

REPORT

Groundwater Investigation

Havant, Hampshire PO9 2NG, UK

Submitted to:

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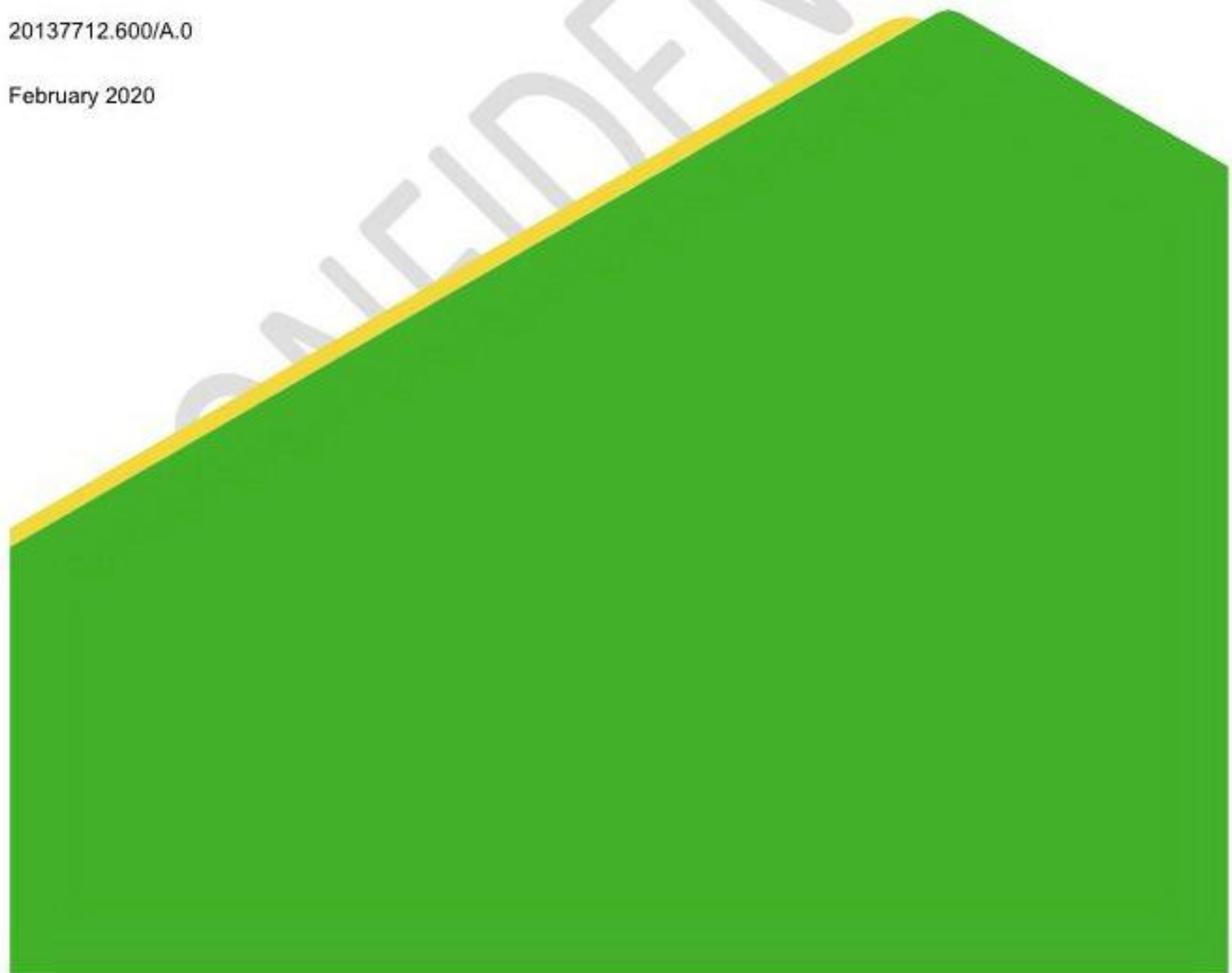
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Executive Summary

Golder Associates (UK) Ltd (Golder) was retained by Pfizer Inc. (Pfizer) to undertake a groundwater investigation at its facility located at 32 New Lane, Havant, Hampshire, PO9 2NG, UK (the Site). The work was conducted between December 2019 and January 2020.

The purpose of the groundwater investigation was to characterize the current groundwater quality on-Site based on observations made in the Divestiture Environmental Site Assessment conducted by Golder in 2019. Eight groundwater monitoring wells (GA01 through GA04, GA07 through GA09, and GA07A) were installed on-Site for sampling purposes. In addition, monitoring well BH-4 (installed in 1996 as part of a previous investigation) was found to be intact and suitable for sampling.

A summary of the parameters reported above the Generic Assessment Criteria (GAC) is provided in the table below:

Well ID	Sampling Date	Vinyl Chloride	Trichloroethene (TCE)	Tetrachloroethene (PCE)
FW Screening Value =>		-	10	10
UK DWS =>		0.5	10	10
BH-4-1996	10/22/2019	<0.1	25	32
	1/10/2020	<0.1	<3	7
GA04	1/10/2020	2.1	10	<3
GA07	1/10/2020	<0.1	15	<3

Notes:

FW Screening Value = Freshwater Screening Value

UK DWS = UK Drinking Water Standard

The findings of the investigation can be summarized as follows:

- The groundwater sample obtained from BH-4-1996 reported concentrations of TCE and PCE above the GAC in October 2019. However, subsequent analyses performed in January 2020 did not report any compound concentrations above the GAC;
- Vinyl chloride was reported above the GAC in GA-04;
- TCE was reported above the GAC in GA07;
- No other compounds were reported above the GAC or above the laboratory limits of reporting; and
- The concentrations reported during this current investigation represent a significant decrease when compared to historical results.

Although groundwater concentrations of vinyl chloride and TCE are reported above the GAC at two locations, these parameters are within an order of magnitude of the assessment criteria. Based on observations made during drilling, the water table aquifer consists of generally clayey material (i.e., low permeability), therefore lateral/vertical migration is not considered to be a significant concern. This is evident as the concentrations are not widespread and appear to be delineated and confined within the property boundary (i.e., no concentrations were reported above the GAC in the downgradient wells).

It is noted that the GAC are considered conservative as they are for the receptor itself and do not consider dilution, retardation or biodegradation in the aquifer.

Study Limitations

IMPORTANT: This section should be read before reliance is placed on any of the opinions, advice, recommendations or conclusions set out in this report.

This Groundwater Investigation report is intended for the sole use of Pfizer Inc. Any use of this document or of the findings or conclusions provided in this report by any person other than Pfizer Inc. or other person mentioned in the foregoing is at the sole risk of such user.

Golder Associates (UK) Ltd (Golder) will not be responsible for the real or perceived decrease in a property value, its saleability or ability to gain financing through the reporting of factual information. With respect to regulatory compliance issues; please note that regulatory statutes and the interpretation of regulatory statute are subject to change over time.

This report was developed using data and information obtained during the 2019 Divestiture Environmental Site Assessment and Groundwater Investigation conducted by Golder and is also based on information obtained in previous investigations, where Golder has relied in good faith on information provided by others.

In assessing the property, to the extent that Golder has relied in good faith on information provided by others to prepare this report Golder accepts no responsibility for any deficiency, misstatements, or inaccuracies contained in this report as a result of omissions, misinterpretations or fraudulent acts of others.

All work carried out in preparing this report has used, and is based on, Golder's professional knowledge and understanding of current (January 2020) relevant UK and European Community legislation, standards, and guidance. Changes in the legislation, standards, and guidance may cause the opinion, advice, or conclusions in this report to become inappropriate or incorrect. Following delivery of this report, Golder will have no obligation to advise the Client of any changes, or of their repercussions.

Golder acknowledges that it was retained, in part, because of its knowledge and experience of geotechnical and environmental matters. Golder considered and analysed all information gathered by or provided to it in the context of Golder's knowledge and experience and all other relevant information known to Golder. Provided the information given to Golder was not inconsistent or incompatible therewith, Golder shall be entitled to rely on and assume, without independent verification, the accuracy and completeness of all such information and Golder shall have no obligation to verify the accuracy and completeness of such information.

The scope of work included borings, test pits, or engineering interpretation of such information, and attention is drawn to the fact that special risks occur when engineering and related disciplines are applied to identify subsurface conditions. Even a comprehensive sampling and testing programme implemented under a professional Standard of Care may fail to detect certain conditions.

The environmental, geological, geotechnical, geochemical and hydrogeological conditions that Golder interpreted to exist between sampling points may differ from those that actually exist. Passage of time, natural occurrences, and activities near the Site may substantially alter discovered conditions.

The services described in this report were performed in accordance with the general practices and procedures accepted for geotechnical and environmental consultants. Golder does not provide specialist legal advice.

