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Ground Investigation Report

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

On behalf of Foreman Homes Limited

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REPORT REFERENCE	GWPR6068/GIR/September 2024. The conditions and limitations of this geotechnical report can be viewed within Appendix A, with the aims of the investigation provided within Appendix B. A technical glossary has also been provided within Appendix C.
SITE DETAILS	The site comprised a ~4,500m^2 roughly rectangular shaped plot of land, situated on the south-eastern corner of the junction of Dunsbury Way to the west and Fulflood Road to the north. The site was located in the northern portion of Havant, a mainly residential town within south-east Hampshire. A site location plan has been provided within Figure 1. The northern part of the site comprises a single storey masonry former milk packaging and distribution depot building along the north-west boundary with covered bays and a yard in the north-east and east, a toilet block in the north-east corner and parking bays in the west of the site. The building contains predominantly office accommodation at the western end with warehouse, storage, refrigeration and loading areas in the centre and west. The covered bays in the north-east and east of the site, where milk distribution vehicles are believed to have been parked, were noted to be of steel frame construction with brick rear walls and suspected asbestos cement sheeting forming the roofs. The yard was predominantly covered by asphalt surfacing with a concrete slab along the western edge of the yard. No evidence of fuel or chemical storage was observed during the walkover survey and it is understood from planning records that repair, servicing or refuelling of vehicles was not permitted on site under the planning permission for the development of the depot. The southern part of the site comprises a single storey brick funeral care facility with soft landscaping and parking fronting Dunsbury Way to the west of the building with a yard and garage to the rear (east) of the building. Adjacent to the south of the funeral care building is a residential bungalow, understood to have originally been constructed as the dwelling for the manager of the funeral care facility, with soft landscaping fronting Dunsbury Way and a rear garden to the east. No evidence of fuel or chemical storage was noted in relation to the funeral care facility or the bungalow. The southern boundary of the site is formed by a steep embankment down to the adjacent Riders Stream, approximately 2-3m below the general site level. A view of the site development area has been provided within Figure 2, with an aerial view of the site provided in Figure 3.
PROPOSED DEVELOPMENT	At the time of reporting, August 2024, the proposed development was understood to comprise the re-development of the Former Dairy Crest site and adjacent Southern Co-Op owned land to the south. The development will comprise 74no. apartments spread across the northern and western parts of the site with car parking occupying much of the remainder. A communal amenity space is proposed in the south, while covered bicycle storage located in the centre. Ground floor flats will have private gardens. A proposed development plan is displayed within Figure 4.
HISTORICAL MAPPING (PROVIDED FROM Ridge Site	The Ordnance Survey maps provided and reviewed from 1866 to 2014 (scales 1:2,500, 1:10.000, 1:1,250, 1:10,560) indicate that the site formed part of an open field from the earliest available map until the site was initially developed as part of a sewage disposal works sometime shortly after 1932, which included the construction of Dunsbury Way along the western boundary of the site. The site comprised Congestion Tanks in the south-east and Sludge Beds in the south-west with Settling Tanks

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Investigation Report – July 2021)	and Filter beds shown adjacent to the east of the site and Humus Beds shown beyond Dunsbury Way to the west of the site. A Site Plan detailing these features is included as Figure 3. The sewage works appear to have been removed in the mid to late 1950s and a housing estate was developed to the south of the site. The site is shown to be vacant until the 1962 map, which shows the northern part of the site to have been developed as a Depot, believed to be the existing former Dairy Crest Depot. The Depot on site appears to have formed part of an industrial estate with another Depot adjacent to the east, the Leigh Park Estate Office and Fulflood Road adjacent to the north with large Works buildings beyond these. A garage is also shown beyond Dunsbury Way to the west. The ground level of the site and the associated new industrial estate appears to have been raised as part of the development with an embankment shown along the stream to the south of the site. During the late 1960s/early 1970s the south of the site was developed with two linked buildings identified as 222 and 224, believed to be the existing Co-operative Funeral care premises and adjacent residential bungalow. The 1971 map also shows the Depot to the east to be an Omnibus Depot, the Works beyond that to the east to have been extended and referred to as a Factory and the Works building to the north to have also been extended. It is understood that these units formed the former Procter and Gamble factory. The western section of the Factory building was subsequently demolished during the early 1990s and the works buildings and former Estate Office to the north of the site were demolished between 2002 and 2010 and the majority of the area replaced with housing.
ANTICIPATED GEOLOGY AND HYDROGEOLOGY	The British Geological Survey (BGS) maps and DEFRA online maps for the area suggest that the site was located on superficial Head Deposits within the western half, classified as a Secondary (Undifferentiated) Aquifer, no superficial deposits were recorded within the eastern half of the site. This was underlain by the Bognor Sand Member, classified as a Secondary (A) Aquifer, within the eastern half of the site and the London Clay Formation, classified as Unproductive Strata, within the western half of the site. The superficial and bedrock aquifers are considered to be in hydraulic continuity. A BGS borehole record in similar geology ~1km north of the site (ref.: SU70NW320) noted Topsoil to 0.30m bgl, followed by a silty fine sand with bands of very sandy clay to a depth of 5.60m bgl. This was followed by a very silty grey CLAY to the base of the borehole at a depth of 34.40m bgl. Numerous water levels recorded throughout the drilling, shallowest level recorded at 4.39m bgl.
SITE WORKS	Site works were undertaken between 16th – 18th July 2024 and comprised the drilling of the 2no. cable percussive boreholes (BH01 & BH02) to 20.00m with standard penetration tests at 1.00m intervals to a depth of 3.00m bgl, with SPTs and U100's alternating at 1.50m intervals thereafter to the base of the borehole. The installations of 2No. combined ground water and ground gas monitoring wells were installed within BH01 and BH02, the details of which can be found in the following table. A second phase of site works was undertaken on 7th August and comprised the drilling of 5No. Windowless Sampler Boreholes (WS101 – WS105) to depths between 4.60 – 5.45m bgl. SPTs were undertaken a 1.00m intervals to the base of the trial holes. A combined groundwater and ground gas

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monitoring well was installed to a depth of 4.50m bgl with a response zone noted between 1.10 – 4.50m bgl. Details have been provided in the following table.

Combined Ground-gas and Groundwater Monitoring Well Construction					
Trial Hole	Depth of Installation (m bgl)	Thickness of slotted piping with gravel filter pack (m)	Depth of plain piping with bentonite seal (m bgl)	Response Zone (m bgl)	Piping internal diameter (mm)
BH01	5.00	3.00	2.00	2.00 – 5.00	50
BH02	8.00	3.00	5.00	5.00 – 8.00	50
WS105	4.50	3.40	1.10	1.10 – 4.50	50

A trial hole location plan can be viewed within Figure 5.

GROUND CONDITIONS ENCOUNTERED

A summary of the ground conditions encountered has been summarised in the following table. The trial hole logs can be seen within Appendix D.

Summary of Strata Encountered (BH01 - BH02 & WS101 – WS105)			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
MADE GROUND (BH1-BH02 & WS101 – WS105): Brown silty sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse flint, brick, chalk, carbonaceous material and concrete.	GL – 0.90	1.10 – 3.00	1.10 – 2.10
MADE GROUND (BH02): Reddish brown gravelly fine to coarse SAND. Gravel is angular to sub-rounded fine to coarse brick.	GL	0.90	0.90
MADE GROUND (WS103): Brown silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded flint. Fragments of red brick.	0.80	2.60	1.80
HEAD DEPOSITS (BH02): Greyish brown silty sandy angular to sub-rounded fine to coarse GRAVEL comprised of flint. Sand is fine to coarse.	3.00	4.20	1.20
HEAD DEPOSITS (WS103): Grey and brown clayey fine to medium SAND.	2.60	>5.45	>2.85
HEAD DEPOSITS (WS105): Dark grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine sub-rounded flint.	1.10	2.80	1.70
BOGNOR SAND MEMBER (WS102 & WS105): Orangish brown slightly sandy (slightly gravelly) CLAY. Sand is fine to coarse. Gravel is fine to medium angular flint.	1.20 – 2.80	3.10 – 3.90	1.10 - 1.90
BOGNOR SAND MEMBER (BH01 & WS101 – WS102 & WS104): Orangish brown silty (slightly gravelly) fine to medium SAND. (Gravel is fine to coarse angular flint.)	1.10 – 3.10	3.70 - 4.30	0.80 – 2.60
LONDON CLAY FORMATION (BH01 - BH02 & WS101 – WS102 & WS104 – WS105): Dark grey brown to Blueish grey silty slightly sandy CLAY. Sand is fine.	3.55 - 4.30	>4.60 – >20.00	>1.05 - >15.80

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GROUNDWATER

Groundwater was encountered at shallow to intermediate depth within all of the boreholes undertaken on-site. A summary can be seen in the following table.

Summary of Groundwater Strikes		
Trial Hole	Depth of Strike (m bgl)	Depth after 20 minutes (m bgl)
BH01	2.60	2.40
BH02	3.30	2.90
WS101	2.00	-
WS102	2.35	-
WS103	2.30	-
WS104	2.10	-
WS105	3.50	-

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was undertaken in July – August 2024 when groundwater levels are likely to be approaching their annual minimum (lowest elevation). Exact groundwater levels may only be determined through long term measurements from monitoring wells installed on-site.

Groundwater monitoring was undertaken on one occasion to date. A summary can be seen in the following table.

Summary of Groundwater Observations			
Date	Trial Hole	Water Level	Final Well Depth
08/08/2024	BH01	2.10	5.20
	BH02	2.43	3.14
	WS105	2.20	4.33

ROOTS

Fresh roots were proven to depths between 1.10 – 1.50m bgl across the site. The depths of root penetration can be seen tabulated below.

Summary of Root Penetration	
Trial Hole	Fresh Root Depth (m bgl)
BH01	None noted.
BH02	None noted.
WS101	1.10
WS102	1.50
WS103	1.10
WS104	1.10
WS105	None noted.

It should be noted that the accuracy of determining the depth of root penetration within narrow diameter boreholes is considered low. The site and its immediate environs were noted to contain a number of existing trees and vegetation. Therefore, it should be noted that roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

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IN-SITU STRENGTH TESTING

A summary of the in-situ strength testing conducted has been summarised in the following table.

Interpretation of In-situ Geotechnical Testing Results					
Strata	SPT "N" Blow Counts or Equivalent SPT "N Value from DP	Equivalent Undrained Shear Strength (Cu) (kPa)	Soil Type		Trial Hole/s
			Granular (Density)	Cohesive (Cu)	
Soft Spots of the Bognor Sand Member (Cohesive)	5 - 6	25 - 30	-	Low	WS102/1.20 – 3.10m bgl
Soft Spots of the Head Deposits (Cohesive)	2	10	-	Very Low	WS105/1.10 – 2.00m bgl
Head Deposits (Cohesive)	10	50	-	Medium	WS105/2.00 – 2.80m bgl
Head Deposits (Granular)	8 - 13	-	Medium Dense	-	WS103/2.60 - >5.45m bgl
Bognor Sand Member (Granular)	33 - 36	-	Dense	-	BH01/1.90 – 4.30m bgl
	43	-	Very Dense	-	BH02/3.00 – 4.20m bgl
	9 - 26	-	Medium Dense to Dense	-	WS101/1.10 – 3.70m bgl
	10	-	Medium Dense	-	WS102/3.10 – 3.90m bgl
	9 - 11	-	Medium Dense	-	WS104/1.55 – 3.55m bgl
Bognor Sand Member (Cohesive)	8	40	-	Medium	WS105/2.80 – 3.90m bgl
London Clay Formation (Cohesive)	9 - 45	45 - 225	-	Medium to Very High	BH01/4.30 - >20.00m bgl
	9 - 43	45 - 215	-	Medium to Very High	BH02/4.20 – >20.00m bgl
	17 - 19	85 - 95	-	High	WS101/3.70 – 5.45m bgl
	9 - 12	45 - 60	-	Medium	WS102/3.90 – 5.45m bgl
	9 - 20	45 - 100	-	Medium to High	WS104/3.55 - >5.45m bgl
	9 - 50	45 - 250	-	Medium to Very High	WS105/3.90 - >4.60m bgl

GEOTECHNICAL LABORATORY TESTING

Atterberg Testing

A précis of Atterberg limit testing undertaken can be seen in the following table. The test results are presented within Appendix E.

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Atterberg Limit Tests Results Summary							
Stratum	Moisture Content (%)	Passing 425 µm sieve (%)	Modified PI (%)	Soil Class	Consistency Index (Ic)	Volume Change Potential	
						BRE	NHBC
London Clay Formation	22 - 28	100	20.00 – 24.00	CI	Stiff	Medium	Medium

NP – Non-plastic
BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)
Soil Classification based on British Soil Classification System.
Consistency Index (Ic) based on BS EN ISO 14688-2:2018.

Moisture Deficits

The results of the Atterberg Limit tests were analysed to determine the Liquidity Index of the samples, to give an indication as to whether the samples recovered showed a moisture deficit as well assessing their degree of consolidation. Liquid Limit analyses was undertaken to assess whether there were any potentially significant moisture deficits within the samples tested.

No significant moisture deficits were noted within any of the samples tested.

Particle Size Distribution Testing

The results of particle size distribution (PSD) testing undertaken show that the granular Head Deposits do not have volume change potential in accordance with BRE240 and NHBC Standards Chapter 4.2. The results of particle size distribution (PSD) testing undertaken show that the granular Bognor Sand Member does have volume change potential in accordance with BRE240 and possibly in accordance with NHBC Standards Chapter 4.2. The results of the PSD testing can be viewed within Appendix E.

Particle Size Distribution Tests Results Summary			
Stratum	Range Passing 63µm Sieve (%)	Volume Change Potential	
		BRE	NHBC
Head Deposits	2	No	No
Bognor Sand Member	23 - 45	Yes	Possibly

Volume Change Potential refers to BRE Digest 240 (based on Grading test results).
Shrinkability refers to NHBC Standards Chapter 4.2 (based on Grading test results).
BRE 240 states that a soil has a volume change potential when the clay fraction exceeds 15%. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63µm sieve.
NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63µm sieve is greater than 35% and the Plasticity Index is greater than 10%.

10No. Multi-stage unconsolidated-undrained triaxial tests were undertaken on undisturbed samples of the London Clay Formation from BH01 and BH02 on-site. The results have been tabulated below. The full results can be seen within Appendix E.

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Summary of Multi-Stage Unconsolidated-Undrained Triaxial Tests

Trial Hole	Depth (m bgl)	Average C_u (kPa)
BH01	6.00	30
BH01	9.00	101
BH01	12.00	37
BH01	15.00	15
BH01	18.00	35
BH02	7.50	62
BH02	10.50	51
BH02	13.50	56
BH02	16.50	106
BH02	19.50	57

CONTAMINATION

Results of the contamination testing will be provided within the final report.

FOUNDATION RECOMMENDATIONS

A summary of the findings from the site investigation, relevant to foundation recommendations, can be seen below:

Foundations should be taken through any Made Ground/Topsoil and constructed either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

The design of each structural element (slab/piles/beams) should be designed in accordance with the appropriate volume change potential of the respective bearing stratum. Special foundation precautions may be required to prevent possible future shrinkage/swelling of the soils affecting the integrity of the faces of foundations and/or structural element (underfloor void diameter/compressible material/void formers etc).

Due to the shallow soils having volume change potential and Made Ground thickness is more than 600mm, a suspended slab is required.

The loads of proposed foundations should not exceed the allowable bearing capacity of the soils they are founding upon.

If soft spots are encountered, they should be taken into account in design and construction.

Foundations must not be placed within fresh root penetrated and/or desiccated soils with volume change potential. It is recommended that foundations are taken at least 300mm into non-fresh root penetrated strata if the soils have volume change potential, or into soils of no volume change potential.

The influence of trees on or surrounding the site will need to be taken into account in final design (NHBC Standards Chapter 4. 2) (tree rings).

Any water ingress must be prevented from entering foundation trenches and excavations must be kept dry and either concreted or blinded as soon after excavation as possible. If water were allowed to accumulate within the excavation for even a short period of time, an increase in heave occur. The shear strength will also be reduced, resulting in lower bearing capacities, resulting in increased settlements. Instability issues may arise within the foundation trenches, in case of perched water being present.

SHALLOW FOUNDATIONS

Based on the variable depth of deep made ground on-site, the variable strength profiles encountered and the anticipated loadings of the blocks of flats, foundations were recommended to extend beyond

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2.50m bgl. Given the anticipated required depth of strip footings, a piled/minipile foundation scheme was deemed more suitable.

PILED FOUNDATIONS

Given the results of the ground investigation, a piled foundation system was deemed more suitable.

The construction of a piled foundation is a specialist job, and the advice of a reputable contractor, familiar with the type of ground and groundwater conditions encountered on this site, should be sought prior to finalising the foundation design. The actual pile working load will depend on the particular type of minipile/pile and method of installation adopted.

The foundation would most likely comprise a piled foundation with reinforced ground beams or a piled slab. In general, for the cumulative pile capacity calculations, shaft friction over desiccated levels should be ignored and minipiles/piles should not be terminated within desiccated soils where moisture recovery following tree removal could occur.

Indicative/guidance limit loads and settlements for a bored pile under compression only have been given within the table below have been based on a combined soil/strength profile from BH01 and BH02. An allowance for no resistance to occur within the top 3.00m of the soil has been included within the calculations where it could pass through any Made Ground. An adhesion factor of 0.45m has been applied to all natural cohesive units.

The bearing values may be limited by the maximum permissible stress allowable on a concrete pile. To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

The table below assumes a factor of safety of 3.

Bored Pile Limit Loads and Settlement Parameters						
Depth	Diameter	Limit States (kN)			Settlement	
(m bgl)	(mm)	Tip	Lateral	Total	Load (kN)	Total (mm)
8.00	300	16.96	35.21	52.17	50	0.8
	450	38.17	54.44	92.61	90	1.2
	600	67.86	74.75	142.60	140	1.7
10.00	300	24.39	62.78	87.16	85	1.2
	450	54.87	95.80	150.66	150	1.8
	600	97.55	129.88	227.43	225	2.3
15.00	300	36.05	165.27	201.32	200	2.1
	450	81.11	249.54	330.65	330	3.2
	600	144.2	334.87	479.07	475	3.9

The loads above are indicative and the advice of a specialist piling contractor should be sought. The analysis was focused on the geotechnical aspects and the capacity of the soils. The actual pile loads permitted may be further limited for structural reasons (i.e. the concrete strength and the overall structural capacity of the pile, buckling etc). The structural engineer and the piling contractor are to perform the final design.

