

Supplementary Site Investigation

PORTMAN ROAD, READING

RIDGEPOINT HOMES LTD

17 JANUARY 2023

Ridgepoint Homes
Terriers House
201 Amersham Road
High Wycombe
Buckinghamshire
HP13 5AJ

CAT/RAN/ME/46465-004

For the attention of Malcolm Law

17 January 2023

Dear Malcolm,

Portman Road, Reading – Supplementary Site Investigation Report

This letter provides a report on the findings of a supplementary geo-environmental and geotechnical site investigation carried out by Eastwood Consulting Engineers for, and on the behalf of, Ridgepoint Homes Limited. The purpose of this additional investigation was:

- Examination of the shallow and deep ground conditions;
- In situ description of soils, enabling any localised lateral and vertical changes in soil conditions to be logged;
- Assessment of any contamination identified using visual and olfactory methods;
- Further ground gas and groundwater monitoring; and
- Inspection and chemical analysis of the mound present in the north of the site.

Any other parties using the information in this letter do so at their own risk and any duty of care is excluded. This letter is to be read in conjunction with the Geo-Environmental Report, completed by WDE Consulting in August 2019, report reference 20931R1. ECE completed a 'Site Investigation Review' of this WDE report in September 2021, report reference 46465-001, which should also be read in conjunction with this letter.

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Site Description

The approximately 0.7 hectare site includes roughly the northern third of the Tesco Extra car park at Portman Road, as well as a raised area of soft landscaping (a grassed mound) believed to be a spoil heap resulting from earlier construction projects in the surrounding area. A recycling bank comprising a small parking area and several recycling bins is located in the north east of the site. Aside from the grassed area in the north of the site, the site is covered by macadam hard standing and comprises parking spaces and access roads. A number of trees have been planted at regular intervals across the site. The site is accessed from the east via an unnamed access road leading off Portman Road to the north.

To the south of the site is the remainder of the car park and the Tesco Extra supermarket. To the west of the site is a residential area; to the east is the Tesco petrol station, beyond which are residential apartment blocks as well as a number of commercial and industrial premises. Beyond Portman Road to the north are further industrial and commercial premises and a railway line runs approximately east/west around 150 m north of the site.

A number of mature trees border the north and west of the site.

The site is relatively level with the exception of the steep slope going up to the grassed mound, believed to be an old spoil heap, in the north of the site. The majority of the site lies at around 39.5 to 39.8 m AOD and the mound in the north of the site lies at around 41 m AOD.

Previous Site Investigation

The site investigation previously completed by WDE comprised five boreholes (BH1 to BH5) to between 2 and 5 m below ground level including installation of three monitoring wells. Five dynamic probes (DP1 to DP5) were undertaken adjacent to the boreholes, to a depth of 5 m.

WDE undertook one round of gas monitoring which recorded elevated concentrations of both carbon dioxide and methane.

Elevated concentrations of arsenic, lead and polycyclic aromatic hydrocarbons (PAH), were recorded within the made ground as well as the presence of asbestos in one location which is now outside the boundary of the site. In addition, elevated concentrations of metals and total petroleum hydrocarbons (TPH) were recorded in the groundwater.

Based on the ground conditions encountered, a piled foundation solution was deemed to be necessary.

WDE recommended the following additional works:

- Further gas and groundwater monitoring;
- Installation of deep boreholes to inform pile design; and
- Preparation of a Remedial Strategy to manage the contamination identified on site.

ECE later found two of the three wells to be damaged and not functioning.

ECE Site Investigation

ECE visited site between 24 and 26 October 2022 and completed two cable percussion boreholes (BH101 and BH102), three window samples boreholes (WSA to WSC) and three hand pits within the mound in the north (HP01 to HP03), to determine the underlying ground conditions.

Each of the cable percussion boreholes and window sample holes were installed as gas and groundwater monitoring wells.

Copies of all logs are enclosed, and their locations are plotted on the Exploratory Hole Location Plan, drawing number 46465/001 revision A, also appended.