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1.0 INTRODUCTION

Golder Associates (UK) Ltd (Golder) was retained by Pfizer Inc. (Pfizer) to undertake a groundwater investigation at its facility located at 32 New Lane, Havant, Hampshire, PO9 2NG, UK (the Site).

1.1 Background and Objectives

Golder undertook a Divestiture Environmental Site Assessment (DESA) in 2019 (Golder, 2019) in order to evaluate the potential for significant environmental issues associated with the Site as a result of past or current operations. Previous intrusive investigations were conducted by ERM in 1996 (ERM, 1996), 1997 (ERM, 2007) and 2008 (ERM, 2008) as shown in Appendix A. Concentrations of certain compounds in groundwater, including trichloroethene (TCE) and acetone, were reported in excess of generic screening levels adopted at the time, and others such as isopropanol, were reported at detectable concentrations but no GAC was identified. The reports indicated that although some parameters were reported above the screening levels they were unlikely to pose a risk to receptors.

The main objective of this groundwater investigation was to gain further information to allow a better understanding of the current groundwater conditions at the Site for those parameters that were previously detected in excess of current screening criteria. Based on the observations made during the DESA work, the following additional monitoring wells were proposed:

Proposed Monitoring Wells	Replacement for:	Rationale
GA01	BH1-1996	Historic VOC results above the current GAC.
GA02	BH2-1996	Acetone previously detected.
GA03	BH3-1996	Historic VOC and phenol results above the current GAC. Acetone and isopropanol previously detected.
GA04	BH4-1996	Historic VOC results above the current GAC.
GA07	BH7-1996	Downgradient of the historic locations.
GA07A	BH7A-1996	Downgradient of the historic locations.
GA08	BH08-1996	Downgradient of the historic locations.
GA09	BH9-1996	Downgradient of the historic locations.

Notes:

VOC – Volatile organic compounds

GAC – Generic assessment criteria

1.2 Scope of Work

The scope of work involved the following:

- Production of task- and Site-specific Health and Safety documentation;
- Existing monitoring well inspection, groundwater level monitoring and groundwater sampling;
- Service clearance and set out;

- Drilling and installation of eight monitoring wells to approximately 5 metres below ground level (m bGL);
- Collection of groundwater samples for laboratory analysis; and
- Topographical survey of monitoring well locations.

2.0 SITE DESCRIPTION

2.1 Site Location and Site Setting

The Site is owned by John Wyeth & Brother Limited (a subsidiary of Pfizer Inc.). The Site has an area of approximately 16.51 acres (66,827 m²) with approximately 28,054 m² of building area. Other than areas of car parking and roads/walkways, much of the Site area is open land following historical demolition of buildings. Demolished areas have been covered with gravel.

The Site receives, repackages and distributes injectable products. Products are received in bulk packaging and are repackaged into end-user packaging. No manufacturing takes place at the Site.

The topography of the Site and surrounding areas is generally flat, at around 15 m above ordnance datum.

2.2 Site Surroundings

Adjacent land uses include:

- North – To the north the Site is bounded by an industrial estate, comprising light industrial activities. To the north east is an area of ground formerly containing a distribution warehouse owned by Pfizer (i.e., the North Warehouse which was sold in 2017). A new industrial/commercial building was built on that parcel in 2019 by the current property owner;
- East – A railway line is located immediately to the east of the Site, with residential properties beyond;
- West – Residential properties are located to the west of the site; and
- South – A plastics extrusion business (Sumika Polymer Compounds) is located to the south of the Site.

2.3 Geology and Hydrogeology

According to the British Geological Survey, the Site's geology can be summarized as follows:

- Quaternary drift deposits (River Terrace Deposits) lie immediately beneath the Site, consisting of sand, silt and clay, with clay and gravel at the far west of the Site; and
- London Clay lies beneath the drift deposits. The London Clay Formation is mainly comprised of bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

The drift deposits are classified as a Secondary A aquifer, i.e., 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. The bedrock is not classified as a productive aquifer.

The Site is located in a Source Protection Zone (zone 1c (Inner Protection Zone)). A Zone 1 is defined as the 50-day travel time from any point below the water table to the source. Zone 1c is where the aquifer is covered by a protective cover of low permeability (i.e., the London Clay Formation) and may be affected by deep drilling or other subsurface activities. This is a zone defined by the Environment Agency to identify where contamination risk from any activities might cause pollution to public water supplies sourced from groundwater. These zones are used by the Agency to respond appropriately to pollution threats.

There are no groundwater abstractions within 1 km of the Site noted in the Landmark Envirocheck report. The closest water groundwater abstraction is located 1.52 km to the southwest of the Site, which is the abstraction well associated with the Source Protection Zone.

2.4 Surface Water Features

The nearest surface water body is the River Lavant, around 50 m west of the Site. In addition, the coast (English Channel) is located around 2 km south of the Site.

3.0 METHODOLOGY

3.1 Health and Safety Documentation

Prior to initiating the work, Golder developed and implemented Site-specific protocols to protect the health and safety of its employees and appointed contractors through the development of a Site-specific Work Method Statement including risk assessment and method statements.

3.2 Monitoring Well Inspection

A monitoring well inspection was completed by a Golder engineer on 22 October 2019 in order to locate and inspect the condition of monitoring wells installed during previous investigations for signs of damage and suitability for groundwater sampling. Results of the inspection are detailed in Section 4.1; in summary, only one monitoring well was located which was sampled as discussed in Section 3.6.

3.3 Service Clearance

A utility location survey was completed by Endeavour Drilling on 2 December 2019, to identify the presence of underground utilities and services in the area of the proposed borehole locations. The survey considered utility plans provided by Pfizer Site representatives.

A Cable Avoidance Tool (CAT) with generator and Ground Penetrating Radar (GPR) were used to survey the proposed drilling locations, and nearby manhole covers were lifted and inspected to identify utilities and services. The proposed locations were marked on the ground with spray paint.

Inspection pits were dug by hand to a depth of 1.5 m bGL if possible (or 1.2 m bGL where not possible, and approval to proceed granted by a Pfizer representative) to confirm the absence of services before drilling commenced. Where the inspection pits could not be completed due to challenging ground conditions or evidence of potential services, an alternative location was selected following review of service plans and confirmed with the Pfizer representative before commencing.

Well locations were relocated as necessary based on the utility survey and inspection pits. Prior to drilling, all locations were agreed with the Pfizer representative.

3.4 Drilling and Soil Logging

Endeavour Drilling mobilised to the Site to complete the drilling works on 2 December 2019 with a Dando terrier tracked rig designed for percussive drilling (as completed during previous investigations). The scope of work was not able to be completed in the allowed timeframe (2 to 6 December) due to challenging ground conditions; therefore, Endeavour Drilling remobilised to the Site on 6 January 2020 with a Commachio Rotary tracked rig to complete the drilling works using a rotary drilling method.

Boreholes were targeted close to locations where historical results had been reported above the screening criteria (new locations GA01, GA02, GA03 and GA04 to replace BH1, BH2, BH3 and BH4 from the 1996 investigation respectively (ERM, 1996)) along with locations close to historical downgradient locations (new locations GA07, GA07A, and GA08/GA08A and GA09/GA09A to replace BH7, BH7A, BH8 and BH9 respectively, also from the 1996 investigation). The new monitoring wells were named to reflect the historical locations they were designed to replace. The borehole plans from the previous site investigations are included in Appendix A, the new locations are positioned close to historical locations but are not shown in these Drawings in Appendix A but are included in Drawing 1.

Due to operational constraints, it was not possible to locate boreholes within the buildings on Site; however, the available locations were relatively close to the previous 1996 investigation locations. The investigation locations are shown on Drawing 1.

The drill arisings were sampled using core barrels with core recovered in acetate liners. Arisings were logged by a Golder engineer in general accordance with BS EN ISO 14688-1:2002, Eurocode 7, Part 2.

On-Site testing was undertaken on the drill arisings. This comprised headspace testing using a photo-ionisation detector (PID) to screen for the presence of Volatile Organic Compounds (VOC). The PID used a 10.6 eV lamp and was calibrated against 100 ppm isobutyl gas.

Groundwater monitoring wells comprising 50 mm high-density polyethylene (HDPE) standpipe were installed in the eight boreholes. The annular space surrounding the HDPE pipe was backfilled with non-calcareous filter gravel around the slotted section and bentonite pellets around the casing to approximately ground level. Monitoring wells were completed at the surface with flush-to-ground steel covers.

3.5 Topographical Survey

A topographical survey was undertaken by a surveyor (Endeavour Drilling) using GPS equipment to gain coordinates and elevations of the new monitoring wells along with the existing borehole. The coordinates are shown in borehole logs in Appendix B.

XY coordinates could not be gained at GA07, GA08 or GA08A due to limited GPS signal however, the ground elevations were captured in metres above ordnance datum (m aOD). The locations are shown approximately on Drawing 1 and 2.