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	The bearing values given in the table above are applicable to single piles. Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of approximately 0.8 and a calculation made to check the factor of safety against block failure. The piles will need to be designed in accordance with the volume change potential of the soils encountered, depth of desiccation and root penetration. Temporary casing may be required where the upper portion of the pile passes through the Made Ground, particularly where perched water is encountered, to prevent necking of the concrete. Piling Groundwater Risk Assessment Given the geology at the site, piling is the preferred method for foundations. As these may extend into the aquifer beneath the site, the potential for pathways to be present need to be considered. Review of the Wilson and Mortimer paper Piled foundations and pathways for ground gas migration in the UK (ICE publishing – Environmental Geotechnics), indicates that any preferential pathways for ground gases or contaminated water created by piles needs consideration for ground conditions and the nature of the pile utilised. An important consideration is the nature of the pile, whether it is a displacement or replacement pile. For there to be a preferential pathway for the movement of groundwater, a continuous open annulus is required around the piles installed. An open annulus will not form around piles during installation except for driven H and I piles. Cast in-situ piles are driven or bored and filled with wet concrete. The pressure exerted on the wet concrete will seal up any annulus around the pile, sealing any pathway. The Environment Agency recommend that CFA piling is undertaken on any site where contamination may be expected. Based on the above, the use of CFA piles or other cast in-situ piles should be adopted, which will not result in the downward migration of contamination within the groundwater.
EXCAVATIONS AND INSTABILITY	Shallow excavations in the Made Ground are likely to be marginally stable at best. Long, deep excavations, through these strata and into the underlying strata are likely to become unstable, particularly when the shallow groundwater is encountered on-site. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported before excavations are entered by personnel.
SUB-SURFACE CONCRETE DESIGN	Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground' considering the pH of the soils. For the classification given below, the "mobile" and "brownfield" case was adopted given the geology encountered and the previous use of the site. This assessment was based on the results of chemical laboratory testing displayed within Appendix F, specifically relating to sulphates, pH and other water soluble chemicals. Made Ground

The water-soluble sulphates in the Made Ground was noted to be 296 - 609mg/l, with a pH of 7.7 – 8.1, from chemical laboratory testing. The total potential sulphate (3x total sulphur) was 0.111 – 0.192%, from chemical laboratory testing.

Therefore, sulphate concentrations measured in 2:1 water/soil extracts taken from the Made Ground and total potential sulphate concentrations, fell into Class DS-2 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2.

Head Deposits
According to Box C6 of BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' the Head Deposits did not fall within a list of UK geological formations known to contain pyrite. Consequently, it was not required to consider the levels of total potential sulphate in the classification process.

The water-soluble sulphates in the Head Deposits were noted to be 482mg/l, with a pH of 10.6, from chemical and geotechnical laboratory testing.

Therefore, sulphate concentrations measured in 2:1 water/soil extracts taken from the Head Deposits, fell into Class DS-1 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-1.

Bognor Sand Member
According to Box C6 of BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' the Bognor Sand Member fell within a list of UK geological formations known to contain pyrite. It was therefore required to consider the levels of total potential sulphate in the classification process.

The water-soluble sulphates in the Bognor Sand Member were noted to be 18.7mg/l, with a pH of 7.9, from chemical laboratory testing. The total potential sulphate (3x total sulphur) was 0.021%, from chemical laboratory testing.

Therefore, sulphate concentrations measured in 2:1 water/soil extracts taken from the Bognor Sand Member and total potential sulphate concentrations, fell into Class DS-2 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2.

London Clay Formation
According to Box C6 of BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' the London Clay Formation fell within a list of UK geological formations known to contain pyrite. It was therefore required to consider the levels of total potential sulphate in the classification process.

The water-soluble sulphates in the London Clay Formation was noted to be 615 - 871mg/l, with a pH of 7.6 – 8.1, from chemical laboratory testing. The total potential sulphate (3x total sulphur) was 0.933 – 6.6%, from chemical laboratory testing.

Therefore, sulphate concentrations measured in 2:1 water/soil extracts taken from the London Clay Formation and total potential sulphate concentrations, fell into Class DS-5 of the BRE Special Digest 1,

Geotechnical Report	
	2005, 'Concrete in Aggressive Ground'. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-4s. When applying the C8 practical note on pyritic ground, given the cast in-situ piles are proposed for the site, therefore the ground will not be disturbed and exposed to allow the pyrite to oxidise, the lower design class based upon the water soluble sulphates can be applied. Therefore for the piles on-site a concrete design class of fell into Class DS-2 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2. It is prudent to note that pyrite nodules may be present within the London Clay Formation. Pyrite can oxidise to gypsum and this normally only occurs in the upper weathered layer, but excavation allows faster oxidation and water-soluble sulphate values can rapidly increase during construction. Therefore, rising sulphate values should be considered should ferruginous staining/pyrite nodules be encountered within the London Clay Formation.
CONTAMINATION	A full contamination risk assessment report along with a remediation method statement will be provided in due course once testing and monitoring is completed, a summary has been provided below of the findings to date. Soil Contamination – Private Garden Areas The results to date indicate that due to elevated levels of lead, PAHs and asbestos, remediation within private gardens is require on-site. Based on the results an engineered capping system comprising a 600mm reduced dig, placement of a 150mm thick anti-dig layer, followed by a marker membrane and 450mm imported clean soil to ground level. Ground Gasses Monitoring to date has confirmed the findings of the Ridge Ltd July 2021 Site Investigation Report with the site being characterised as CS2 due to elevated CO2 levels. In the absence of vapour protection measures, ground gas protection measures in line with BS 8485:2015+A1:2019 would be required, with the building meeting a 3.5 gas protection score. Vapours Based on one round of monitoring to date PID levels of between 19.1 – 78.2ppm have been identified across the site. The PID measures a wide range of vapour compounds and provides a total level identified. Further testing through the means of a vacuum cannister is required in order to assess the individual VOCs/SVOCs or TICs that are elevated in order to determine if a compound exceeds the relevant vGAC. In the absence of further testing, vapour protection measures would be required across the ground floor of the buildings on-site. It should be noted that vapour protection measures also qualify as gas resistant membranes and therefore only one vapour protection membrane would be required to remove both the ground gas and vapour risk on-site.

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Geotechnical Report	
ROADS AND HARDSTANDING	This section provides information relating to the construction of roads and hardstanding, for each strata encountered. Topsoil Roads and hardstanding should bypass Topsoil given the likely low strength, high compressibility and general variability. Made Ground Where roads and hardstanding are to be founded on Made Ground, a CBR value of 1% should be adopted, as a result of the variable nature of Made Ground in terms of consistency, strength and compressibility. Head Deposits (granular) Roads and hardstanding constructed on the granular Head Deposits should be designed based on a CBR value of 15%. This is based on reference to Table C1 of TRL1132 and average construction conditions. These granular-based soils (well drained) with less than 10% of their content passing the 150µm sieve are likely to be frost susceptible. Bognor Sand Member (granular) Roads and hardstanding constructed on the granular Bognor Sand Member should be designed based on a CBR value of 20%. This is based on reference to Table C1 of TRL1132 and average construction conditions. These granular-based soils (poorly drained) with greater 10% of their content passing the 150µm sieve are likely to be non-frost susceptible. Bognor Sand Member (cohesive) Roads and hardstanding constructed on the cohesive Bognor Sand Member should be designed based on a CBR value of 3.0%. This is based on reference to Table C1 of TRL1132 and average construction conditions. Based on wet conditions a CBR of 1.5% should be adopted, with dry conditions a CBR of 3.5% being applicable. These clay-based soils (poorly drained) with plasticity indexes generally less than 20% are likely to be frost susceptible, due to their granular content. London Clay Formation (cohesive) Roads and hardstanding constructed on the cohesive London Clay Formation should be designed based on a CBR value of 4%. This is based on reference to Table C1 of TRL1132 and average construction conditions. Based on wet conditions a CBR of 2.5% should be adopted, with dry conditions a CBR of 4.5% being applicable. These clay-based soils (poorly drained) with plasticity indexes generally greater than 20% are likely to be non-frost susceptible.

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WASTE CLASSIFICATION	The excavation of foundations and other soils is likely to produce waste which will require classification and then recycling or removal from site. Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal all waste must be classified as; Inert; Non-hazardous, or; Hazardous. The Environment Agency's Hazardous Waste Technical Guidance (WM3) document outlines the methodology for classifying wastes. Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal. Hazardous waste requires pre-treatment prior to removal. The site may need to be registered as a Hazardous waste producer should such waste be removed from the site.
DUTY OF CARE	Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather. To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust is generated as a result of construction activities. The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

FIGURES 15
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APPENDIX C: Technical Glossary 21
APPENDIX D: GroundSure Historical Mapping 22
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APPENDIX F: Geotechnical Laboratory Testing 24
APPENDIX G: Chemical Laboratory Testing ..... Error! Bookmark not defined.

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FIGURES

Site Location

NTS

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	
Foreman Homes Limited	September 2024
Figure 1 – Site Location Plan	GWPR6068

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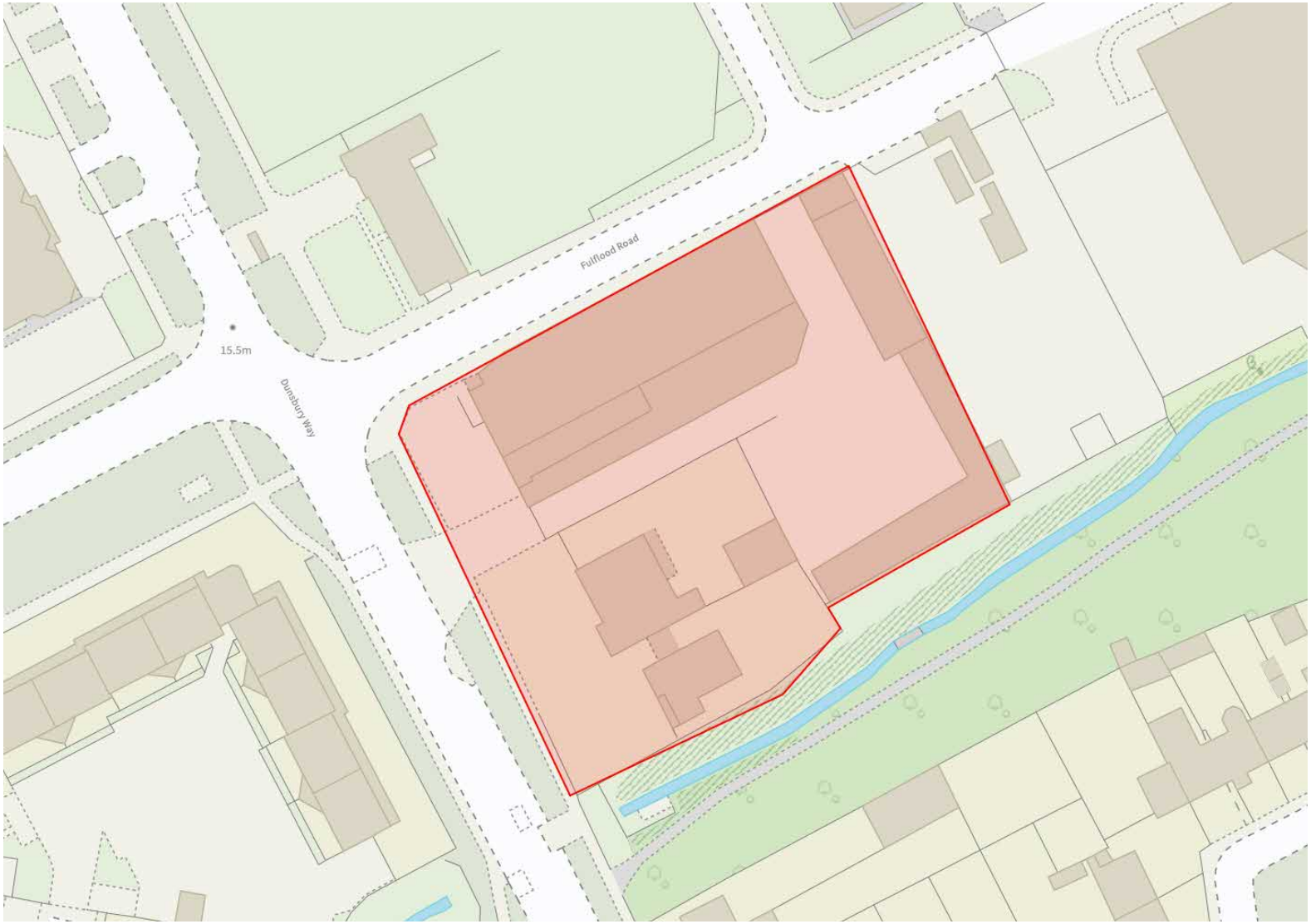

Site Boundary

NTS

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Foreman Homes Limited	September 2024
Figure 2 – Site Development Area	GWPR6068

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NTS

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Foreman Homes Limited	September 2024
Figure 3 – Aerial Photograph	GWPR6068

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NTS

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Foreman Homes Limited	September 2024
Figure 4 – Proposed development plan -Site plan	GWPR6068

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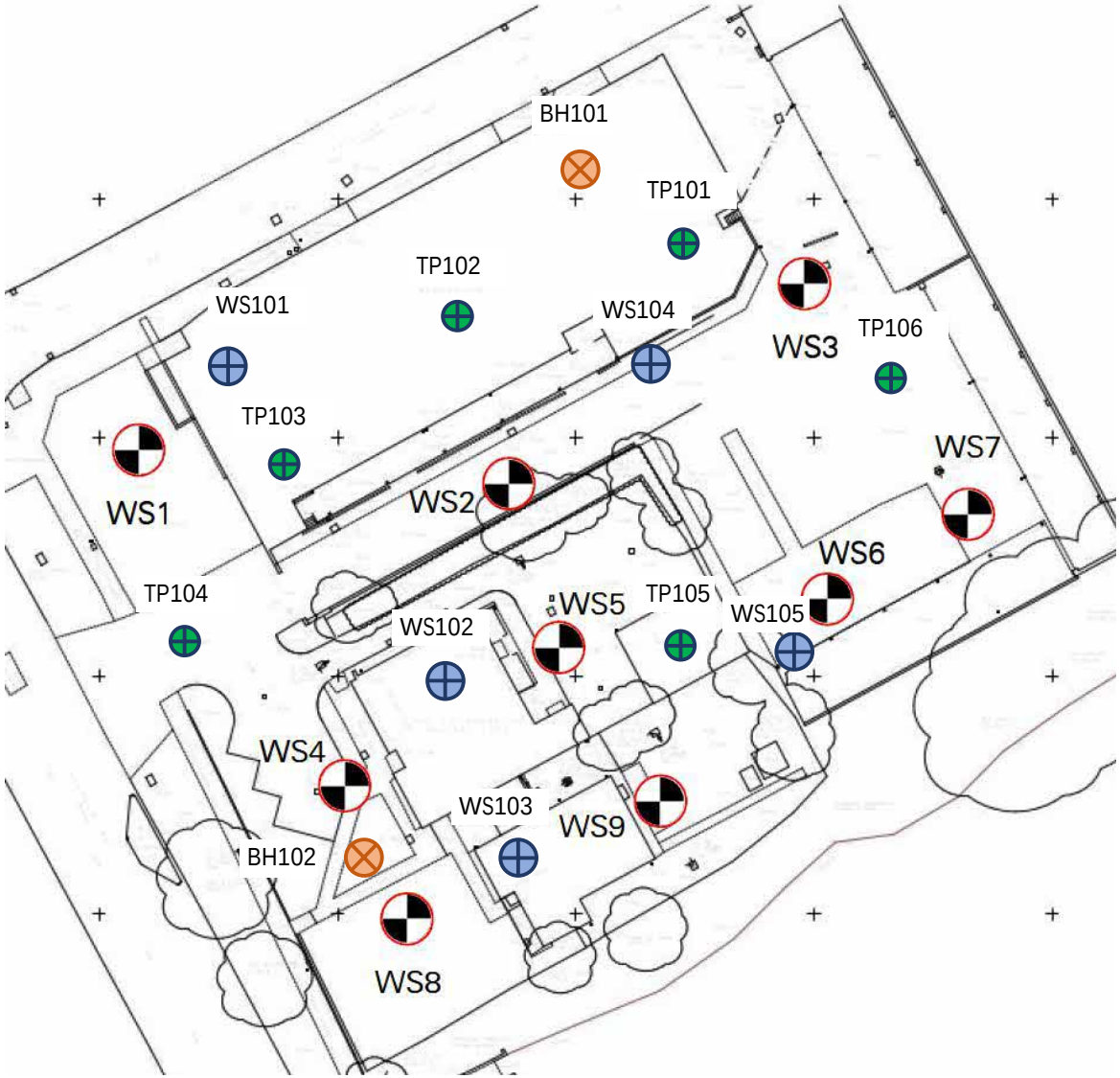

Site boundary

Cable Percussion Borehole

Windowless Sampler Borehole

Trial Pit

Ridge Boreholes

NOT TO SCALE

Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	
Foreman Homes Limited	September 2024
Figure 5 – Trial Hole Location Plan	GWPR6068

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APPENDIX A: Conditions and Limitations

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The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Any Recipient must take into account any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist. It was not part of the scope of this report to comment on environment/contaminated land considerations.

The conclusions and recommendations relate to Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sampler borehole implies the specific technique used to produce a trial hole.

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The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets, remain with Ground and Water Limited. Licence is for the sole use of the client and may not be assigned, transferred or given to a third party.

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

The aim of the investigation was understood to be to supply the client and their designers with information regarding the ground conditions underlying the site to assist them in preparing an appropriate scheme for development.

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APPENDIX B: Scope of the Investigation

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The investigation was to be undertaken to provide parameters for the design of foundations by means of in-situ and laboratory geotechnical testing undertaken on soil samples recovered from trial holes.

