the risk to the ground water to have been managed adequately.

Formal approval by the Environment Agency and Granting of an Environmental Permit will be required prior to soakaways being used.

No temporary site drainage is to be discharged into the Soakaways.

EXISTING SITE

There is no requirement for remediation of soil to be protective of controlled waters.

SOAKAWAY LOCATION

The deep bore soakaways for the site have been located within an area of hard standing 10m away from the proposed building perimeter in accordance with Kent County Council "Kent Design" (2000).

We have also placed the soakaway as far away from the adjacent highway, between 9 and 10m from the back of footpath. As indicated in the plan extract below.

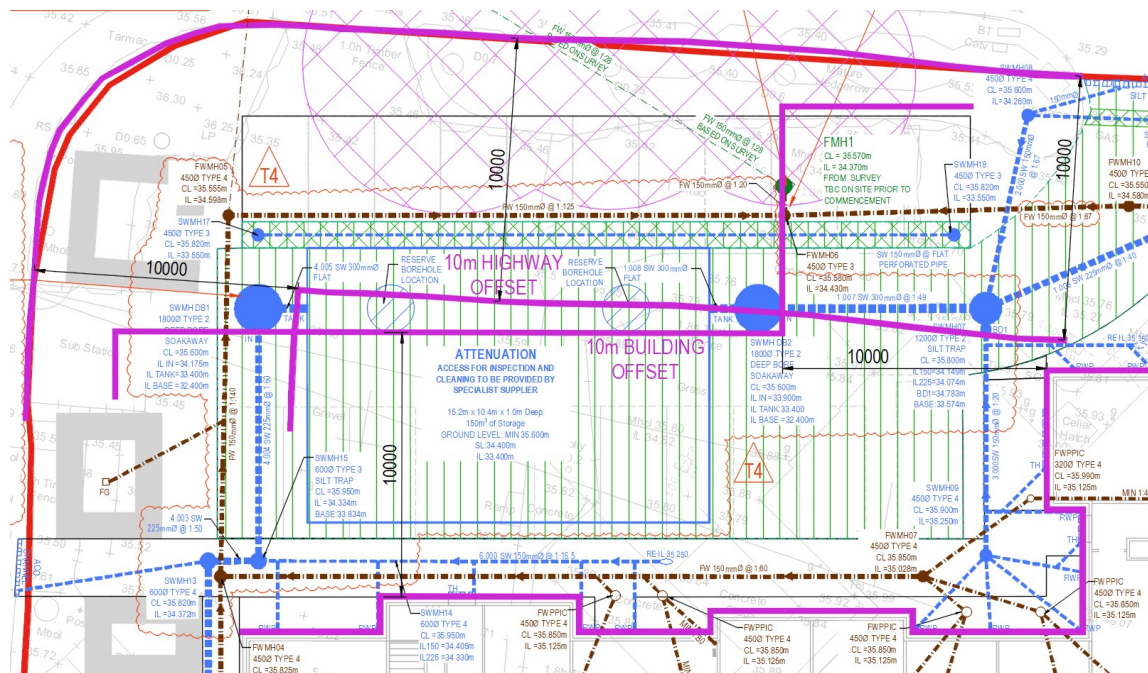


Figure 5 - Extract of Current Drainage Plan with 10m Offsets from building

This positioning is aimed at reducing the risk of the deepbore soakaway influencing the ground conditions below the proposed building.

It should be noted that the proposed building is to be constructed off CFA piles to a depth of between 6 and 15m. The foundations of the building are at a sufficient depth that the Deep Bore soakaway is out of the 45 degree of influence even at the base of the bore hole.

SITE TOPOGRAPHY

The site is reasonably flat within the vicinity of the proposed deep bore soakaways. There are no existing or proposed embankments or earth retaining structures which could be effected by the introduction of a soakaway.

DISSOLUTION OF CHALK

The ground Investigation produced by asl has a statement related to the dissolution risk.

6.11 Ground Dissolution Risk

The site is located in an area indicated to have a very significant soluble rock risk with a 'high possibility' of occurrence, however there are no recorded natural cavities in the vicinity of the site. Further to this, the environmental database search indicates the site to be at 'very low' risk from ground dissolution stability hazards.

Based on the findings of the Desk Study Report, the potential risk from ground dissolution at the site is considered to be very low.

It is considered that the findings of the current intrusive investigation have confirmed the findings of the Desk Study Report with competent chalk materials encountered at shallow depth across the site. However, it is recommended that where less competent chalk or any other anomalous ground is encountered during the development works the materials are inspected by a suitably qualified geotechnical engineer to assess whether the materials pose a constraint to the development works.

Figure 6 - asl - Dissolution of Chalk Statement

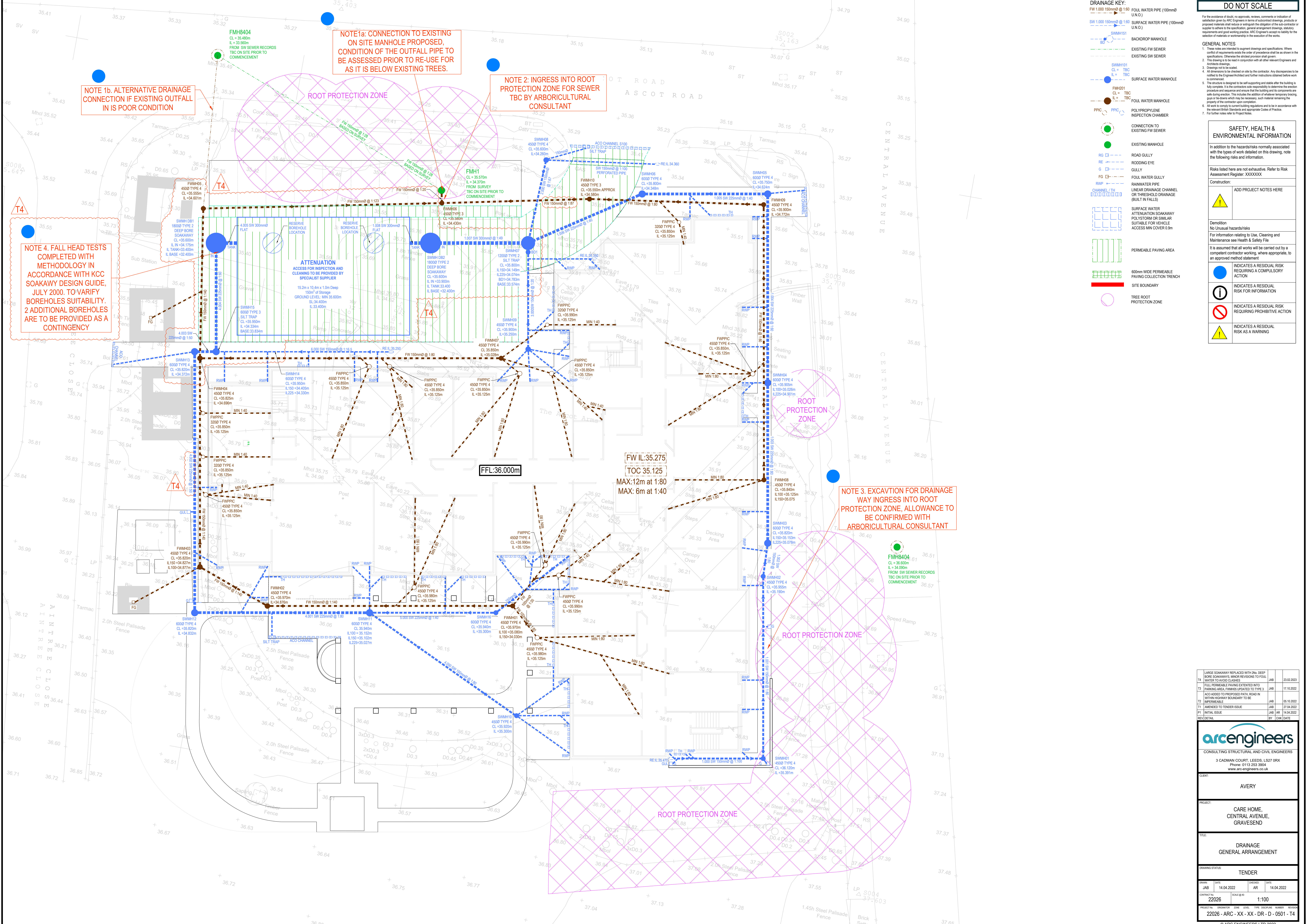
Additional site investigation works have been completed by GES and the following statement have been made.

'We can confirm that GES did not find anything in our supplementary ground investigation works (Report ref 12992, dated February 2023) which would contradict the findings of the earlier phase of investigations carried out by ASL with respect to the risk of ground dissolution.'

Figure 7 – GES – Dissolution of Chalk Statement

It is therefore considered that the risk of ground dissolution on the site is Low.

APPENDIX A – PROPOSED DRAINAGE PLAN



APPENDIX B – ADDITIONAL SI REPORT WITH BOREHOLES



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**New Care Home
Central Avenue
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DA12 5AW**

**Report on Supplementary Ground Investigation
On Behalf of Jenner (Contractors) Ltd**



Document Reference: 12992

February 2023

air quality assessment contaminated land ecology environmental audits noise assessment
environmental impact assessments flood risk assessments geotechnical engineering ground investigation
hydrogeology noxious weeds remediation design risk assessments waste management

Site: New Care Home, Central Avenue, Gravesend, DA12 5AW

Document Reference No: 12992

Quality Management

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4. In situ CBR Test Results and Dynamic Cone Penetrometer Test Results
5. Laboratory Test Results

1 INTRODUCTION

Ground and Environmental Services Ltd (GES) was commissioned by the Jenner (Contractors) Ltd (The Client) to undertake a Supplementary Ground Investigation on a proposed redevelopment site at Central Avenue, Gravesend, Kent, DA12 5AW.

It was understood that the proposed redevelopment of the site will comprise the demolition of a former public house and the construction of a new care home.

The objectives of the supplementary ground investigation were to provide provide guideline recommendations with regard to a piled foundation solution and ground floor slab design. Parameters for use in the design of the surface water drainage and pavements has also been presented.

The scope of the supplementary ground investigation works was provided by The Client.

This report specifically excludes comment or advice with regards to contaminated land or pollution related issues with regards to the development.

2 SITE LOCATION AND LAYOUT

The site is located at the junction of Central Avenue and Ascot Road approximately 1.8km to the south of Gravesend town centre and is centred on approximate National Grid Reference TQ649724.

The site comprises a relatively flat lying rectangular shaped piece of land approximately 65m by 60m in plan. The northern and eastern areas of the site were dominated by the former Ascot Arms Public House with a tarmac parking areas to the north of the pub and a hardcore parking area to the north west of the structure. An electrical substation is located in the north-western corner of the site.

To the south of the public house were areas of soft landscaping which were mainly laid to grass.

3 GEOLOGICAL SETTING

Reference to the British Geological Survey geological mapping of the area indicates that the geology underlying the site comprises chalk of the Lewes Nodular Chalk Formation, Newhaven Chalk Formation and Seaford Chalk Formation (undifferentiated). No superficial deposits are shown on site.

The geological memoir for the area described this stratum is as follows:

Lewes Nodular Chalk Formation

Composed of hard to very hard nodular chalks and hardgrounds (which resist scratching by finger-nail) with interbedded soft to medium hard chalks (some grainy) and marls; some

griotte chawks. The softer chawks become more abundant towards the top. Nodular chawks are typically lumpy and iron-stained (usually marking sponges). Brash is rough and flaggy or rubbly, and tends to be dirty. First regular seams of nodular flint, some large, commence near the base and continue throughout.

Seaford Chalk Formation

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.

Newhaven Chalk Formation

Composed of soft to medium hard, smooth white chawks with numerous marl seams and flint bands, including abundant Zoophycos flints (notably at levels near the base). The formation is known to contain distinct phosphatic chawks of limited lateral extent. Equivalent beds, the Margate Chalk of north Kent, are marl-free and contain little flint.

4 INTRUSIVE INVESTIGATION

4.1 FIELDWORK

The site works were carried out between the 27th January and the 7th February 2023 and comprised the following:

- Cable Percussion Drilling;
- Falling Head Testing;
- DG365 Soakage Testing
- In situ CBR and Dynamic Cone Penetrometer Testing

The positions of the above works on the site are indicated on Figure 1, Exploratory Hole Location Plan.