3.6 Groundwater Sampling

Groundwater level was measured and groundwater samples were collected as follows:

- The wells were dipped with a dip meter to measure the groundwater level and the depth to the base of the borehole;
- Groundwater was purged from the wells using a submersible pump;
- A multiparameter probe with a flow through cell was used to measure field parameters which were recorded until the field parameter levels sufficiently stabilised; and
- Samples were collected in laboratory provided containers and placed in cool boxes prior to dispatch to a UK Accreditation Service (UKAS) accredited laboratory for analysis.

A sample was collected from BH4-1996 on October 22, 2019 during the well inspection. Additional samples from the newly installed GA01, GA02 and GA03 were collected on December 5 and 6, 2019 following drilling, and samples from GA04, GA07, GA07A, GA08A and GA09A were collected on January 10, 2020 following the drilling along with a repeat sample from the existing onsite borehole (BH4-1996). The schedule of analysis is detailed in Table 1.

Table 1: Groundwater Analytical Schedule

Proposed Locations	VOC (TCE related)	Acetone/Isopropanol	Phenol
BH4-1996	x	x	x
GA01	x		
GA02		x	

Proposed Locations	VOC (TCE related)	Acetone/Isopropanol	Phenol
GA03	x	x	x
GA04	x		
GA07	x	x	
GA07A	x	x	
GA08	x	x	
GA09	x	x	

4.0 RESULTS

4.1 Monitoring Well Inspection

The monitoring well inspection identified that only one serviceable monitoring well was present on Site. The well was in satisfactory condition and was suitable for monitoring.

The location of the existing monitoring well corresponded to the approximate location of BH4 drilled in the 1996 investigation; however, the dip to base was significantly shallower (3.12 m bGL compared to a drilled depth of 6.00 m bGL), suggesting either the well is blocked or that silting has occurred over the years which may limit recharge into the monitoring well. For the purposes of this investigation, the results relating to this monitoring well are referred to as BH4-1996.

4.2 Lithology

The boreholes were drilled to depths of between 5.0 and 5.9 m bGL. Two locations, GA08 and GA09, were initially attempted but had to be relocated to secondary positions as close as possible to the original locations, as the inspection pits could not be completed due to thickness of surface concrete and loose gravel preventing progress respectively. Secondary positions were agreed with Pfizer (GA08A and GA09A) where drilling to the required depth was successful. Original and secondary positions are shown in Drawing 1.

In general, the ground conditions comprised concrete, asphalt or gravel at ground surface underlain with made ground including sands and gravels to a maximum depth of 1.8 m bGL. Below this was generally sandy, gravelly clay with flint. The strata beneath the drift deposits is believed to form part of the London Clay formation and comprising silty and sandy clays from a minimum depth of 3.2 m bGL which is consistent with previous investigation findings.

A summary of the visual and olfactory evidence of contamination is included in borehole logs (Appendix B) and summarised in Table 2 below.

Table 2: Summary of Visual and Olfactory Evidence of Contamination

Location	Depth (m bGL)	PID Reading	Description
GA01	0.16 – 0.40	0	Sheen and slight hydrocarbon odour.
	0.40 – 0.55	0	Slight hydrocarbon odour.
GA03	0.12 – 0.50	0	Slight hydrocarbon odour.

The results for the organic vapour sampling by PID are included in the borehole logs in Appendix B.

4.3 Groundwater Elevation

Groundwater elevations are included in Appendix C-1 and are summarised in Table 3. The groundwater elevations indicate that groundwater is flowing in a southwesterly direction (Drawing 2). Previous investigations reported a southerly groundwater direction.

Table 3: Groundwater Elevations (January 2020)

Sample Locations	Ground level	Groundwater Level	
	(m AOD)	(m bGL)	(m aOD)
BH4-1996	14.916	2.35	12.57
GA01	16.189	3.52	12.67
GA02	15.442	2.86	12.58
GA03	15.601	3.03	12.57
GA04	14.797	2.24	12.56
GA07	15.411	2.64	12.77
GA07A	15.195	3.05	12.15
GA08A	14.985	2.83	12.16
GA09A	14.061	2.24	11.82

4.4 Laboratory Chemical Analysis

The results of the laboratory chemical analysis undertaken on the groundwater samples during the investigation are presented in Appendix D.

4.4.1 Groundwater Quality Assessment

Generic assessment criteria (GAC) were selected for comparison of the groundwater analytical results which is in line with the UK approach to assessing groundwater contamination. Based on the Site setting, and the proximity of the River Lavant, the groundwater analyses have been compared to the Freshwater Environmental Quality Standards (FW-EQS) provided in the Water Framework Directive. In addition, due to the sensitivity of the ultimate receptor (the underlying aquifer), the results have been compared with UK Drinking Water standards (2018) in the first instance and World Health Organisation (WHO) guidelines for Drinking Water Quality (2011) where the UK values were not available.

The results of the groundwater screening assessment are presented in Appendix E and concentrations reported above the GAC are summarised below in Table 4.

Table 4: Summary of Concentrations above GAC

Well ID	Sampling Date	Vinyl Chloride	Trichloroethene (TCE)	Tetrachloroethene (PCE)
FW Screening Value =>		-	10	10
UK DWS =>		0.5	10	10
BH-4-1991	10/22/2019	<0.1	25	32
	1/10/2020	<0.1	<3	7
GA04	1/10/2020	2.1	10	<3
GA07	1/10/2020	<0.1	15	<3

Notes:

FW Screening Value = Freshwater Screening Value

UK DWS = UK Drinking Water Standard

4.4.1.1 Volatile Organic Compounds

Tetrachloroethene (PCE) was reported above the limit of detection in only BH4-1996. Concentrations were above the relevant GAC (10 µg/l) in the sample taken in October 2019 (32 µg/l) and below the GAC in January 2020 (7 µg/l). PCE was not detected in any of the other monitoring locations, this includes monitoring wells near the downgradient property boundary.

TCE was reported above the limit of detection in four of the 10 groundwater samples. Two locations reported concentrations marginally above the GAC (BH4-1996 October 2019 and GA07). However, TCE was reported below the detection limits at BH4-1996 when sampled again in January 2020. TCE was not detected above the GAC in downgradient monitoring wells.

Vinyl chloride was reported at the limit of detection at one location (GA08A) and was slightly above the relevant GAC (0.5 µg/l) at a concentration of 2.1 µg/l (GA04). Vinyl chloride was not detected at any of the monitoring wells on the downgradient boundary of the Site.

Other VOCs and breakdown products, including 1,1,1 trichloroethane, cis-1-2-Dichloroethene, dissolved ethene and dissolved ethane, were reported in some locations at low concentrations, within an order of magnitude of the limits of detection. There are no publicly available GAC for these substances.

4.4.1.2 Phenol

Phenol was not reported above the limit of detection in the groundwater sample taken from GA03 (<10 µg/l); however, it should be noted that the GAC is slightly below the limit of detection (7.7 µg/l). Phenol was not analysed for in samples from other locations.

4.4.1.3 Alcohols and Acetates

The samples analysed for isopropanol and acetone were reported below the respective detection limits. There are no publicly available GAC for these substances.

4.4.2 Comparison to Historic Results

The pertinent historical concentrations, where no GAC is available, have been compared to the result of the 2019/2020 samples from the corresponding boreholes. The comparison is shown below in Table 5. The results show that the concentration of these determinants at the corresponding locations have reduced since the 1996 investigation.

Table 5: Historical Sampling Comparison

Determinant	Sampling Location (1996)	Screening Value (µg/l)	Historical Conc. (1996) (µg/l)	Concentration 2019/2020 (µg/l)
TCE	BH1	10	690	<2
	BH3		16	<3
	BH4		25	10 (GA04) <3 (BH4-1996 Jan 2020)
Cis 1,2 Dichloroethene	BH1	50	74	<3

Determinant	Sampling Location (1996)	Screening Value (µg/l)	Historical Conc. (1996) (µg/l)	Concentration 2019/2020 (µg/l)
Acetone	BH2	No value	240	<50
	BH3		14,400	<50
Isopropanol	BH3	No value	9,200	<100
Phenol	BH3	7.7	9	<10

5.0 SUMMARY AND CONCLUSIONS

Golder has undertaken a Site investigation and associated groundwater monitoring at the Site. Eight monitoring wells were installed at locations where historical results had been reported above the current GAC along with locations close to historical downgradient locations; one historic well was sampled.

The findings of the investigation can be summarized as follows:

- The groundwater sample obtained from BH-4-1996 reported concentrations of TCE and PCE above the GAC in October 2019. However, subsequent analyses performed in January 2020 did not report any compound concentrations above the GAC;
- Vinyl chloride was reported above the GAC in GA-04;
- TCE was reported above the GAC in GA07;
- No other compounds were reported above the GAC or above the laboratory limits of reporting; and
- The concentrations reported during this current investigation represent a significant decrease when compared to historical results.