A full scale Environmental Desk Study and Contamination Assessment including a gas risk assessment were not part of the remit of this report; however Included within the fee proposal was an allowance to undertake chemical laboratory testing on soil samples recovered from the site to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any potential contamination identified.

The techniques adopted for the investigation were chosen considering the requirements of the client, anticipated ground conditions, and bearing in mind the nature of the site, limitations to site access and other logistical limitations.

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APPENDIX C: Technical Glossary

TECHNICAL GLOSSARY

The list of possible definitions within the report may be seen below. Please note that some definitions may not be relevant to this report.

HYDROGEOLOGY:

A Principal Aquifer is a layer of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary (A) Aquifers consist of deposits with 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. These are generally aquifers formerly classified as Minor Aquifers.

Secondary (B) Aquifers consist of deposits with predominantly lower permeability layers with may stoke and yield limited amounts of groundwater due to localised features such as fissures, think permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Aquifers (Undifferentiated) are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor aquifer and non-aquifer in different locations due to the variable characteristics of the rock type.

Unproductive Strata are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

FLOOD ZONES:

Environment Agency Flood Zone 2, defined as; land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1%0 or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

Environment Agency Flood Zone 3 area that benefits from flood defences, defined as; land and property in this flood zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

GROUNDWATER SOURCE PROTECTION ZONES (SPZS):

Inner Zone (SPZ1): This zone is 50 day travel time of pollutant to source with a 50 metres default minimum radius.

Outer Zone (SPZ2): This zone is 400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken.

Total Catchment (SPZ3): This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Zone of Special Interest (SPZ4): This zone is where local conditions require additional protection.

IN-SITU STRENGTH GEOTECHNICAL TESTING:

Windowless Sample and/or Cable Percussion and/or Rotary Boreholes provide samples of the ground for assessment but they do not give any engineering data. The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The test uses a thick-walled sample tube, with an outside diameter of 50mm and an inside diameter of 35mm, and a length of around 650mm. This is driven into the ground at the bottom of a borehole by blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. The sample tube is driven 150mm into the ground and then the number of blows needed for the tube to penetrate each 75mm up to a depth of 450mm is recorded. The sum of the number of blows is termed the "standard penetration resistance" or the "N-value".

Dynamic Probing involves the driving of a metal cone into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg (SHDP) hammer onto the top of the rods through a set height, thus ensuring a consistent energy input. The number of hammer blows that are required to drive the cone down by each 100mm increment are recorded. These blow counts then provide a comparative assessment from which correlations have been published, based on dynamic energy, which permits engineering parameters to be generated. (The Dynamic Probe 'Super Heavy' (SHDP) Tests were conducted in accordance with BS 1377; 1990; Part 9, Clause 3.2).

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APPENDIX D: Trial Hole Logs

Well

Well

Well

Well

Well

Well

Well

Well

Well

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APPENDIX E: Geotechnical Laboratory Testing

Laboratory Report

UKAS TESTING 2788

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES
A PHENNA GROUP COMPANY

Contract Number: 74050

Client Ref: **GWPR6068**
Client PO: **GWPR6068**

Date Received: **07-08-2024**
Date Completed: **15-08-2024**
Report Date: **15-08-2024**

Client: **Ground and Water Limited**

This report has been checked and approved by:

Contract Title: **Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ**
For the attention of: **Myles Finnerty**

[redacted]

Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	5
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	5
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	5
Quick Undrained Triaxial Compression Test - Multi-stage Loading of a single specimen (100mm diameter) BS 1377:1990 - Part 7 : 9 - * UKAS	10
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (HR & HSE Manager)

GEO Site & Testing Services Ltd
Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784 040 Fax: 01554 784 040 info@gstl.co.uk https://gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.4 & 5.3)	
Contract Number	74050	
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	
Date Tested	10/08/2024	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH01	1	B	6.45	-		Grey silty CLAY
BH01	1	B	11.20	-		Grey silty CLAY
BH02	1	B	5.20	-		Grey silty CLAY
BH02	1	B	9.70	-		Grey silty CLAY
BH02	1	B	19.95	-		Grey silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
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				-		
				-		
				-		
				-		
				-		

Operator
Dean Smith

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.4 & 5.3)	
Contract Number	74050	
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	
Date Tested	10/08/2024	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH01	1	B	6.45	-		22	40	20	20	100	CI Intermediate Plasticity
BH01	1	B	11.20	-		25	47	24	23	100	CI Intermediate Plasticity
BH02	1	B	5.20	-		23	45	22	23	100	CI Intermediate Plasticity
BH02	1	B	9.70	-		23	43	22	21	100	CI Intermediate Plasticity
BH02	1	B	19.95	-		28	49	25	24	100	CI Intermediate Plasticity
				-							
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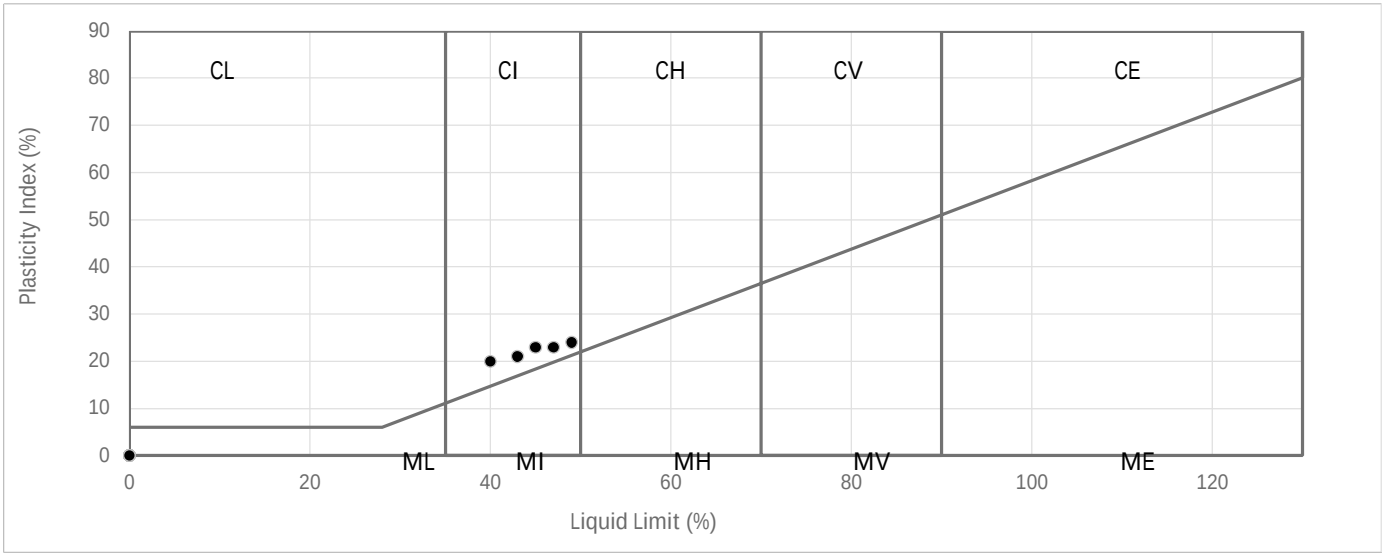
Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

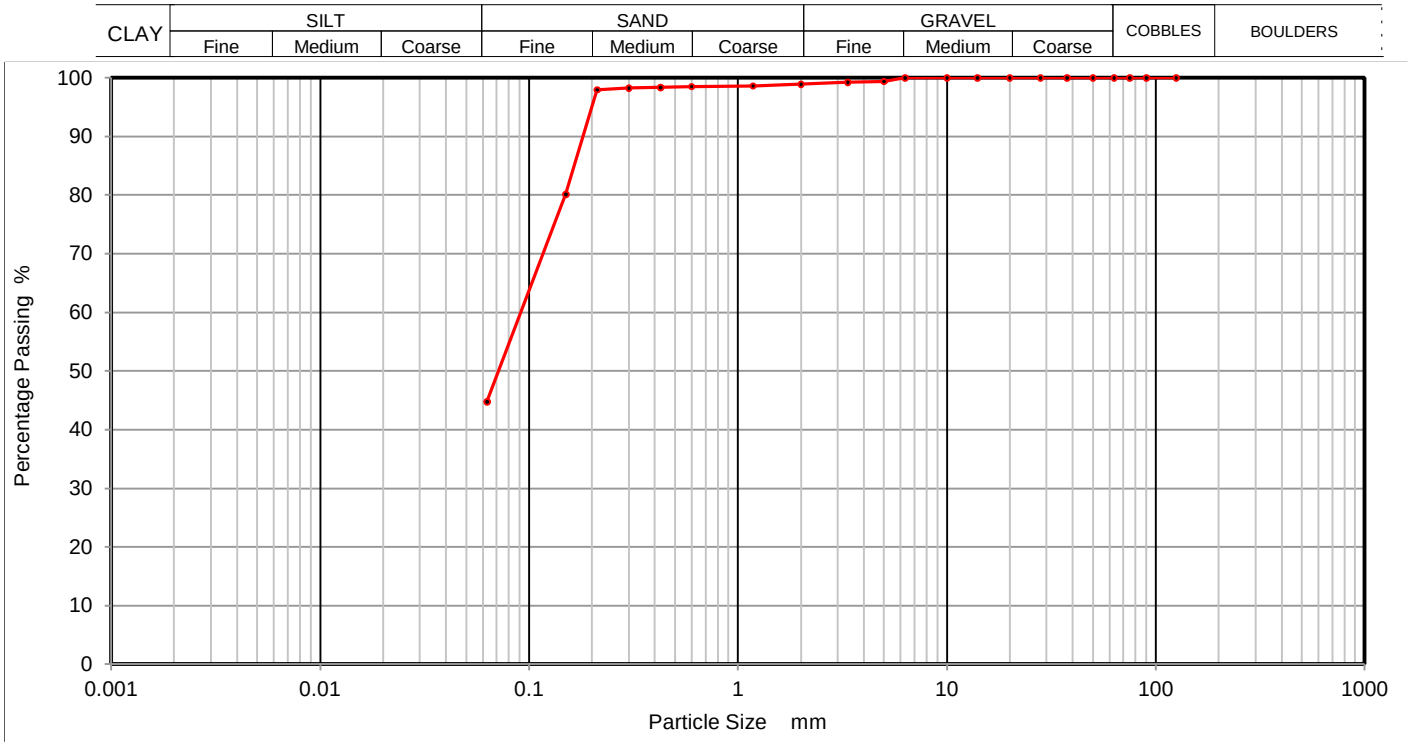
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Dean Smith

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74050**
		Borehole/Pit No.	**BH01**
Project Name	**Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ**	Sample No.	**1**
Sample Description	Brown slightly gravelly fine to coarse sandy SILT/ CLAY	Depth Top	**2.20**
		Depth Base	
Date Tested	14/08/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	99		
0.63	99		
0.425	98		
0.30	98		
0.20	98		
0.15	80		
0.063	45		

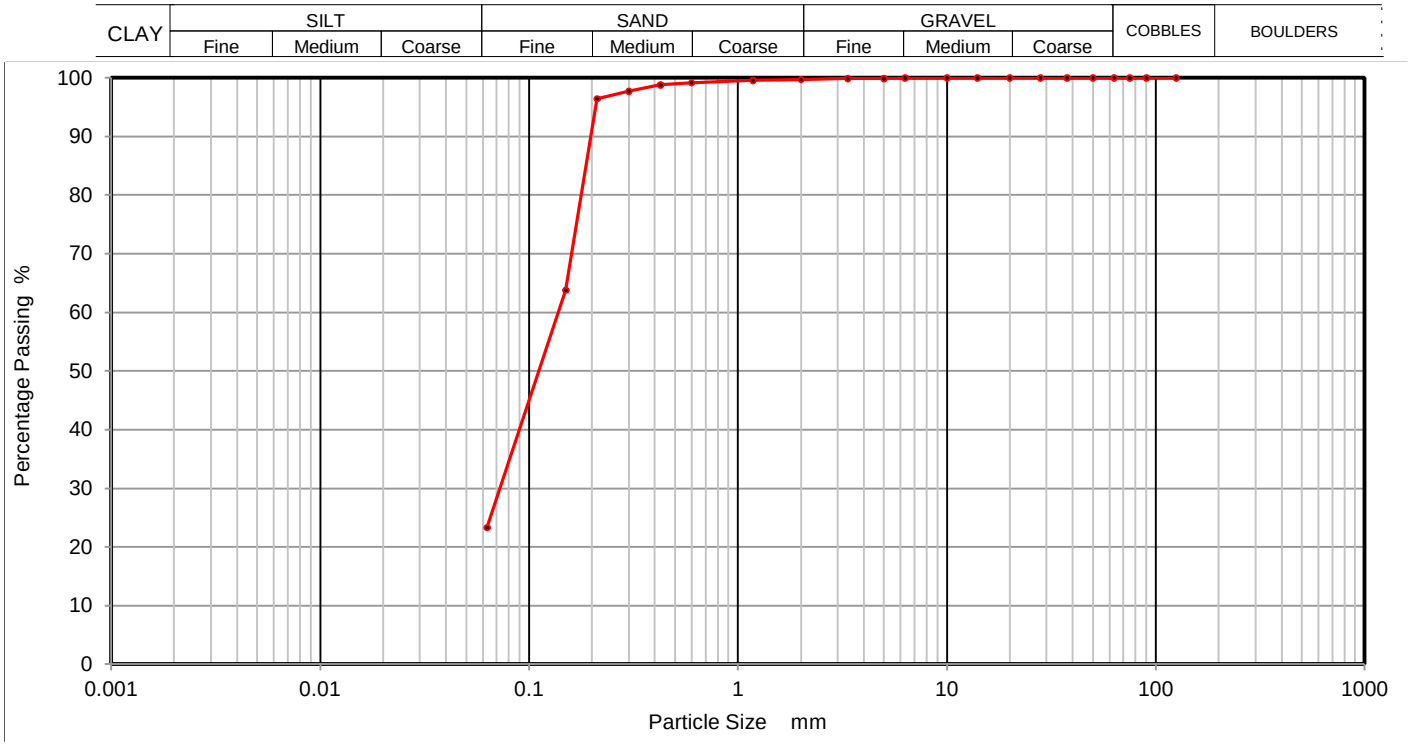
Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	54
Silt and Clay	45

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
David Edwards

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2	Contract Number	74050
		Borehole/Pit No.	BH01
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Sample Description	Orange/ brown silty/ clayey fine to coarse SAND	Depth Top	3.20
		Depth Base	
Date Tested	14/08/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	99		
0.425	99		
0.30	98		
0.20	96		
0.15	64		
0.063	23		

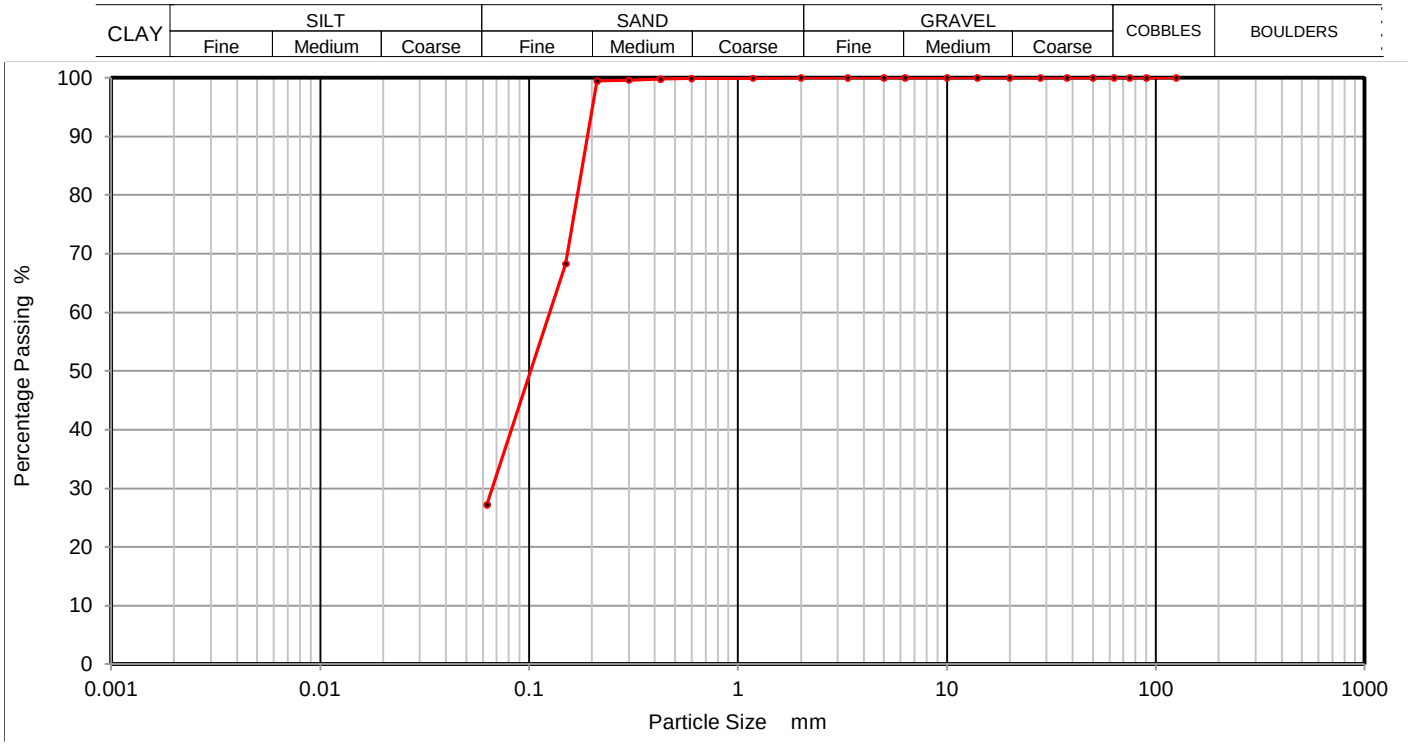
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	77
Silt and Clay	23

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
David Edwards

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74050**
		Borehole/Pit No.	**BH01**
Project Name	**Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ**	Sample No.	**1**
Sample Description	Brown silty/ clayey fine to medium SAND	Depth Top	**4.20**
		Depth Base	
Date Tested	14/08/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	100		
0.30	100		
0.20	99		
0.15	68		
0.063	27		