Ground Conditions

- Surface Covering – The surface covering across the site, with exception of the area occupied by the grassed mound, was macadam. A small area of concrete surface covering was observed adjacent to the recycling bins in the north of the site.
- Made Ground – Made ground was encountered below the hard-standing in all exploratory holes across the car park area.

WSA, WSB and BH101 recorded 10 to 30 mm of concrete underlying the macadam. The underlying made ground then extended to between 1.6 and 3 m below ground level (bgl) and generally comprised loose to medium dense sandy gravel or gravelly sand and comprised fine to coarse subangular flint, chalk, concrete, brick, glass, wood, tile fragments and rare slate.

- **Natural Ground** – Underlying the made ground, the natural strata comprised a combination of soft to firm sandy and/or gravelly clay, silty sand and sand and gravel. This strata is considered to be representative of the superficial Alluvium recorded to be present at the site, and possibly the Taplow Gravel Member which is also noted to be present in the vicinity of the site. Variable standard penetration test (SPT) values were recorded in this strata, as would be expected of superficial deposits of this nature. The superficial deposits were encountered to depths of between 3.5 m and 7.5 m, however the shallowest depth of 3.5 m was recorded in one of the window sample holes and this could be representative of a chalk inclusion within the superficial deposits.

Chalk was encountered underlying the superficial deposits. The SPT N values were initially recorded to be low, i.e. 6 to 7, suggesting weathered, unstructured chalk. These then increased steadily with depth as the chalk became less weathered and more structured. Refusal was met at depths of 15 and 20 m.

- **Grassed Mound** – The hand pits completed within the mound recorded made ground, generally comprising clayey gravelly sand with the gravel being fine to coarse and generally subangular, including flint, red brick, weak concrete, cardboard and rare limestone. HP02 recorded sandy gravelly clay with occasional rootlets from surface to 0.3 m.

Obstructions

Concrete was encountered at 0.8 m in HP03 causing the hand pit to be terminated. It is expected that this is a concrete boulder and not representative of in-situ concrete.

WSA, WSB and BH101 recorded concrete directly underlying the macadam which required a breaker to enable the exploratory holes to be progressed. WSC and BH01 encountered a dense layer of compacted brick and concrete gravel and cobbles below the macadam. A breaker was also required to progress the exploratory holes through this strata.

Groundwater

Groundwater strikes were recorded in both of the cable percussion boreholes. These are summarised in the table overleaf:

Borehole	Strike depth (m bgl)	Depth after 20 min (m bgl)
BH101	6.0	2.65
BH102	4.7	4.18

Groundwater strikes were not recorded in any of the window sample holes or hand pits.

Evidence of Contamination

Visual or olfactory evidence of possible contamination was not identified in any of the exploratory holes. In addition, no evidence of any organic matter was identified in the exploratory holes.

Geotechnical Appraisal

The site is proposed for development with an apartment building with associated communal spaces, parking and hardstanding.

The ground conditions generally comprise macadam hardstanding at the surface (with the exception of a grassed mound in the north of the site) followed by superficial clay, sand and gravel deposits to between 6 and 7.5 m bgl at which depth weathered, unstructured chalk was encountered. This then becomes less weathered and more structured with depth.

In-situ Testing

Within the cable percussion boreholes standard penetration tests (SPTs) were carried out at 1.5 m intervals from 1.2 m bgl to the base of the holes. SPTs were also undertaken within WSC at 1 m intervals. The results of the SPTs are summarised in the table below.

Material	Depth Range (m bgl)	N-Value Range	Mean N-Value
Made Ground	0.2 to 3.0	5 to 11	8.7
Clay	3 to 5.3	3 to 6	4.5
Sand and Gravel	1.6 to 7.5	10 to 23	15.4
Structureless Chalk	3.5 to 8	6 to 13	9.5
Chalk	8.0 to >20.0	20 to 50	37.1

Foundations

Given the significant depths of made ground present across the majority of the site, as well as the variable nature of the superficial deposits, piled foundations taken through the made ground into the structured chalk bedrock are considered to be required.