Although groundwater concentrations of vinyl chloride and TCE are reported above the GAC at two locations, these parameters are within an order of magnitude of the assessment criteria. Based on observations made during drilling, the water table aquifer consists of generally clayey material (i.e., low permeability), therefore lateral/vertical migration is not considered to be a significant concern. This is evident as the concentrations are not widespread and appear to be delineated and confined within the property boundary (i.e., no concentrations were reported above the GAC in the downgradient wells).

It is noted that the GAC are considered conservative as they are for the receptor itself and do not consider dilution, retardation or biodegradation in the aquifer.

6.0 REFERENCES

ERM, 1996. Wyeth Laboratories. Phase II Site Investigation Report: Wyeth Laboratories, Havant, Hampshire. December 1996.

ERM, 2008. Phase I & II Environmental Sites Assessment, Tableting/Dispensary area, Wyeth, New Lane, Havant. Dated June 2008.

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Signature Page

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Date: 23 January 2020

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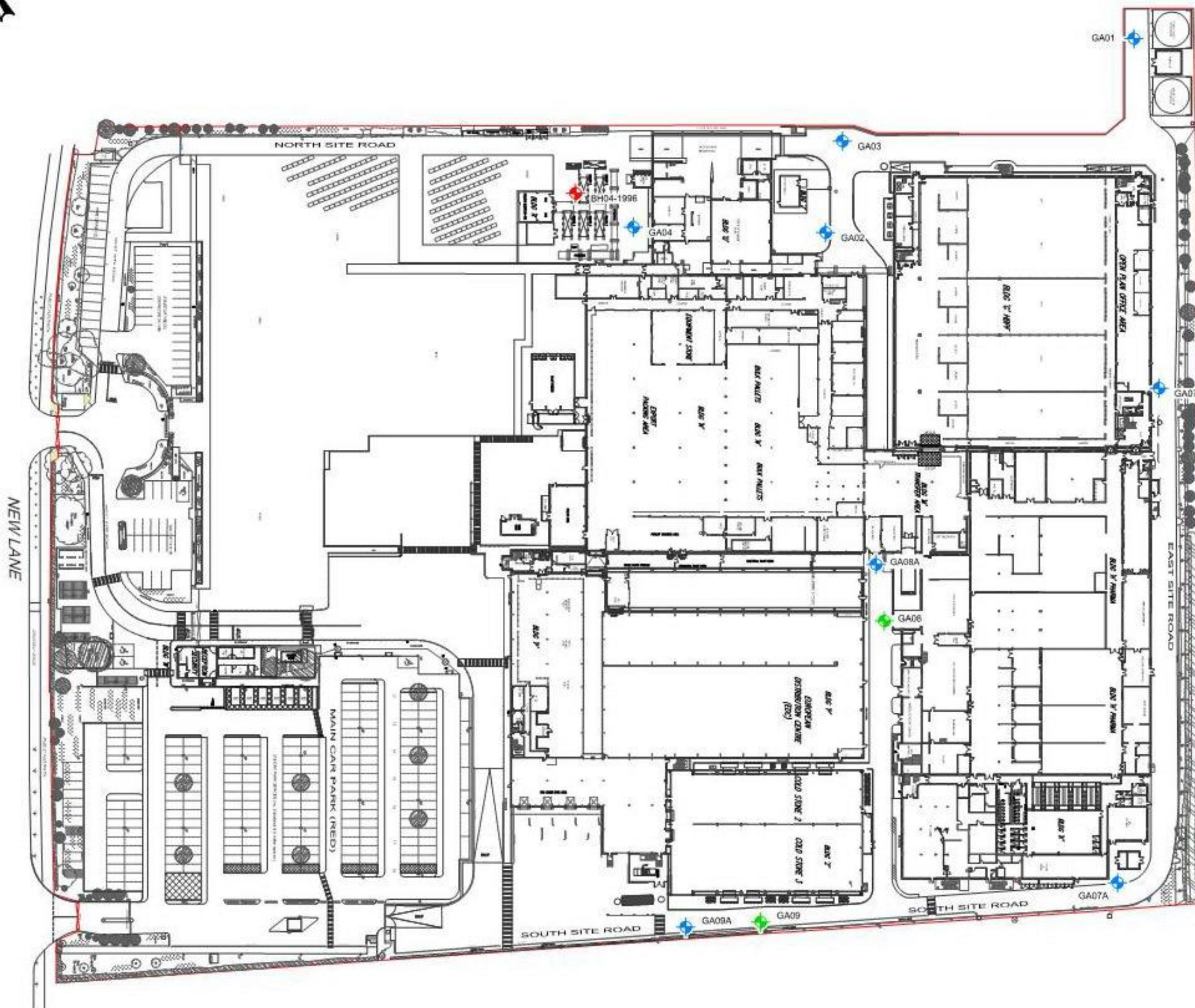
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DRAWINGS



	MONITORING WELL INSTALLED IN 2019/2020
	PREVIOUSLY INSTALLED MONITORING WELL
	ATTEMPTED BUT BACKFILLED WELL LOCATION

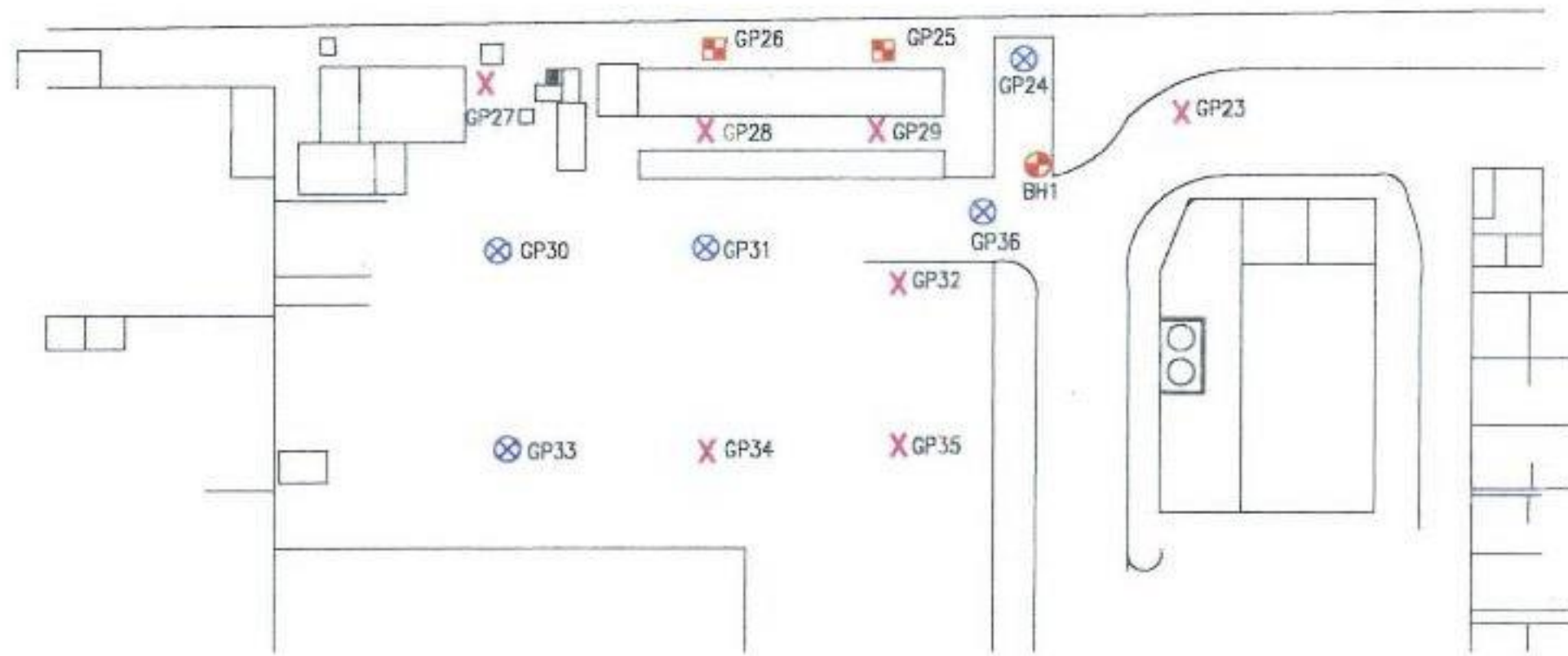
BASE MAP TAKEN FROM PFIZER BIOTECH DRAWING NO 4859 (003), DATED 1 NOVEMBER 2016.

A scale bar with markings at 0, 50, and 100 metres. Below the bar, the text '1:2,000' is on the left and 'METRES' is on the right.