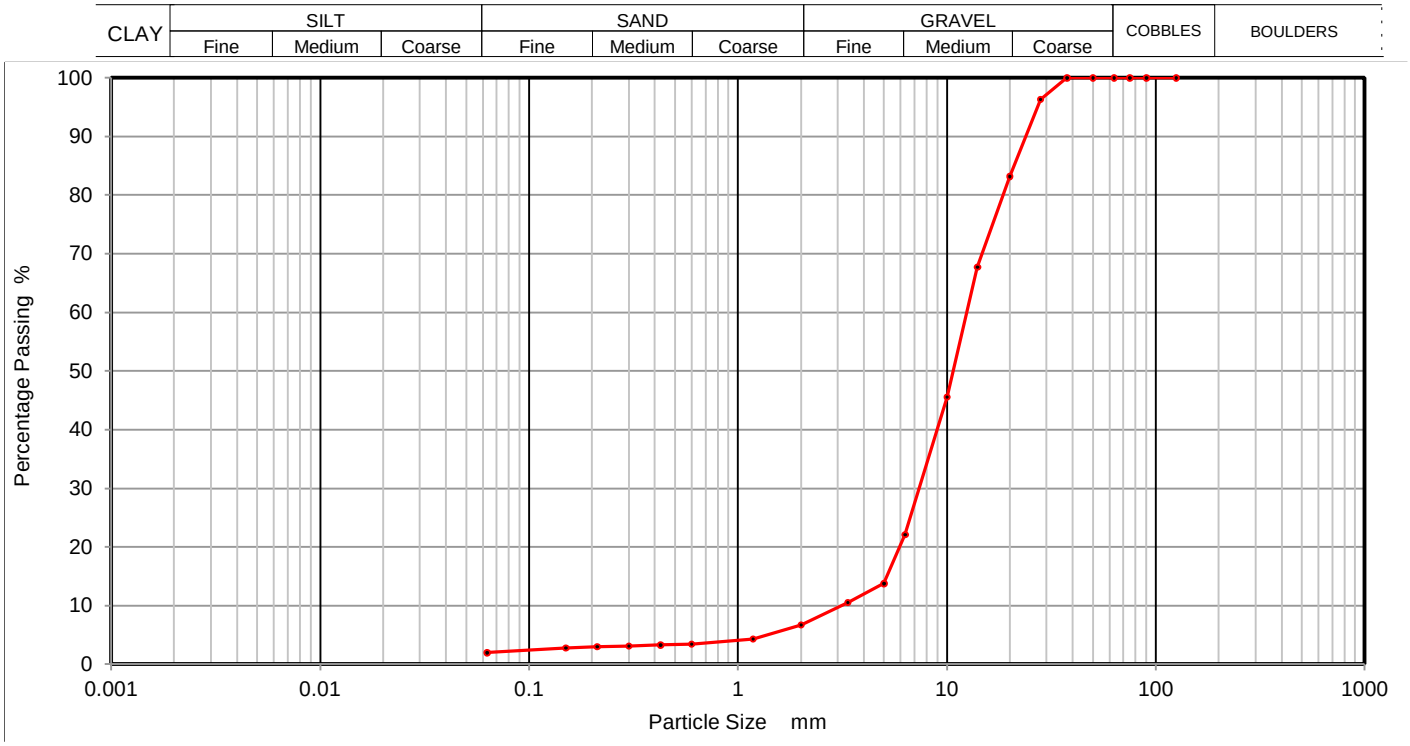
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	73
Silt and Clay	27

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
David Edwards

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74050**
		Borehole/Pit No.	**BH02**
Project Name	**Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey slightly sandy fine to coarse GRAVEL	Depth Top	**3.20**
		Depth Base	
Date Tested	14/08/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	83		
14	68		
10	46		
6.3	22		
5	14		
3.35	11		
2	7		
1.18	4		
0.63	3		
0.425	3		
0.30	3		
0.20	3		
0.15	3		
0.063	2		

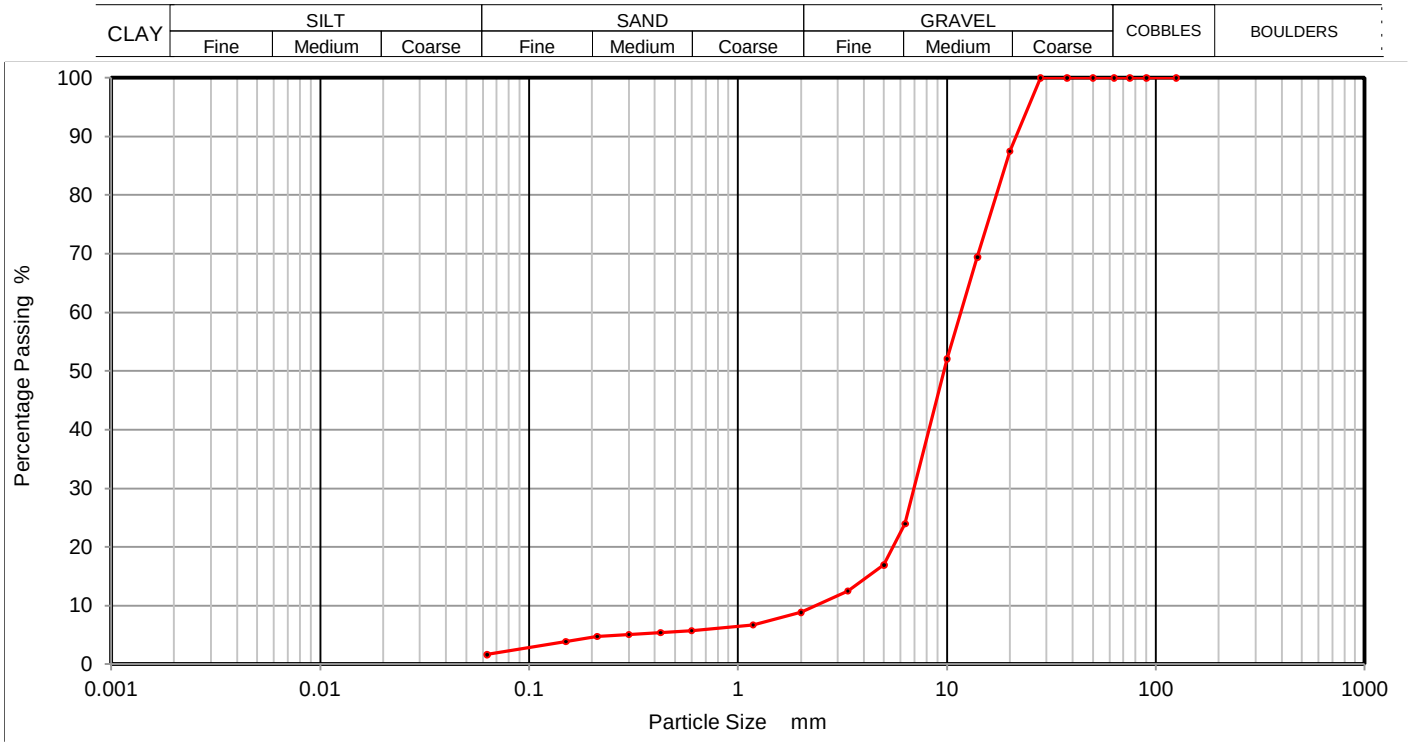
Sample Proportions	% dry mass
Cobbles	0
Gravel	93
Sand	5
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
David Edwards

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74050**
		Borehole/Pit No.	**BH02**
Project Name	**Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ**	Sample No.	**1**
Sample Description	Grey slightly silty/ clayey slightly sandy fine to coarse GRAVEL	Depth Top	**4.20**
		Depth Base	
Date Tested	14/08/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	87		
14	69		
10	52		
6.3	24		
5	17		
3.35	13		
2	9		
1.18	7		
0.63	6		
0.425	5		
0.30	5		
0.20	5		
0.15	4		
0.063	2		

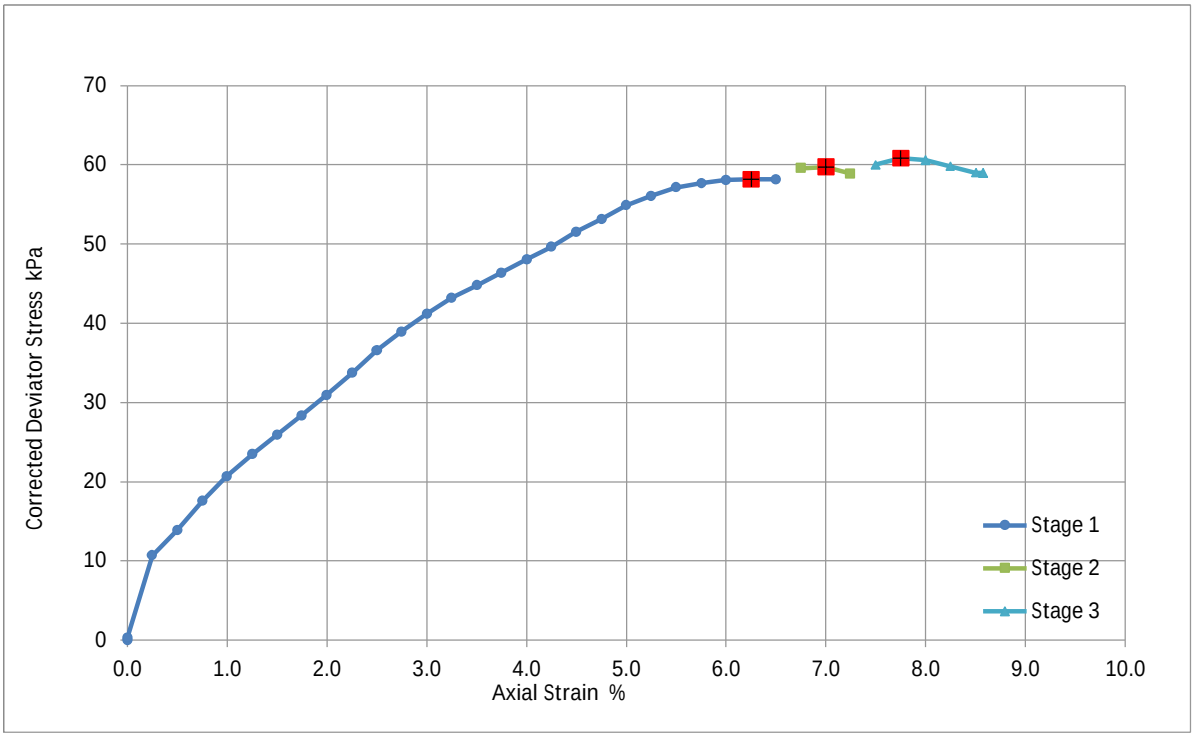
Sample Proportions	% dry mass
Cobbles	0
Gravel	91
Sand	7
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS17892 unless noted below

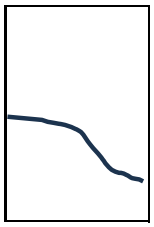
Operator
David Edwards

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	6.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	23		
Bulk Density (Mg/m^3)	2.05		
Dry Density (Mg/m^3)	1.67		
Specimen Length (mm)	204.7		
Specimen Diameter (mm)	103.8		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	70	120	170
Deviator Stress (kPa)	58	60	61
Undrained Shear Strength (kPa)	29	30	30
Failure Strain (%)	6.2	7.0	7.7
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

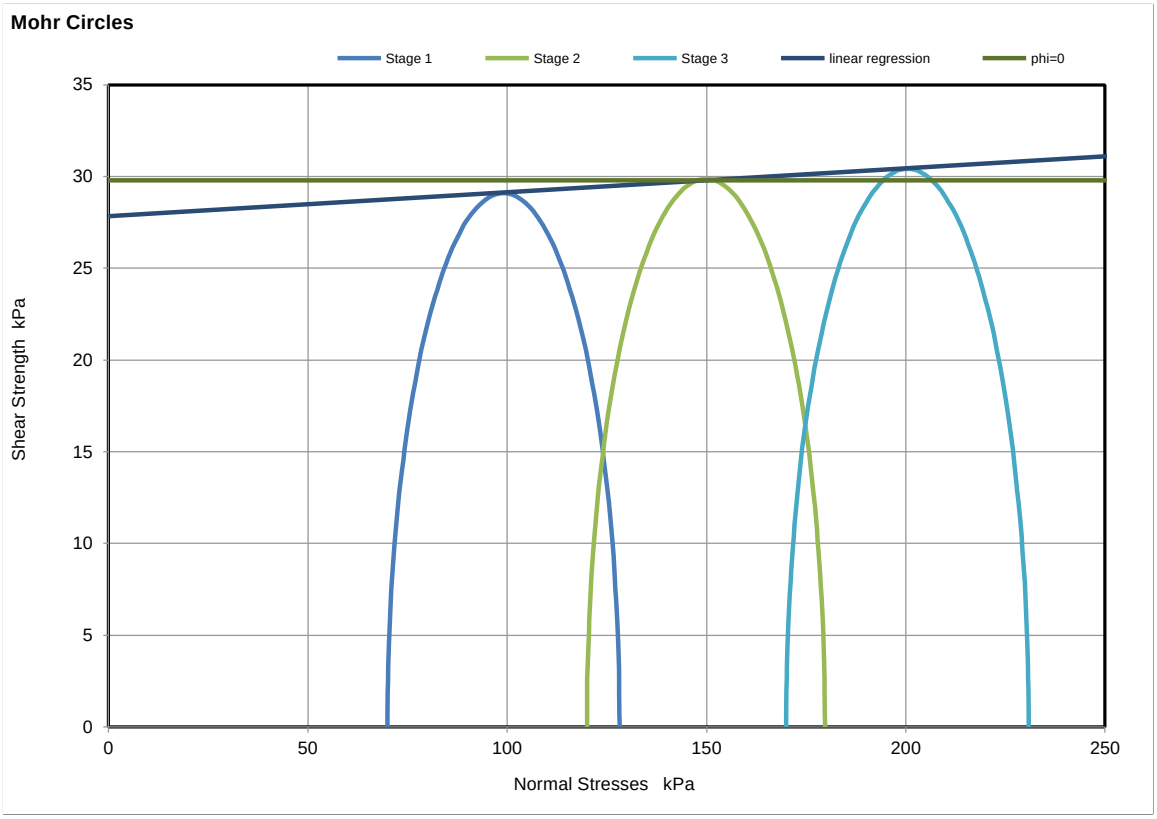
Notes.



Failure Sketch.

UKAS TESTING 2788

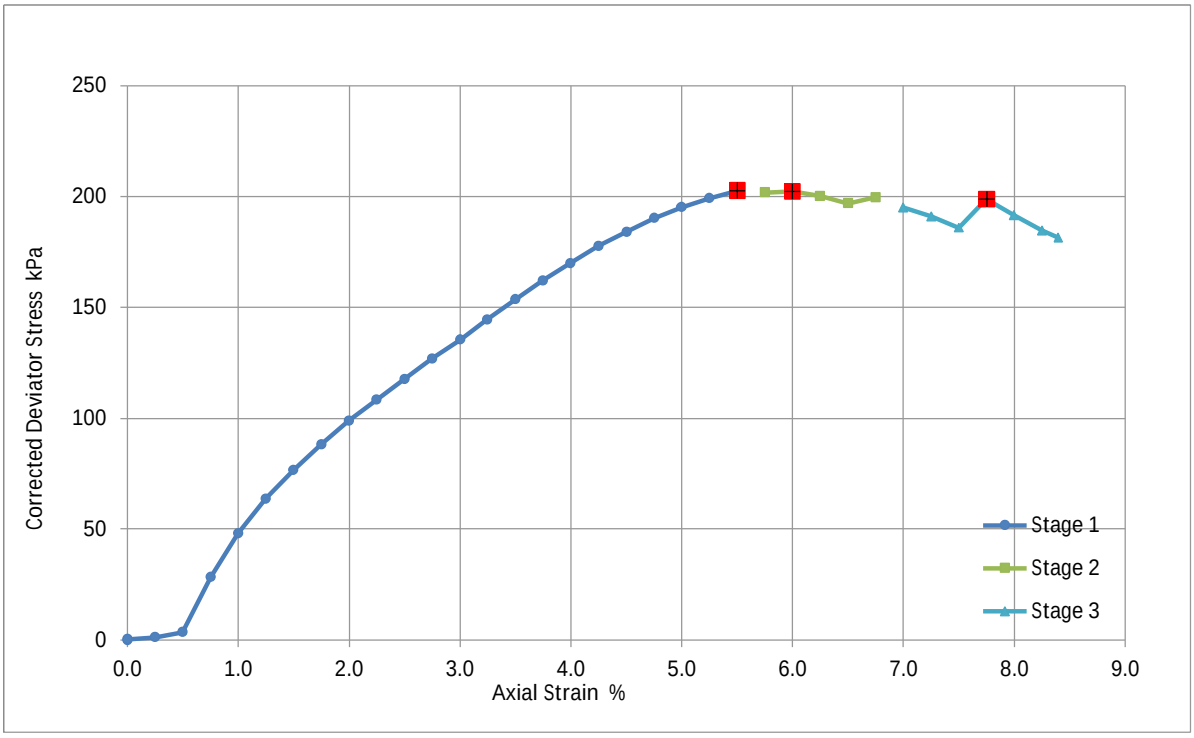
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	6.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	30	kPa	ϕ_u	0.8	°
			c_u	28	kPa

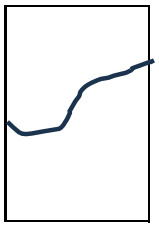
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	9.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	21		
Bulk Density (Mg/m^3)	2.10		
Dry Density (Mg/m^3)	1.73		
Specimen Length (mm)	208.4		
Specimen Diameter (mm)	102.9		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	130	180	230
Deviator Stress (kPa)	203	202	199
Undrained Shear Strength (kPa)	101	101	99
Failure Strain (%)	5.5	6.0	7.7
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

