



PHASE 2 GROUND INVESTIGATION FOR PROPOSED CRICKET PAVILION

AT

GWERSYLLT PARK CRICKET CLUB, GWERSYLLT LL11 4DA

30TH MARCH 2023

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Geotechnical Design, Earthworks & Materials Reuse, Waste Assessments & Classification

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CONTENTS

1.0	INTRODUCTION	4
1.1.	Background	4
1.2.	Proposed Development	4
1.3.	Objectives	4
1.4.	Existing Information	5
1.5.	Confidentiality	5
1.6.	Limitations	5
2.0	SITE SETTING	7
2.1.	Site Details	7
2.2	Geology and Site History	8
2.3	Phase 1 Geoenvironmental Assessment	10
3.0	SITE INVESTIGATION	11
3.1	Site Investigation Rationale	11
3.2	Fieldwork	11
4.0	GROUND CONDITIONS	12
4.1	Anthropogenic Material	12
4.2	Topsoil	12
4.3	Natural Superficial Material	12
4.4	Bedrock	12
4.5	Groundwater	12
4.6	Contamination	12
5.0	LABORATORY TESTING	13
6.0	PHASE 2 ENVIRONMENTAL RISK ASSESSMENT	14
6.1	Introduction	14
6.2	Assessment for the Protection of Human Health	14
6.3	Assessment for the Risk to Plant Life	14
6.4	Assessment for the Protection of Controlled Waters	14
6.5	Assessment for Water Supply Pipes	14
6.6	Chemical Attack on Below Ground Concrete	15
6.7	Permanent Ground Gases	15
7.0	GEOTECHNICAL ASSESSMENT	15
7.1	Proposed Development	15
7.2	Trees and Clay Soils	15
7.3	Foundation Conditions & Bearing Capacity	15
7.4	Excavations & Stability	16
7.5	Mining	16
8.0	CONCLUSION	17
	APPENDIX I – LIMITATIONS	18
	APPENDIX II – BOREHOLE AND HAND PIT LOGS	20
	APPENDIX III – LABORATORY TEST RESULTS	21

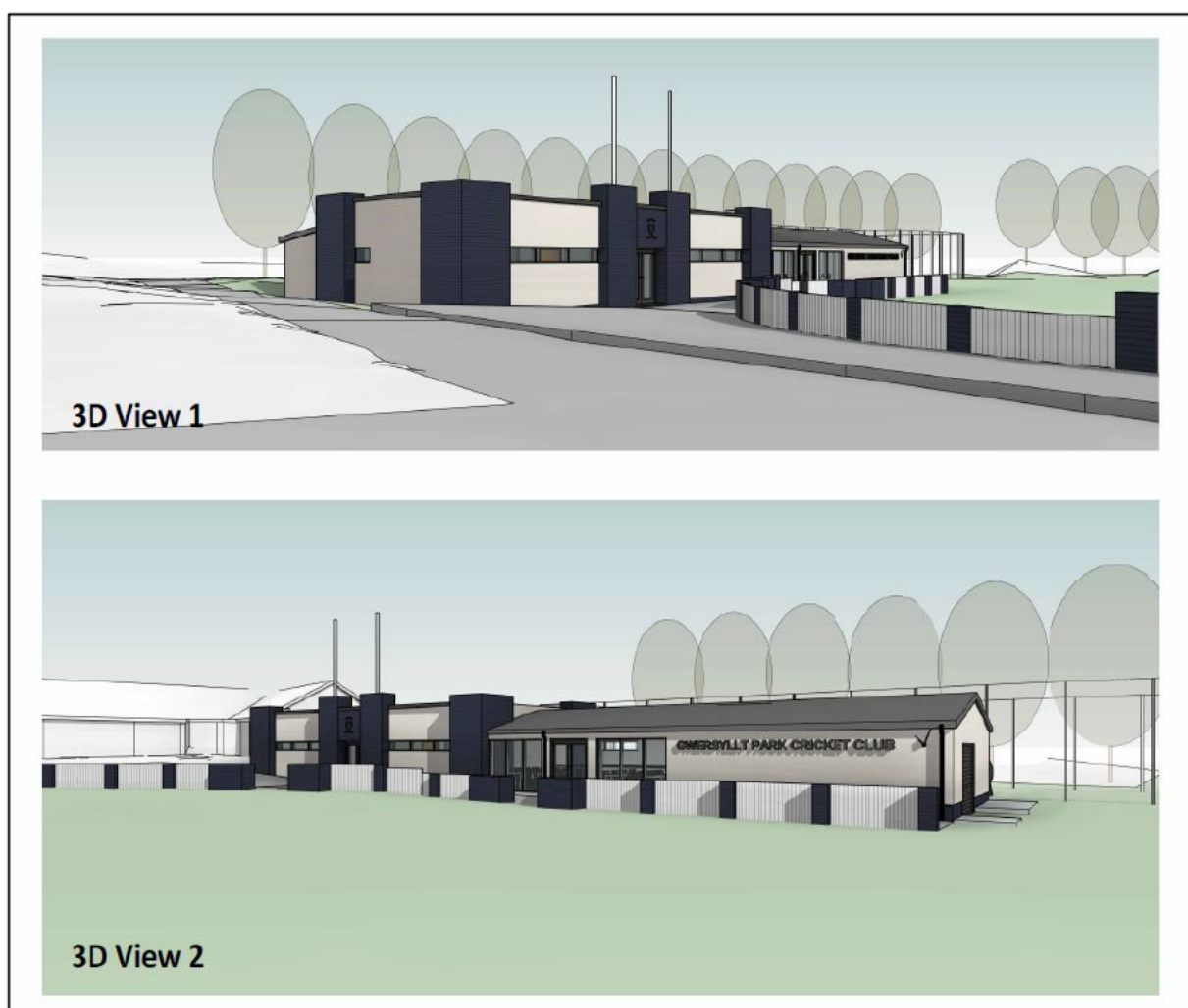
1.0 INTRODUCTION

1.1. Background

C Eccles Brownfield Engineering Consultancy has been commissioned by Engineering Assist, who are acting as Project Manager/Designer on behalf of Gwersyllt Cricket Club, hereafter referred to as “the Client”, to undertake a ground investigation to determine the shallow ground conditions at the site of a proposed new cricket pavilion at Gwersyllt Park Cricket Club, Park Wall Road, Gwersyllt, Wrexham LL11 4DA.

1.2. Proposed Development

It is understood that the proposed development comprises the construction of a new cricket pavilion which will be relatively lightly loaded, it is understood that line loads of <75kN/m and point loads of <75kN are expected for this scheme. An illustration of the proposed building is given in Figure 1.



TAKEN FROM PLANNING PORTAL DOCUMENTS)

1.3. Objectives

The development has been granted planning permission (reference [P/2022/0936](#)) by Wrexham Council, with conditions. This report seeks to discharge Condition 6 and Condition 7, which are related to contaminated land and are reproduced below:

***Condition 6:** No part of the development hereby approved shall commence until a scheme to deal with potential contamination at the site has been submitted to and approved in writing by the Local Planning Authority. The scheme shall include a phased investigation approach to identify the extent of contamination and any measures required to remediate the site, including post-development monitoring. Alternatively, gas protection measures should be installed in all new buildings. A methodology of these works (including specification details, design plans, installation, inspection and validation details) shall be submitted to and approved in writing by the Local Planning Authority prior to any works commencing on site. Thereafter, the development shall be undertaken in accordance with the approved details at all times.*

***Condition 7.** Each part of the site subject to the remediation under the scheme(s) approved as part of condition 6, shall not be occupied or brought into use until a Validation Report has been completed in respect of that part of the site and submitted to and approved in writing by the Local Planning Authority.*

***Reasons:** To ensure that the proposed development does not result in any adverse impacts arising from ground contamination from known nearby potential sources.*

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including but not limited to:

- Part IIA of the Environment Protection Act, 1990;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (HCA, March 2012);
- BS5930:2015 +A1 2020: "Code of practice for site investigations";
- BS10175: 2011 +A1:2013 "Investigation of Potentially Contaminated Sites - Code of Practice";
- The Building Regulations 2010. Part C (HM Government 2013)
- DEFRA/Environment Agency (2004) Report CLR11 "Model Procedures for the Management of Land Contamination";
- Environment Agency (2011) Report GPLC1 "Guiding Principles for Land Contamination";
- Environment Agency (2017) Report GP3 "Groundwater protection: Principles and Practice."