Weathered chalk was encountered from between 6 and 7.5 m bgl, and possibly as shallow as 3.5 m in WSC, although this could possibly have been a chalk inclusion within the superficial deposits. The chalk was found to become less weathered and more structured with depth, and structured chalk is estimated to be present from between around 10 to 15 m bgl, with refusal at between 15 and 20 m bgl.

Assuming all hard-surfacing will be removed prior to development, and as no significant obstructions were encountered, it is expected that driven or CFA piles would be appropriate. Detailed pile design has not been undertaken, as the specified types, spacings and surface areas of the piles that will be used is unknown. Specific pile design will need to be undertaken by the piling contractor using the information provided in this report.

Information within the WDE report confirmed that the cohesive soils present on site have a low to medium volume change potential. A medium volume change potential should therefore be assumed. Heave precautions will therefore be required in accordance with the guidance within the NHBC Standards Chapter 4.2.

Ground Floors

Due to the proposed piled foundation solution, a pre-cast concrete floor with an underlying ventilated void will be required for the proposed development. The void height will need to be increased where heave protection is required.

Surface Water Drainage

Due to the significant depths of made ground at the site, as well as the presence of cohesive bands within the superficial deposits, traditional chamber soakaways are unlikely to be a viable form of surface water drainage at the site. Alternative drainage solutions should therefore be sought. It is understood that an existing surface water sewer crosses the site and approval to connect into this is likely to be the most appropriate solution with regards to surface water drainage at the site.

Chemical Testing

As part of the recent investigation, four samples of made ground from across the car par area, three samples of made ground from the mound and two samples of natural ground were dispatched for chemical testing, each of the samples was tested for the suite of contaminants listed in the table below:

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium, lead, mercury, nickel, selenium, copper and zinc
pH	pH
PAHs	Speciated PAH
Sulphates	Water soluble sulphate, acid soluble sulphate, total sulphur
Asbestos*	Fibres

*made ground samples only

In addition to the above testing, the three samples of made ground from the mound were scheduled for Waste Acceptance Criteria (WAC) testing.

Testing was undertaken by Chemtest, using MCERTs accredited methodologies, where available. A copy of the results (report ref 22-41161) is enclosed.

The proposed development of the site is to be residential with communal spaces. As the new development is proposed to comprise apartments with no private gardens the assessment criteria for public open space near housing is considered to be appropriate. Tables detailing the relevant assessment concentrations used are appended.

For the purposes of this report a conservative soil organic matter content (SOM) of 1% has been assumed.

Made Ground – Excluding Grassed Mound

A number of made ground samples originating from outside the area of the mound recorded elevated concentrations of several determinants. These are summarised in the table below.

Contaminant	Recorded Concentration (mg/kg)				Assessment Value
	WSC 0.6	WSB 0.3	WSB 1.7	WSA 1.2	
Mercury	0.05	0.05	0.64	3.2	1
Lead	30	23	460	1000	270 to 760
Zinc	40	46	350	440	300

Benzo[a]pyrene	4.2	3.2	9.9	2.7	5.7
Dibenz(a,h)anthracene	0.56	0.01	0.6	0.1	0.57
	Recorded concentration exceeds human health assessment value				
	Recorded concentration exceeds phytotoxic assessment value				

Modified/corrected mean values have been calculated for all the determinants which recorded elevated concentrations, with the exception of the phytotoxic exceedances. In order to calculate these, the above concentrations were used in conjunction with relevant chemical test results from the previous site investigation by WDE. The calculation sheets are enclosed and the results are summarised in the table below:

Determinant	Modified/Corrected Mean Value (mg/kg)	Assessment Value (mg/kg)
Lead	3070	270 to 760
Benzo[a]pyrene	5.65	5.7
Dibenz(a,h)anthracene	0.50	0.57

The above table demonstrates that the modified mean value for lead exceeds the assessment value, while the modified means for the two PAH compounds are below their assessment values.