Cable Percussion Drilling

Two boreholes, BH1 and BH2, were excavated using cable percussion boring methods to depths of 20 m below existing ground level.

During boring, temporary steel casing (150mm diameter) was used to support the sides of the bores. Disturbed (D) soil samples were recovered at regular intervals for description and subsequent laboratory testing purposes.

In addition in situ Standard Penetration tests were carried out at regular intervals using the SPT split spoon attachment.

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Upon completion the boreholes were backfilled with arisings and surface coverings made safe.

Borehole logs are presented in Appendix 1.

Falling Head Testing

Falling head soakage testing was undertaken in boreholes BH1 and BH2 as they were progressed. The test involved recording the drop in water level with respect to time.

The field test data is summarised below in Section 7.4 below and the results presented in Appendix 2.

DG365 Soakage Tests

Two trial pits (SP1 and SP2) were excavated across the site, to depths of 2.95m and 3.25m below existing ground level respectively using a JCB 3CX excavator under the supervision of a Geo-Environmental Engineer from GES. The soils/materials encountered were logged on site.

Infiltration tests were carried out in both trial pit excavations. These tests were carried out in accordance with the methodology given in BRE DG365 'Soakaway design' and comprised discharging water into the excavations up to approximately 1 m bgl and monitoring the fall in water level against time.

The field test data is summarised below in Section 7.4 below and the results presented in Appendix 3.

Plate Load and Dynamic Cone Penetrometer Testing

In situ plate load tests were carried out using the 8.5T JCB 3CX as kentledge. A total of four plate load tests (CBR1 – CBR4) were undertaken at locations specified in order to obtain CBR parameters. The results from the plate load tests are presented in Appendix 4.

In addition, in areas inaccessible for the JCB3CX two dynamic cone penetrometer (DCP) tests (DCP1 and DCP2) were undertaken.

The dynamic cone penetrometer (DCP) uses an 8 kg hammer dropping through a height of 575 mm and a 60° cone having a maximum diameter of 20 mm. Penetration depth is recorded after every blow.

The DCP is a Penetrometer device used to provide a measure of in situ CBR. Blow count readings were converted to an equivalent CBR, which is displayed in the results tables are also presented in Appendix 4. The TRRL equation was used to calculate the equivalent CBR value from the DCP results.

4.2 GROUNDWATER

Groundwater was not encountered during the excavation of the boreholes.

It should be noted that the absence of groundwater is not necessarily indicative of the absence of a groundwater table in view of the short period the boreholes and trial pits remained open. Groundwater levels may vary due to seasonal fluctuations in rainfall, but in the shorter term, can be affected by antecedent weather conditions or other causes.

5 LABORATORY TESTING

The following range of laboratory tests were scheduled, and the results are presented in Appendix 5.

- i.* Determination of Natural Moisture Content (1 no.).
- ii.* Determination of Atterberg limits (1 no.).
- iii.* Determination of Saturation Moisture content and Density of chalk (3 no.).
- iv.* Determination of pH (5 No.).
- v.* Determination of water soluble sulphate (5 No.).

In addition, two composite samples of arisings were prepared and submitted for analysis in accordance with the Environment Agency's waste acceptance criteria (WAC) for the off-site disposal of soils. The results of the WAC testing are also presented in Appendix 5.

6 GROUND CONDITIONS

6.1 GROUND PROFILE

The soils encountered during the investigation are described in the borehole and trial pit logs presented in Appendices 1 and 2.

This ground investigation found a surface layer of Made Ground/Topsoil over a discontinuous horizon of Head materials with chalk typical of the Lewes Nodular Chalk Formation found at depth.

Made Ground/Topsoil

Made Ground materials were encountered to depths ranging between 0.02m and 0.8m. The Made ground at the location of SP1 comprised of Type 1 material and was found to 0.2m. At the location of SP2 a thin layer of topsoil was found. In boreholes BH1 and BH2 the surface layer comprised silty sandy clayey topsoil.

Head Deposits

Underlying the Made Ground at the locations of BH1, and both trial pits were soils typical of Head Deposits. The Head Deposits comprised silty clay with a variable gravel component comprising of flint. The Head Deposits were not found at the location of borehole BH2 which found chalk directly beneath the Made Ground/Topsoil.

Where found the Head Deposits were proven to depths ranging between 1.95m and 2.4m.

Lewes Nodular Chalk Formation

Materials typical of the Lewes Nodular Chalk Formation were found beneath the Made Ground in BH2 and beneath the Head Deposits at other test locations.

The chalk materials comprised an upper layer of off white and light brown highly weathered chalk which was recovered as fine to coarse chalk gravel in a silt matrix with frequent flints. The highly weathered materials were found to depths ranging between 2.1m and 2.9m. Below which was partially weathered white chalk which was also recovered as fine to coarse chalk gravel. The partially weathered materials was differentiated from the highly weathered materials by colour. Scattered flints were observed throughout the stratum.

The chalk stratum was proven to a minimum depth of 20m during this ground investigation.

6.2 ENGINEERING PROPERTIES

The engineering properties of the principal strata, as discussed above, can be assessed based upon a combination of the in situ and laboratory test results. A summary of the engineering properties is given below.

Head Deposits

In situ SPT's recorded N values of 20 and 19 (stiff) at the location of BH1. See Figure 2, SPT v Depth Profile. Figure 3 provides a plot of corrected N₆₀ values against depth. The N₆₀ value taking into account an energy ratio (Er) of 70% for equipment used.

Tactile observations recorded firm to stiff soils.

Classification testing recorded a slightly gravelly very silty clay of low plasticity with a plasticity index of 12% measured – low shrink/swell potential.

Lewes Nodular Chalk Formation

In situ SPT's indicated this material to be very weak to weak with N values in the range 16 to 46. The SPT N values rose significantly below depths of 14.0m in BH1 and 13.0m in BH2.

Laboratory testing on disturbed chalk samples found that the chalk was of low to medium density with dry densities in the range 1.41 to 1.58 Mg/m³ and saturation moisture contents in the range 26.2 to 33.7% recorded.

6.3 FOUNDATION DESIGN PARAMETERS

Based upon visual observations, laboratory test results and in situ test results the following parameters are recommended for use in the design of piled foundations:

Stratum	In situ SPT range (See Figures 2 and 3)	Design SPT Range	Undrained Shear Strength	Effective angle of shearing resistance
Head Deposits	19 and 20		75 kN/m ²	
Chalk	16- 46	See Figures 2 and 3		
Groundwater was not found during this investigation				

7 ENGINEERING DESIGN

7.1 OUTLINE FOUNDATION DESIGN

The proposed development is understood to comprise the construction of a new care home.

Structural loads were unknown at the time of reporting however for preliminary foundation design purposes column loads of upto 400kN have been adopted.

In deliberation of suitable foundation options consideration was given to the geotechnical hazards and risks as presented below:

Geotechnical Hazard	Qualitative Risk & Consequences	Possible Risk Reduction Measures
Variations in stiffness of ground below foundation depth that could give rise to unacceptable total and differential settlement.	Medium Large span buildings would be particularly sensitive to differential settlement. Would result in cracking of superstructure if conventional brickwork or brick cladding is used.	Calculate likely magnitude of settlement and determine if within acceptable tolerances. Make foundations act as reinforced beams. Consider ground treatment to improve ground conditions or adopt deep foundation.
Existing underground structures such as service runs and old footings.	Very High Implication for foundation depth and economic feasibility of shallow foundations.	New foundations to be constructed in undisturbed ground or alternatively disturbed ground to be removed and replaced with suitable engineering fill. Consider a deep foundation solution.
Shrinkage/swelling of foundation soils due to action of tree roots.	Low Foundation movement and cracking of brickwork.	Follow requirements for low shrink/swell potential soils

Based upon the findings of an earlier phase of ground investigation carried out by others and on the understanding that the proposed building is to be located over the footprint of the existing public house, which includes a basement area, it is understood that a deep foundation solution (i.e. piles) is the preferred foundation solution. Piles should be founded within the Lewes Nodular Chalk Formation.

Piled Foundations in Chalk

The variation in ground conditions encountered across the site would typically lend itself to a deep foundation solution, such as piles, as this minimises the potential for total and differential settlements.

The choice of pile type at this site is very dependent upon the magnitude of noise and vibration generated by the piling equipment and installation technique. Driven piles are considered unsuitable as excessive noise and vibration will occur. Bored cast in situ or

continuous flight auger (CFA) piles are therefore the basic alternative options. Bored pile excavations would need to be supported by temporary casing during construction. The chosen method of piling would need to be capable of advancing through flint bands which were encountered within the chalk stratum and required chiselling tools to advance through.

CFA piles would not normally require casing through soils of the type found on this site. However, the piling contractor should be made aware of possible underground obstructions due to the previous development of the site and the presence of hard flint layers within the Chalk as noted above.

The suitability of this method of piling for use on this site should be checked with a piling contractor to ensure all factors have been taken into consideration. It should be noted that all pile types would require reinforcement.

Preliminary Design Criteria

The following discussion is based on the use of bored cast in situ or CFA piles and assumes the following criteria:

The design line relating SPT 'N₆₀' in chalk to depth is provided in Figure 3.

- Piles to terminate in the Lewes Nodular Chalk Formation with a minimum penetration of 3 m into the chalk and in chalk with an SPT 'N' greater than 25.
- Groundwater at a minimum of 20m below existing ground level.
- The end bearing stress that can be mobilised by the pile is dependent on the ability of the chosen method of installation to ensure a clean base. A factor of safety of 3.5 (CFA piles) on end-bearing resistance has been incorporated.
- A factor of safety of 1.5 has been used for shaft friction.
- Positive and negative skin friction effects from Made ground materials overlying the Lewes Nodular Chalk Formation have been ignored for preliminary design but should be accounted for in final design.
- Pile working loads may be obtained by summing the working end bearing stress and shaft resistance for the required pile lengths and pile diameters.
- The settlement of isolated piles designed on the above basis should be acceptably small and typically about 0.5% of the pile diameter. Settlement should be checked for piles installed in groups.

Predicted load capacity for CFA piles are given in the tables below and are based on the Construction Industry Research and Information (CIRIA) Reports C574,2000 and PR86,2003.

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CFA Piles: - Working end-bearing stress in Lewes Nodular Chalk Formation (incorporating a factor of safety of 3.5).				
Pile Toe Depth (m)	SPT 'N₆₀' value at Pile Toe (blows)	Pile Diameter (m)		
		0.3	0.45	0.6
		Working End Bearing Capacity (kN)		
15	36	145	327	582
16	37	149	336	598
17	38	153	345	614
CFA Piles - Working shaft friction in Lewes Nodular Chalk Formation (Factor of Safety, FOS, of 1.5)				
Shaft Length in Chalk (m)		Pile Diameter (m)		
		0.4	0.5	0.6
		Working Shaft Friction (kN)		
4-15		502	753	1005
4-16		580	870	1160
4-17		663	995	1327

Working Loads – combined

An example of working loads for a range of pile diameters is given in the table below. This combines the shaft friction and end bearing resistance generated within the chalk.

Pile Toe Depth (m)	Pile Diameter (mm)	Safe Working Load (kN) – Shaft friction and End bearing
15	300 CFA	648
	450 CFA	1081
16	300 CFA	730
	450 CFA	1207
17	300 CFA	817
	450 CFA	1341

NB: A requirement of pile design is that ground conditions should be known to a minimum of 5 x pile diameter or 5m below the toe of the pile. (Eurocode 7).

It should be noted that the above predictions are for preliminary design purposes only and final design should be carried out by the appointed specialist piling contractor. In addition as piles will be required to penetrate into the Chalk the Environment Agency would need to be consulted and a risk assessment maybe required

The final choice of pile type and installation method should take into consideration the following:

- The effects of noise and vibration during pile installation on nearby adjacent structures.
- flint bands.

7.2 GROUND FLOORS

Based upon the results of this ground investigation and that a piled foundation solution is likely to be utilised it is recommended that suspended ground floor slabs should be adopted.