1.4. Existing Information

A Phase 1 study for the development has been undertaken by e-geo Solutions Ltd and was provided by the Client. A summary of this report is given in Section 2. The report reference is:

e-geo Solutions Ltd : "Land at Gwersyllt Park Cricket Club, Gwersyllt, LL11 4DX: Stage 1- Phase 1 – Desk Study and Preliminary Geotechnical and Ground Contamination Risk Assessment" Report No E1579.S1.P1.R1 May 2022.

1.5. Confidentiality

C Eccles Brownfield Engineering Consultancy has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from C Eccles Brownfield Engineering Consultancy. A charge may be levied against such approval.

1.6. Limitations

The full limitations of this report are presented in Appendix I.

The findings and conclusions of this report have been set out and recommendations given for the proposed construction. If there is a subsequent change in the proposed use, the assessments and conclusions should be reviewed to determine whether they are still applicable for the revised end use.

2.0 SITE SETTING

2.1. Site Details

The site area is located within the grounds of Gwersyllt Park Cricket Club, on Park Wall Road, approximately 1km northeast of the centre of Gwersyllt, Wrexham. The site location is shown in Figure 2.

The site is within a mainly residential area, bordered by the cricket field to the east, Park Wall Road and residential properties to the south, and a bowling green, car park and existing single storey club buildings to the west. To the north is an area of woodland with public footpaths.

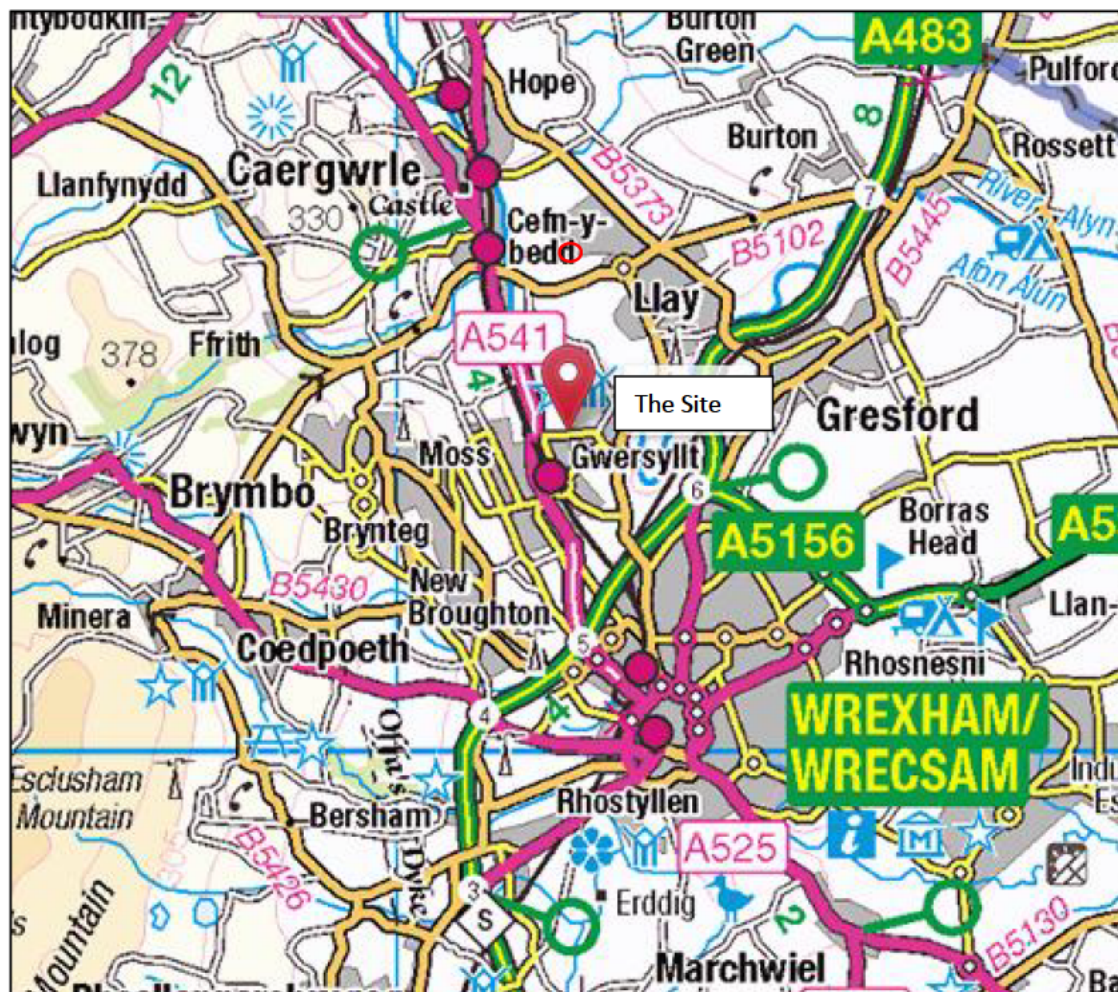


FIGURE 2 SITE LOCATION

The new pavilion is proposed at the northern end of the site and an existing store of concrete block construction which was constructed by members of the cricket club in the 70s will be demolished.

The proposed location is shown in Figure 3.

Table 1: Site Summary	
Site Address	Gwersyllt Park Cricket Club, Park Wall Road, Gwersyllt, Wrexham LL11 4DA
National Grid Reference	332169 354053
Site Area	Around 40mx20m in overall plan