Made Ground – Grassed Mound

One sample of made ground from within the grassed mound recorded elevated concentrations of several determinants. These are summarised in the table below.

Contaminant	Recorded Concentration (mg/kg)			Assessment Value
	HP02 0.3	HP02 0.6	HP03 0.8	
Lead	53	370	170	270 to 760
Benzo(b)fluoranthene	2.0	9.8	5.1	7.1
Benzo[a]Pyrene	1.6	7.3	4.5	5.7
Dibenz(a,h)anthracene	0.1	0.66	0.25	0.57
	Recorded concentration exceeds human health assessment value			

Modified/corrected mean values have been calculated for all the determinants which recorded concentrations elevated above the assessment values. In order to calculate these, the above concentrations were used in conjunction with relevant chemical test results from the previous

site investigation by WDE. The calculation sheets are enclosed and the results are summarised in the table below:

Determinant	Modified Mean Value (mg/kg)	Assessment Value (mg/kg)
Lead	418	270 to 760
Benzo(b)fluoranthene	9.05	7.1
Benzo[a]Pyrene	6.95	5.7
Dibenz(a,h)anthracene	0.60	0.57

The above table demonstrates that the modified/corrected mean values all exceed the corresponding assessment values.

In addition to the elevated concentrations discussed above, free asbestos fibres/clumps were also recorded in the sample taken from HP03 at 0.8 m bgl. Further gravimetry testing was therefore scheduled to determine the abundance of asbestos fibres/clumps present in this sample, this recorded the total asbestos within the sample to be less than 0.001%.

Natural Ground

Of the two samples of natural ground dispatched for chemical testing, one (WSC 1.8 m bgl) recorded elevated concentrations of benzo[a]pyrene and dibenz(a,h)anthracene of 17 mg/kg and 1.9 mg/kg respectively, compared to their assessment concentrations of 5.7 mg/kg and 0.57 mg/kg.

No further elevated concentrations were recorded in either sample of natural ground.

Contamination Risk Assessment: Human Health – Future Site Users

A number of determinants were recorded at elevated concentrations within the made ground both in the grassed mound in the north of the site as well as across the remainder of the site. It is understood that the material in the mound is to be removed from site prior to construction and will not be present in the development. If this is the case, it will not pose any significant risk to human health. Should this not be the case, additional risk assessment will be required.

The made ground across the remainder of the site recorded elevated concentrations of lead and PAH compounds. In addition, one sample of natural ground also recorded elevated concentrations of two PAH compounds, however this is possibly a result of cross-

contamination from the overlying made ground. Following statistical analysis on the results from the made ground, only lead remained elevated.

Given the nature of the proposed development comprising apartments, the majority of the site will be surfaced with hardstanding, therefore breaking any pathways between source and potential receptors on site. It is therefore considered that the contaminants recorded in the made ground at the site do not pose significant risk to human health. However, where limited areas of soft landscaping are present, a 600 mm clean capping layer, of which a minimum 150 mm should be clean topsoil, should be installed.

Contamination Risk Assessment: Human Health – During Construction

Groundworkers employed during the construction phase of the development are most at risk of harm due to them having direct contact with the affected soils. However, the contact is generally of short duration, and all competent ground workers will be aware of the potential risks associated with the made ground soils. Therefore, the overall risk to the health of construction workers is considered to be low.

Normal site procedures, such as the wearing of gloves when handling soils and the washing of hands prior to eating, should be implemented at all times.

Contamination Risk Assessment: Phytotoxicity

The phytotoxic limits for zinc and mercury were exceeded within the made ground. In any areas of soft landscaping the 600 mm capping layer, including a minimum of 150 mm of topsoil, discussed above should provide a suitable growing medium.