7.3 TEMPORARY WORKS

Excavations in excess of 1.2m depth may be required in connection with the proposed development on this site. If there is a requirement for personnel to enter into excavations, then the need for trench side support should be considered for any depth of excavation and, therefore, appropriate equipment should be available on site prior to excavation proceeding. A site specific risk assessment should be carried out where man entry into excavations is required.

The base of foundation excavations should be inspected and any soft loose, organic or otherwise deleterious material at foundation level removed and replaced with lean mix concrete. The soils encountered will be liable to softening/loosening when exposed to surface water infiltration. In order to avoid deterioration of the prepared formation the base of foundations should be blinded with concrete as soon as practical after excavation and particularly if there is delay before placing foundation concrete.

7.4 ROADS/HARDSTANDING

The results of in situ DCP tests indicated CBR values in the range 6 to >100% although generally in the range 6 to 17% below a typical formation level of 0.45m.

The results of the in situ plate CBR tests recorded CBR values in the range 4.5 % to 6.7% at typical formation levels at or below 450mm. A CBR value of 14.0% was recorded in the CBR test carried out at ground level.

For preliminary design purposes a CBR value of 4.5% should be adopted. The soils encountered during this ground investigation are considered frost susceptible therefore road construction should have a minimum of thickness of 450 mm.

Following excavation to formation level the subgrade should be proof rolled and inspected by an engineer and any soft, loose or otherwise deleterious material either stabilised or removed and replaced with well compacted granular fill.

Clay soils at formation level will locally be moisture susceptible and liable to softening and swelling or heave when wet. Prepared surfaces should therefore be kept dry to prevent localised subgrade softening where cohesive soils are exposed.

7.5 SOAKAWAYS

The results from the DG365 soakage tests are presented in the table below:

Trial Pit ID	Test No	Test Depth (m)	Infiltration rate (m/s)	Comment
SP1	1	0.93-2.95	5.15×10^{-6}	Low Infiltration – rate based on extrapolation of test data
SP2	1	1.0-3.25	1.30×10^{-6}	Low Infiltration – rate based on extrapolation of test data

NB: Rates are unfactored

Based on these results the use of shallow chamber type soakaways discharging into the Lewes Nodular Chalk Formation would not be a viable option for disposal of surface water.

To assess the p[potential for adopting a deep bore soakaway option falling head testing was carried out in the boreholes as they were advance. The test results are tabulated below:

Borehole ID	Test No	Test Depth (m)	Infiltration rate – KCC Method l/m ² /min	Infiltration rate (m/s)	Comment
BH1	1	7.5-10	24.75	4.3×10^{-4}	Good Infiltration
BH2	1	9-11	57.5	1.7×10^{-3}	Good Infiltration
BH2	2	9-15	21.4	1.6×10^{-3}	Good Infiltration

Based on the results of the falling head tests the use of a deep bore soakaway solution would be feasible for this site.

Should soakaways be considered as part of the development then irrespective of other considerations they should be sited at least 10m away from any foundations. The Environment Agency and Local Authority must be consulted when planning soakaway installations.

7.6 CHEMICAL ATTACK ON BURIED CONCRETE

The results of the chemical testing indicated a concentration of water-soluble sulphate in the range 456 to 576mg/l as SO₄. pH values were slightly alkaline with a range between 8.0 and 8.3 pH units.

In accordance with BRE Special Digest 1 (SD1:2005) entitled 'Concrete in Aggressive Ground' a design sulphate class for the site of DS-2 is recommended. Using SD1 an ACEC (Aggressive Chemical Environment for Concrete) class of AC-2 is recommended.



7.7 WASTE DISPOSAL

Should an excess volume of soil be required to be disposed of off-site then a waste classification may be required.

For a waste classification to be undertaken, materials need to be subjected to chemical testing which would give an indication to the contaminants present and, therefore those most toxic to the environment in the waste.

Following the assessment of the waste as hazardous or non-hazardous waste acceptance criteria leachate testing allows the appropriate disposal pathway to a suitably licensed disposal facility to be further determined.

Waste acceptance criteria (WAC) leachate testing was carried out on two composite soil samples from the site. The results are attached at Appendix 5 and show that no leachable content in excess of the inert limit values was noted. No organic contamination was noted in the soils.

As a preliminary waste assessment and based on the results of materials tested to date, it is considered that any waste soils would be classed as non-hazardous and would be suitable for offsite disposal at a facility licensed to accept inert waste. The soils would be classed as EWC 17 05 04.

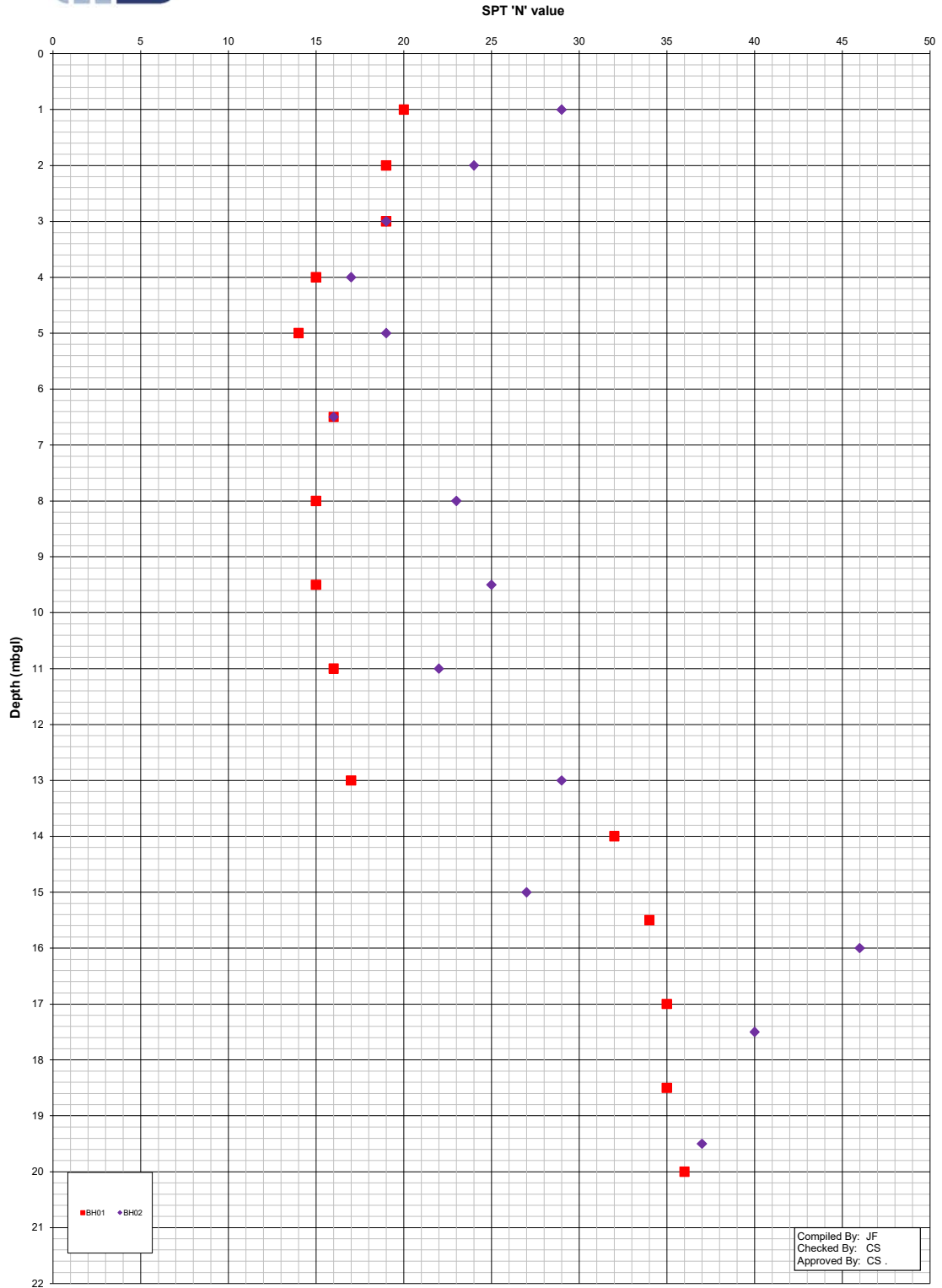
8 CONCLUSIONS AND RECOMMENDATIONS

Based on the site investigation, intrusive works and subsequent data assessment, the following conclusions and recommendations have been drawn in respect of the New Care Home site at Central Avenue, Gravesend, DA12 2BG.

- The ground investigation found, beneath a variable thickness of Made Ground/Topsoil, a discontinuous layer of Head Deposits and chalk typical of the Lewes Nodular Chalk Formation.
- Piled foundations into the Lewes Nodular Chalk Formation have been recommended. Preliminary safe working loads have been presented for a range of pile diameters and lengths.
- Suspended ground floor slabs were recommended
- A design CBR of 4.5% was recommended for pavements.
- The results of the DG365 testing indicated a shallow soakaway solution would not be a feasible option for the surface water drainage .
- Falling Head Testing in the boreholes indicated a good infiltration potential therefore deep bore soakaways are considered a viable option for this site. Soakaways would need to be sited a minimum of 10m from any structures.
- A design sulphate class for the site of DS-2 and an ACEC class of AC-2 is recommended
- The majority of any surplus subsoil material to be removed off site is likely to be classified as non-hazardous and may be acceptable at a facility licensed to accept inert waste.