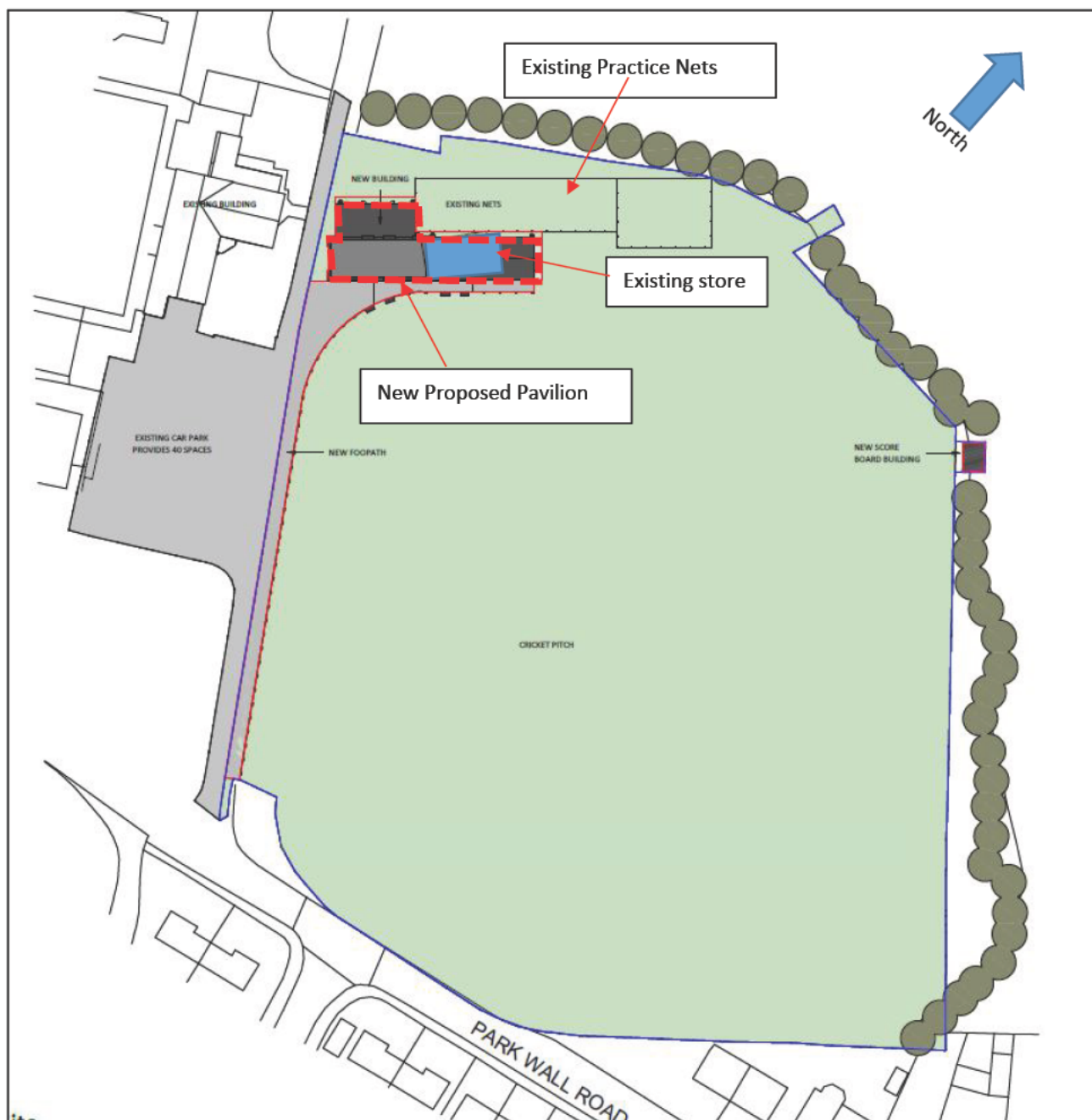


FIGURE 3: LOCATION OF EXISTING AND PROPOSED BUILDINGS (TAKEN FROM PLANNING PORTAL DOCUMENTS)

2.2 Geology and Site History

The Phase 1 report (See Section 1.4) described the geology below the site:

The British Geological Survey Map 50,000 scale series indicates that the near surface deposits below the site are Glaciofluvial Sheet Deposits of sand and gravel. The solid geology below the site comprises mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation.

The Phase 1 report included a Coal Authority Consultants Mining Report which notes that the shallowest recorded worked coal seams are 183m deep below the site. The Phase 1 report concluded that these were too deep to affect the site. Unrecorded shallower workings are unlikely, although it is noted that the area is one in which mining was prevalent. Gwersyllt Colliery is located about 600m to the south west of the site.

The superficial sands and gravels have been worked in the area:

The Glaciofluvial Sheet Deposits of sand and gravel extend over a large area for several hundred meters to the west, south and east but are likely to have been worked to the north and immediately west of the site area. The sand and gravel are likely to be present to depths of 8 to 12m. The deposits will be of high permeability.

There is an extensive area of made ground to the north and west of the site area, where there were sand and gravel pits. The access track area is at the boundary of the made ground and as the area was always a track it is probably underlain by natural sand and gravel. The area of the new building within the cricket ground is likely to be underlain by sand and gravel that has been worked to create the flat, level surface.

The area of made ground is shown as a landfill, operated by Wrexham Maelor Borough Council between 1973 and 1984 which accepted Inert, Industrial, Commercial, Household, Special waste. The Groundsure report presented in the Phase 1 Report shows the area of sand and gravel pits to go around the cricket pitch area. The landfill is shown across the entire area, and all the way to the river in the north east. This is shown in Figure 4.

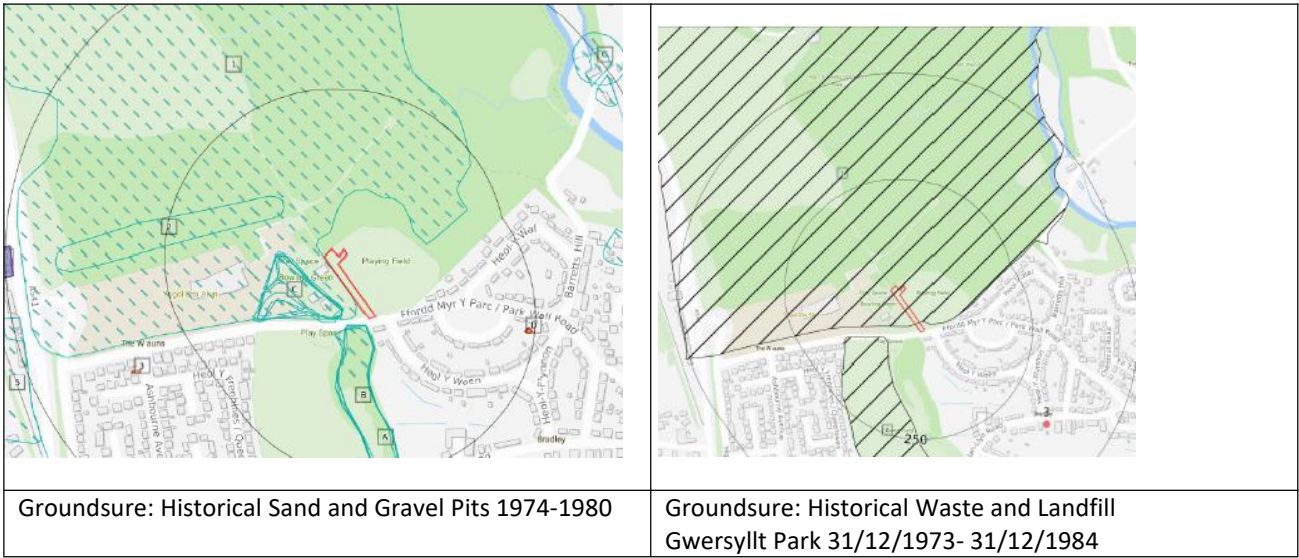


FIGURE 4: SAND AND GRAVEL PITS VERSUS LANDFILL AREA

A brief review of the site’s history from the desk study report indicates the site has been largely undeveloped throughout its mapped history. Further examination of the historical maps, and additional maps discovered online, was undertaken to attempt to gain more information about the landfill and its extents.

Historical maps at 1:2,500 scale in the Phase 1 cover from 1874 to 2003, but no larger scale plans are included. There is no coverage of the site or the Gwersyllt park area between 1912 and 1962 and between 1962 and 1986 so there are no maps showing the sand and gravel pits and the landfill, which are dated 1973-1984. Another map (1964) was found online, at a larger scale, showing a cricket pitch further north than presently, into the park area. This is shown in Figure 5.

Gwersyllt Park is marked as a park throughout its mapped history.

Anecdotal evidence from longstanding members of the cricket club who have lived in Gwersyllt since childhood is that the cricket club was once located to the north, within the area now designated as Gwersyllt Park, and was moved south to its current site in the 70s, at which time the store shed was built. The members remember the boundary of the infilling being at the edges of the cricket field, as shown on the historical sand and gravel pit map.

The location of the landfill is further discussed in Section 4.