Sulphates

In accordance with BRE Special Digest 1, the site comes under the classification of 'brownfield' and groundwater is expected to be mobile. The following table displays the results of the made ground and natural ground samples tested by ECE and WDE:

Made Ground (outside mound)	Range of Results	Characteristic Value	Sulphate Class
Water Soluble Sulphate (mg/l)	240 to 1700	1400	DS-4 AC-4
Total Sulphur (%)	0.31 to 3.0	3.0	
Total Potential Sulphate (%)	0.93 to 9	9	
pH	7.4 to 1.04	7.4	

Made Ground (within mound)	Range of Results	Characteristic Value	
Water Soluble Sulphate (mg/l)	<10 to 550	550	DS-2 AC-2
Total Sulphur (%)	0.078 to 0.16	0.16	
Total Potential Sulphate (%)	0.23 to 0.48	0.48	
pH	8.2 to 10.4	8.2	
Natural Ground	Range of Results	Characteristic Value	
Water Soluble Sulphate (mg/l)	64 to 160	112	DS-1 AC-1
Total Sulphur (%)	0.067 to 0.13	0.099	
Total Potential Sulphate (%)	0.2 to 0.39	0.3	
pH	8.0 to 8.2	8.1	

Whilst the total sulphate concentration for the made ground outside the mound falls into the category of Sulphate Class 5, the results for water soluble sulphate within this material fell into Sulphate Class 3 or lower. Within BRE SD1 it is stated that where this is the case, the Sulphate Class for the material in question can be reduced to DS-4.

It should be noted, the sulphate class for made ground outside the grassed mound is based on a data set of less than five results. If the dataset is increased, it becomes possible to average the top 20% of results in order to determine the characteristic value, and this is then used to confirm the sulphate class. It is therefore, considered that additional sampling and testing of the made ground outside of the mound may result in a lower sulphate class.

Disposal of Material

If material needs to be removed, it should to be taken to a suitably licensed landfill or waste treatment facility. The costs of disposal and landfill tax can be substantial. The disposal of material should therefore be seen as a last resort with options such as treatment and reuse either on-site or off-site considered where possible.

Waste acceptance criteria (WAC) testing has been completed on three samples of made ground collected from the grassed mound in the north of the site, the results of which are enclosed. All three samples record levels of total organic carbon to exceed the limiting value for inert waste. In addition, one sample recorded a concentration of fluoride to exceed the limiting value for inert classification and another sample recorded a petroleum hydrocarbon (TPH) concentration exceed the limiting value for inert classification. The sample taken in

HP02 at 0.3 m bgl also recorded loss on ignition to exceed the limiting value for hazardous waste.

In addition to the WAC testing, three samples of the made ground from within the mound also underwent testing of a generic suite of contaminants. This testing recorded the presence of fibres/clumps of chrysotile asbestos in one of the samples. Further quantification of this then revealed the sample to contain <0.001% asbestos. The presence of asbestos above 0.1% would necessitate the material to be classed as hazardous.

Overall, the samples exceed the requirements for classification as inert, however, the test results should be passed on to an appropriate landfill operator as classification of material is at their discretion. Additional specific testing may be requested by the landfill operator, depending on their requirements. Given the identification of asbestos at low levels in one sample, they may request additional asbestos testing is undertaken in order to confirm that this is not widespread within the material. It should be noted, no visible asbestos was identified during our investigations in this area. At this stage, it should be assumed that the material in the grassed mound would be classified as hazardous waste for disposal purposes. This was also found to be the case for material both within and outside the mound following the testing undertaken by WDE previously.

Ground Gas

Radon precautions are not required in new developments at the site.

According to the WDE report, there are no landfill sites recorded within 250 m of the site. However, significant depths of made ground (up to 3 m) were identified, beneath the car park area. Due to the potential for generation and migration of ground gas from the made ground, WDE installed three gas monitoring wells and completed one round of gas monitoring on these. All wells recorded elevated concentrations of carbon dioxide, and one of the wells, which is now located outside the site boundary, also recorded significantly elevated concentrations of methane.

In order to better understand the gassing regime at the site, ECE installed gas and groundwater monitoring wells in each of the cable percussion boreholes and window sample holes undertaken at the site. A programme of gas monitoring was subsequently undertaken.

Six monitoring visits have been completed between 15 November 2022 and 13 January 2023, and a copy of the results is enclosed.