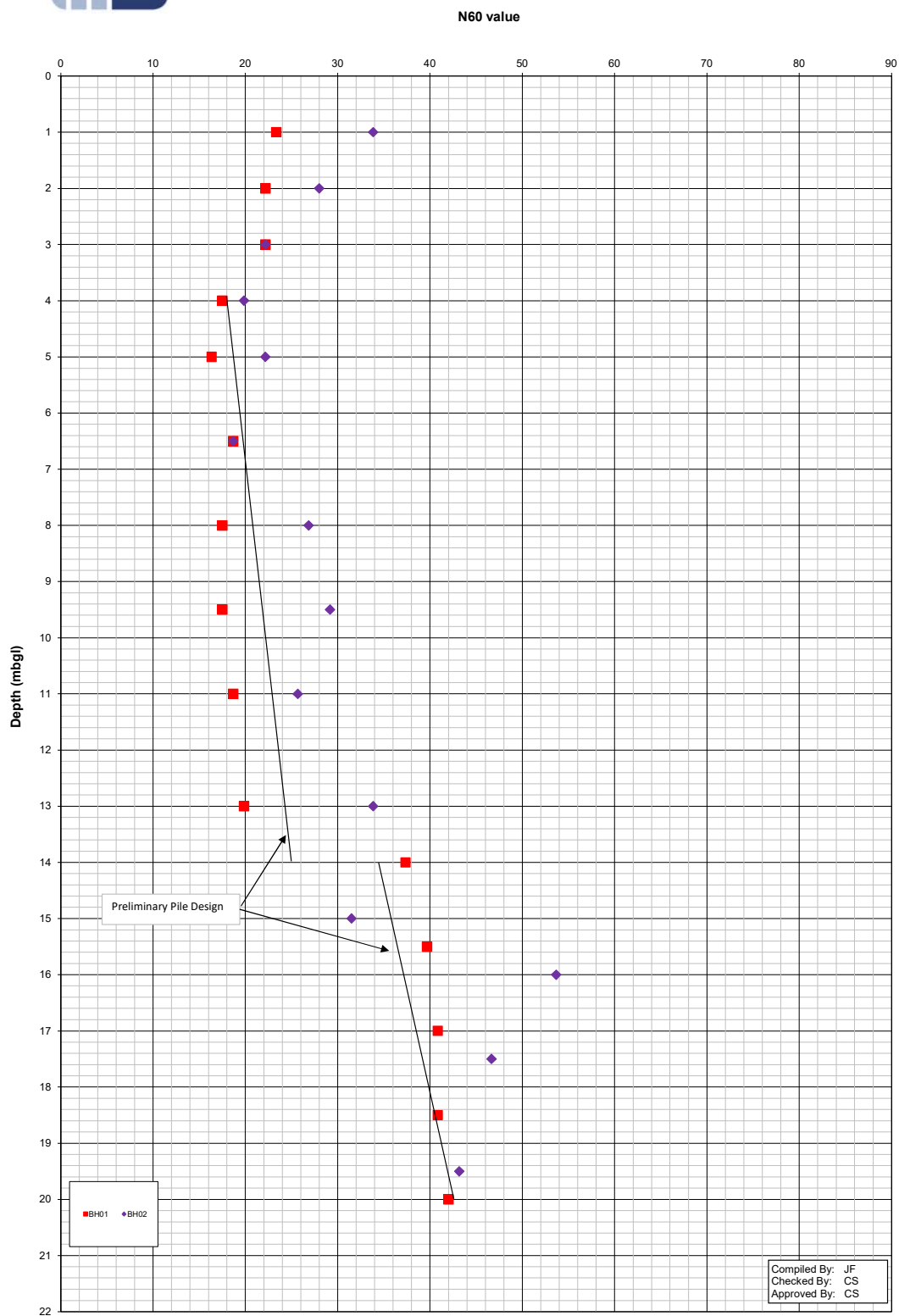


Figure 2: Former Ascot Arms, Central Avenue, Gravesend
SPT N-Depth Profile





**Figure 3: Former Ascot Arms, Central Avenue, Gravesend
N60-Depth Profile**





APPENDIX 1
BOREHOLE LOGS



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH1

Sheet: 1 of 3

Equipment & Methods. Dando 150 Backfill: Arisings					Project Name: New Care Home Project Location: Central Avenue, Gravesend, Kent Client: Jenner (Contractors) Ltd			Job No: 12992		
Co-ordinates: E: N:					Ground Level (m):			Date Started:01/02/2023 Date Completed:07/02/2023		
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)		
Depth (m)	No.	Type	Result							
0.70		D		3,4/4,5,6,5	MADE GROUND: Grass over silty sandy clayey topsoil with frequent roots	-0.70		(0.70)		
1.00- 1.45		SS	SN=20		Stiff orange brown silty gravelly CLAY. Gravel is fine to coarse flint		0.70			
1.60		D		3,5/5,4,5,5				(1.50)		
2.00- 2.45		SS	SN=19							
2.60		D		4,5/4,5,5,5	Off white and light brown highly weathered CHALK. recovered as fine to coarse chalk gravel in a silt matrix	-2.20		2.20		
3.00- 3.45		SS	SN=19		White partially weathered CHALK. Recovered as fine to coarse chalk gravel in a comminuted silt matrix. Scattered flint throughout	-2.60		(0.40)		
3.70		D		2,4/5,4,4,3				2.60		
4.00- 4.45		SS	SN=15							
4.60		D		3,3/4,3,3,4						
5.00- 5.45		SS	SN=14							
6.00		D		2,4/5,4,4,3						
6.50- 6.95		SS	SN=16							
7.00		D		2,3/3,4,3,5						
8.00		SS	SN=15							
8.00- 8.45		D		2,2/3,4,4,4						
9.00		SS	SN=15							
9.50- 9.95		D		2,3/3,4,5,4						
10.00		SS	SN=16							
11.00		D		3,3/4,5,4,4						
11.00- 11.45		SS	SN=17							
12.00		D						(17.40)		
Remarks:						Logged By:		Checked By:		
						DPR		CSS		
						Scale: 1:60		Approved By:		
Notes: For explanation of symbols and abbreviations, see Key Sheet.						FIG No.		.1		



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH1

Sheet: 2 of 3

Equipment & Methods. Dando 150 _Backfill: Arisings					Project Name: New Care Home Project Location: Central Avenue, Gravesend, Kent Client: Jenner (Contractors) Ltd			Job No: 12992		
Co-ordinates: E: N:					Ground Level (m):			Date Started:01/02/2023 Date Completed:07/02/2023		
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)		
Depth (m)	No.	Type	Result							
12.00- 12.45		SS								
13.00		D								
14.00		D	SN=32	3,3/5,7,8,12						
14.00- 14.45		SS								
15.00		D								
15.50- 15.95		SS	SN=34	4,4/7,8,9,10						
16.00		D								
17.00		D	SN=35	4,6/6,8,9,12						
17.00- 17.45		SS								
18.00		D								
18.50- 18.95		SS	SN=35	4,7/7,9,9,10						
19.00		D								
20.00		D	SN=36	4,5/8,8,9,11						
20.00- 20.45		SS								
						-20.00		20.00		
						End of Borehole 20.00 m (Thickness of basal layer not proven)				
Remarks:						Logged By:		Checked By:		
						DPR		CSS		
						Scale: 1:60		Approved By:		
Notes: For explanation of symbols and abbreviations, see Key Sheet.						FIG No.		.2		



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH1

Sheet: 3 of 3

Equipment & Methods.

Dando 150
_Backfill: Arisings

Project Name: New Care Home

Project Location: Central Avenue, Gravesend, Kent

Client: Jenner (Contractors) Ltd

Job No:

12992

Co-ordinates:

E:

N:

Ground Level (m):

Date Started:01/02/2023

Date Completed:07/02/2023

Water Level Observations During Boring

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Depth to Water (m)	Remarks
1-2-23	00:00	2.00		dry	end of shift
6-2-23	08:00	2.00		dry	start of shift
6-2-23	15:00	12.00	6.00	dry	end of shift
7-2-23	08:00	12.00	6.00	dry	start of shift
7-2-23	14:00	20.00	6.00	dry	end of borehole

Hole Diameter by Depth Table

Depth of Hole (m)	Diameter of Hole (mm)	Diameter of Casing (mm)	Depth of Casing (m)
20.00	150	150	9.00

Remarks:

Logged By:

DPR

Checked By:

CSS

Scale:
1:60

Approved By:

FIG No.

.3

Notes: For explanation of symbols and abbreviations, see Key Sheet.



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH2

Sheet: 1 of 3

Equipment & Methods. Dando 150 Backfill: Arisings					Project Name: New Care Home Project Location: Central Avenue, Gravesend, Kent Client: Jenner (Contractors) Ltd			Job No: 12992		
Co-ordinates: E: N:					Ground Level (m):			Date Started:30/01/2023 Date Completed:01/02/2023		
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)		
Depth (m)	No.	Type	Result							
0.50		D			MADE GROUND: Grass over silty sandy clayey topsoil with frequent roots			(0.80)		
1.00- 1.45		SS	SN=29	4,6/7,7,7,8	Off white and light brown highly weathered CHALK. recovered as fine to coarse chalk gravel in a silt matrix	-0.80		0.80		
1.70		D								
2.00- 2.45		SS	SN=24	3,5/5,6,7,6				(2.10)		
2.60		D								
3.00- 3.45		SS	SN=19	4,6/5,4,5,5	...from 2.60 to 2.90 flints	-2.90		2.90		
3.50		D			White partially weathered CHALK. Recovered as fine to coarse chalk gravel in a comminuted silt matrix. Scattered flint throughout					
4.00- 4.45		SS	SN=17	3,4/5,4,4,4						
4.60		D								
5.00- 5.45		SS	SN=19	3,4/4,5,4,6						
6.00		D								
6.50- 6.95		SS	SN=16	3,3/4,3,4,5						
7.00		D								
8.00		D	SN=23	4,5/6,5,6,6						
8.00- 8.45		SS								
9.00		D								
9.50- 9.95		SS	SN=25	4,5/5,6,6,8	...from 9.10 to 9.50 flints					
10.00		D			...from 9.70 to 10.00 flints					
11.00		D	SN=22	3,5/5,6,6,5						
11.00- 11.45		SS						(17.10)		
Remarks:						Logged By:		Checked By:		
						DPR		CSS		
						Scale: 1:60		Approved By:		
Notes: For explanation of symbols and abbreviations, see Key Sheet.						FIG No.		.1		



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH2

Sheet: 2 of 3

Equipment & Methods. Dando 150 _Backfill: Arisings					Project Name: New Care Home Project Location: Central Avenue, Gravesend, Kent Client: Jenner (Contractors) Ltd			Job No: 12992		
Co-ordinates: E: N:					Ground Level (m):			Date Started:30/01/2023 Date Completed:01/02/2023		
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)		
Depth (m)	No.	Type	Result							
13.00 13.00- 13.45		D SS	SN=29	3,5/6,7,7,9						
14.00		D								
15.00 15.00- 15.45		D SS	SN=27	4,5/5,6,7,9						
16.00 16.00- 16.45		D SS	SN=46	4,7/7,10,12,17						
17.00		D								
17.50- 17.95		SS	SN=40	5,6/8,9,10,13						
18.00		D								
19.00		D								
19.50- 19.95		SS	SN=37	3,7/8,8,9,12						
						-20.00		20.00		
						End of Borehole 20.00 m (Thickness of basal layer not proven)				
Remarks:							Logged By:		Checked By:	
							DPR		CSS	
							Scale: 1:60		Approved By:	
Notes: For explanation of symbols and abbreviations, see Key Sheet.							FIG No.		.2	



Ground and Environmental Services Limited

Unit 2 Montpelier Business Park,
Dencora Way, Ashford,
Kent TN23 4FG

Tel: 01233 646237

Borehole No. BH2

Sheet: 3 of 3

Equipment & Methods.

Dando 150
_Backfill: Arisings

Project Name: New Care Home

Project Location: Central Avenue, Gravesend, Kent

Client: Jenner (Contractors) Ltd

Job No:

12992

Co-ordinates:

E:

N:

Ground Level (m):

Date Started:30/01/2023

Date Completed:01/02/2023

Water Level Observations During Boring

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Depth to Water (m)	Remarks
30-1-23	00:00	6.50	1.50	dry	end of shift
31-1-23	08:00	6.50	1.50	dry	start of shift
31-1-23	16:00	15.00	9.00	dry	end of shift
1-2-23	09:00	15.00	9.00	dry	start of shift
1-2-23	13:00	20.00	9.00	dry	end of borehole

Hole Diameter by Depth Table

Depth of Hole (m)	Diameter of Hole (mm)	Diameter of Casing (mm)	Depth of Casing (m)
20.00	150	150	9.00

Chiselling Details

From (m)	To (m)	Time Taken (hhmm)	Chiselling Tool Used	Notes
2.60	2.90	00:15		flints
9.10	9.50	00:30		flints
9.70	10.00	00:15		flints

Remarks:

Logged By:

DPR

Checked By:

CSS

Scale:
1:60

Approved By:

FIG No.

.3

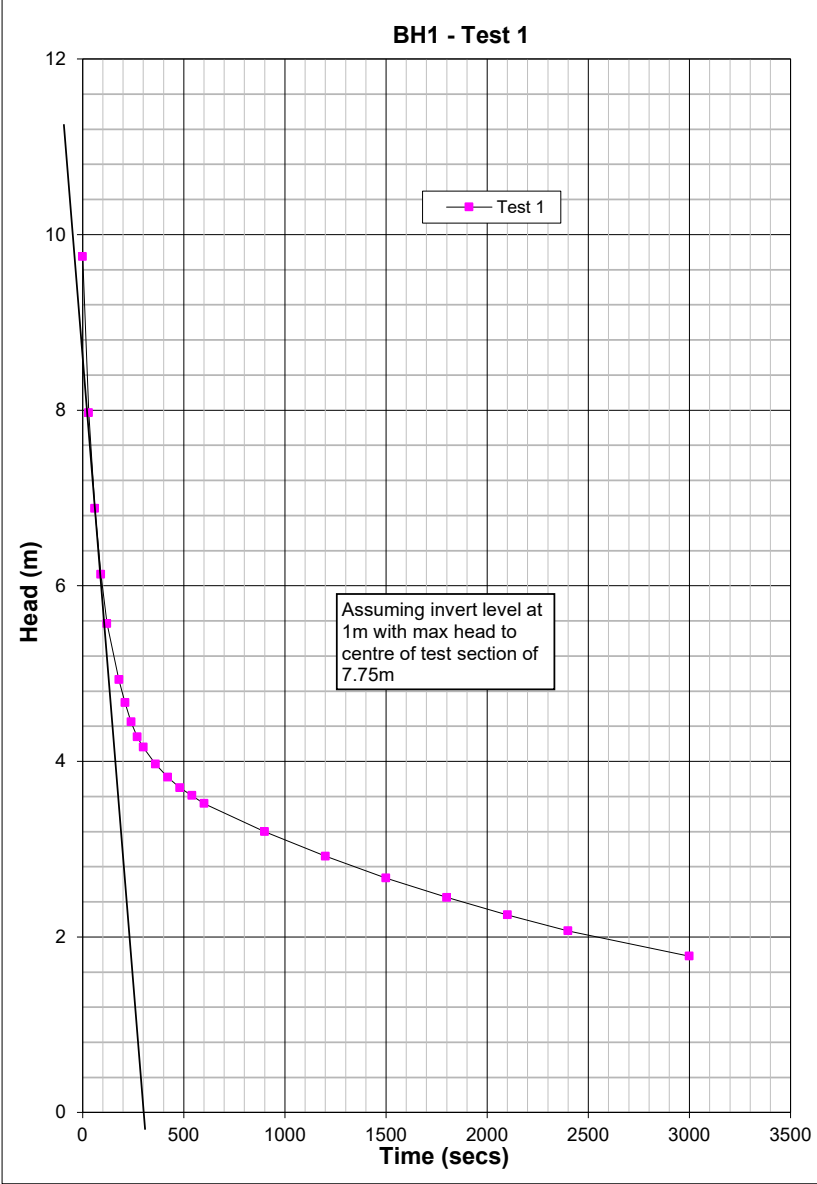
Notes: For explanation of symbols and abbreviations, see Key Sheet.