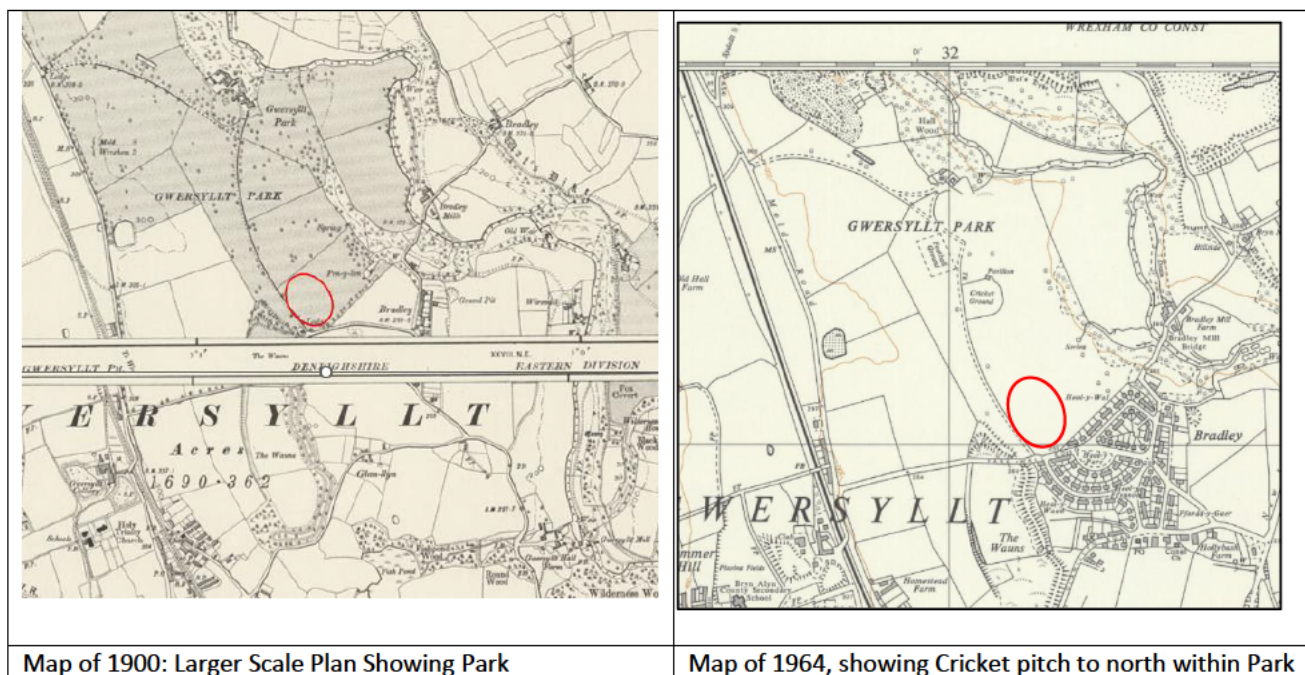


FIGURE 5: ADDITIONAL MAPS

2.3 Phase 1 Geoenvironmental Assessment

The Phase 1 report (See Section 1.4) described the following potential sources of contamination on site:

- Made Ground: fill of probably natural origin
- Ground gas from adjacent landfill

No potential pathways to sensitive surface or groundwater receptors were identified. The report concluded that:

The information collected has allowed an assessment of the geological, hydro geological and potential contamination status of the site to be made. The assessment has identified that the likelihood of significant solid contaminants and hazards being present on site is very low. However due to possible waste disposal on adjacent land there may be risks from hazardous gasses.

In addition, full radon protection measures were recommended as the site is within a radon affected area with between 10% and 30% of properties above the Action Level as defined by the Health Protection Agency.

The historic filling occurred off site and about It is noted that full radon protection measures will give an equivalent protection to CS3 or CS4 standards, which would cover all but the very worst ground gas conditions, such as the building being located directly above actively gassing wastes. This is further discussed in Section 6. Note that no ground gas monitoring

3.0 SITE INVESTIGATION

3.1 Site Investigation Rationale

The location of the exploratory holes was decided on site by C Eccles Brownfield Engineering Consultancy with the aim of obtaining a spread of positions across the accessible area whilst avoiding buried services. The hole locations are shown in Figure 6.

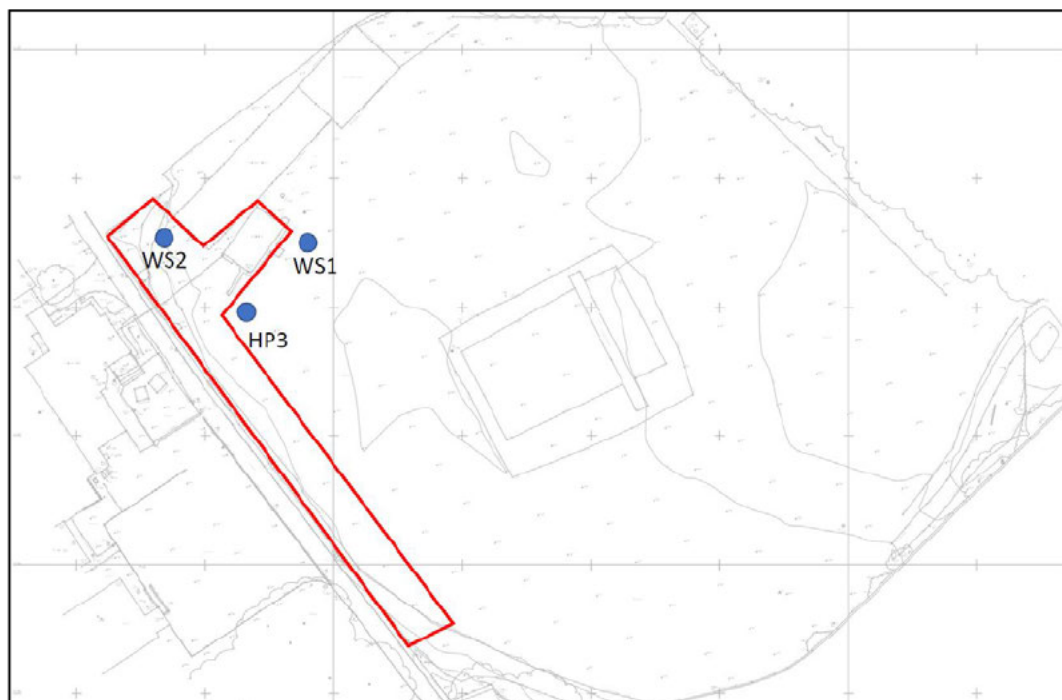


FIGURE 6: EXPLORATORY HOLE LOCATION PLAN

3.2 Fieldwork

Fieldworks were conducted on the 9th March 2023. A geologist with 27 years' experience supervised the works, described the ground encountered and carried out in-situ testing.

Fieldwork procedures were undertaken in accordance with the relevant sections of: BS5930:2015 + A1:2020 "Code of Practice for Site Investigations."

The investigation comprised two boreholes undertaken with a window sample rig. Shear strength was estimated using hand field tests and from the results of CPT and SPT in situ testing carried out in the boreholes. In addition, a pit was dug by hand into the shallow superficial deposits to carry out infiltration testing for the design of drainage soakaways.

The depths of exploratory holes, descriptions of strata encountered and comments on groundwater conditions are given on the records in Appendix II.

Table 2: Summary of Exploratory Holes			
Exploratory Hole	Exploratory Hole Type	Max Depth (m bgl)	Groundwater Strike (m bgl)
WS1	Window Sample Borehole	5.25m (refusal)	2.60m
WS2	Window Sample Borehole	5.45m	3.00-4.00m
HP3	Hand excavated pit	0.60m	Not encountered

4.0 GROUND CONDITIONS

4.1 Anthropogenic Material

No anthropogenic materials were encountered.

4.2 Topsoil

A 0.22m thickness of sandy topsoil was encountered in all 3 positions.

4.3 Natural Superficial Material

Below the topsoil, natural material contained varying proportions of sand, clay, gravel and cobbles. The gravel and cobble fractions comprised mainly quartz and sandstone with occasional mudstone and dolerite.