The following is a summary of results recorded:

- Steady methane concentrations in excess of 1% were recorded in WSB, WSC, BH101 and BH2 over the course of the monitoring. WSC and BH101 also recorded methane concentration in excess of 5%, with a maximum concentration of 14.7% being recorded in BH101 during the monitoring visit on 13 December.
- Steady carbon dioxide concentrations in excess of 5% were recorded in each of the wells on at least one occasion. In addition, steady values in excess of 10% were recorded in BH102, WSB and BH2, with a maximum value of 16.3% being recorded in BH102 on 13 December.
- Depleted oxygen concentrations as low as 0% were recorded in conjunction with the elevated carbon dioxide and methane concentrations.
- Steady flow rates were generally recorded to be negative or zero. However, positive flow rates of between 0.3 and 3.3 l/hr were recorded during visits between 21 December and 13 January in BH101; and
- Groundwater was recorded at depths of between 2.17 and 2.72 m bgl. The screened sections of the wells were not flooded during any of the visits.

The maximum steady flow of 3.3 l/hr has been used for the calculation of Gas Screening Values (GSVs). Using the maximum recorded methane concentration of 14.7%, a methane GSV of 0.049 l/hr is calculated. The maximum carbon dioxide concentration of 16.3% results in a carbon dioxide GSV of 0.054 l/hr.

In accordance with CIRIA C665, the GSV for both methane and carbon dioxide fall within the limits of Characteristic Situation 1 (CS1), which does not require the addition of gas protective measures. However, the maximum concentrations of both methane and carbon dioxide which were recorded during the monitoring exceed the typical values for CS1, and therefore an increase to CS2 would be required. The typical scope of protective measures for CS2 in a residential building (excluding low-rise residential) is;

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM and underfloor venting; or
- Beam and block or pre-cast concrete and 2000 g DPM/reinforced gas membrane and underfloor venting.

In both cases, the membrane would need to be fully lapped with all joints and penetrations sealed.

In accordance with BS8485:2015 +A1:2019 the proposed development would be considered a 'Type B Building'. As a result, in order to meet CS2 classification, the construction must achieve a gas protection score of at least 3.5. Points are assigned depending on the nature of the floor slab, ventilation measures and membrane. It is anticipated that the following elements will be incorporated into the proposed development:

- Pre-cast suspended floor, i.e. beam and block - 0 points
- Passive sub-floor dispersal layer, i.e. ventilated sub-floor void - 1.5 to 2.5 points
- Adequate gas resistant membrane system - 2 points

It should be noted that in order for the gas resistant membrane system to achieve 2 points, it must meet the following criteria:

1. sufficiently impervious to the gases with a methane transmission rate $<40 \text{ ml/day/m}^2/\text{atm}$ (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method);
2. sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
3. sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
4. sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc);

5. capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
6. verified in accordance with CIRIA C735 [N1]

Table A2 within CIRIA C735 details the verification requirements for Situation A developments, the relevant section of this table is extracted below:

Table A2 *Situation A – all development types except situation B – reinforced slabs (from Wilson et al, 2007)*

Gas regime/risk	Slab type	Installer experience	Suggested levels of verification and integrity testing
Low risk CS2 (*with venting) Basic radon protection area		General builder/groundworker/landfill operative (no relevant qualification ¹)	Verifier (consultant ⁴ or qualified and experienced installer ¹) to conduct a thorough verification (visual) inspection prior to all concrete pours. Contractor to supply sign off sheets (verification evidence) including sub grade acceptance forms and photographs to independent verifier.
		Qualified ¹ and experienced installer (minimum one operative to hold qualification)	Verifier (consultant ⁴ or third party qualified and experienced installer ¹) to conduct a thorough verification (visual) inspection prior to 25 per cent concrete pours (min two visits), including vented void, subgrade etc. Installer to supply sign off sheets (verification evidence) including, sub grade acceptance forms, photographs to independent verifier for all other pours.

Verification of the membrane installation should therefore be undertaken in accordance with the above.