DRAWING
1

APPENDIX A

**Historical Borehole Location
Plans**



Date	26/4/96	Drawn	PBZ
Checked	<i>[Signature]</i>	Approved	<i>[Signature]</i>
Scale	A4		
Client	Wyeth Laboratories		
Project	4063		
Title	Figure 2.2a Location of Soil Borings and Shallow Groundwater Sampling Points in the vicinity of BH1		
Drawing No	4063-A008	Iss.	A

- Key:**
- Geoprobe Locations for Soil and Water Samples
 - Geoprobe Locations for Soil Samples
 - Hand Auger Locations
 - Groundwater Monitoring Borehole

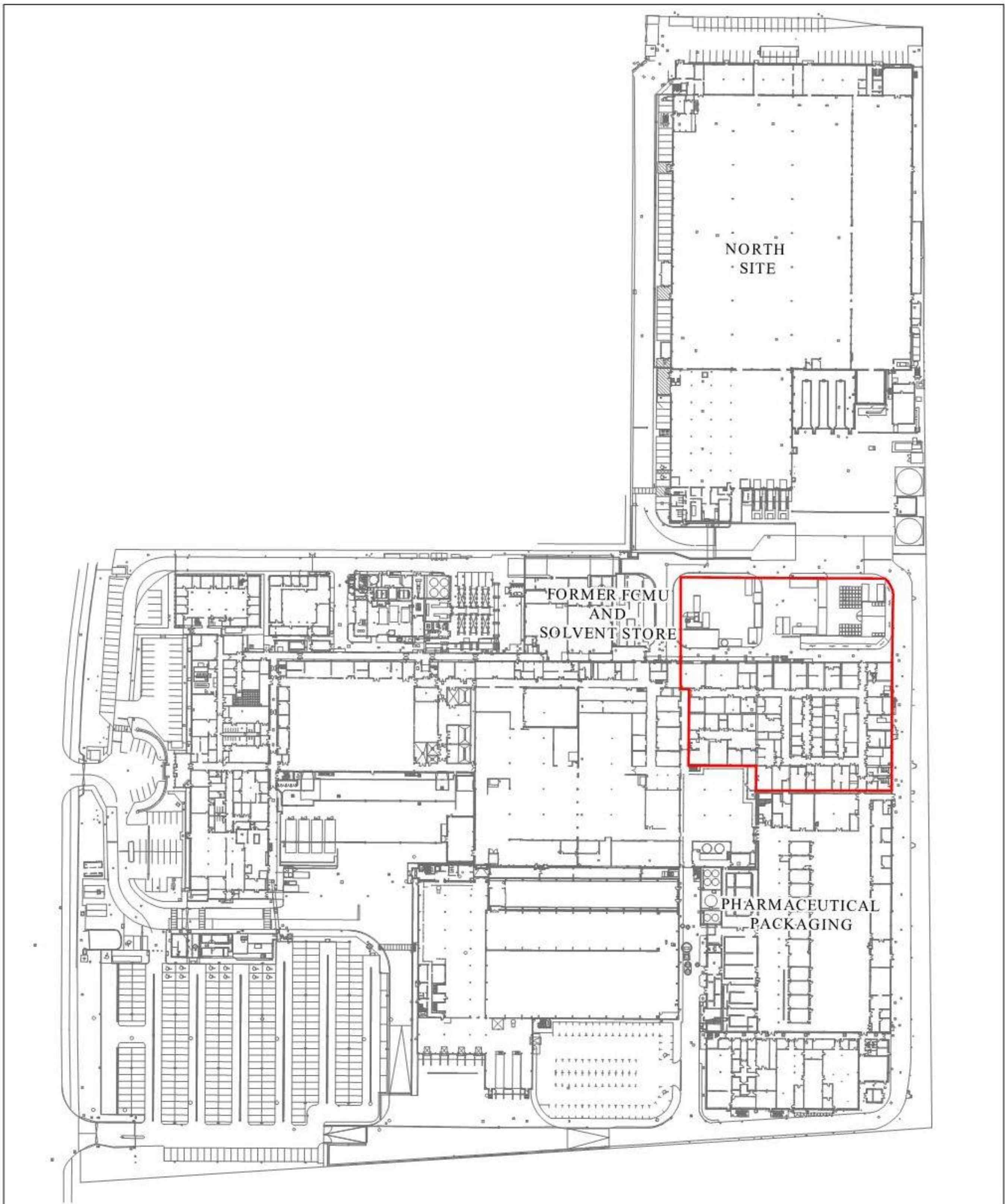
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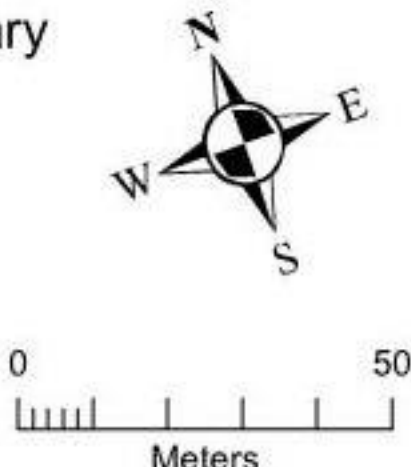
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Telephone 01865 384000
Facsimile 01865 204982





KEY: SiteBoundary 	CLIENT: Wyeth Pharmaceutical ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Telephone: 01865 384800 Facsimile: 01865 204982  SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2008 Licence number 0100031673. PROJECTION: Local Grid	SIZE: A4 TITLE: Figure 2 Site Context Plan <table><tr><td>DATE: 10/06/2008</td><td>CHECKED:</td><td>PROJECT: 0081829</td></tr><tr><td>DRAWN: KP</td><td>APPROVED:</td><td>SCALE: 1:1,350</td></tr><tr><td colspan="2">DRAWING: Site_Context.mxd</td><td>REV: 0</td></tr></table>	DATE: 10/06/2008	CHECKED:	PROJECT: 0081829	DRAWN: KP	APPROVED:	SCALE: 1:1,350	DRAWING: Site_Context.mxd		REV: 0
	DATE: 10/06/2008	CHECKED:	PROJECT: 0081829								
	DRAWN: KP	APPROVED:	SCALE: 1:1,350								
DRAWING: Site_Context.mxd		REV: 0									



KEY: SiteBoundary Monitoring Well Borehole N E S W 0 10 Meters	CLIENT: Wyeth Pharmaceutical	SIZE: A4	TITLE: Figure 3 Borehole Location Plan		
	ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Telephone: 01865 384800 Facsimile: 01865 204982	 ERM	DATE: 06/06/2008 CHECKED: PROJECT: 0081829		
	SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2508 Licence number 010031673. PROJECTION: Local Grid		DRAWN: KP APPROVED: SCALE: 1:350		
	DRAWING: borehole_locations.mxd		REV: 0		

APPENDIX B

Borehole Logs



Pfizer Inc

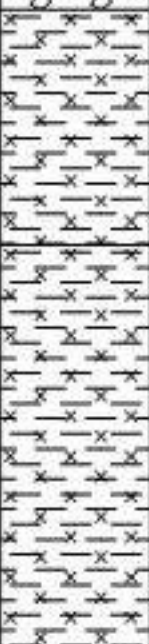
GA01

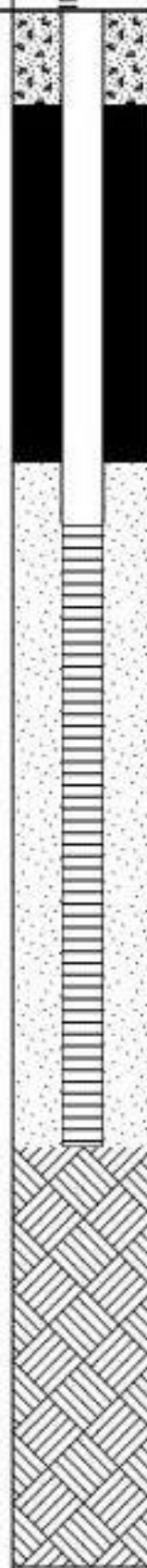
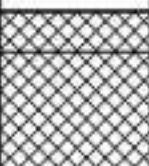
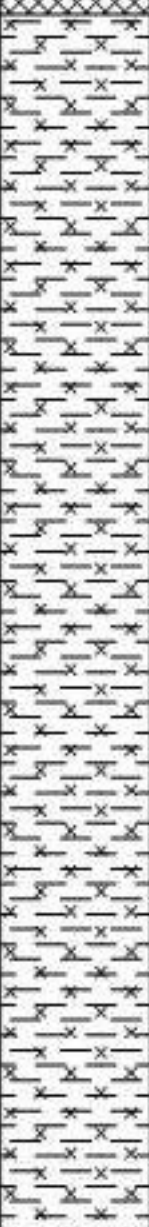
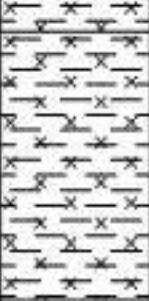
Project No : 19125953