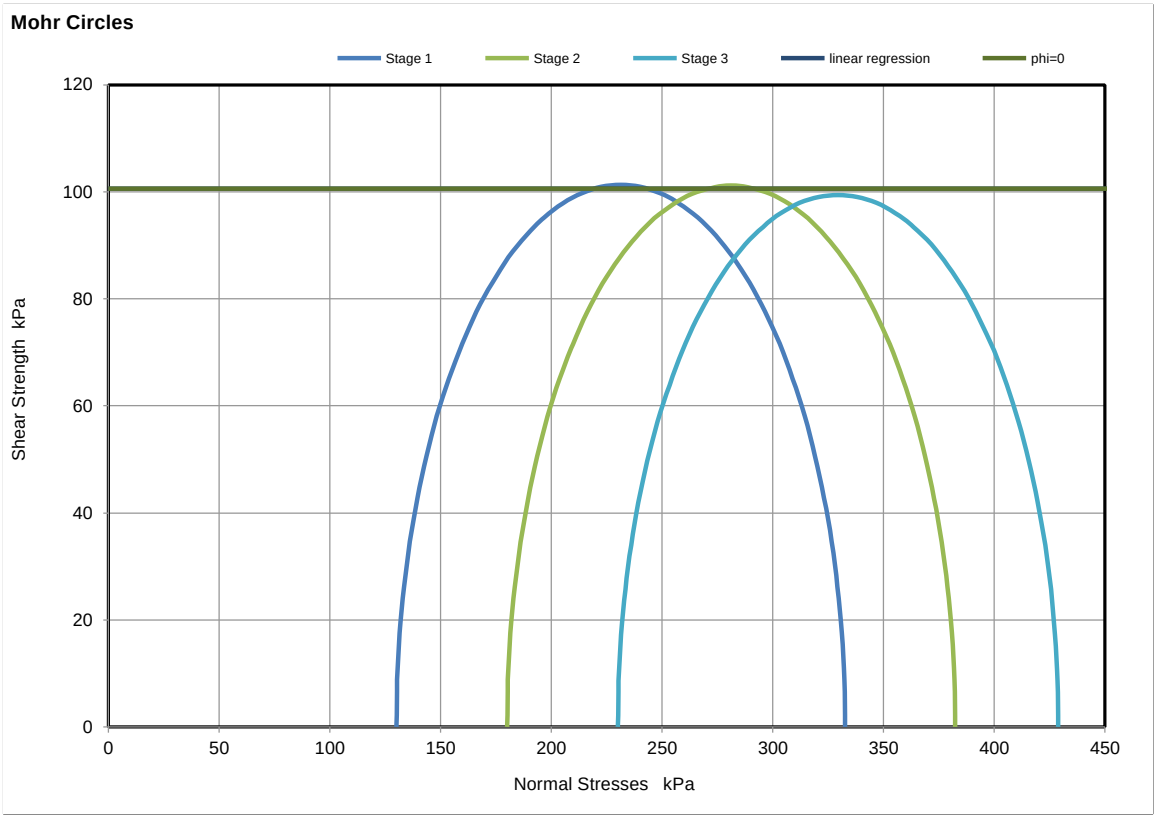
Notes.



Failure Sketch.

UKAS TESTING 2788

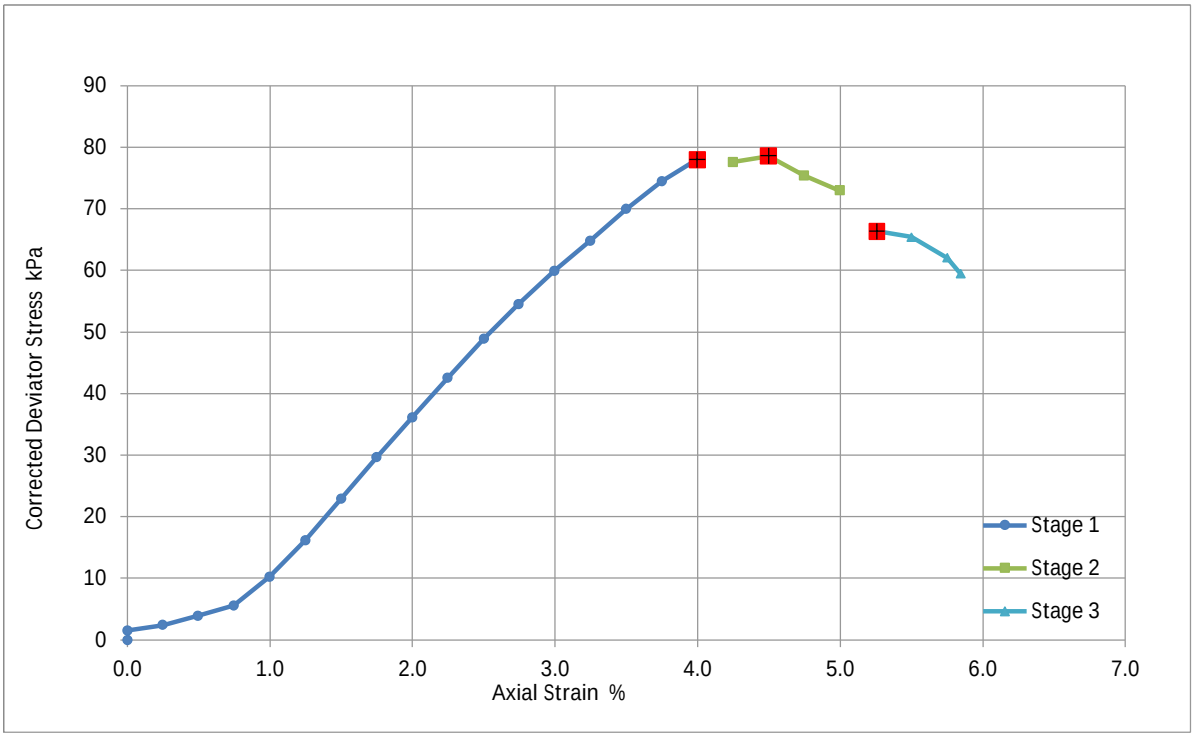
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	9.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	101	kPa	ϕ_u	0	°
			c_u	101	kPa

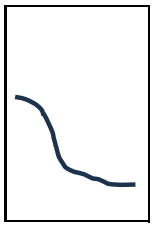
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	12.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	23		
Bulk Density (Mg/m^3)	2.09		
Dry Density (Mg/m^3)	1.69		
Specimen Length (mm)	207.7		
Specimen Diameter (mm)	103.4		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	170	240	290
Deviator Stress (kPa)	78	79	66
Undrained Shear Strength (kPa)	39	39	33
Failure Strain (%)	4.0	4.5	5.3
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

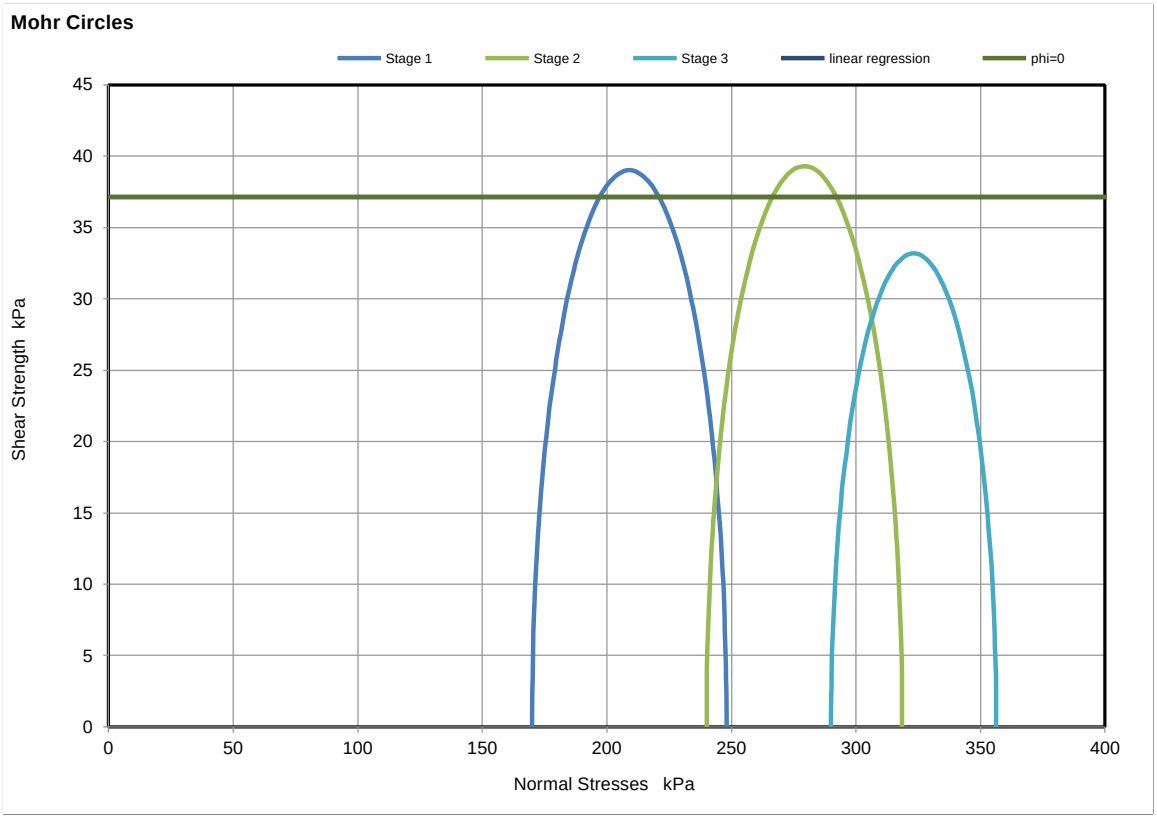
Notes.



Failure Sketch.

UKAS TESTING 2788

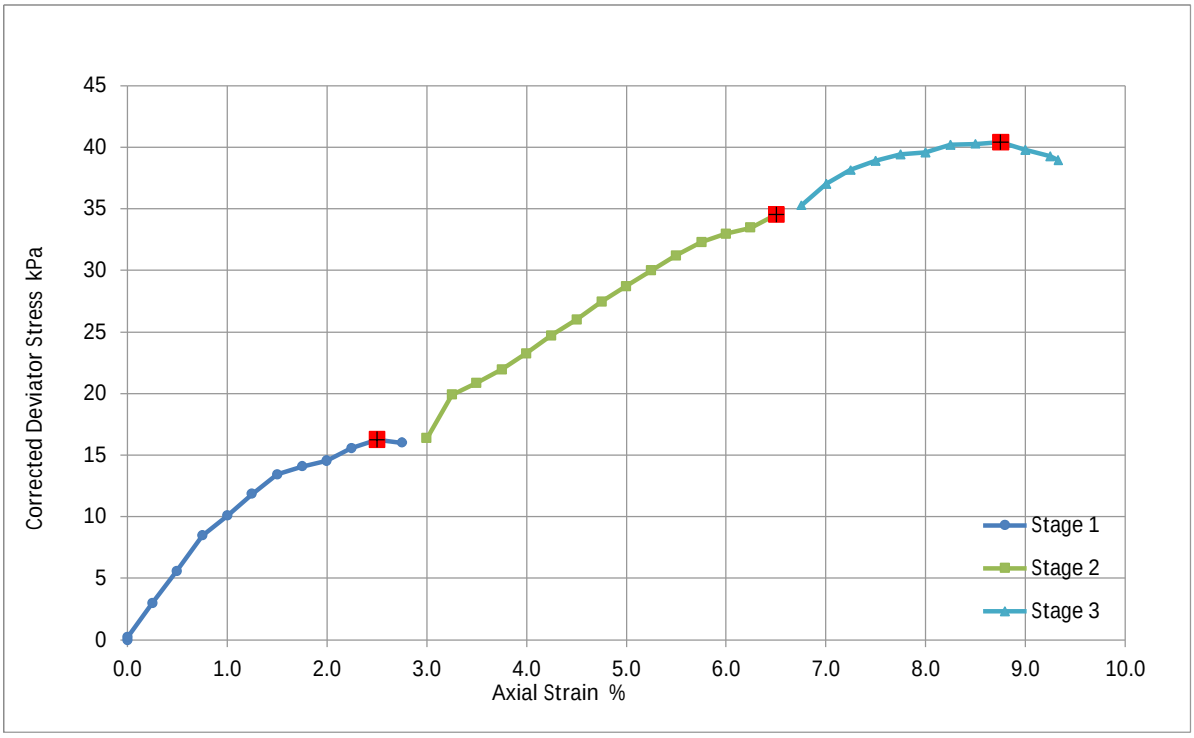
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	12.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	37	kPa	ϕ_u	0	°
			c_u	37	kPa

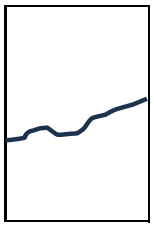
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty CLAY	Depth Top	15.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	28		
Bulk Density (Mg/m^3)	1.97		
Dry Density (Mg/m^3)	1.53		
Specimen Length (mm)	193.1		
Specimen Diameter (mm)	101.8		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	250	300	350
Deviator Stress (kPa)	16	35	40
Undrained Shear Strength (kPa)	8.1	17	20
Failure Strain (%)	2.5	6.5	8.8
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

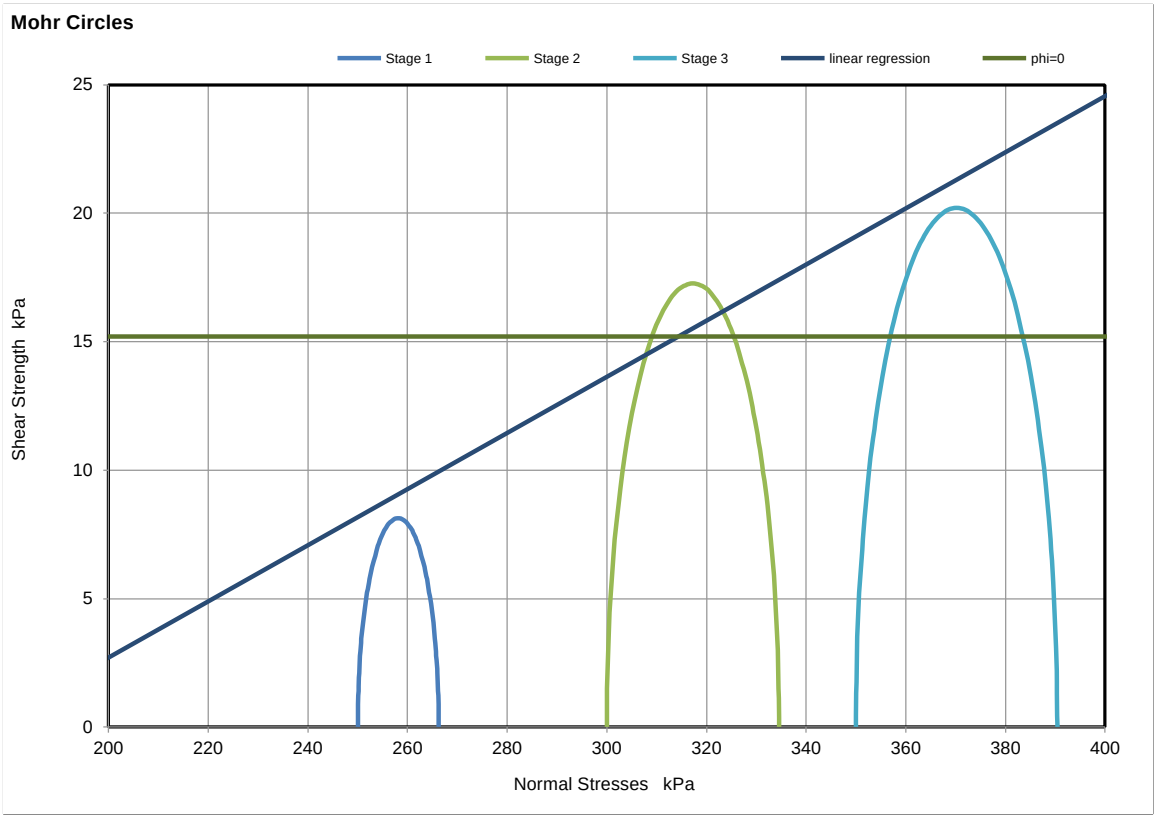
Notes.



Failure Sketch.