APPENDIX 2
FALLING HEAD TEST RESULTS

	New Care Home, Central Avenue, Gravesend				BH1
Top section Bottom section	7.5	m	Centre section Diameter of test section	8.75	m
	10	m		0.15	m
				0.15	m
Diameter of Hole Length of test section				0.15	m
				2.5	m
Water Level	dry m				

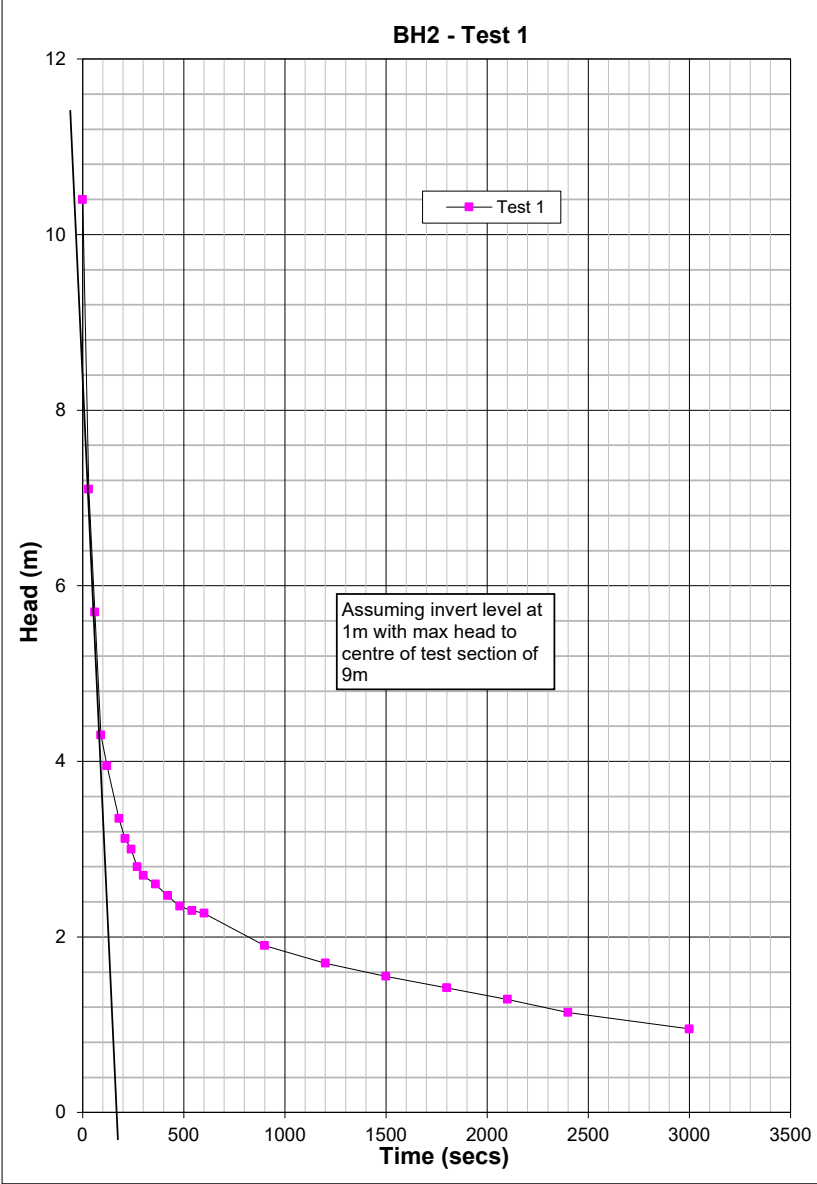
Time (Seconds)	Depth	Head
0	0.25	9.75
30	2.03	7.97
60	3.12	6.88
90	3.87	6.13
120	4.43	5.57
180	5.07	4.93
210	5.33	4.67
240	5.55	4.45
270	5.72	4.28
300	5.84	4.16
360	6.03	3.97
420	6.18	3.82
480	6.3	3.7
540	6.39	3.61
600	6.48	3.52
900	6.8	3.2
1200	7.08	2.92
1500	7.33	2.67
1800	7.55	2.45
2100	7.75	2.25
2400	7.93	2.07
3000	8.22	1.78



BH1 - Test 1

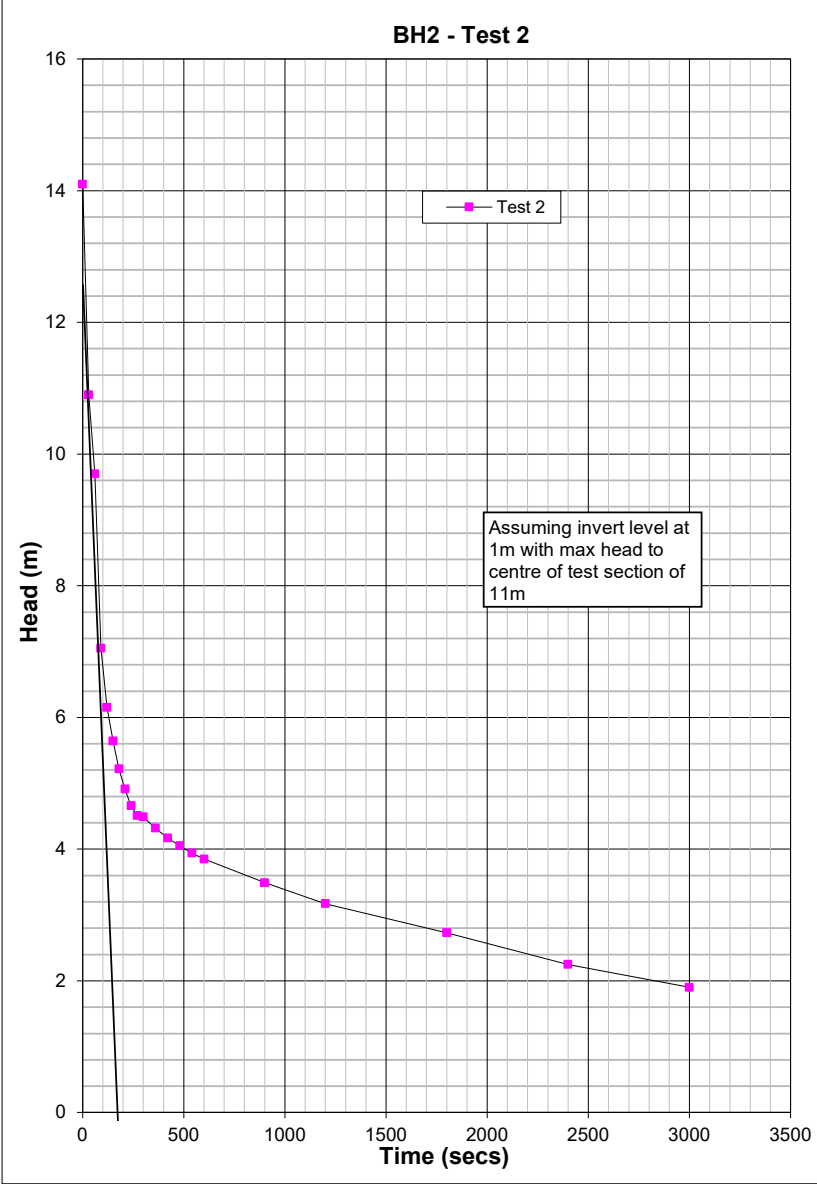
Assuming invert level at 1m with max head to centre of test section of 7.75m

METHODOLOGY IN ACCORDANCE WITH KCC SOAKAWAY DESIGN GUIDE, JULY 2000.							
Soakage Rate:	250*Hp*d^2	Hp	8.25	m	th	5	mins
	D*L*th	Very good Infiltration - 1000L added to borehole in 280 seconds. Constant head at 0.25m for 40 seconds. Borehole collapsed to 9.35m during the test					
=	24.75						
		After BS5930:1999 k(approx) = 4.3 x10-4m/s ESTIMATED					

		New Care Home, Central Avenue, Gravesend				BH2		
Top section Bottom section	9 11	m m	Centre section Diameter of test section	10 0.15	m m	Diameter of Hole Length of test section	0.15 2	m m
Water Level		dry m						
Time (Seconds)	Depth	Head						
0	0.6	10.4						
30	3.9	7.1						
60	5.3	5.7						
90	6.7	4.3						
120	7.05	3.95						
180	7.65	3.35						
210	7.88	3.12						
240	8	3						
270	8.2	2.8						
300	8.3	2.7						
360	8.4	2.6						
420	8.53	2.47						
480	8.65	2.35						
540	8.7	2.3						
600	8.73	2.27						
900	9.1	1.9						
1200	9.3	1.7						
1500	9.45	1.55						
1800	9.58	1.42						
2100	9.71	1.29						
2400	9.86	1.14						
3000	10.05	0.95						
			BH2 - Test 1					
								
			METHODOLOGY IN ACCORDANCE WITH KCC SOAKAWAY DESIGN GUIDE, JULY 2000.					
Soakage Rate:	$250 \cdot H_p \cdot d^2$		Hp	9.2	m	th	3	mins
	$D \cdot L \cdot th$		Very good Infiltration - 1000L added to borehole in 240 seconds. Constant head at 0.6m for 1 minute 10 seconds. Borehole collapsed to 10.2m during the test					
=	57.50	L/m ² /min	After BS5930:1999 k(approx) = 1.7×10^{-3} m/s ESTIMATED					

	New Care Home, Central Avenue, Gravesend					BH2		
Top section Bottom section	9 15	m m	Centre section Diameter of test section	12 0.15	m m	Diameter of Hole Length of test section	0.15 6	m m
Water Level		dry m						

Time (Seconds)	Depth	Head
0	0.9	14.1
30	4.1	10.9
60	5.3	9.7
90	7.95	7.05
120	8.85	6.15
150	9.36	5.64
180	9.78	5.22
210	10.09	4.91
240	10.34	4.66
270	10.49	4.51
300	10.51	4.49
360	10.68	4.32
420	10.83	4.17
480	10.95	4.05
540	11.06	3.94
600	11.15	3.85
900	11.51	3.49
1200	11.83	3.17
1800	12.27	2.73
2400	12.75	2.25
3000	13.1	1.9



BH2 - Test 2

METHODOLOGY IN ACCORDANCE WITH KCC SOAKAWAY DESIGN GUIDE, JULY 2000.							
Soakage Rate:	250*Hp*d^2	Hp	12	m	th	3.5	mins
	D*L*th	Very good Infiltration - 1000L added to borehole in 250 seconds. Borehole collapsed to 13.9m during the test					
=	21.43	L/m^2/min		After BS5930:1999		k(approx) = 1.6x10 ⁻³ m/s	
				ESTIMATED			