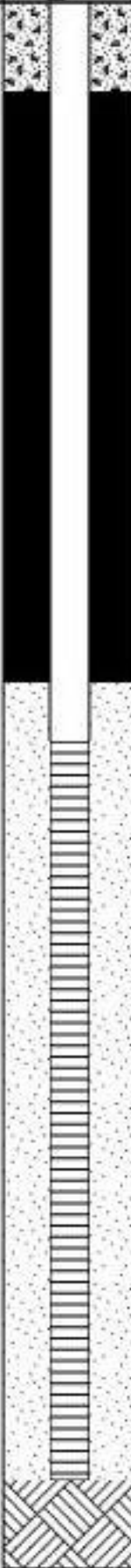
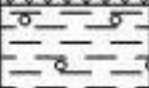
Logged by : RV

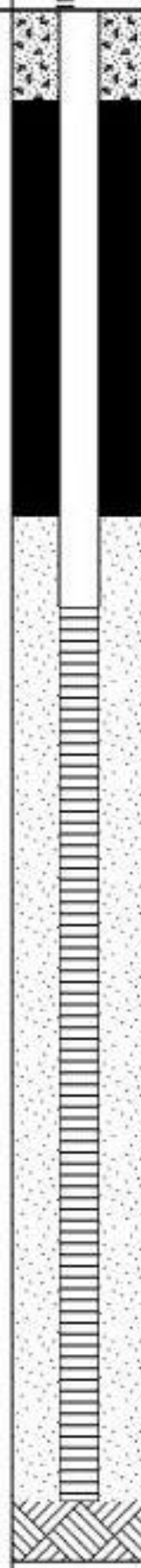
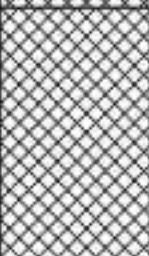
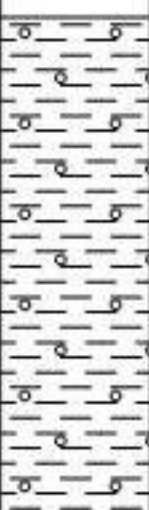
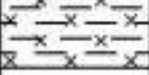
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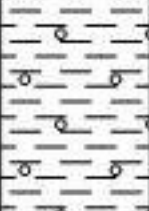
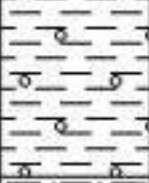
6000-0000

 GOLDER						Client : Pfizer Inc			Hole No. GA02	
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953	
Equipment & Methods : Terrier Rig						Contractor : Endeavour Date Started : 03/12/2019 Completed : 06/12/2019 Logged by : RV			Ground Level (mAOD) : 15.44 Co-ordinates : E 472610.0 N 107228.0	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD				
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description	
					0.00	15.34		0.10	Dry, brown/grey, loose, medium, sub-angular gravel. [MADE GROUND] 1A	
						15.14			0.30	Slightly damp, compact, brown/grey, sandy gravel and cobbles. Gravel is fine to coarse sub-angular including concrete and flint. [MADE GROUND] 1A
						14.34			(0.80)	Slightly damp, compact, orange brown silty clay matrix with gravel. Gravel is fine to coarse, sub-rounded to sub-angular, predominantly flint with occasional cobbles. [MADE GROUND] 1A
					0.00			(2.10)	Slightly damp, orange/brown, silty, sandy clay matrix with flint GRAVEL. Gravel is fine to medium, sub-rounded with occasional cobbles. 1A	
						12.24				3.20
					0.00			(1.20)	Wet, soft to firm, yellow/brown, silty CLAY. 1A	
						11.54				3.90
					0.00					
					0.00					
					0.00					
									End of Hole at 5.10m	
Remarks :										
Checked By: HDL										
Scale 1:30										
GOLDER April 2008										

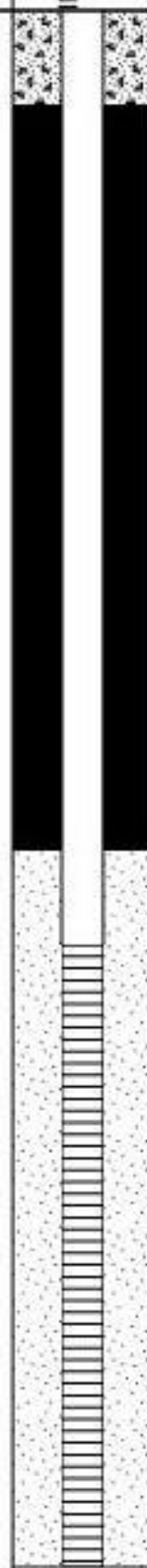
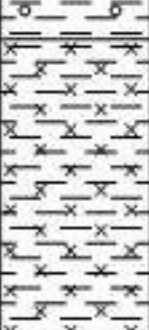
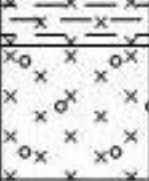
 GOLDER						Client : Pfizer Inc			Hole No. GA03		
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953		
Equipment & Methods : Terrier Rig						Contractor : Endeavour Date Started : 03/12/2019 Completed : 05/12/2019 Logged by : RV			Ground Level (mAOD) : 15.60 Co-ordinates : E 472623.0 N 107249.0		
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD					
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description		
						15.48		0.12	Asphalt over concrete. [MADE GROUND] 1A		
								(0.38)	Slightly damp, very compact, dark brown/grey, sandy gravel. Gravel is fine to coarse and sub-angular. Slight hydrocarbon odour. [MADE GROUND] 1B		
					0.00	15.10		0.50	Slightly damp, soft, orange/brown with some dark brown mottling, sandy, silty CLAY with fine to coarse, sub-angular gravel. 1A		
					0.00			(3.70)			
					0.00						
					11.40		4.20	Wet, soft, orange brown, silty CLAY. 1A			
			0.00		(0.80)						
					10.60		5.00	End of Hole at 5.00m			
Remarks :										Checked By: HDL	
										Scale 1:30	
										GOLDER HDL April 2008	

 GOLDER						Client : Pfizer Inc			Hole No. GA04	
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 02/12/2019 Completed : 07/01/2020 Logged by : CF			Ground Level (mAOD) : 14.80 Co-ordinates : E 472563.0 N 107248.0	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD				
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description	
						14.65		0.15	Concrete. [MADE GROUND] 1A	
						14.55		0.25	Brown, coarse sand. [MADE GROUND] 1A	
					0.00			(0.95)	Brown/grey, slightly damp, slightly clayey, sandy gravel. Gravel is coarse and sub-rounded to sub-angular comprising predominantly flint. [MADE GROUND] 1A	
						13.60	1.20			
						13.30	(0.30) 1.50		Dense, brown, sandy gravelly CLAY. Gravel is fine to coarse, sub-angular including chalk and flint. 1A	
					0.00				No Recovery	
							(3.80)			
									3.7 m brown, gravelly sand noted.	
							9.50	5.30		
										End of Hole at 5.30m
Remarks :									Checked By: HDL	
									Scale 1:30	
									GRUN-CP 100 April 2008	

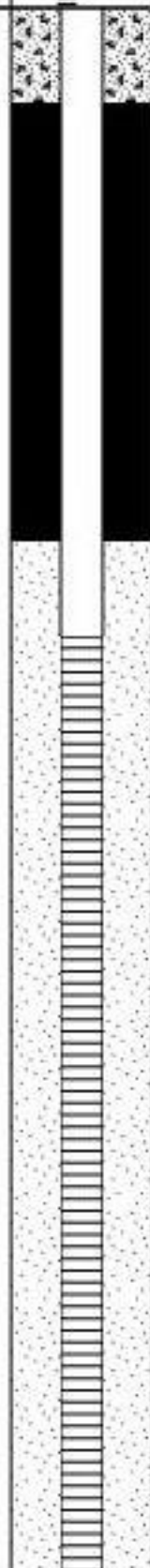
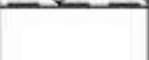
 GOLDER						Client : Pfizer Inc			Hole No. GA07	
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 04/12/2019 Completed : 09/01/2020 Logged by : CF			Ground Level (mAOD) : 15.41 Co-ordinates : E N	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD				
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description	
					0.00	15.21		0.20	Concrete. [MADE GROUND] 1A	
								(0.50)	Dry, very compact, dark grey, sandy gravel. Gravel is fine to coarse and sub-angular including brick and concrete. [MADE GROUND] 1A	
						14.71		0.70		
						(0.80)		Firm, brown, slightly sandy gravelly CLAY. Clay is fine to coarse and sub-angular with concrete and flint and occasional flint cobbles. [MADE GROUND] 1A		
					0.00	13.91		1.50	No Recovery	
						(1.50)				
						12.41		3.00		
						(1.55)		Firm, brown, slightly sandy, gravelly CLAY with occasional cobbles. Gravel is fine to coarse, sub-angular to sub-rounded flint with occasional cobbles. 1A		
					0.00	10.86		4.55		
						(0.65)		Soft to firm, light brown, slightly sandy, silty CLAY. 1A		
			0.00	10.21		5.20	End of Hole at 5.20m			
Remarks :										Checked By: HDL
										Scale 1:30
										GRUN-CP 10 April 2008