UKAS TESTING 2788

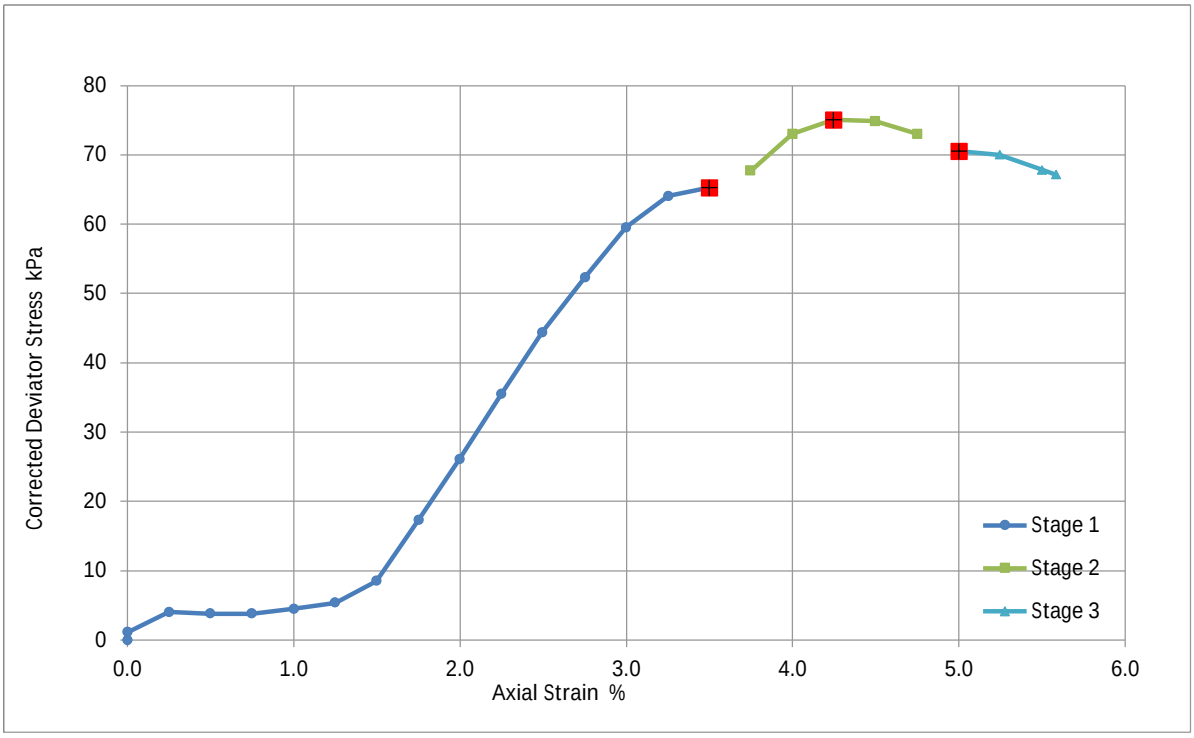
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty CLAY	Depth Top	15.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	15	kPa	ϕ_u	6.2	°
			c_u	-19	kPa

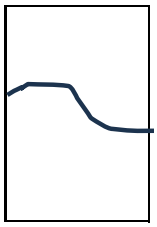
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Silty CLAY	Depth Top	18.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	16		
Bulk Density (Mg/m^3)	2.03		
Dry Density (Mg/m^3)	1.75		
Specimen Length (mm)	208.2		
Specimen Diameter (mm)	104.1		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	310	360	410
Deviator Stress (kPa)	65	75	71
Undrained Shear Strength (kPa)	33	38	35
Failure Strain (%)	3.5	4.2	5.0
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

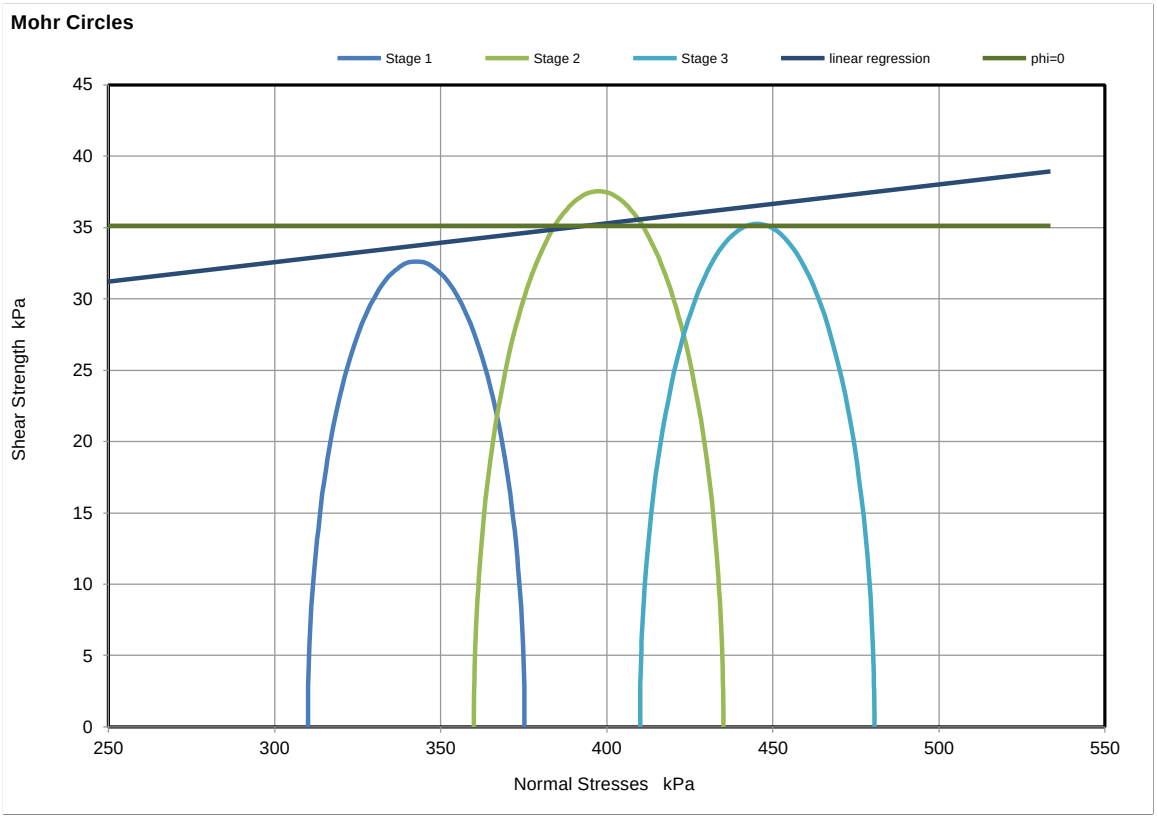
Notes.



Failure Sketch.

UKAS TESTING 2788

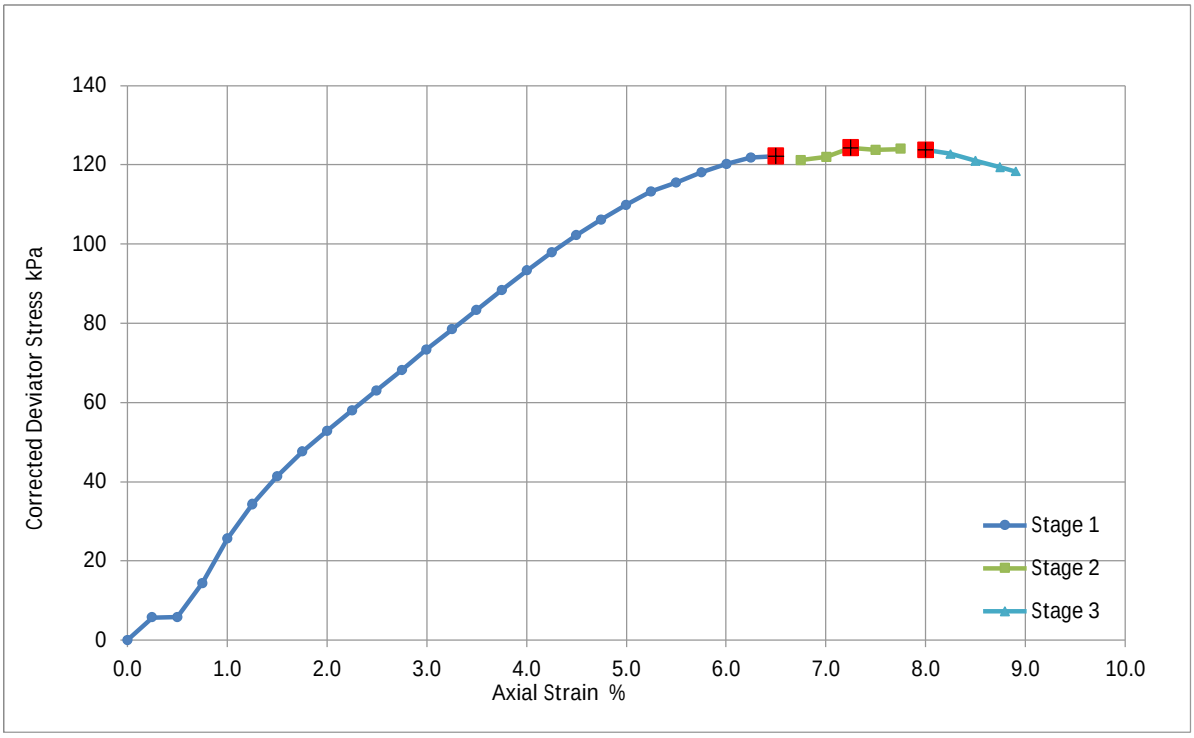
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH1
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Silty CLAY	Depth Top	18.00
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	35	kPa	ϕ_u	1.6	°
			c_u	24	kPa

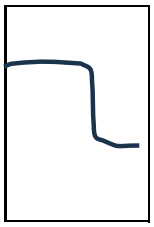
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	7.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	23		
Bulk Density (Mg/m^3)	2.08		
Dry Density (Mg/m^3)	1.69		
Specimen Length (mm)	208.1		
Specimen Diameter (mm)	103.1		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	100	150	200
Deviator Stress (kPa)	122	124	124
Undrained Shear Strength (kPa)	61	62	62
Failure Strain (%)	6.5	7.2	8.0
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

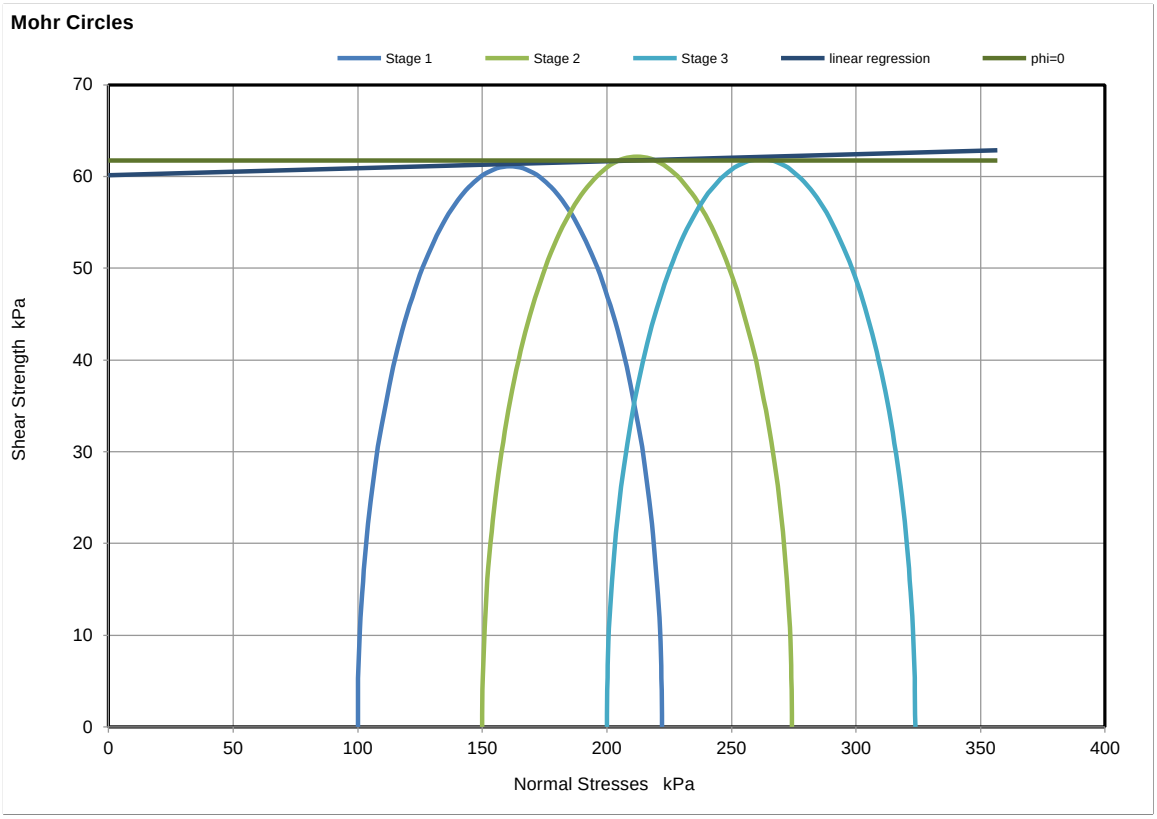
Notes.



Failure Sketch.

UKAS TESTING 2788

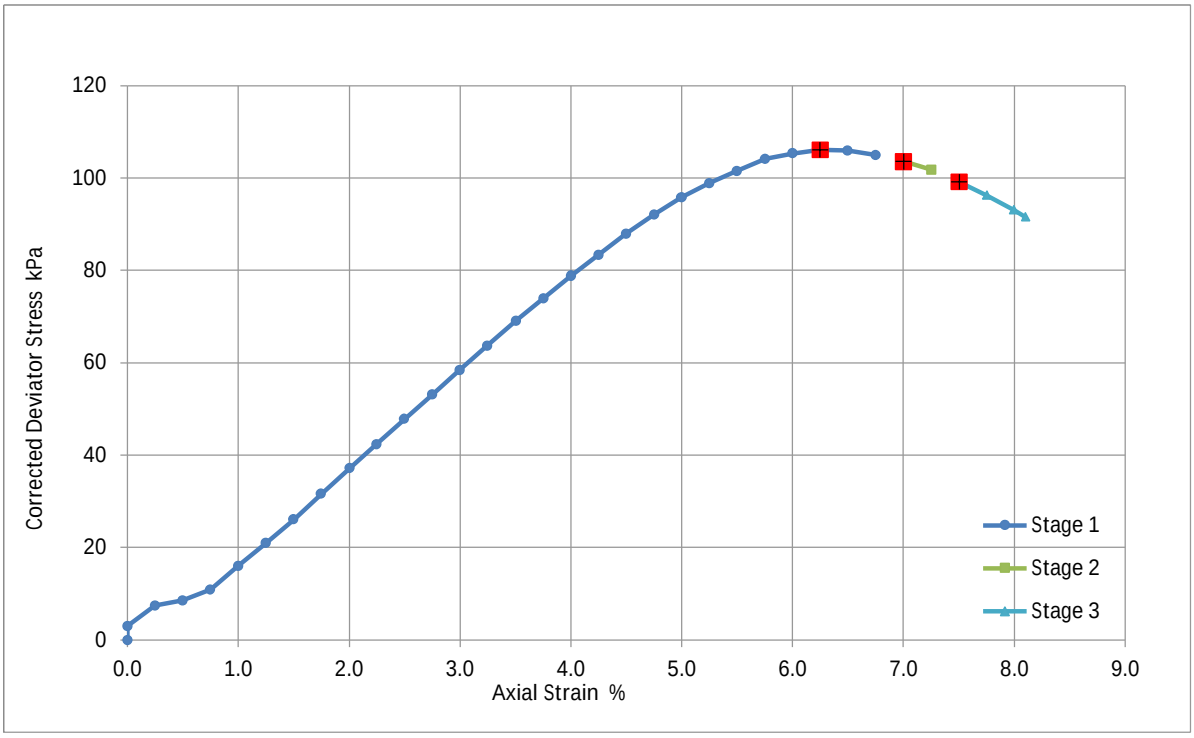
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty Sandy CLAY	Depth Top	7.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	62	kPa	ϕ_u	0.4	°
			c_u	60	kPa

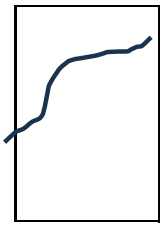
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Silty CLAY	Depth Top	10.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	35		
Bulk Density (Mg/m^3)	2.07		
Dry Density (Mg/m^3)	1.54		
Specimen Length (mm)	207.3		
Specimen Diameter (mm)	103.0		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	160	210	260
Deviator Stress (kPa)	106	104	99
Undrained Shear Strength (kPa)	53	52	50
Failure Strain (%)	6.2	7.0	7.5
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

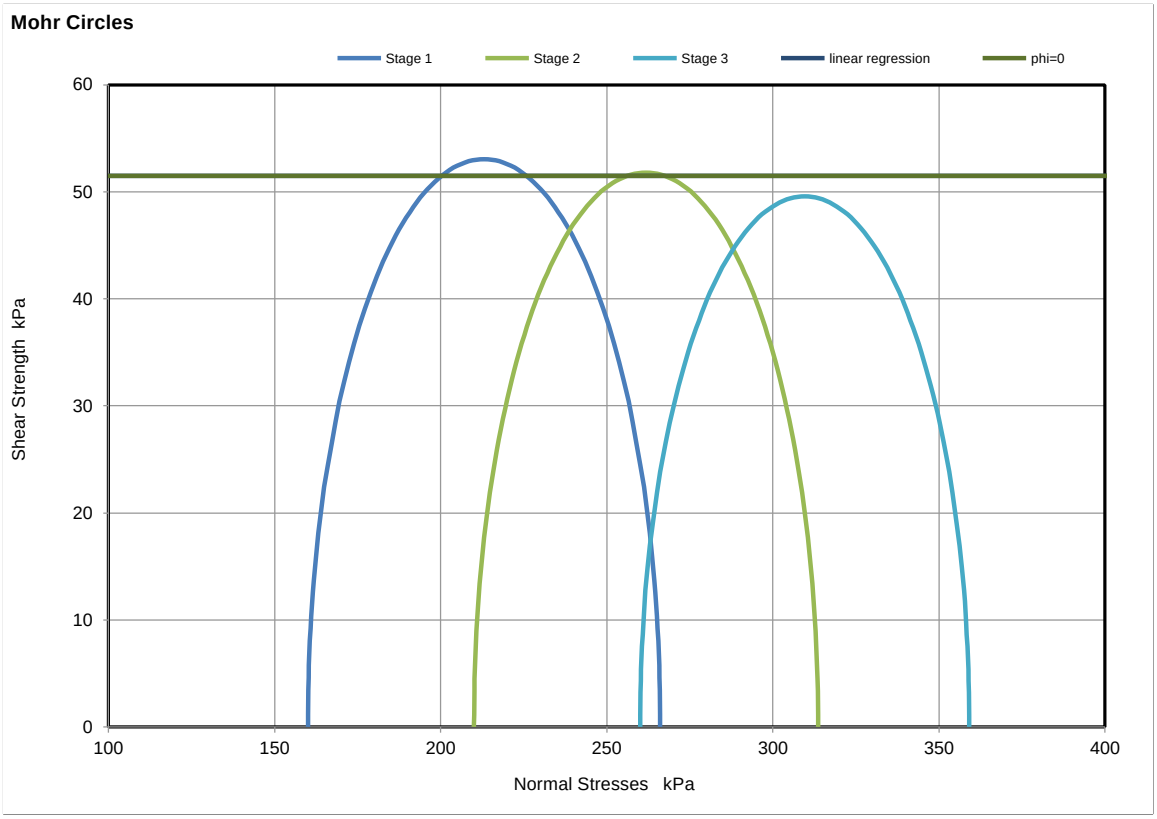
Notes.



Failure Sketch.