Generally, clayey strata were encountered to 2.6m and 2.8m bgl, underlain by granular materials, with groundwater entries. Firm clay was encountered again from 4.8m and 3.7m depth, to the bases of the holes.

An infiltration test was attempted in the shallow clayey strata above the water table but no fall in water level was recorded over the test period of 80 minutes.

Table 3: Summary of SPT Tests					
Soil	Layer Thickness (m)	SPT N values	Design N-Value	Estimated Φ^*	Estimated C_u^* (kPa)
Clay	1.08 -2.38	11,16,13	11	-	55
Gravel	2.20 - 2.40	10,16,18,20	10	30	-
Deeper Clay	>1.75	15, 50	15	-	75

*from SPT tests, from Barnes, Soil Mechanics, 3rd ed.

4.4 Bedrock

Bedrock was not encountered.

4.5 Groundwater

Groundwater was encountered at around 2.6m to 3m depth, within the gravels.

4.6 Contamination

No visual or olfactory evidence of contamination was noted during the fieldwork. Representative samples of the strata encountered were taken for testing.

Soil samples for chemical analysis each comprised a plastic tub for metals and inorganics, and an amber glass jars for organics. Soil samples for chemical analysis were sent to the testing laboratory under chain of custody.

5.0 LABORATORY TESTING

The samples were submitted to i2 Analytical who are UKAS accredited in accordance with ISO17025 and are also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratory carries out Quality Assurance and Quality Control in accordance with BS ISO 17025 and participate in external laboratory comparison and quality control schemes. Details of the accreditation and the methods of analysis are provided on the relevant test reports.

The selection of samples for laboratory testing and the analytes to be determined was made based on the Phase 1 assessment, the excavation records and other observations during the investigations. The sample selection rationale was : to gain a good coverage across the site and of the various material types and strata encountered, with the aim of providing evidence for the presence or absence of wastes.

The selected soil samples were tested for a range of typical contamination indicators including specific tests for contaminants suspected as being present from the desk study and from observations made on site.

Each of the soil samples were analysed for the 'total' concentration of a suite of potential contaminants.

The results of the laboratory analysis are presented in Appendix III. The suite of analysis for the soil was as follows, and in addition, three samples were submitted for a full BRE Suite to assess the classification of concrete required for foundations.

Table 4: Chemical Test Suites		
Determinand	Soil Suite 1	BRE Full Suite
Number of Samples	6	1
Asbestos Screen	✓	
pH	✓	✓
Total Cyanide	✓	
Thiocyanate	✓	
Total Sulphate	✓	✓
Water soluble sulphate	✓	✓
Sulphide	✓	
Water soluble chloride	✓	✓
Total Sulphur	✓	✓
Ammoniacal Nitrogen		✓
Water Soluble Nitrate		✓
Total Phenols	✓	
Speciated PAHs	✓	
Total PAH	✓	
Heavy Metals	✓	
As, Cd, Cr, CrVI, Cu, Pb, Hg, Ni, Zn (all totals)		
Mg, Mg (water soluble)		✓
BTEX	✓	
MTBE	✓	
TPH C10-C40	✓	
Speciated TPH	✓	

6.0 PHASE 2 ENVIRONMENTAL RISK ASSESSMENT

6.1 Introduction

The assessment of contamination has been carried out in accordance with the overall guidance presented in Environment Agency (2021) "Land Contamination Risk Management (LCRM) procedures. Generic risk assessment is a two-stage process. Firstly, in the Risk Estimation stage, the measured contaminant concentrations are compared to the relevant first tier assessment criteria where they have been published. Where there is a suitable dataset, this is done after carrying out statistical analysis to determine the upper confidence limit on the true mean. Otherwise, maximum or specific data points are compared directly. The second stage, Risk Evaluation, comprises an authoritative review of the findings with other pertinent information, in cases where the first stage assessment criteria are exceeded, in order to consider if exceedance may be acceptable in the particular circumstances.

The aspects of risk from substances in the ground considered below are as follows:

- human health;
- plant life;
- pollution of Controlled Waters;
- water supply pipes
- below ground concrete; and
- ground gases.

6.2 Assessment for the Protection of Human Health

The Generic Qualitative Risk Assessment (GQRA) has been carried out assessing the risk based on commercial end use in line with current regulations and guidance for England. A summary of the chemical test results is presented in Appendix III (including the source of the assessment criteria) with a comparison against assessment criteria for commercial/industrial end use.

None of the chemical test results exceeded the assessment criteria for Public Open Space/Parks (or for the more stringent residential end use criteria).

6.3 Assessment for the Risk to Plant Life

The concentrations of the phytotoxic metals copper, chromium, nickel and zinc have the potential to be harmful to plants. However, all the measured concentrations of these metals are generally lower than the guideline values for the protection of plants as presented in the MAFF document "Code of Good agricultural practice for the protection of soil".

Therefore, there is no risk to plants at the site due to phytotoxicity should any be planted in the ground as part of the proposed development.

6.4 Assessment for the Protection of Controlled Waters

The Phase 1 study (section 5.4) did not identify any controlled waters receptors. Surface water receptors were identified as at least 100m away and the site is underlain by "Secondary minor or non aquifer strata" with vertical migration pathways assessed as limited given the soakaway test result. With no elevated concentrations of contaminants identified the overall assessed risk to controlled waters is very low.

6.5 Assessment for Water Supply Pipes

Plastic pipe materials are potentially vulnerable to attack from elevated levels of hydrocarbons, which can potentially lead to contamination of potable water supplies and water supply companies also require the risk to their workers from other contaminants in the ground to be assessed. The assessment has been completed in accordance with the current WRAS UK Guidance for the Specification of Water Supply Pipes. This sets out the

importance of the Phase 1 desk study and provides threshold concentrations for different pipe material for various chemical groups. The default recommendation for water supply pipes is to use PE with other types of pipework only used if the limits for PE pipes are exceeded. The available data indicates that PE pipe is deemed permissible for this site. Welsh Water may require a formal Water Supply Pipe Material Assessment to be carried out on their own proforma and submitted with the application for any new connection.

6.6 Chemical Attack on Below Ground Concrete

Below ground concrete structures are potentially at risk in areas of elevated sulphates and where there is low pH. An assessment of the soil and groundwater data (following the protocol established in BRE Special Digest 1, 2005) indicates that DS-1 ACEC Class AC-2z conditions prevail, due to low pH condition generally in the pH range 5.5 to 6.5.

6.7 Permanent Ground Gases

It is noted that full radon protection measures are required at the site, will give an equivalent protection to CS3 or CS4 standards. No waste materials or evidence of wastes are present below the building and the nearest recorded landfilling is over 60 m from the proposed building. This landfill is not domestic black bag type waste and it will be at least 39 years old so it will be a relatively low risk ground gas source which will be well past its main gassing phase. This does present a potential risk to the new building but this is relatively low. If in the unlikely event that the adjacent landfilled ground contains wastes that are actively producing gas and this does migrate to below the new building, the site is sufficiently distant that the worst case risk from permanent ground gases is CS2. Because the building will have radon protection measures which meet CS3 or CS4 standards, this provides more than adequate protection and nothing further is required in relation to permanent ground gases.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Proposed Development

It is understood that the proposed loads are in the order of <75kN/m for line loads and point loads of <75kN.

7.2 Trees and Clay Soils

Clay soils are present below the site. In the presence of trees, these soils can undergo seasonal movement due to changes in moisture content. The removal of trees can also result in soil heave movements. The amount of movement is a function of the mineralogy of the clay, the tree type and the distance to the foundations. Trees are present at the perimeter of the site. The clay soils at the site contained a high proportion of sand and gravel and are most likely to be of low plasticity, and therefore low volume change potential. The trees are sufficiently distant from most of the proposed building that the low plasticity clay will exhibit minimal or zero movement. However, if tree roots are present in foundation trenches, particularly at the north western end of the building which is the closest to the trees, foundations may need to be deepened in this area to below the depth of seasonal movement which will be in the order of 0.90m.