 GOLDER						Client : Pfizer Inc			Hole No. GA07A	
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 07/01/2020 Completed : 07/01/2020 Logged by : CF			Ground Level (mAOD) : 15.20 Co-ordinates : E 472619.0 N 107039.0	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD				
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description	
						15.05		0.15	Concrete. [MADE GROUND] 1A	
						14.90		0.30	Loose, grey, slightly sandy, coarse gravel. Gravel is fine to coarse, sub-angular including flint. [MADE GROUND] 1A	
					0.00			(1.50)	Dry, very firm, brown, sandy, gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded including flint. [MADE GROUND] 1A	
						13.40		1.80		
								(0.80)	Firm, light brown, silty, gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded flint. 1A	
						12.60		2.60		
					0.00			(0.60)	Firm, brown, sandy, gravelly CLAY. Gravel is fine to medium, sub-angular flint. 1A	
						12.00		3.20		
					0.00			(2.00)	Firm, brown, silty, sandy CLAY, with occasional bands of medium brown sand. 1A	
					0.00	10.00		5.20	End of Hole at 5.20m	
Remarks :								Checked By: HDL		
								Scale 1:30		
								GOLDER April 2020		

 GOLDER						Client : Pfizer Inc		Hole No. GA08	
Site : Havant						Project : Pfizer Havant Site Investigation		Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 06/01/2020 Completed : 06/01/2020 Logged by : CF		Ground Level (mAOD) : Co-ordinates : E N	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD			
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description
								(0.55)	Concrete. [MADE GROUND] 1A
								0.55	End of Hole at 0.55m
Remarks : Borehole could not be advanced due to thick concrete, GA08A undertaken as replacement location.									
									Checked By: HDL
									Scale 1:30
									GRUN-CP 110 April 2008

 GOLDER						Client : Pfizer Inc			Hole No. GA08A	
Site : Havant						Project : Pfizer Havant Site Investigation			Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 06/01/2020 Completed : 08/01/2020 Logged by : CF			Ground Level (mAOD) : 14.99 Co-ordinates : E N	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD				
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description	
						14.77		0.22	Concrete. [MADE GROUND] 1A	
						14.49		(0.28) 0.50	Brown, sandy, gravelly clay. Gravel is fine to coarse, sub-angular to sub-rounded including flint and concrete. [MADE GROUND] 1A	
					0.00				Firm, brown, silty, sandy, gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded flint, with occasional flint cobbles. 1A	
					0.00			(3.10)		
					0.00					
					0.00	11.39		3.60		
					0.00			(1.00)	Soft to firm, light brown with orange mottling, sandy, silty CLAY. 1A	
						10.39		4.60		
						9.99		(0.40) 5.00	Soft to firm, light grey, sandy, gravelly SILT. Gravel is fine flint. 1A	
					0.00				End of Hole at 5.00m	
Remarks :									Checked By: HDL	
									Scale 1:30	
									GOLDER April 2020	

 GOLDER						Client : Pfizer Inc		Hole No. GA09	
Site : Havant						Project : Pfizer Havant Site Investigation		Project No : 19125953	
Equipment & Methods : Commachio 305						Contractor : Endeavour Date Started : 07/01/2020 Completed : 07/01/2020 Logged by : CF		Ground Level (mAOD) : 14.44 Co-ordinates : E 472527.0 N 107064.0	
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD			
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description
	 					14.19	   	(0.25) 0.25	Concrete. [MADE GROUND] 1A
						13.89		(0.30) 0.55	Dense, sandy gravel. Gravel is fine to coarse and sub-angular including flint and concrete. [MADE GROUND] 1A
						13.44		(0.45) 1.00	Loose, brown, medium, rounded mixed gravel. [MADE GROUND] 1A
		End of Hole at 1.00m							
Remarks : Borehole could not be advanced due to loose gravels in inspection pit, GA09A undertaken as replacement location.									
								Checked By: HDL	
								Scale 1:30	
								GRUN-CP 10 April 2008	

 GOLDER				Client : Pfizer Inc			Hole No. GA09A		
Site : Havant				Project : Pfizer Havant Site Investigation			Project No : 19125953		
Equipment & Methods : Commachio 305				Contractor : Endeavour Date Started : 09/01/2020 Completed : 09/01/2020 Logged by : CF			Ground Level (mAOD) : 14.06 Co-ordinates : E 472508.0 N 107070.0		
WATER/ PROGRESS	INSTALLATION /BACKFILL	SAMPLES				STRATA RECORD			
		Sample Top (m)	Sample Base (m)	Sample Type	PID (ppm)	Level (mAOD)	Legend	Depth (Thickness) m	Description
					0.00	13.81		(0.25) 0.25	Concrete. [MADE GROUND] 1A
						13.61		0.45	Dense, brown, sandy Gravel. Gravel is fine to coarse, sub-angular to sub-rounded flint. [MADE GROUND] 1A
								(0.75)	Firm, brown, sandy, gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded with occasional cobbles of sub-angular flint. 1A
						12.86		1.20	
					0.00			(3.35)	No Recovery
						9.51		4.55	
								(0.45)	Soft to firm, light grey/brown, sandy, gravelly, clayey SILT. 1A
			0.00	9.06		5.00	End of Hole at 5.00m		
Remarks :									Checked By: HDL
									Scale 1:30
									GRUN-CP 100 April 2008

APPENDIX C

Groundwater Data

Appendix C-1
Groundwater Elevations

Sample Locations	Ground level	Groundwater Level	
	(m AOD)	(m bGL)	(m aOD)
22/10/2020			
BH4-1996	14.916	2.42	12.50
w/c 05/12/2020			
GA01	16.189	3.60	12.59
GA02	15.442	2.96	12.48
GA03	15.601	3.06	12.54
10/01/2020			
BH4-1996	14.916	2.35	12.57
GA01	16.189	3.52	12.67
GA02	15.442	2.86	12.58
GA03	15.601	3.03	12.57
GA04	14.797	2.24	12.56
GA07	15.411	2.64	12.77
GA07A	15.195	3.05	12.15
GA08A	14.985	2.83	12.16
GA09A	14.061	2.24	11.82

Appendix C-2
Ground Water Field Parameters

Sampling Location	Temp (°C)	pH	DO (ppm)	Conductivity specific (µS/cm)	Conductivity absolute (µS/cm)	ORP (mV)
22/10/2020						
BH4-1996	15.80	6.43	9.09	654.0	538.0	-68.5
w/c 05/12/2020						
GA01	14.52	7.20	1.77	654.8	523.9	90.8
GA02	12.77	7.71	4.46	403.4	309.2	100.9
GA03	14.20	7.76	SFS	987.7	781.2	SFS
10/01/2020						
BH4-1996	12.15	7.87	8.50	600.00	452.8	85.5
GA04	12.36	7.97	1.14	651.6	493.1	101.6
GA07	12.80	7.56	0.68	621	476.1	51.4
GA07A	13.77	7.48	3.38	1252.8	983.6	67.3
GA08A	13.54	7.68	1.64	798.5	623.6	42.5
GA09A	12.63	7.91	7.37	625.7	477.8	70.9

Notes:

SFS - standard field suite taken where use of flow through cell not possible.

APPENDIX D

Laboratory Data

Golder Associates Ltd
Golder House
Tadcaster Enterprise Park
Station Road
Tadcaster
LS24 9JF



Attention :	Rachel Vojvodic
Date :	30th October, 2019
Your reference :	19125953
Our reference :	Test Report 19/17364 Batch 1
Location :	Pfizer Havant
Date samples received :	24th October, 2019
Status :	Final report
Issue :	1

One sample were received for analysis on 24th October, 2019 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Paul Boden BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Golder Associates Ltd
Reference: 19125953
Location: Pfizer Havant
Contact: Rachel Vojvodic
EMT Job No: 19/17364

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₂

EMT Sample No.	1-4										Please see attached notes for all abbreviations and acronyms		
Sample ID	BH4-1095												
Depth													
COC No / misc													
Containers	V												
Sample Date	22/10/2019												
Sample Type	Ground Water												
Batch Number	1												
Date of Receipt	24/10/2019										LOD/LOR	Units	Method No.
Alcohols/Acetates													
i-Propyl Alcohol (Isopropanol)	<100										<100	ug/l	TM83/PM10
Acetone	<50										<50	ug/l	TM83/PM10
Dissolved Ethene*	<1										<1	ug/l	TM25/PM0
Dissolved Ethane*	<1										<1	ug/l	TM25/PM0

Client Name: Golder Associates Ltd
Reference: 19125953
Location: Pfizer Havant
Contact: Rachel Vojvodic
EMT Job No: 19/17364

VOC Report : Liquid

[illegible]

Client Name: Golder Associates Ltd

Reference: 19125953

Location: Pfizer Havant

Contact: Rachel Vojvodic

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/17364

SOILS

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

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory.