UKAS TESTING 2788

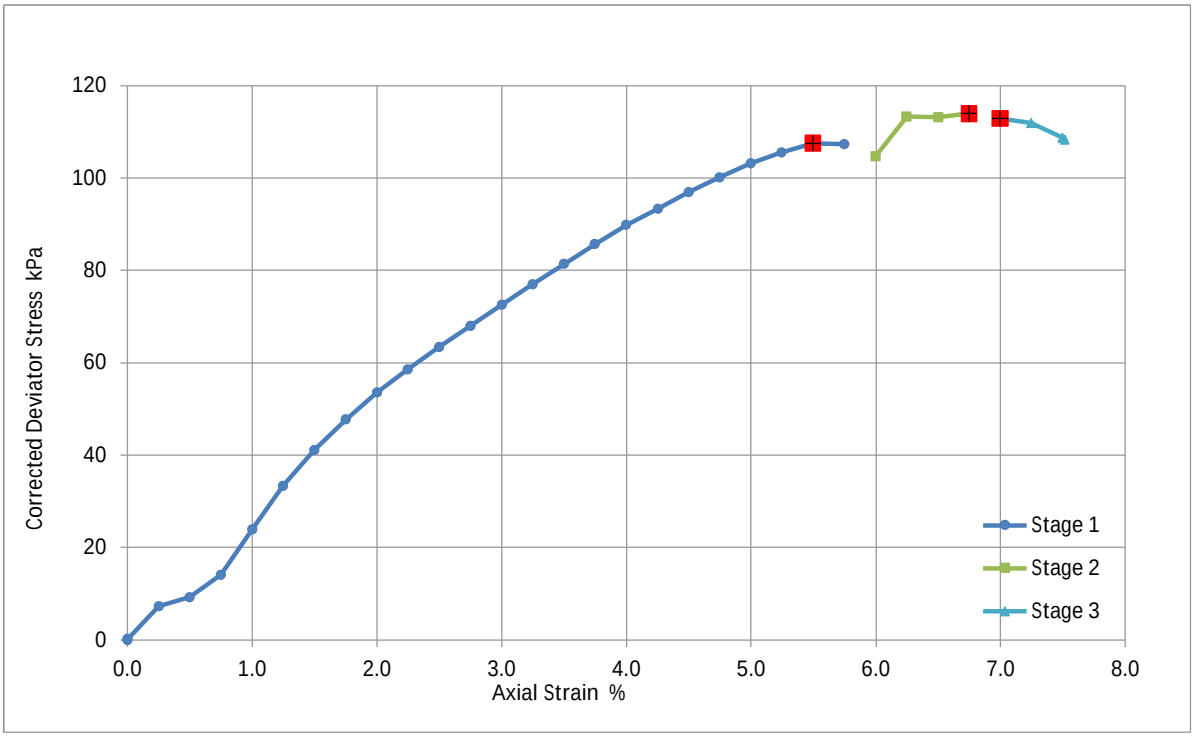
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Silty CLAY	Depth Top	10.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	51	kPa	ϕ_u	0	°
			c_u	51	kPa

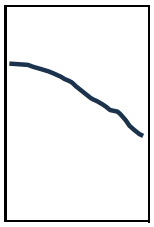
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty CLAY	Depth Top	13.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	23		
Bulk Density (Mg/m^3)	2.06		
Dry Density (Mg/m^3)	1.68		
Specimen Length (mm)	208.3		
Specimen Diameter (mm)	102.8		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	220	270	320
Deviator Stress (kPa)	108	114	113
Undrained Shear Strength (kPa)	54	57	56
Failure Strain (%)	5.5	6.7	7.0
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

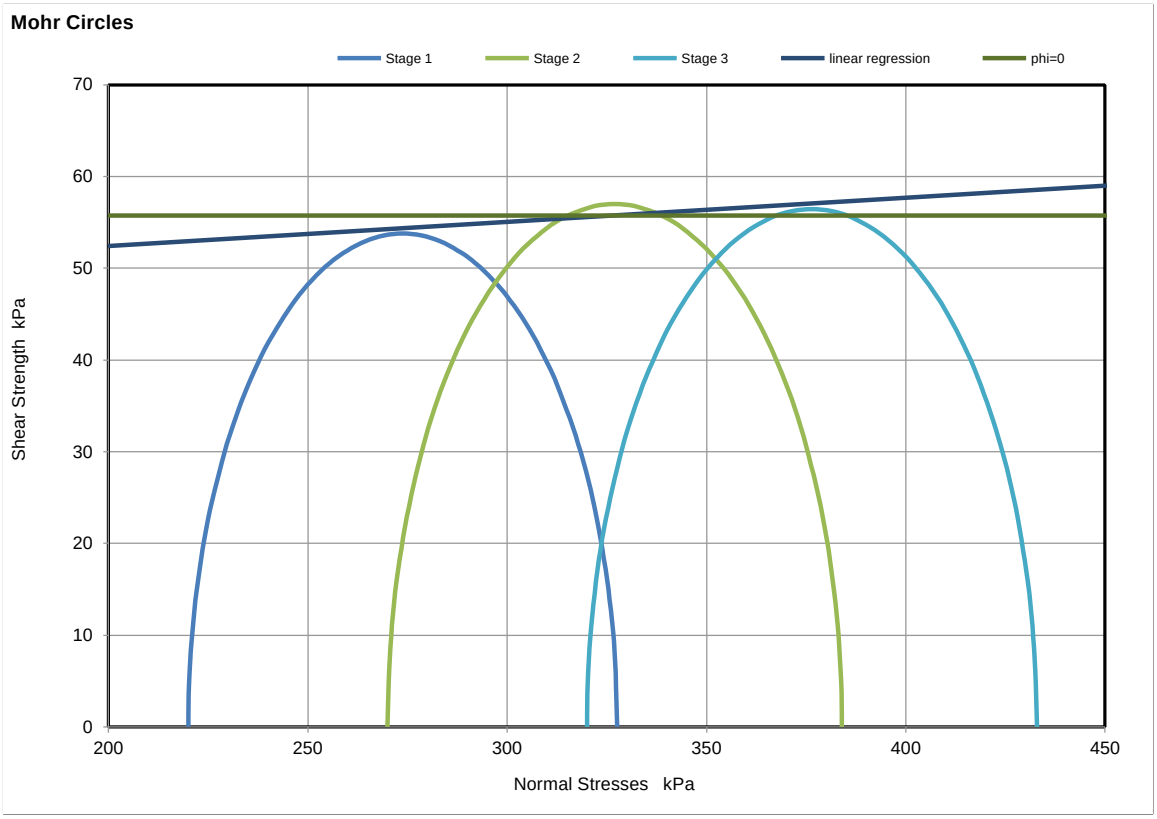
Notes.



Failure Sketch.

UKAS TESTING 2788

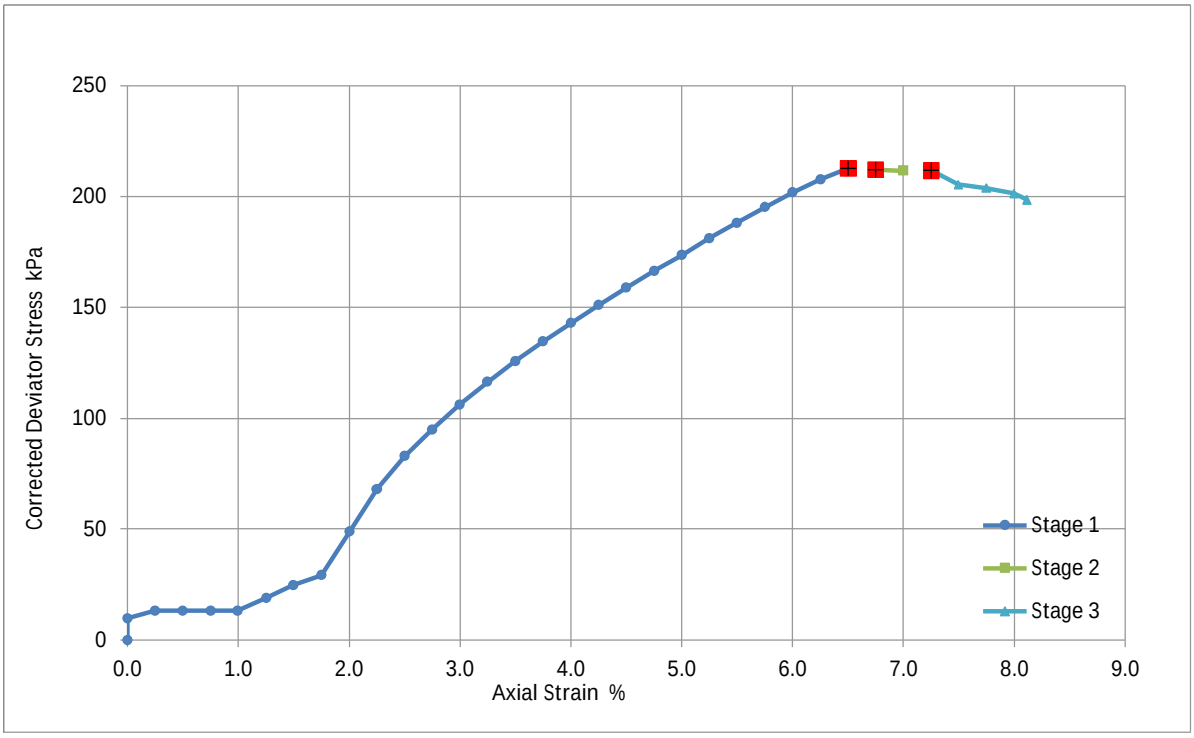
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Brown Gravelly Silty CLAY	Depth Top	13.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	56	kPa	ϕ_u	1.5	°
			c_u	47	kPa

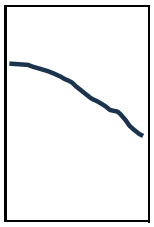
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	16.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	26		
Bulk Density (Mg/m^3)	2.02		
Dry Density (Mg/m^3)	1.60		
Specimen Length (mm)	208.6		
Specimen Diameter (mm)	103.1		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	280	330	380
Deviator Stress (kPa)	213	212	212
Undrained Shear Strength (kPa)	106	106	106
Failure Strain (%)	6.5	6.7	7.2
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

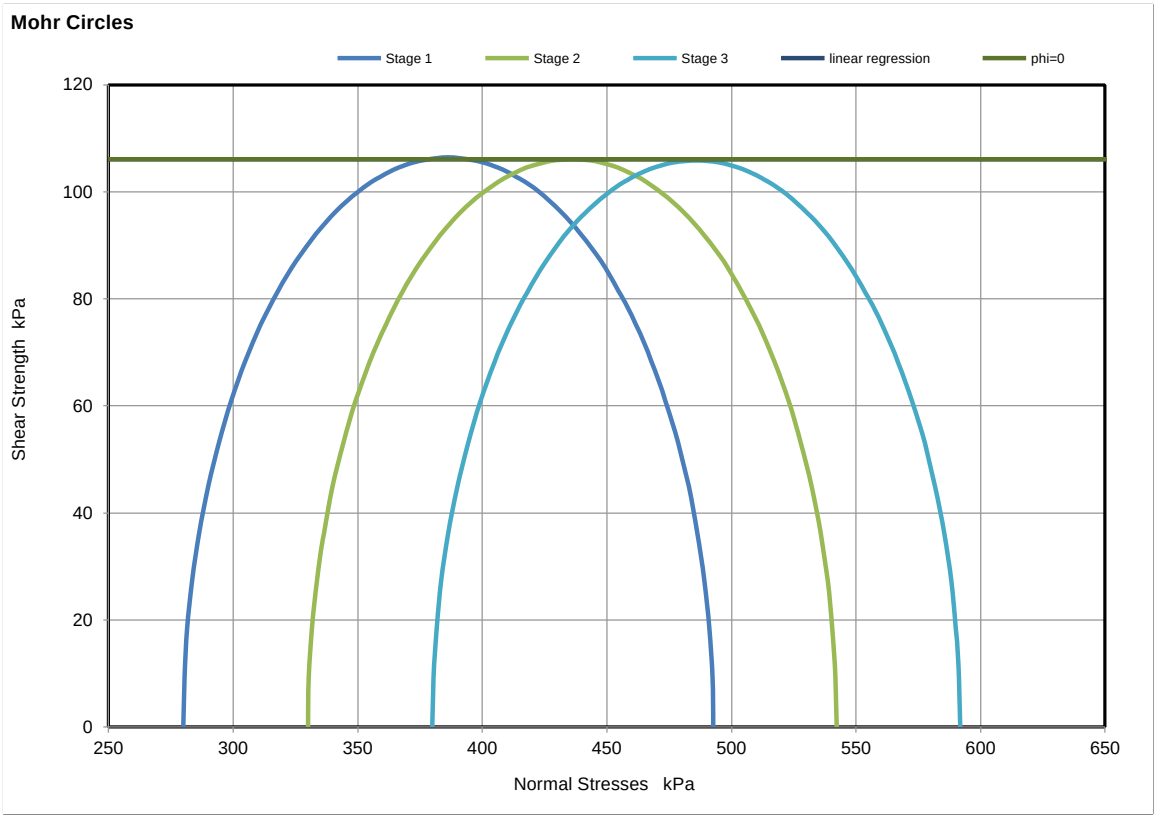
Notes.



Failure Sketch.

UKAS TESTING 2788

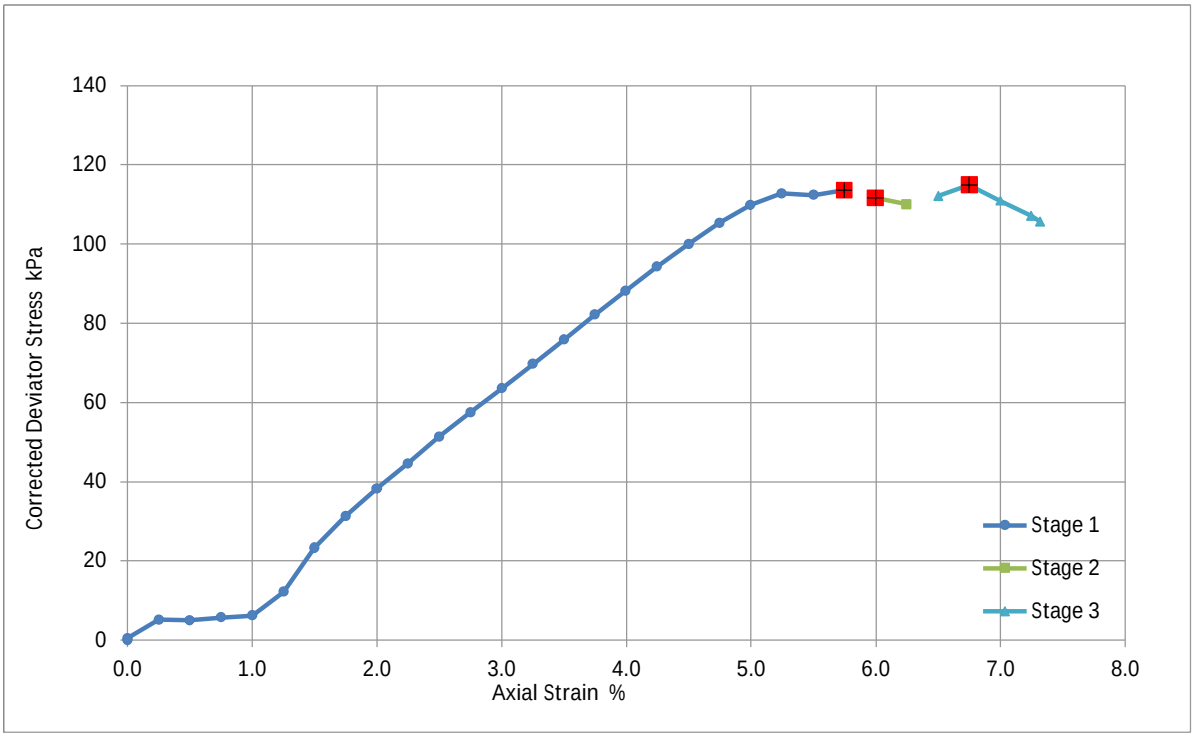
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	16.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	106	kPa	ϕ_u	0	°
			c_u	106	kPa

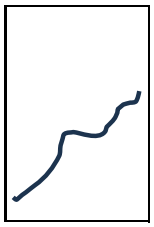
Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	19.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Operator	David E



Moisture Content (%)	30		
Bulk Density (Mg/m^3)	2.09		
Dry Density (Mg/m^3)	1.61		
Specimen Length (mm)	207.9		
Specimen Diameter (mm)	103.2		
Stage Number	**1**	**2**	**3**
Cell Pressures (kPa)	340	390	440
Deviator Stress (kPa)	114	112	115
Undrained Shear Strength (kPa)	57	56	57
Failure Strain (%)	5.7	6.0	6.7
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.4mm		
Rate of Strain (%/min)	3.00		

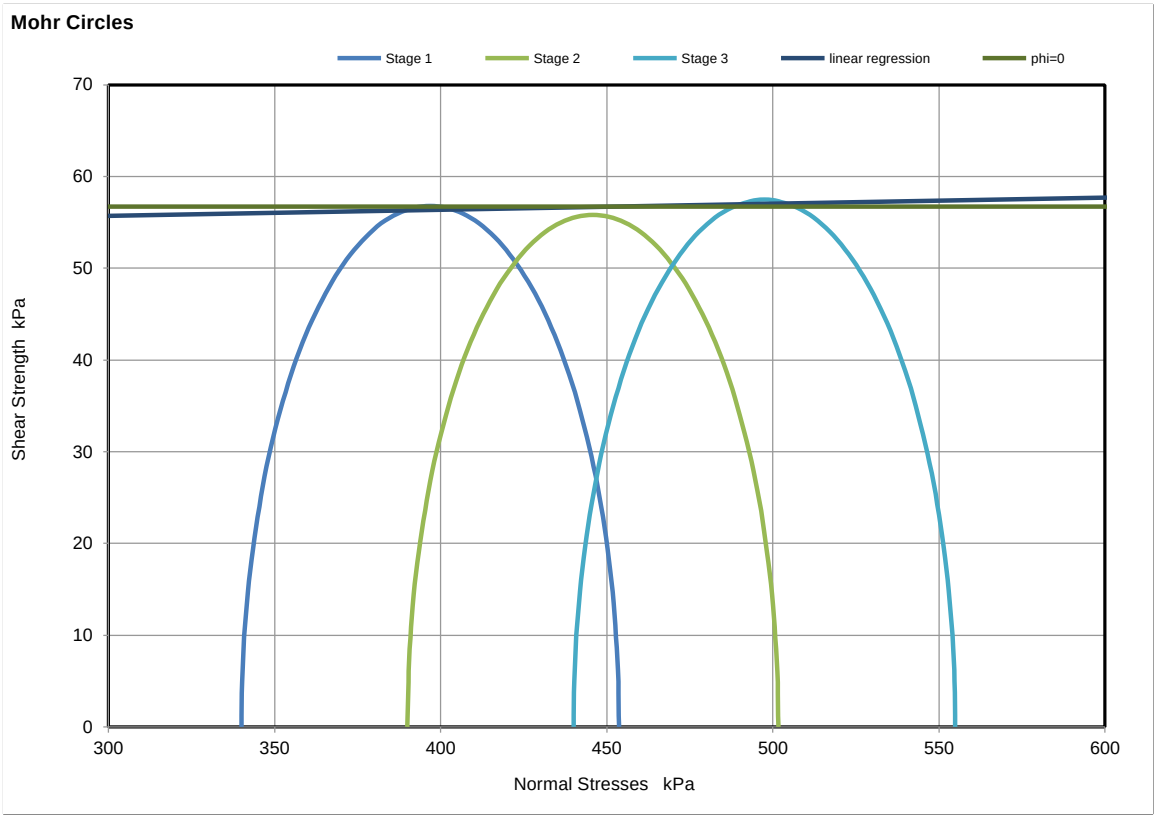
Notes.