7.3 Foundation Conditions & Bearing Capacity

No made ground was present at the site and the natural soils below the site are reasonably uniform and compact.

Soils at around 1m depth are likely to comprise gravelly clays. Pad foundations at approximately 0.9m depth and 0.8m square are calculated to have a bearing capacity of around 130kPa.

Expected settlements are calculated to be less than 10mm, however differential movement in the order of 5mm is a possibility. Reinforcement should be provided to foundations.

For trench fill type footings at 0.90m depth it is recommended that an allowable bearing pressure of 120kPa is used for design purposes.

Ground bearing floor slabs should be constructed once the formation has been proof rolled and any soft spots overdug and replaced with compacted granular fill. A layer of compacted granular fill should be placed below the whole slab. Reinforcement will be required to mitigate differential settlement.

7.4 Excavations & Stability

Shallow excavations through the soils should be stable with near vertical excavation sides down to a depth of 0.90 m for a period of over a week or more. However, it is not recommended that trenches be left open for extended periods of time as softening and weathering of the clayey strata can occur.

Groundwater was encountered during the ground investigation below 2.5m depth but this is not the long term at rest level which will be shallower than this, particularly in winter months. However, groundwater is not anticipated to be present during excavations for foundation trenches. If there are any inflows these are anticipated to take the form of slow seepages and can probably be dealt with by pumping from sumps.

All excavations should be carried out in accordance with CIRIA Report 97 “Trenching Practice” and BS6031: 2009: Code of Practice for Earthworks. Further guidance on this aspect of site works is given in the British Standards for “Workmanship on Building Sites”, BS 8000, Parts 1 and 14, and in the Construction Industry Training Board’s Site Safety Note 10.

7.5 Mining

The Phase 1 study concluded mining was a low risk to the site. Whilst it is agreed that this is true, the area is one in which mining was prevalent and many mines were completed and abandoned long before there was any statutory requirement to keep records. The potential for unrecorded mine entries below the site remains as a low risk, although following the results of the site investigation, this risk can be lowered further due to the proven absence of any mining wastes below the site. A watching brief should be maintained by groundworkers during the excavations for foundations for any unrecorded mine shafts, and if any are found, then work should cease immediately and expert advice sought.

8.0 CONCLUSION

There is no evidence of anthropogenic material below the site, and no evidence of contamination that might be associated with wastes. The site is not within the area of the former gravel pits and anecdotal evidence together with the results of the site investigation supports the hypothesis that the site is not located above landfilled ground.

The site will already be subject to full radon protection measures and these are considered to provide more than adequate protection against any ground gas that may be reasonably assumed to be present.

No remediation or mitigation measures, beyond those necessary for radon protection, are therefore required at the site.

The structure is lightly loaded and the natural strata below the site reasonably uniform and compact. Shallow pad foundations or trench fill foundations and ground bearing floor slabs should therefore be practicable.

A watching brief should be maintained by groundworkers during the excavations for foundations for any unrecorded mine shafts, and if any are found, then work should cease immediately and expert advice sought.

The shallow soils have too high a clay content for moderate soakaway drainage, and granular soils below them already contain groundwater. Soakaways will have to be relatively large for this building and a gravel filled infiltration trench may be the best option for this site.

END OF REPORT

APPENDIX I – LIMITATIONS

APPENDIX I - LIMITATIONS

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between C Eccles Brownfield Engineering Consultancy and the Client as indicated in Section 1.0.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency/Natural Resources Wales. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. In addition to the above C Eccles Brownfield Engineering Consultancy note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.
7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
10. This report presents an interpretation of the geotechnical information established by excavation, observation, and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man-made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently, there may be conditions present not revealed by this investigation.
11. C Eccles Brownfield Engineering Consultancy cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by C Eccles Brownfield Engineering Consultancy is owned by them and no such plans or documents may be reproduced, published, or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by C Eccles Brownfield Engineering Consultancy in this connection without their explicit written agreement there to by C Eccles Brownfield Engineering Consultancy.
12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II – BOREHOLE AND HAND PIT LOGS

APPENDIX II –BOREHOLE LOGS

C S Eccles Brownfield Engineering Consultant				Dynamic Sample Log				Exploratory hole no: WS01				
Borehole formation details:								Location details:				
Type: WLS	From: 0.00	To: 5.25	Start date: 09/03/2023	End date: 09/03/2023	Plant: DART	Hammer details: Er(%): 67 S/N: DART 428		mE: mN: m OD: Grid:				
Samples & In Situ Testing:					Stratum Description:		Depth (thick- ness):	Level:	Backfill/ install:	Water- str ke:	Legend:	
Water:	Case:	Depth:	Type & No:	Result:								
Dry	-	0.10- 0.20 0.22- 0.50	ES1 ES2	N=11 (2,2/2,3,3,3)	Dark brown clayey slightly gravelly SAND. Occasional rootlets. (TOPSOIL) Firm becoming stiff brown slightly silty sandy slightly gravelly CLAY wih a low cobble content. Gravel is fine to coarse rounded quartz and sandstone with occasional mudstone Cobbles are rounded sandstone.	0.22						
		1.50	ES3									
Dry	-	2.00	S	N=16 (3,2/4,5,4,3)	Medium dense light brown occasionally clayey sandy fine to coarse rounded GRAVEL of sandstone, quartz and mudstone.	2.60						
Wet	-	3.00	S	N=10 (2,3/3,2,2,3) No recovery								
		4.00	S	N=16 (5,4/4,4,4,4)								
		4.80	S	N=50 for 37mm	Firm reddish brown and grey sandy gravelly CLAY. Gravel is rounded quartz and sandstone. Grey fine to coarse sand pockets.	4.80						
					Exploratory holes ends at 5.25 m (refusal)	5.25						
Groundwater entries:			Casing:		Remarks:			Run details:				
Struck: Wet at 2.6m	Rose:	Case:	Sealed:	Depth: n/a	Dia:	All depths in metres, all diameters in mm.			From:	to:	Dia:	Rec (%):
									0.00	1.00	101	100
									1.00	2.00	101	100
									2.00	3.00	101	50
									3.00	4.00	92	30
									4.00	5.00	79	90
Logged by: CK		09/03/2023		Project:		Proposed Pavilion, Gwersyllt Cricket Club						
Checked by: CSE		09/03/2023		Proj. No:								
Approved by: CSE		09/03/2023		Client:		Gwersyllt Cricket Club						

C S Eccles Brownfield Engineering Consultant				Dynamic Sample Log				Exploratory hole no: WS02			
Borehole formation details:								Location details:			
Type: WLS	From: 0.00	To: 5.45	Start date: 09/03/2023	End date: 09/03/2023	Plant: DART	Hammer details: Er(%): 67 S/N: DART 428		mE: mN: m OD: Grid:			
Samples & In Situ Testing:					Stratum Description:		Depth (thick- ness):	Level:	Backfill/ install:	Water- str ke:	Legend:
Water:	Case:	Depth:	Type & No:	Result:							
Dry	-	0.20	ES1	N=13 (3,3/3,3,3,4)	Dark brown clayey slightly gravelly SAND. Occasional rootlets. (TOPSOIL)	0.22					
		0.50	ES2		Firm becoming stiff brown slightly silty sandy very gravelly CLAY with a low cobble content. Gravel is fine to coarse rounded quartz and sandstone with occasional mudstone. Cobbles are rounded sandstone and dolerite. Occasional sand pockets.	1.30					
Dry	-	1.00	S	N=18 (2,2/2,3,5,8)	Medium dense light brown slightly clayey sandy fine to coarse rounded GRAVEL of sandstone, quartz and mudstone.	2.30-2.80: clay pocket	2.80				
Damp	-	2.00	S								
Wet	-	3.00	S	N=20 (6,5/6,8,2,4)	Medium dense light brown and orange brown slightly clayey slightly sandy fine to coarse rounded GRAVEL and COBBLES of sandstone	3.70					
		4.00	S		Firm reddish brown and grey sandy gravelly CLAY. Gravel is rounded quartz and sandstone. Grey fine to coarse sand pockets.						
Wet		5.00	S	N=40 (6,7/6,7,9,18)	Exploratory holes ends at 5.45 m	5.45					
Groundwater entries:			Casing:		Remarks:			Run details:			
Struck: Rose: Case: Sealed:			Depth: Dia:		All depths in metres, all diameters in mm.			From: to: Dia: Rec (%):			
Wet at 4m			n/a					0.00 1.00 101 100			
								1.00 2.00 101 100			
								2.00 3.00 101 100			
								3.00 4.00 92 60			
								4.00 5.00 79 60			
Logged by: CK 09/03/2023			Project: Proposed Pavilion, Gwersyllt Cricket Club								
Checked by: CSE 09/03/2023			Proj. No:								
Approved by: CSE 09/03/2023			Client: Gwersyllt Cricket Club								