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 19/17364

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM25	Determination of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.	Yes			
TM83	Modified USEPA method 8260. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				

Golder Associates Ltd
Golder House
Tadcaster Enterprise Park
Station Road
Tadcaster
LS24 9JF



Attention :	Heather Di Lauro
Date :	16th December, 2019
Your reference :	PFIZER HAVANT
Our reference :	Test Report 19/20091 Batch 1
Location :	
Date samples received :	7th December, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 7th December, 2019 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Paul Boden BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: Golder Associates Ltd
Reference: PFIZER HAVANT
Location:
Contact: Heather Di Lauro
EMT Job No: 19/20091

VOC Report : Liquid

[illegible]

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	18.5		
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	84.4		
Particle Size <4mm =	>95%				
EMT Job No	19/20091		Landfill Waste Acceptance Criteria Limits		
Sample No	17				
Client Sample No	SKIP		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill	Hazardous Waste Landfill
Depth/Other					
Sample Date	06/12/2019				
Batch No	1				
Solid Waste Analysis					
Total Organic Carbon (%)	0.27		3	5	6
Loss on Ignition (%)	2.3		-	-	10
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<30		500	-	-
PAH Sum of 17(mg/kg)	<0.64		100	-	-
pH (pH Units)	9.25		-	>6	-
ANC to pH 7 (mol/kg)	0.21		-	to be evaluated	to be evaluated
ANC to pH 4 (mol/kg)	2.55		-	to be evaluated	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg		
	C ₁₀ mg/l	A ₁₀ mg/kg			
	Arsenic	0.0065	0.065	0.5	2
Barium	<0.003	<0.03	20	100	300
Cadmium	<0.0005	<0.005	0.04	1	5
Chromium	0.0059	0.059	0.5	10	70
Copper	<0.007	<0.07	2	50	100
Mercury	<0.001	<0.01	0.01	0.2	2
Molybdenum	0.004	0.04	0.5	10	30
Nickel	<0.002	<0.02	0.4	10	40
Lead	<0.005	<0.05	0.5	10	50
Antimony	0.002	<0.02	0.06	0.7	5
Selenium	<0.003	<0.03	0.1	0.5	7
Zinc	<0.003	<0.03	4	50	200
Chloride	10.0	100	800	15000	25000
Fluoride	0.6	6	10	150	500
Sulphate as SO4	66.7	667	1000	20000	50000
Total Dissolved Solids	176	1759	4000	60000	100000
Phenol	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	7	70	500	800	1000

Client Name: Golder Associates Ltd

Reference: PFIZER HAVANT

Location:

Contact: Heather Di Lauro

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/20091

SOILS

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

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory.

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 19/20091

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 19/20091

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM25	Determination of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2: As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM77	Modified DDCE/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No

EMT Job No: 19/20091

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM83	Modified USEPA method 8260. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Golder Associates Ltd
Golder House
Tadcaster Enterprise Park
Station Road
Tadcaster
LS24 9JF



Attention :	Rachel Vojvodic
Date :	17th January, 2020
Your reference :	
Our reference :	Test Report 20/388 Batch 1
Location :	Pfizer Havant
Date samples received :	11th January, 2020
Status :	Final report
Issue :	1

Seven samples were received for analysis on 11th January, 2020 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Paul Boden BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Report : Solid

Location: Pfizer Havant

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Job No: 20/388

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Report: Liquid

Location: Pfizer Havant

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle

H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

Please see attached notes for all abbreviations and acronyms

Client Name: Golder Associates Ltd
Reference:
Location: Pfizer Havant
Contact: Rachel Vojvodic
EMT Job No: 20/388

Reference:

Location:

Contact:

EMT Job No:

Golder Associates Ltd

Pfizer Havant

Rachel Voivodic

20/388

Please see attached notes for all abbreviations and acronyms

5 of 12

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	25.6		
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	79.6		
Particle Size <4mm =	>95%				
EMT Job No	20/388		Landfill Waste Acceptance Criteria Limits		
Sample No	28				
Client Sample No	SKIP1		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill	Hazardous Waste Landfill
Depth/Other					
Sample Date	10/01/2020				
Batch No	1				
Solid Waste Analysis					
Total Organic Carbon (%)	0.15				
Loss on Ignition (%)	2.9		-	-	10
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<30		500	-	-
PAH Sum of 17(mg/kg)	<0.64		100	-	-
pH (pH Units)	10.48		-	>6	-
ANC to pH 7 (mol/kg)	0.14		-	to be evaluated	to be evaluated
ANC to pH 4 (mol/kg)	3.58		-	to be evaluated	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg		
	C ₁₀	A ₁₀			
	mg/l	mg/kg			
Arsenic	0.0050	0.050	0.5	2	25
Barium	0.005	0.05	20	100	300
Cadmium	<0.0005	<0.005	0.04	1	5
Chromium	<0.0015	<0.015	0.5	10	70
Copper	<0.007	<0.07	2	50	100
Mercury	<0.001	<0.01	0.01	0.2	2
Molybdenum	0.005	0.05	0.5	10	30
Nickel	<0.002	<0.02	0.4	10	40
Lead	<0.005	<0.05	0.5	10	50
Antimony	<0.002	<0.02	0.06	0.7	5
Selenium	<0.003	<0.03	0.1	0.5	7
Zinc	<0.003	<0.03	4	50	200
Chloride	0.6	6	800	15000	25000
Fluoride	0.3	3	10	150	500
Sulphate as SO4	20.5	205	1000	20000	50000
Total Dissolved Solids	118	1180	4000	60000	100000
Phenol	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	2	20	500	800	1000

Client Name: Golder Associates Ltd

Reference:

Location: Pfizer Havant

Contact: Rachel Vojvodic

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 201388

SOILS

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

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory.

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

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REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/388

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM25	Determination of Dissolved Methane, Ethane and Ethene by Headspace GC-FID	PM0	No preparation is required.	Yes			

EMT Job No: 20/388

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM77	Modified DDCE/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
TM83	Modified USEPA method 8260. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes

EMT Job No: 20/388

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

APPENDIX E

Groundwater Screening

Appendix E
Groundwater Screening

Determinant	Fresh Water Screening Value	Source	Drinking Water Screening Value	Source			Existing Borehole		New Boreholes							
					Sample ID		BH4-1996		GA01	GA02	GA03	GA04	GA07	GA07A	GA08A	GA09A
					Sampled Date		22/10/2019	10/01/2020	05/12/2019	06/12/2019	06/12/2019	10/01/2020	10/01/2020	10/01/2020	10/01/2020	10/01/2020
					Units	LOD										
VOC																
Vinyl Chloride	No value	-	0.5	UK DWS	µg/l	<0.1	<0.1	<0.1	<0.1	-	<0.1	2.1	<0.1	<0.1	0.1	<0.1
cis-1-2-Dichloroethene	No value	-	50	WHO DWS	µg/l	<3	<3	<3	<3	-	<3	5	<3	<3	<3	<3
1,1,1-Trichloroethane	100	FW-EQS	No value	-	µg/l	<2	33	<2	<2	-	<2	<2	<2	<2	<2	<2
Trichloroethene (TCE)	10	FW-EQS	10	UK DWS	µg/l	<3	25	<3	<3	-	<3	10	15	<3	<3	3
Tetrachloroethene (PCE)	10	FW-EQS	10	UK DWS	µg/l	<3	32	7	<3	-	<3	<3	<3	<3	<3	<3
Dissolved Ethene	No value	-	No value	-	µg/l	<1	<1	<1	<1	-	<1	10	<1	<1	<1	<1
Dissolved Ethane	No value	-	No value	-	µg/l	<1	<1	<1	<1	-	<1	1	<1	<1	<1	<1
Phenol																
Phenol	7.7	FW-EQS	No value	-	µg/l	<10	-	-	-	-	<10	-	-	-	-	-
Alcohols/Acetates																
i-Propyl Alcohol (Isopropanol)	No value	-	No value	-	µg/l	<100	<100	<100	-	<100	<100	-	<100	<100	<100	<100
Acetone	No value	-	No value	-	µg/l	<50	<50	<50	-	<50	<50	-	<50	<50	<50	<50

Notes:

Concentration exceeds GAC

'-' Not analysed as per proposal



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