APPENDIX 3

TRIAL PIT LOGS
AND DG365 TEST RESULTS



SOAKAWAY TESTING

Test in accordance with BRE 365 Guidelines

Project Reference Number: 12992 Client: Jenner Contractors

Site: New Care Home

Location: Central Avenue, Gravesend, DA12 5AW

SP 1 Test
1 / 1

Weather: Clear skies, sunny

Date of Test: 27-Jan-23

TRIAL PIT DIMENSIONS

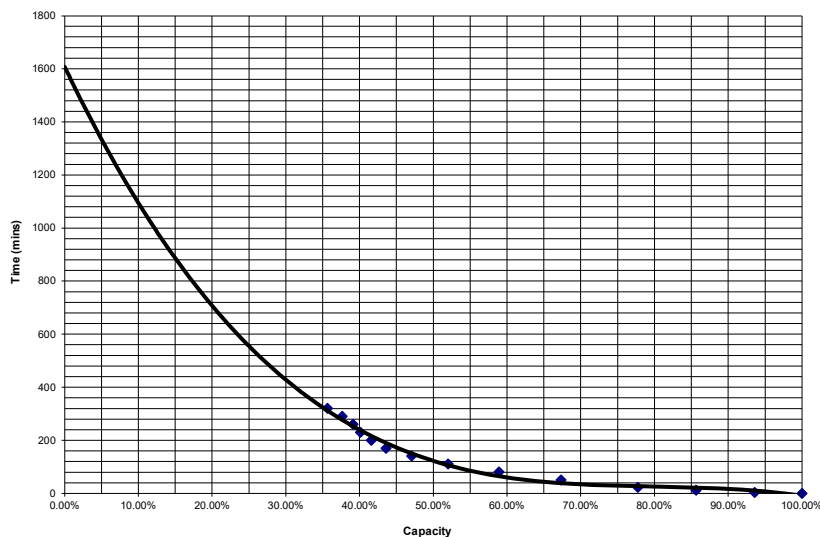
Width (m): 0.5 Length (m): 1.8

Depth (m): 2.95 Invert Depth (m): 0.93

Drainage time of test (mins): 321 (64% Drained)

SOAKAGE RESULTS

Depth	(%)	Time
0.93	100.00%	0
1.06	93.56%	4
1.22	85.64%	12
1.38	77.72%	23
1.59	67.33%	51
1.76	58.91%	81
1.9	51.98%	111
2	47.03%	141
2.07	43.56%	171
2.11	41.58%	201
2.14	40.10%	231
2.16	39.11%	261
2.19	37.62%	291
2.23	35.64%	321
2.95	0.00%	



INFILTRATION RATE

Depth (B.G.L.) (m)	Infiltration Rate (m/s)
0.93 - 2.95	5.15E-06

Departures from the specified test method: None

Remarks: low infiltration-rate based on extrapolation of test data

Authorised Signatory: C SPANTON Date: 1 / 02 / 2023



SOAKAWAY TESTING

Test in accordance with BRE 365 Guidelines

Project Reference Number: 12992 Client: Jenner Contractors

Site: New Care Home

Location: Central Avenue, Gravesend, DA12 5AW

SP 2 Test
1 / 1

Weather: Clear skies, sunny

Date of Test: 27-Jan-23

TRIAL PIT DIMENSIONS

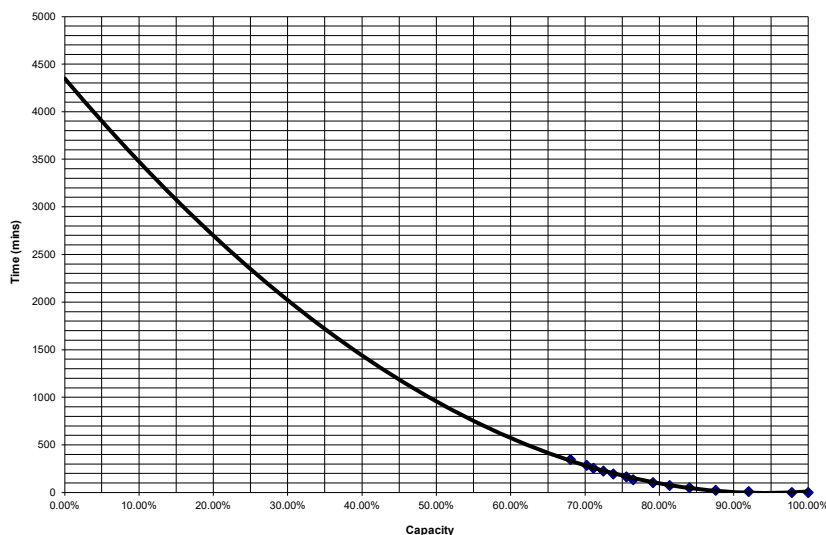
Width (m): 0.5 Length (m): 2

Depth (m): 3.25 Invert Depth (m): 1

Drainage time of test (mins): 346 (32% Drained)

SOAKAGE RESULTS

Depth	(%)	Time
1	100.00%	0
1.05	97.78%	1
1.18	92.00%	11
1.28	87.56%	26
1.36	84.00%	50
1.42	81.33%	76
1.47	79.11%	106
1.53	76.44%	136
1.55	75.56%	166
1.59	73.78%	196
1.62	72.44%	226
1.65	71.11%	256
1.67	70.22%	286
1.72	68.00%	346
3.25	0.00%	



INFILTRATION RATE

Depth (B.G.L.) (m)	Infiltration Rate (m/s)
1.00-3.25	1.30E-06

Departures from the specified test method: None

Low infiltration - rate based on extrapolation of test data

Remarks: _____

Authorised Signatory: C SPANTON Date: 1 / 02 / 2023



APPENDIX 4

PLATE LOAD AND DYNAMIC CONE PENETROMETER TEST RESULTS

TEST REPORT:	ESTIMATION OF CALIFORNIA BEARING RATIO		
	Design Manual for Roads and Bridges Vol. 7, Design and Maintenance: IAN 73/06, Revision 1 (2009)		
REFERENCE NUMBER :	MH23-12298-27-01-23-1	CLIENT :	Ground and Environmental Services Limited
CLIENT REF.:	CBR 3	ADDRESS :	Unit 2 Montpelier Busines Park, Dencora Way, Ashford
DATE TESTED :	27.01.2023		
TECHNICIAN :	R.Gaskin	SITE :	Land @ Central Avenue Gravesend
LOCATION :	CBR 3	MATERIAL :	Brown Sandy Clay With Masonry

TEST RESULTS

LOAD APPLIED TO PLATE	AVERAGE BEARING PRESSURE	GAUGE READING			GAUGE SETTLEMENT			AVERAGE SETTLEMENT
		1	2	3	1	2	3	
kN	kN/m ²	mm			mm			mm
0.0	0.0	20.30	19.43	18.92	0.00	0.00	0.00	0
5.3	32.0	20.08	19.03	18.62	0.22	0.40	0.30	0.31
8.3	50.3	19.80	18.60	18.27	0.50	0.83	0.65	0.66
10.5	64.0	19.50	18.20	17.88	0.80	1.23	1.04	1.02
12.0	73.2	19.17	17.78	17.49	1.13	1.65	1.43	1.40
13.5	82.3	18.83	17.36	17.10	1.47	2.07	1.82	1.79
15.0	91.5	18.58	16.92	16.71	1.72	2.51	2.21	2.15

EQUIPMENT DETAILS

Plate Diameter : 457 mm
Plate Area : 0.164 m²
Plate Correction : 0.63

AVERAGE BEARING PRESSURE

Average Bearing Pressure (P) at 1.25mm penetration

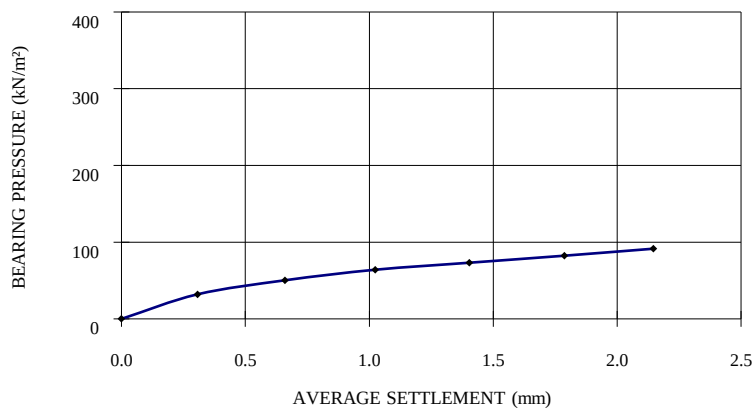
$$P = 69 \text{ kN / m}^2$$

ESTIMATED C.B.R VALUE

Estimated C.B.R at 1.25mm penetration

Estimated C.B.R.=4.5%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Estimated C.B.R.=4.5%

REMARKS :

This test report shall not be reproduced, except in full , without the written approval of M&H Testing Limited. These results relate only to the items tested.



Checked and verified by:
Jon Champion
General Manager

27-Jan-23



M & H Testing Limited

"Adding Quality To Construction"

Southfield, Barnfield Road, Charing Heath, Ashford, Kent, TN27 0BP
Telephone: 01233 714051 Fax: 0700 601 9306



9873

TEST REPORT:		ESTIMATION OF CALIFORNIA BEARING RATIO	
		Design Manual for Roads and Bridges Vol. 7, Design and Maintenance: IAN 73/06, Revision 1 (2009)	
REFERENCE NUMBER :	MH23-12298-27-01-23-2	CLIENT :	Ground and Environmental Services Limited
CLIENT REF.:	CBR 2	ADDRESS :	Unit 2 Montpelier Busines Park, Dencora Way, Ashford
DATE TESTED :	27.01.2023		
TECHNICIAN :	R.Gaskin	SITE :	Land @ Central Avenue Gravesend
LOCATION :	CBR 2	MATERIAL :	Brown Sandy Clay With Masonry

TEST RESULTS

LOAD APPLIED TO PLATE	AVERAGE BEARING PRESSURE	GAUGE READING			GAUGE SETTLEMENT			AVERAGE SETTLEMENT
		1	2	3	1	2	3	
kN	kN/m ²	mm			mm			mm
0.0	0.0	20.61	19.33	18.92	0.00	0.00	0.00	0
9.0	54.9	20.30	18.92	18.59	0.31	0.41	0.33	0.35
12.0	73.2	19.93	18.52	18.25	0.68	0.81	0.67	0.72
13.5	82.3	19.58	18.19	17.83	1.03	1.14	1.09	1.09
15.0	91.5	19.18	17.89	17.44	1.43	1.44	1.48	1.45
16.5	100.6	18.75	17.58	17.02	1.86	1.75	1.90	1.84

EQUIPMENT DETAILS

Plate Diameter : 457 mm
Plate Area : 0.164 m²
Plate Correction : 0.63

AVERAGE BEARING PRESSURE

Average Bearing Pressure (P) at 1.25mm penetration

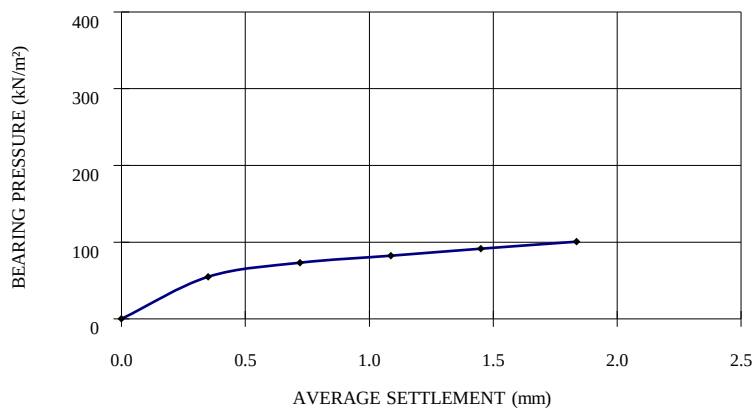
$$P = 86 \text{ kN / m}^2$$

ESTIMATED C.B.R VALUE

Estimated C.B.R at 1.25mm penetration

Estimated C.B.R.=6.7%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Estimated C.B.R.=6.7%

REMARKS :

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Checked and verified by:
Jon Champion
General Manager

27-Jan-23

TEST REPORT:	ESTIMATION OF CALIFORNIA BEARING RATIO		
	Design Manual for Roads and Bridges Vol. 7, Design and Maintenance: IAN 73/06, Revision 1 (2009)		
REFERENCE NUMBER :	MH23-12298-27-01-23-3	CLIENT :	Ground and Environmental Services Limited
CLIENT REF.:	CBR 1	ADDRESS :	Unit 2 Montpelier Busines Park, Dencora Way, Ashford
DATE TESTED :	27.01.2023		
TECHNICIAN :	R.Gaskin	SITE :	Land @ Central Avenue Gravesend
LOCATION :	CBR 1	MATERIAL :	Brown Sandy Clay With Masonry