C S Eccles Brownfield Engineering Consultant				Trial Pit Log				Exploratory hole no: HP03			
								Sheet 1 of 1			
Borehole formation details:								Location details:			
Type: HDP	From: 0.00	To: 0.60	Start date: 09/03/2023	End date: 09/03/2023	Plant: DART	Hammer details: Er(%): 67 S/N: DART 428		mE: mN: m OD: Grid:			
Samples & In Situ Testing:					Stratum Description:		Depth (thick- ness):	Level:	Backfill/ install:	Water- str ke:	Legend:
Water:	Case:	Depth:	Type & No:	Result:							
		0.20 -0.25	ES1		Dark brown clayey slightly gravelly SAND. Occasional rootlets. (TOPSOIL)		0.22				
		0.50 -0.60	ES2		Firm becoming stiff brown slightly silty sandy slightly gravelly CLAY. Gravel is fine to coarse rounded quartz and sandstone.						
							0.60				
					Exploratory holes ends at 0.6 m						
Groundwater entries:				Casing:		Remarks:			Run details:		
Struck: Rose: Case: Sealed: Dry				Depth: Dia: n/a		All depths in metres, all diameters in mm. Soakage test carried out 0.30m - 0.60m bgl. 10L of water added to pit. Water level did not drop. Test abandoned at 80 minutes.			From: to: Dia: Rec (%):		
Logged by: CK 09/03/2023				Project: Proposed Pavilion, Gwersyllt Cricket Club							
Checked by: CSE 09/03/2023				Proj. No:							
Approved by: CSE 09/03/2023				Client: Gwersyllt Cricket Club							

DYNAMIC SAMPLING PHOTOGRAPHS

Probehole No.

WS01

Sheet 1 of 1

Contract No:

Contract

Name:

Client:

Proposed Pavilion,
Gwersyllt Gwersyllt Cricket
Club.

Drilling Method:

Core Diameter:

Casing Depth:

Window Sampling

101-79mm

0m

Co-ordinates:

Ground Level:

Date:

09/03/2023

Photograph

TOP

BASE



DYNAMIC SAMPLING PHOTOGRAPHS

Probehole No.

WS02

Sheet 1 of 1

Contract No:

Contract

Name:

Client:

Proposed Pavilion,
Gwersyllt Gwersyllt Cricket
Club.

Drilling Method:

Core Diameter:

Casing Depth:

Window Sampling

101-79mm

0m

Co-ordinates:

Ground Level:

Date:

09/03/2023

Photograph

TOP

BASE



TRIAL HOLE PHOTOGRAPHS

HP03

Sheet 1 of 1

Contract No:		Drilling Method:	Hand Dug	Co-ordinates:	
Contract Name:	Proposed Pavilion, Gwersyllt Gwersyllt Cricket Club.	Core Diameter:		Ground Level:	
Client:		Casing Depth:		Date:	09/03/2023

Photograph



Trial Hole during soakage test

Spoil Mound

APPENDIX III – LABORATORY TEST RESULTS

APPENDIX III – LABORATORY TEST RESULTS

Chris Eccles

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Analytical Report Number : 23-22454

Replaces Analytical Report Number: 23-22454, issue no. 1
Client sampling date amended.
Sampling date changed for all samples as per client's request.

Project / Site name:	Gwersyllt Cricket Club	Samples received on:	10/03/2023
Your job number:		Samples instructed on/ Analysis started on:	10/03/2023
Your order number:	I2-PO004	Analysis completed by:	26/03/2023
Report Issue Number:	2	Report issued on:	26/03/2023
Samples Analysed:	7 soil samples		

Signed:

Anna Goc
Junior 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.

Analytical Report Number: 23-22454
Project / Site name: Gwersyllt Cricket Club
Your Order No: I2-PO004

Lab Sample Number				2613577	2613578	2613579	2613580	2613581
Sample Reference				WS01 ES1	WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	0.22-0.50	1.50	0.20	0.50
Date Sampled				09/03/2023	09/03/2023	09/03/2023	09/03/2023	09/03/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	17	13	18	14
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.9	6.2	6.3	7.6	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	-	< 5.0	< 5.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	580	380	-	570	200
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	0.008	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	16	7.5	-	9.7	3.9
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0079	0.0037	0.0037	0.0048	0.002
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	7.9	3.7	3.7	4.8	2
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	1.6	-	-
Total Sulphur	mg/kg	50	MCERTS	390	230	-	370	100
Total Sulphur	%	0.005	MCERTS	-	-	0.006	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	-	0.6	-	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	0.06	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	< 2.0	-	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.13	< 0.05	-	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.18	< 0.05	-	0.15	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.2	< 0.05	-	0.2	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.1	< 0.05	-	0.1	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.15	< 0.05	-	0.1	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.2	< 0.05	-	0.14	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.06	< 0.05	-	0.08	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.13	< 0.05	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.15	< 0.80	-	< 0.80	< 0.80
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Analytical Report Number: 23-22454
Project / Site name: Gwersyllt Cricket Club
Your Order No: I2-PO004

Lab Sample Number				2613577	2613578	2613579	2613580	2613581
Sample Reference				WS01 ES1	WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	0.22-0.50	1.50	0.20	0.50
Date Sampled				09/03/2023	09/03/2023	09/03/2023	09/03/2023	09/03/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.4	7.1	-	10	7.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	0.3	-	0.5	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	-	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	21	-	19	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	12	-	17	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	27	-	60	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	18	-	19	23
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	64	-	150	39

Magnesium (water soluble)	mg/kg	5	NONE	-	-	16	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	8.2	-	-

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	MCERTS	< 10	< 10	-	< 10	< 10
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	< 10	< 10	-	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	-	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	-	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	< 10	< 10	-	< 10	< 10

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

Analytical Report Number: 23-22454
Project / Site name: Gwersyllt Cricket Club
Your Order No: I2-PO004

Lab Sample Number				2613582	2613583
Sample Reference				HP03 ES1	HP03 ES2
Sample Number				None Supplied	None Supplied
Depth (m)				0 20-0.25	0.50-0.60
Date Sampled				09/03/2023	09/03/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	14
Total mass of sample received	kg	0.001	NONE	0.5	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.2	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	420	210
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	20	6.6
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0098	0.0033
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	9.8	3.3
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-
Total Sulphur	mg/kg	50	MCERTS	330	140
Total Sulphur	%	0.005	MCERTS	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.07	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.09	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80
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Analytical Report Number: 23-22454
Project / Site name: Gwersyllt Cricket Club
Your Order No: I2-PO004