Failure Sketch.

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Multi Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 9**	Contract Number	74050
		Borehole/Pit No.	BH2
Project Name	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	Sample No.	1
Soil Description	Grey / Brown Sandy Silty CLAY	Depth Top	19.50
		Depth Base	
Date Tested	09/08/2024	Sample Type	U
		Technician	David E



$\phi_u = 0$			Linear Regression		
Average c_u	57	kPa	ϕ_u	0.4	°
			c_u	54	kPa

Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

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groundandwater.co.uk

APPENDIX F: Chemical Laboratory Testing

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alice.tettmar@groundandwater.co.uk

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Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-034983

Project / Site name:	Former Dairy Crest Depot, Dunsbury Way	**Samples received on:**	07/08/2024
Your job number:	GWPR6068	**Samples instructed on/ Analysis started on:**	07/08/2024
Your order number:	GWPR6068	**Analysis completed by:**	13/08/2024
Report Issue Number:	1	**Report issued on:**	13/08/2024
Samples Analysed:	9 soil samples		

[redacted]

Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-034983
Project / Site name: Former Dairy Crest Depot, Dunsbury Way
Your Order No: GWPR6068

Lab Sample Number				280077	280078	280079	280080	280081
Sample Reference				BH01	BH01	BH01	BH01	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00-1.00	3.20-3.20	5.20-5.20	10.50-10.50	1.20-1.20
Date Sampled				18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	18	17	15	18
Total mass of sample received	kg	0.1	NONE	0.5	0.5	0.6	0.4	0.5

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.7	7.9	8	8.1	8.1
Total Sulphate as SO_4	%	0.005	MCERTS	0.128	0.008	0.125	0.126	0.065
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1200	37	1300	1300	590
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	609	18.7	642	645	296
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	16	2	15	8.7	5.7
Total Sulphur	mg/kg	50	MCERTS	640	71	4700	6300	370
Total Sulphur	%	0.005	MCERTS	0.064	0.007	0.465	0.63	0.037
Ammoniacal Nitrogen as NH_4^+	mg/kg	0.5	MCERTS	28	< 0.5	< 0.5	< 0.5	0.5
Ammonium as NH_4^+ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	1.81	< 0.05	< 0.05	< 0.05	< 0.05
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	5.3
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	3.1

Heavy Metals / Metalloids

Magnesium (leachate equivalent)	mg/l	2.5	NONE	7.1	< 2.5	36	32	7.4
Magnesium (water soluble)	mg/kg	5	NONE	14	< 5.0	72	64	15

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-034983
Project / Site name: Former Dairy Crest Depot, Dunsbury Way
Your Order No: GWPR6068

Lab Sample Number				280082	280083	280084	280085
Sample Reference				BH02	BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.20-4.20	7.95-7.95	16.95-16.95	19.95-19.95
Date Sampled				18/07/2024	18/07/2024	18/07/2024	18/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status				
Stone Content	%	0.1	NONE	56.6	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.4	15	15	16
Total mass of sample received	kg	0.1	NONE	0.5	1	0.8	0.5

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	10.6	7.6	8	7.8
Total Sulphate as SO_4	%	0.005	MCERTS	0.272	0.165	0.124	0.115
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	960	1700	1200	1100
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	482	871	615	536
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	39	4.2	17	3.4
Total Sulphur	mg/kg	50	MCERTS	1200	6800	22000	3100
Total Sulphur	%	0.005	MCERTS	0.12	0.677	2.2	0.311
Ammoniacal Nitrogen as NH_4^+	mg/kg	0.5	MCERTS	0.7	< 0.5	1.1	< 0.5
Ammonium as NH_4^+ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	0.05	< 0.05	0.08	< 0.05
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	39	33	37
Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	77	66	74

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-034983
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
280077	BH01	None Supplied	1.00-1.00	Brown clay and loam with gravel
280078	BH01	None Supplied	3.20-3.20	Brown clay and sand
280079	BH01	None Supplied	5.20-5.20	Brown clay and sand
280080	BH01	None Supplied	10.50-10.50	Brown clay and sand
280081	BH02	None Supplied	1.20-1.20	Brown clay and sand with gravel
280082	BH02	None Supplied	4.20-4.20	Brown gravel with stones *b
280083	BH02	None Supplied	7.95-7.95	Brown clay and sand
280084	BH02	None Supplied	16.95-16.95	Brown clay and sand
280085	BH02	None Supplied	19.95-19.95	Brown clay and sand

Analytical Report Number : 24-034983
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES	In-house method based on TRL 447	L038B	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078B	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

*b - Unaccredited sample matrix.

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e: reception@i2analytical.com

Analytical Report Number : 24-032141

Replaces Analytical Report Number: 24-032141, issue no. 1
Client references/information amended.
Site name amended at clients request

Project / Site name:	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	**Samples received on:**	23/07/2024
Your job number:	GWPR6068	**Samples instructed on/ Analysis started on:**	23/07/2024
Your order number:	GWPR6068	**Analysis completed by:**	29/07/2024
Report Issue Number:	2	**Report issued on:**	30/07/2024
Samples Analysed:	2 soil samples - 1 leachate sample		

[redacted]

Signed:

Adam Fenwick
Key Account Executive
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Application of uncertainty of measurement would provide a range within which the true result lies.
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Analytical Report Number: 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ
Your Order No: GWPR6068

Lab Sample Number				265002	265003
Sample Reference				BH1	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				0.80-0.80	0.40-0.40
Date Sampled				16/07/2024	18/07/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	16
Total mass of sample received	kg	0.1	NONE	1.1	1.1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MWI	MWI

General Inorganics

pH (L005B)	pH Units	N/A	MCERTS	-	7.5
pH (L099)	pH Units	N/A	MCERTS	10.5	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1900	250
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	973	125
Organic Matter (automated)	%	0.1	MCERTS	1.1	1.5
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	0.9
Loss on Ignition @ 450°C	%	0.2	MCERTS	-	2.8
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	-	4.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.06	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.1	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.08	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.6	0.13
Anthracene	mg/kg	0.05	MCERTS	0.32	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	2.4	0.33
Pyrene	mg/kg	0.05	MCERTS	1.9	0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1	0.16
Chrysene	mg/kg	0.05	MCERTS	1.1	0.17
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	1.3	0.17
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.48	0.13
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.98	0.19
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.51	0.12
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.14	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.56	< 0.05
Coronene	mg/kg	0.05	NONE	-	0.08

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	12.5	1.7
Total WAC-17 PAHs	mg/kg	0.85	NONE	-	1.77

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	8.8
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ
Your Order No: GWPR6068

Lab Sample Number				265002	265003
Sample Reference				BH1	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				0.80-0.80	0.40-0.40
Date Sampled				16/07/2024	18/07/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	280	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.9	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	30	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	54

Petroleum Hydrocarbons

TPHCWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.01	MCERTS	-	< 0.020
TPHCWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.01	MCERTS	-	< 0.020
TPHCWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.01	MCERTS	-	< 0.050
TPHCWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0
TPHCWG - Aliphatic >EC35 - EC40 EH_CU_1D_AL	mg/kg	10	NONE	-	< 10
TPHCWG - Aliphatic >EC5 - EC35 EH_CU+HS_1D_AL	mg/kg	10	NONE	-	< 10
TPHCWG - Aliphatic >EC5 - EC40 EH_CU+HS_1D_AL	mg/kg	10	NONE	-	< 10

TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	MCERTS	-	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	MCERTS	-	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.02	MCERTS	-	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	< 10
TPHCWG - Aromatic >EC35 - EC40 EH_CU_1D_AR	mg/kg	10	NONE	-	< 10
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	-	< 10
TPHCWG - Aromatic >EC5 - EC40 EH_CU+HS_1D_AR	mg/kg	10	NONE	-	< 10

TPH Total >EC5 - EC40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	-	< 10

Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	-	< 10

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-	< 5.0
Benzene	µg/kg	5	MCERTS	-	< 5.0
Toluene	µg/kg	5	MCERTS	-	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	-	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	-	< 5.0
o-Xylene	µg/kg	5	MCERTS	-	< 5.0

Total BTEX	µg/kg	5	MCERTS	-	< 5.0

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	-	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	-	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	-	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	-	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	-	< 0.001

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Analytical Report Number: 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ
Your Order No: GWPR6068

Lab Sample Number				265002	265003
Sample Reference				BH1	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				0.80-0.80	0.40-0.40
Date Sampled				16/07/2024	18/07/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		
PCB Congener 153	mg/kg	0.001	MCERTS	-	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	-	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	-	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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i2 Analytical
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Waste Acceptance Criteria Analytical Results

Report No:	24-032141						
					Client: GANDW		
Location	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ						
Lab Reference (Sample Number)	265003				Landfill Waste Acceptance Criteria Limits		
Sampling Date	18/07/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH2						
Depth (m)	0.40-0.40						
Solid Waste Analysis							
TOC (%)**	0.9				3%	5%	6%
Loss on Ignition (%) **	2.8				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.77				100	--	--
pH (units)**	7.5				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	4.6				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l			mg/kg			
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0234			0.234	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0030			0.030	0.5	10	70
Copper *	0.017			0.17	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00213			0.0213	0.5	10	30
Nickel *	0.0021			0.021	0.4	10	40
Lead *	0.0041			0.041	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.016			0.16	4	50	200
Chloride *	0.75			7.5	800	15000	25000
Fluoride*	0.33			3.3	10	150	500
Sulphate *	16			160	1000	20000	50000
TDS*	66			660	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.51			75.1	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	84						
Moisture (%)	16						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

* = UKAS accredited (liquid eluate analysis only)

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Analytical Report Number : 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
265002	BH1	None Supplied	0.80-0.80	Brown clay with gravel
265003	BH2	None Supplied	0.40-0.40	Brown clay with gravel

Analytical Report Number : 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE

Analytical Report Number : 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))

Analytical Report Number : 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
CU	Clean-up - e.g. by Florisil®, silica gel				
1D	GC - Single coil/column gas chromatography				
2D	GC-GC - Double coil/column gas chromatography				
Total	Aliphatics & Aromatics				
AL	Aliphatics				
AR	Aromatics				
#1	EH_2D_Total but with humics mathematically subtracted				
#2	EH_2D_Total but with fatty acids mathematically subtracted				
_	Operator - underscore to separate acronyms (exception for +)				
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total				

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-032141
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH1	N/A	S	265002	c	Total cyanide in soil	L080	c

UKAS TESTING
4041

Environmental Science

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Analytical Report Number : 24-035877

Project / Site name:	Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ	**Samples received on:**	09/08/2024
Your job number:	GWPR6068	**Samples instructed on/ Analysis started on:**	13/08/2024
Your order number:	GWPR6068	**Analysis completed by:**	16/08/2024
Report Issue Number:	1	**Report issued on:**	16/08/2024
Samples Analysed:	1 water sample		

Signe[redacted]

Rafał Szczepańczyk
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

UKAS TESTING
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Analytical Environmental Science

Analytical Report Number: 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Your Order No: GWPR6068

Lab Sample Number	284243
Sample Reference	WS105
Sample Number	None Supplied
Depth (m)	3.00
Date Sampled	16/08/2024
Time Taken	None Supplied

Analytical Parameter (Water Analysis)	Units	Test Limit of detection	Test Accreditation Status	
General Inorganics				
pH (L099)	pH Units	N/A	ISO 17025	7
Total Cyanide (Low Level 1 µg/l)	µg/l	1	NONE	< 1.0
Sulphate as SO_4	mg/l	0.045	ISO 17025	9.33
Total Phenols				
Total Phenols (Monohydric) Low Level	µg/l	1	NONE	< 1.0
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.09
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.05
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	14
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	9.2
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.7
Boron (dissolved)	µg/l	10	ISO 17025	44
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0

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Analytical Report Number: 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Your Order No: GWPR6068

Lab Sample Number				284243
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				3.00
Date Sampled				16/08/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Petroleum Hydrocarbons

TPH - Aliphatic >EC5 - EC6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >EC6 - EC8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >EC8 - EC10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >EC10 - EC12 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC12 - EC16 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC16 - EC21 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC21 - EC35 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC5 - EC35 HS+EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC35 - EC40 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH - Aliphatic >EC5 - EC40 HS+EH_1D_AL_MS	µg/l	10	NONE	< 10

TPH - Aromatic >EC5 - EC7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC7 - EC8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC8 - EC10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC10 - EC12 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC12 - EC16 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC16 - EC21 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC21 - EC35 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC5 - EC35 HS+EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC35 - EC40 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH - Aromatic >EC5 - EC40 HS+EH_1D_AR_MS	µg/l	10	NONE	< 10

TPH Total (>EC5 - EC40) HS+EH_1D_TOTAL_MS	µg/l	10	NONE	< 10

VOCs

Chloromethane	µg/l	3	ISO 17025	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0
Trans 1,2-dichloroethylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0
2,2-Dichloropropane	µg/l	3	NONE	< 3.0
Chloroform	µg/l	3	ISO 17025	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0
Carbontetrachloride	µg/l	3	ISO 17025	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0

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Analytical Report Number: 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Your Order No: GWPR6068

Lab Sample Number				284243
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				3.00
Date Sampled				16/08/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	Units	Test Limit of detection	Test Accreditation Status	
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0
Bromoform	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	NONE	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05

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Analytical Report Number: 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Your Order No: GWPR6068

Lab Sample Number				284243
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				3.00
Date Sampled				16/08/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	Units	Test Limit of detection	Test Accreditation Status	
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	39
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	0.45
4-Nitroaniline	µg/l	0.05	NONE	< 0.05
Azobenzene	µg/l	0.05	NONE	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05
Carbazole	µg/l	0.05	NONE	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05

3+4-Methylphenol	µg/l	0.1	NONE	< 0.10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Monohydric phenols (low level) in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	NONE
Total cyanide (low level) in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	NONE
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088B	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Phenols in water by GC-MS	Determination of phenols in water by GC-MS	In-house method	L102B	W	NONE

Analytical Report Number : 24-035877
Project / Site name: Former Dairy Crest Depot, Dunsbury Way, Havant PO9 5BQ

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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Analytical Report Number : 24-037309

Project / Site name:	Former Dairy Crest Depot, Dunsbury Way	**Samples received on:**	13/08/2024
Your job number:	GWPR6068	**Samples instructed on/ Analysis started on:**	20/08/2024
Your order number:	GWPR6068	**Analysis completed by:**	23/08/2024
Report Issue Number:	1	**Report issued on:**	23/08/2024
Samples Analysed:	2 soil samples		

Signed: [redacted]

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way
Your Order No: GWPR6068

Lab Sample Number				291569	291570
Sample Reference				WS101	WS102
Sample Number				None Supplied	None Supplied
Depth (m)				1.00	0.80
Date Sampled				07/08/2024	07/08/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		
Stone Content	%	0.1	NONE	65.4	< 0.1
Moisture Content	%	0.01	NONE	4.9	11
Total mass of sample received	kg	0.1	NONE	0.8	0.8

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	PKU	PKU
Actinolite detected	Type	N/A	ISO 17025	Not-detected	-
Amosite detected	Type	N/A	ISO 17025	Detected	-
Anthophyllite detected	Type	N/A	ISO 17025	Not-detected	-
Chrysotile detected	Type	N/A	ISO 17025	Not-detected	-
Crocidolite detected	Type	N/A	ISO 17025	Not-detected	-
Tremolite detected	Type	N/A	ISO 17025	Not-detected	-

Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	Loose Fibres	-

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	11.5	8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	310	450
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	156	224
Organic Matter (automated)	%	0.1	MCERTS	0.9	1.6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	0.9

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.08
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.15
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.13
Phenanthrene	mg/kg	0.05	MCERTS	0.23	1.6
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.49
Fluoranthene	mg/kg	0.05	MCERTS	0.46	2.9
Pyrene	mg/kg	0.05	MCERTS	0.41	2.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	1.4
Chrysene	mg/kg	0.05	MCERTS	0.25	1.4
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.27	1.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.15	0.76
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.25	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.49
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.14	0.53

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.15	15.4

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Analytical Report Number: 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way
Your Order No: GWPR6068

Lab Sample Number				291569	291570
Sample Reference				WS101	WS102
Sample Number				None Supplied	None Supplied
Depth (m)				1.00	0.80
Date Sampled				07/08/2024	07/08/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.5	9.6
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	91	61
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.1	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	39
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	84	79

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
291569	WS101	None Supplied	1	Brown sand with gravel and stones
291570	WS102	None Supplied	0.8	Brown clay and sand with gravel and vegetation

Analytical Report Number : 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS

Analytical Report Number : 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-037309
Project / Site name: Former Dairy Crest Depot, Dunsbury Way

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS101	N/A	S	291569	c	Total cyanide in soil	L080	c
WS102	N/A	S	291570	c	Total cyanide in soil	L080	c