TEST RESULTS

LOAD APPLIED TO PLATE	AVERAGE BEARING PRESSURE	GAUGE READING			GAUGE SETTLEMENT			AVERAGE SETTLEMENT
		1	2	3	1	2	3	
kN	kN/m ²	mm			mm			mm
0.0	0.0	20.12	19.02	18.10	0.00	0.00	0.00	0
7.5	45.7	19.80	18.62	17.95	0.32	0.40	0.15	0.29
9.0	54.9	19.41	18.28	17.65	0.71	0.74	0.45	0.63
10.5	64.0	19.01	17.91	17.30	1.11	1.11	0.80	1.01
12.8	77.7	18.58	17.58	16.97	1.54	1.44	1.13	1.37
15.0	91.5	18.15	17.22	16.62	1.97	1.80	1.48	1.75

EQUIPMENT DETAILS

Plate Diameter : 457 mm
Plate Area : 0.164 m²
Plate Correction : 0.63

AVERAGE BEARING PRESSURE

Average Bearing Pressure (P) at 1.25mm penetration

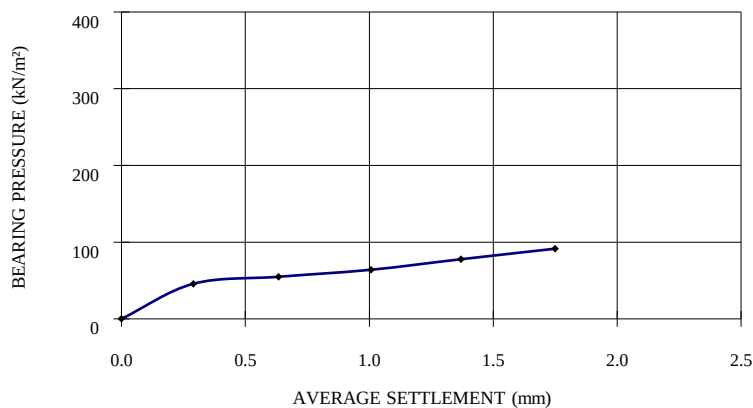
$$P = 73 \text{ kN / m}^2$$

ESTIMATED C.B.R VALUE

Estimated C.B.R at 1.25mm penetration

Estimated C.B.R.=5.0%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Estimated C.B.R.=5.0%

REMARKS :

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Checked and verified by:
Jon Champion
General Manager

27-Jan-23



M & H Testing Limited

"Adding Quality To Construction"

Southfield, Barnfield Road, Charing Heath, Ashford, Kent, TN27 0BP
Telephone: 01233 714051 Fax: 0700 601 9306



9873

TEST REPORT:		ESTIMATION OF CALIFORNIA BEARING RATIO	
		Design Manual for Roads and Bridges Vol. 7, Design and Maintenance: IAN 73/06, Revision 1 (2009)	
REFERENCE NUMBER :	MH23-12298-27-01-23-4	CLIENT :	Ground and Environmental Services Limited
CLIENT REF.:	CBR 4	ADDRESS :	Unit 2 Montpelier Busines Park, Dencora Way, Ashford
DATE TESTED :	27.01.2023		
TECHNICIAN :	R.Gaskin	SITE :	Land @ Central Avenue Gravesend
LOCATION :	CBR 4	MATERIAL :	Brown Sandy Clay With Masonry

TEST RESULTS

LOAD APPLIED TO PLATE	AVERAGE BEARING PRESSURE	GAUGE READING			GAUGE SETTLEMENT			AVERAGE SETTLEMENT
		1	2	3	1	2	3	
kN	kN/m ²	mm			mm			mm
0.0	0.0	21.08	19.57	18.61	0.00	0.00	0.00	0
12.8	77.7	20.71	19.19	18.33	0.37	0.38	0.28	0.34
15.8	96.0	20.35	18.79	18.00	0.73	0.78	0.61	0.71
19.5	118.9	20.00	18.42	17.67	1.08	1.15	0.94	1.06
24.0	146.3	19.64	18.03	17.33	1.44	1.54	1.28	1.42
27.8	169.2	19.28	17.60	16.94	1.80	1.97	1.67	1.81

EQUIPMENT DETAILS

Plate Diameter : 457 mm
Plate Area : 0.164 m²
Plate Correction : 0.63

AVERAGE BEARING PRESSURE

Average Bearing Pressure (P) at 1.25mm penetration

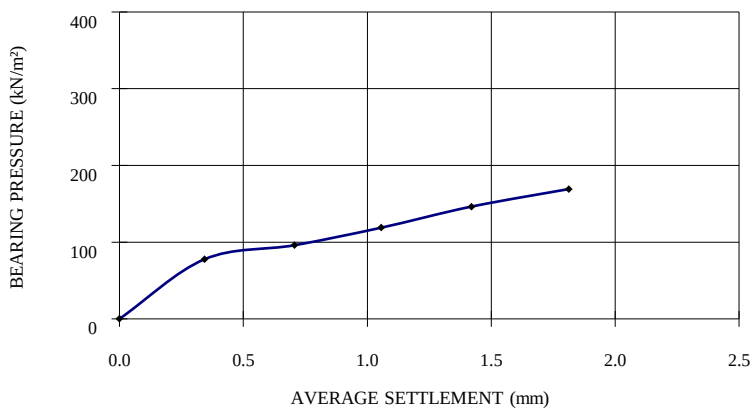
$$P = 134 \text{ kN / m}^2$$

ESTIMATED C.B.R VALUE

Estimated C.B.R at 1.25mm penetration

Estimated C.B.R.=14%

APPLIED LOAD vs SETTLEMENT RELATIONSHIP



Estimated C.B.R.=14%

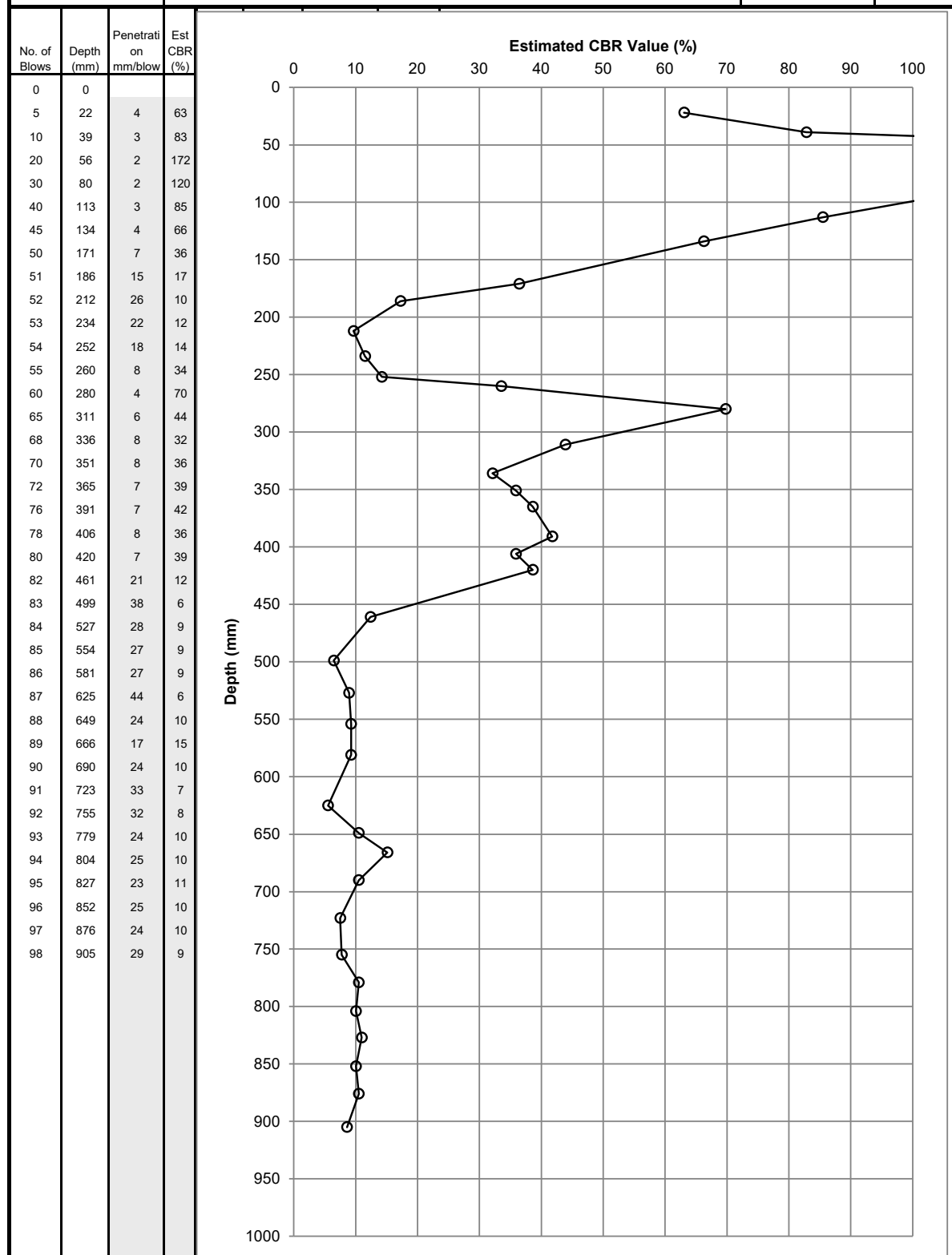
REMARKS :

This test report shall not be reproduced, except in full , without the written approval of M&H Testing Limited. These results relate only to the items tested.

Checked and verified by:
Jon Champion
General Manager

27-Jan-23

DYNAMIC CONE PENETROMETER TEST RESULTS		Test No	DCP1
		Date:	26-Jan
Project Name:	New Care Home, Central Avenue, Gravesend	Project No:	12992
Client Name:	Jenner Group	Zero Reading	48



GROUND AND ENVIRONMENTAL SERVICES LIMITED
Ground Investigation and Environmental Consultants