Lab Sample Number				2613582	2613583
Sample Reference				HP03 ES1	HP03 ES2
Sample Number				None Supplied	None Supplied
Depth (m)				0 20-0.25	0.50-0.60
Date Sampled				09/03/2023	09/03/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.8	6.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1 8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	9.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0 3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	15
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	59	39
Magnesium (water soluble)	mg/kg	5	NONE	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5 0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5 0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5 0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5 0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5 0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5 0	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1 0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2 0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8 0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8 0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1 0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2 0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	< 10	< 10

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

Analytical Report Number : 23-22454

Project / Site name: Gwersyllt Cricket Club

* 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 *
2613577	WS01 ES1	None Supplied	0.10-0.20	Brown loam and clay with vegetation and gravel
2613578	WS01 ES2	None Supplied	0.22-0.50	Brown loam and clay with vegetation and gravel
2613579	WS01 ES3	None Supplied	1.5	Brown clay and sand.
2613580	WS02 ES1	None Supplied	0.2	Brown loam and sand with vegetation and gravel.
2613581	WS02 ES2	None Supplied	0.5	Brown loam and clay.
2613582	HP03 ES1	None Supplied	0.20-0.25	Brown clay and sand with gravel and vegetation.
2613583	HP03 ES2	None Supplied	0.50-0.60	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 23-22454

Project / Site name: Gwersyllt Cricket Club

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, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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.	L038-PL	D	MCERTS
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	A001-PL	D	ISO 17025
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	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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 (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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.	L019-UK/PL	D	NONE
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.	L038-PL	D	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 (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammonium as NH ₄ 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	L082-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 23-22454

Project / Site name: Gwersyllt Cricket Club

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
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	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-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	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 Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	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 30°C.

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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-22454

Project / Site name: Gwersyllt Cricket Club

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
HP03 ES1	None Supplied	S	2613582	b	Hexavalent chromium in soil	L080-PL	c
HP03 ES1	None Supplied	S	2613582	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
HP03 ES1	None Supplied	S	2613582	b	Monohydric phenols in soil	L080-PL	c
HP03 ES1	None Supplied	S	2613582	b	Speciated EPA-16 PAHs in soil	L064-PL	c
HP03 ES1	None Supplied	S	2613582	b	Sulphide in soil	L010-PL	c
HP03 ES1	None Supplied	S	2613582	b	TPH Banding in Soil by FID	L076-PL	c
HP03 ES1	None Supplied	S	2613582	b	TPHCWG (Soil)	L088/76-PL	b
HP03 ES1	None Supplied	S	2613582	b	Thiocyanate in soil	L082-PL	c
HP03 ES1	None Supplied	S	2613582	b	Total cyanide in soil	L080-PL	c
HP03 ES1	None Supplied	S	2613582	b	pH in soil (automated)	L099-PL	c
HP03 ES2	None Supplied	S	2613583	b	Hexavalent chromium in soil	L080-PL	c
HP03 ES2	None Supplied	S	2613583	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
HP03 ES2	None Supplied	S	2613583	b	Monohydric phenols in soil	L080-PL	c
HP03 ES2	None Supplied	S	2613583	b	Speciated EPA-16 PAHs in soil	L064-PL	c
HP03 ES2	None Supplied	S	2613583	b	Sulphide in soil	L010-PL	c
HP03 ES2	None Supplied	S	2613583	b	TPH Banding in Soil by FID	L076-PL	c
HP03 ES2	None Supplied	S	2613583	b	TPHCWG (Soil)	L088/76-PL	b
HP03 ES2	None Supplied	S	2613583	b	Thiocyanate in soil	L082-PL	c
HP03 ES2	None Supplied	S	2613583	b	Total cyanide in soil	L080-PL	c
HP03 ES2	None Supplied	S	2613583	b	pH in soil (automated)	L099-PL	c
WS01 ES1	None Supplied	S	2613577	b	Hexavalent chromium in soil	L080-PL	c
WS01 ES1	None Supplied	S	2613577	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS01 ES1	None Supplied	S	2613577	b	Monohydric phenols in soil	L080-PL	c
WS01 ES1	None Supplied	S	2613577	b	Speciated EPA-16 PAHs in soil	L064-PL	c
WS01 ES1	None Supplied	S	2613577	b	Sulphide in soil	L010-PL	c
WS01 ES1	None Supplied	S	2613577	b	TPH Banding in Soil by FID	L076-PL	c
WS01 ES1	None Supplied	S	2613577	b	TPHCWG (Soil)	L088/76-PL	b
WS01 ES1	None Supplied	S	2613577	b	Thiocyanate in soil	L082-PL	c
WS01 ES1	None Supplied	S	2613577	b	Total cyanide in soil	L080-PL	c
WS01 ES1	None Supplied	S	2613577	b	pH in soil (automated)	L099-PL	c
WS01 ES2	None Supplied	S	2613578	b	Hexavalent chromium in soil	L080-PL	c
WS01 ES2	None Supplied	S	2613578	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS01 ES2	None Supplied	S	2613578	b	Monohydric phenols in soil	L080-PL	c
WS01 ES2	None Supplied	S	2613578	b	Speciated EPA-16 PAHs in soil	L064-PL	c
WS01 ES2	None Supplied	S	2613578	b	Sulphide in soil	L010-PL	c
WS01 ES2	None Supplied	S	2613578	b	TPH Banding in Soil by FID	L076-PL	c
WS01 ES2	None Supplied	S	2613578	b	TPHCWG (Soil)	L088/76-PL	b
WS01 ES2	None Supplied	S	2613578	b	Thiocyanate in soil	L082-PL	c
WS01 ES2	None Supplied	S	2613578	b	Total cyanide in soil	L080-PL	c
WS01 ES2	None Supplied	S	2613578	b	pH in soil (automated)	L099-PL	c
WS02 ES1	None Supplied	S	2613580	b	Hexavalent chromium in soil	L080-PL	c
WS02 ES1	None Supplied	S	2613580	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS02 ES1	None Supplied	S	2613580	b	Monohydric phenols in soil	L080-PL	c
WS02 ES1	None Supplied	S	2613580	b	Speciated EPA-16 PAHs in soil	L064-PL	c
WS02 ES1	None Supplied	S	2613580	b	Sulphide in soil	L010-PL	c
WS02 ES1	None Supplied	S	2613580	b	TPH Banding in Soil by FID	L076-PL	c
WS02 ES1	None Supplied	S	2613580	b	TPHCWG (Soil)	L088/76-PL	b
WS02 ES1	None Supplied	S	2613580	b	Thiocyanate in soil	L082-PL	c
WS02 ES1	None Supplied	S	2613580	b	Total cyanide in soil	L080-PL	c
WS02 ES1	None Supplied	S	2613580	b	pH in soil (automated)	L099-PL	c
WS02 ES2	None Supplied	S	2613581	b	Hexavalent chromium in soil	L080-PL	c
WS02 ES2	None Supplied	S	2613581	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS02 ES2	None Supplied	S	2613581	b	Monohydric phenols in soil	L080-PL	c
WS02 ES2	None Supplied	S	2613581	b	Speciated EPA-16 PAHs in soil	L064-PL	c
WS02 ES2	None Supplied	S	2613581	b	Sulphide in soil	L010-PL	c
WS02 ES2	None Supplied	S	2613581	b	TPH Banding in Soil by FID	L076-PL	c
WS02 ES2	None Supplied	S	2613581	b	TPHCWG (Soil)	L088/76-PL	b
WS02 ES2	None Supplied	S	2613581	b	Thiocyanate in soil	L082-PL	c
WS02 ES2	None Supplied	S	2613581	b	Total cyanide in soil	L080-PL	c

Sample Deviation Report



Analytical Report Number : 23-22454

Project / Site name: Gwersyllt Cricket Club

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
WS02 ES2	None Supplied	S	2613581	b	pH in soil (automated)	L099-PL	c