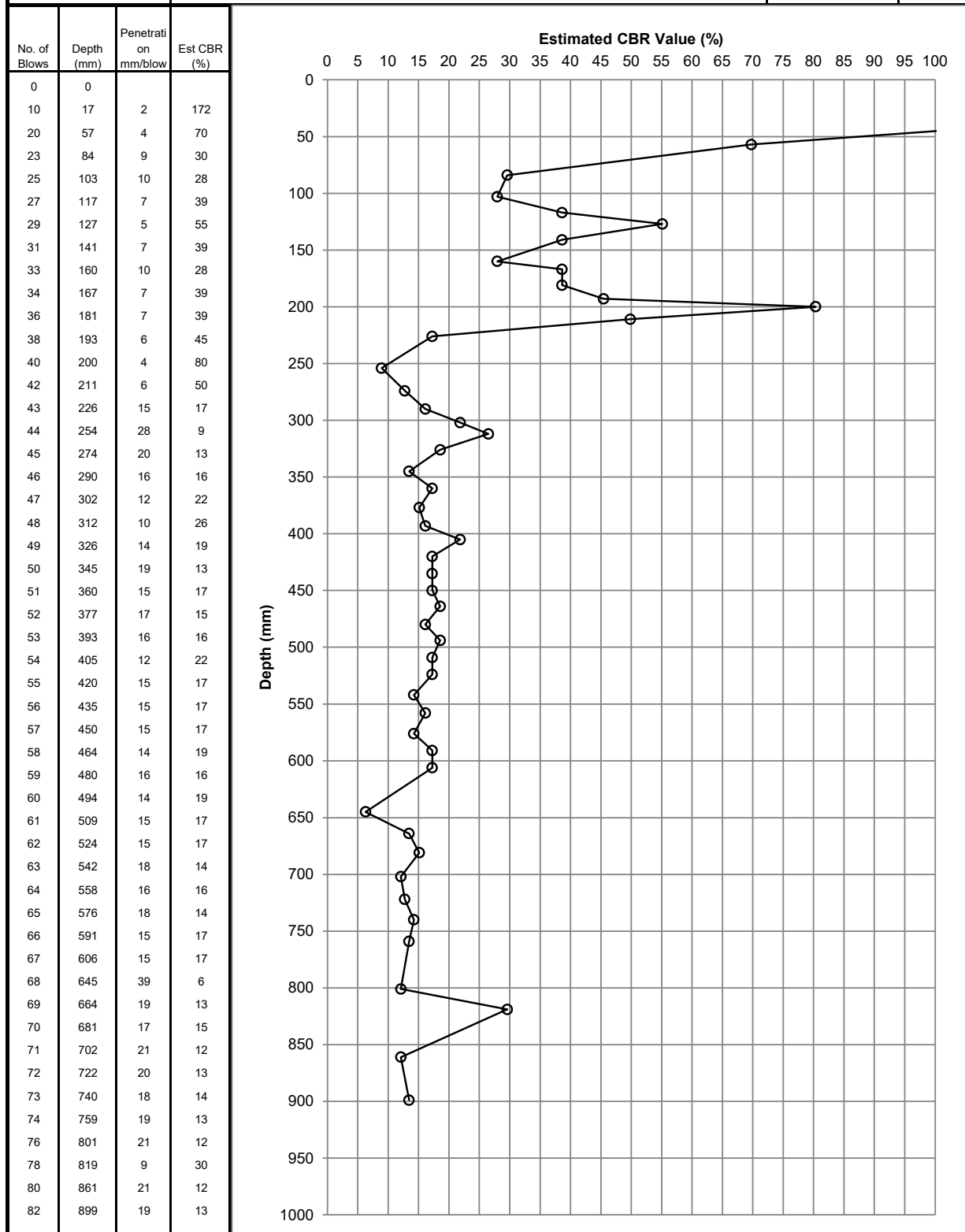
Tested By: JM

Approved By: CSS

Checked By: CSS



DYNAMIC CONE PENETROMETER TEST RESULTS		Test No	DCP2
		Date:	26-Jan
Project Name:	New Care Home, Central Avenue, Gravesend	Project No:	12992
Client Name:	Jenner Group	Zero Reading	48





APPENDIX 5
LABORATORY TEST RESULTS



Ground and Environmental Services Limited
Unit 2 Montpelier Business Park
Dencora Way
Ashford
Kent
TN23 4FG

www.genvs.com
E: info@genvs.com
T: 01233 646237

Site: New Care Home, Gravesend

Project No: 12992

Client: Jenner (Contractors) Ltd

Date 21/02/2023

Date Received: 09/02/2023

Date Tested: 20/02/2023

Test Results

Location ID	Depth (m)	MC (%)	LL (%)	PL (%)	PI (%)	% passing 425 µm sieve	Classification	Sample type
BH 1	1.6	5.3	32	20	12	98	CL	D

Visual Descriptions

Location ID	Depth	Description
BH 1	1.6	Brown slightly gravelly very silty CLAY

Tested by: STP

Checked by: CSS

Approved by: CSS

Ground and Environmental Services Limited

Registered Office - Unit 2 Montpelier Business Park, Dencora Way, Ashford, Kent, TN23 4FG

Co Registration No: 7567478



Ground and Environmental Services Limited
Unit 2 Montpelier Business Park
Dencora Way
Ashford
Kent
TN23 4FG

www.genvs.com
E: info@genvs.com
T: 01233 646237

Site: New Care Home, Gravesend

Project No: 12992

Client: Jenner (Contractors) Ltd

Date: 21/02/2023

Date Received: 09/02/2023

Date Tested: 20/02/2023

Test Results

Location ID	Depth (m)	Saturation Moisture Content SMC (%)	Bulk Density (mg/m ³)	Dry Density (mg/m ³)	Sample type
BH01	10.0	33.2	1.89	1.42	D
SP 1	2.95	26.2	1.98	1.58	D
SP 2	3.25	33.7	1.85	1.41	D

Visual Descriptions

Location ID	Depth	Description
BH01	10.0	Off white gravel of CHALK
SP 1	2.95	Off white gravel of CHALK
SP 2	3.25	Off white gravel of CHALK

Tested by: STP

Checked by: CSS

Approved by: CSS



Craig Spanton
Ground & Environmental Services Ltd
Unit 2
Montpelier Business Park
Dencora Way
Ashford
Kent
TN23 4FG

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-01753

Site Reference: New Care Home, Gravesend

Project / Job Ref: 12992

Order No: GES/5081.12992

Sample Receipt Date: 10/02/2023

Sample Scheduled Date: 10/02/2023

Report Issue Number: 1

Reporting Date: 21/02/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 23-01753	Date Sampled	09/02/23	09/02/23	09/02/23	09/02/23	09/02/23
Ground & Environmental Services Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: New Care Home, Gravesend	TP / BH No	BH1	BH1	BH2	BH2	BH2
Project / Job Ref: 12992	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: GES/5081.12992	Depth (m)	3.70	7.00	2.60	4.60	10.00
Reporting Date: 21/02/2023	DETS Sample No	633578	633579	633580	633581	633582

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
pH	pH Units	N/a	MCERTS	8.0	8.1	8.2	8.2	8.3
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	562	515	456	469	576
Total Sulphate as SO ₄	%	< 0.02	MCERTS	0.06	0.05	0.05	0.05	0.06
Arsenic (As)	mg/kg	< 2	MCERTS					
Barium (Ba)	mg/kg	< 2.5	MCERTS					
Beryllium (Be)	mg/kg	< 0.5	MCERTS					
W/S Boron	mg/kg	< 1	NONE					
Cadmium (Cd)	mg/kg	< 0.2	MCERTS					
Chromium (Cr)	mg/kg	< 2	MCERTS					
Copper (Cu)	mg/kg	< 4	MCERTS					
Lead (Pb)	mg/kg	< 3	MCERTS					
Mercury (Hg)	mg/kg	< 1	MCERTS					
Nickel (Ni)	mg/kg	< 3	MCERTS					
Selenium (Se)	mg/kg	< 2	MCERTS					
Vanadium (V)	mg/kg	< 1	MCERTS					
Zinc (Zn)	mg/kg	< 3	MCERTS					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 23-01753	Date Sampled	09/02/23	09/02/23			
Ground & Environmental Services Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: New Care Home, Gravesend	TP / BH No	WAC A	WAC B			
Project / Job Ref: 12992	Additional Refs	None Supplied	None Supplied			
Order No: GES/5081.12992	Depth (m)	None Supplied	None Supplied			
Reporting Date: 21/02/2023	DETS Sample No	633583	633584			

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS					
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS					
Total Sulphate as SO ₄	%	< 0.02	MCERTS					
Arsenic (As)	mg/kg	< 2	MCERTS	13	6			
Barium (Ba)	mg/kg	< 2.5	MCERTS	54	32			
Beryllium (Be)	mg/kg	< 0.5	MCERTS	1	0.5			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	0.3			
Chromium (Cr)	mg/kg	< 2	MCERTS	23	15			
Copper (Cu)	mg/kg	< 4	MCERTS	14	10			
Lead (Pb)	mg/kg	< 3	MCERTS	31	9			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	23	13			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2			
Vanadium (V)	mg/kg	< 1	MCERTS	35	21			
Zinc (Zn)	mg/kg	< 3	MCERTS	53	27			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-01753		Date Sampled	09/02/23		Landfill Waste Acceptance Criteria Limits		
Ground & Environmental Services Ltd		Time Sampled	None Supplied				
Site Reference: New Care Home, Gravesend		TP / BH No	WAC A				
Project / Job Ref: 12992		Additional Refs	None Supplied				
Order No: GES/5081.12992		Depth (m)	None Supplied				
Reporting Date: 21/02/2023		DETS Sample No	633583				
Determinand	Unit	MDL			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC ^{MU}	%	< 0.1	1		3%	5%	6%
Loss on Ignition	%	< 0.01	3.50		--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05		6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1		1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	350		500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7		100	--	--
pH ^{MU}	pH Units	N/a	7.9		--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.6		--	To be evaluated	To be evaluated
Eluate Analysis			10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)	
Arsenic ^U		< 0.01			< 0.1	0.5	2
Barium ^U		< 0.02			< 0.2	20	100
Cadmium ^U		< 0.0005			< 0.005	0.04	1
Chromium ^U		< 0.005			< 0.05	0.5	10
Copper ^U		< 0.01			< 0.1	2	50
Mercury ^U		< 0.0005			< 0.005	0.01	0.2
Molybdenum ^U		0.003			0.03	0.5	10
Nickel ^U		< 0.007			< 0.07	0.4	10
Lead ^U		< 0.005			< 0.05	0.5	10
Antimony ^U		< 0.005			< 0.05	0.06	0.7
Selenium ^U		< 0.005			< 0.05	0.1	0.5
Zinc ^U		< 0.005			< 0.05	4	50
Chloride ^U		4.2			42	800	15000
Fluoride ^U		< 0.5			< 5	10	150
Sulphate ^U		4.6			46	1000	20000
TDS		68			680	4000	60000
Phenol Index		< 0.01			< 0.1	1	-
DOC		15.9			159	500	800
Leach Test Information							
Sample Mass (kg)			0.10				
Dry Matter (%)			94.4				
Moisture (%)			6				
Stage 1							
Volume Eluate L10 (litres)			0.89				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-01753		Date Sampled	09/02/23		Landfill Waste Acceptance Criteria Limits		
Ground & Environmental Services Ltd		Time Sampled	None Supplied				
Site Reference: New Care Home, Gravesend		TP / BH No	WAC B				
Project / Job Ref: 12992		Additional Refs	None Supplied				
Order No: GES/5081.12992		Depth (m)	None Supplied				
Reporting Date: 21/02/2023		DETS Sample No	633584				
Determinand	Unit	MDL			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC ^{MU}	%	< 0.1	1		3%	5%	6%
Loss on Ignition	%	< 0.01	2.80		--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05		6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1		1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	< 10		500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7		100	--	--
pH ^{MU}	pH Units	N/a	8.2		--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	4.4		--	To be evaluated	To be evaluated
Eluate Analysis			10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)	
Arsenic ^U		< 0.01			< 0.1	0.5	2
Barium ^U		< 0.02			< 0.2	20	100
Cadmium ^U		< 0.0005			< 0.005	0.04	1
Chromium ^U		< 0.005			< 0.05	0.5	10
Copper ^U		< 0.01			< 0.1	2	50
Mercury ^U		< 0.0005			< 0.005	0.01	0.2
Molybdenum ^U		0.001			0.01	0.5	10
Nickel ^U		< 0.007			< 0.07	0.4	10
Lead ^U		< 0.005			< 0.05	0.5	10
Antimony ^U		< 0.005			< 0.05	0.06	0.7
Selenium ^U		< 0.005			< 0.05	0.1	0.5
Zinc ^U		< 0.005			< 0.05	4	50
Chloride ^U		1.7			17	800	15000
Fluoride ^U		< 0.5			< 5	10	150
Sulphate ^U		1.6			16	1000	20000
TDS		52			520	4000	60000
Phenol Index		< 0.01			< 0.1	1	-
DOC		16.2			161	500	800
Leach Test Information							
Sample Mass (kg)			0.11				
Dry Matter (%)			84.3				
Moisture (%)			18.6				
Stage 1							
Volume Eluate L10 (litres)			0.88				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test



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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-01753	
Ground & Environmental Services Ltd	
Site Reference: New Care Home, Gravesend	
Project / Job Ref: 12992	
Order No: GES/5081.12992	
Reporting Date: 21/02/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
633578	BH1	None Supplied	3.70	15.6	White chalk
633579	BH1	None Supplied	7.00	21.2	White chalk
633580	BH2	None Supplied	2.60	18.3	White chalk
633581	BH2	None Supplied	4.60	20.7	White chalk
633582	BH2	None Supplied	10.00	21	White chalk
633583	WAC A	None Supplied	None Supplied	5.6	Brown sandy clay with stones and chalk
633584	WAC B	None Supplied	None Supplied	15.6	Brown sandy clay with stones and chalk

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{I/S}

Unsuitable Sample ^{U/S}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

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Ground & Environmental Services Ltd

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Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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Water Analysis Certificate - Methodology & Miscellaneous Information

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Ground & Environmental Services Ltd

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Project / Job Ref: 12992

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Reporting Date: 21/02/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%