Conclusions and Recommendations

- Due to the depth of made ground present at the site, as well as the variable nature of the superficial deposits, piled foundations into the competent chalk bedrock are recommended.
- A Piling Risk Assessment is likely to be required to demonstrate that there is no risk to the underlying Principal Aquifer from the proposed piling.
- DS-4 AC-4 sulphate precautions are required for below ground concrete at the site. Additional testing of the made ground may enable this classification to be reduced.
- The made ground within the grassed mound was recorded to contain elevated concentrations of a number of heavy metals and polycyclic aromatic hydrocarbons (PAHs), as well as the presence of free asbestos fibres. A hazardous waste classification should be assumed; however, the chemical test results should be forwarded to an appropriate landfill operator to confirm this. They may request additional testing is undertaken.

- The made ground across the remainder of the site was also recorded to contain elevated concentrations of heavy metals and PAHs, and where this material remains in place, a 600 mm capping layer of clean soil, including at least 150 mm of topsoil, will be required in any landscaped areas within the proposed development. Again, where disposal is required, a hazardous classification should be assumed at this stage, but this should be confirmed by an appropriate landfill operator.
- Characteristic Situation 2 (CS2) gas precautions should be incorporated into the development, comprising a ventilated sub-floor void and fully lapped and sealed gas resistant membrane system with verification in accordance with CIRIA C735.
- A Remediation Implementation Plan should be produced to detail the relevant remedial measures and subsequent verification required at the site. This will need to be approved by the Local Authority and your warranty provider.

Yours sincerely,



Ruth Noble
Associate

Enc. Exploratory Hole Location Plan, drawing reference 46465/001

Exploratory Hole Logs

Test Results – Chemtest 22-41161

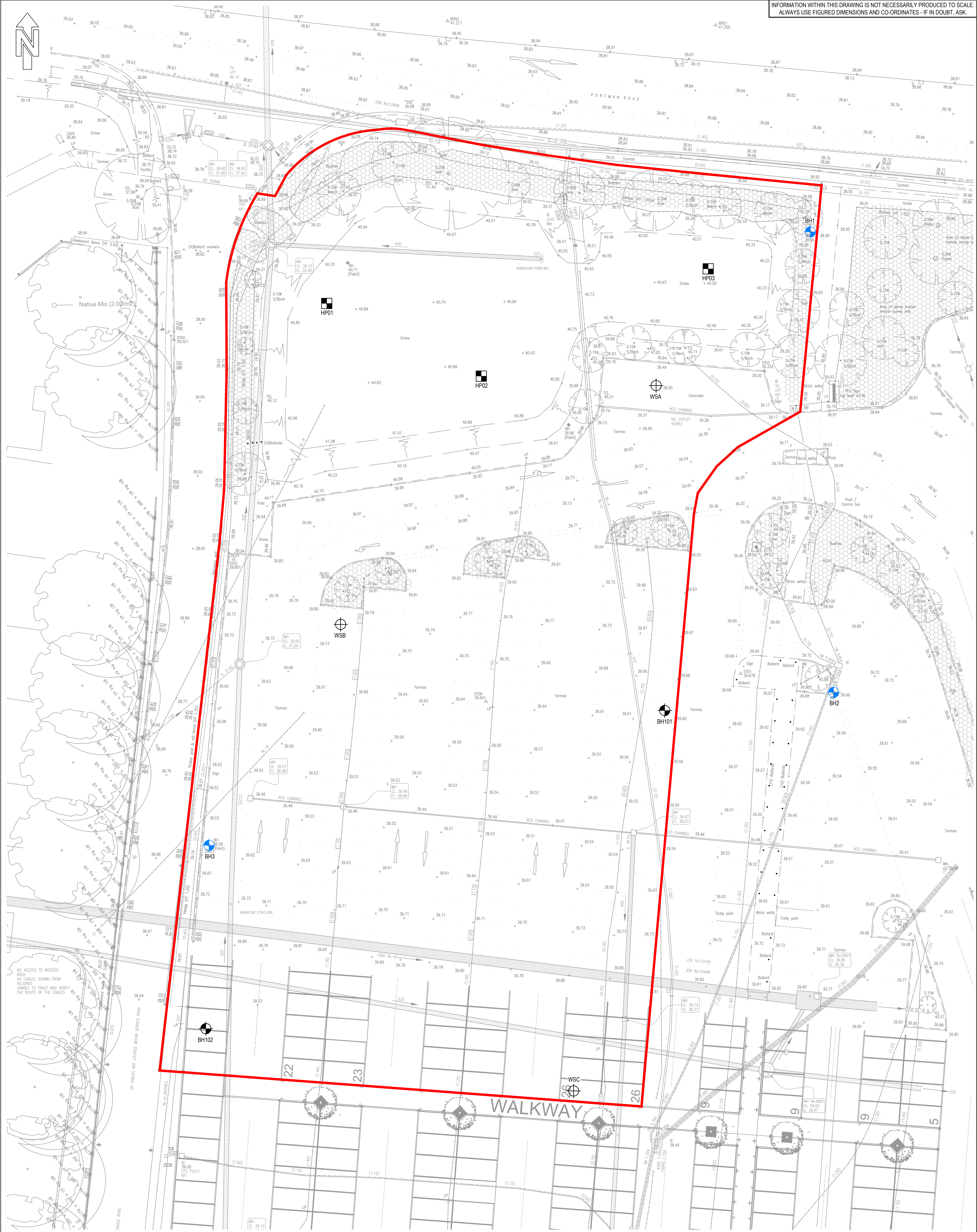
Modified/Corrected Mean Calculation Sheets:

- Mound - Lead, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene
- Made Ground - Lead, Benzo(a)pyrene, Dibenzo(a,h)anthracene

Table of Assessment Values – Public Open Space Near Housing

Gas Monitoring Results

Table of Atmospheric Pressures



INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE.
ALWAYS USE FIGURED DIMENSIONS AND CO-ORDINATES - IF IN DOUBT, ASK.

KEY:



Approximate location of hand dug pit completed by ECE on 24.10.22.



Approximate location of cable percussion borehole completed on behalf of ECE between 24.10.22 and 26.10.22.



Location of gas and groundwater monitoring well installed by WDE as part of their 2019 ground investigation.



Approximate location of window sample borehole completed on behalf of ECE on 24.10.22



Approximate site boundary

A First Issue.

RIDGEPOINT HOMES LTD

PORTMAN ROAD, READING

EXPLORATORY HOLE LOCATION
PLAN

Eastwood
CONSULTING ENGINEERS

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

T: 0114 255 4554
E: mail@eastwoodce.com
eastwoodce.com

SCALE WHEN PLOTTED AT A1
1:200

DRAWING STATUS
INFORMATION

DRAWN
AT

CHECKED
ME

DATE
04.11.2022

DRAWING NUMBER
46465/001

REV
A

Borehole Log

Borehole No.

BH101

Sheet 1 of 1

Project Name: Portman Road, Reading

Project No.
46465

Co-ords: -

Hole Type
CP

Location: Portman Road, Reading

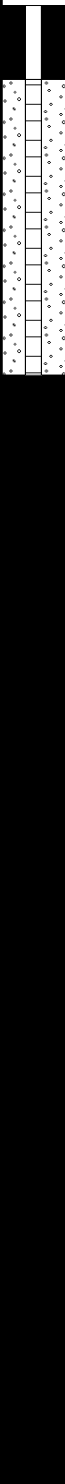
Level:

Scale
1:103

Client: Ridgpoint Homes Ltd

Dates: 24/10/2022 - 25/10/2022

Logged By
GP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: MACADAM.	
					0.37			MADE GROUND: Dense sandy GRAVEL.	
					0.50			Gravel is brick and concrete. MADE GROUND: CONCRETE.	1
		1.20		N=11 (3,3/3,3,3,2)				MADE GROUND: Medium dense sandy GRAVEL. Gravel is brick, concrete, flint, chalk and slate.	
					2.00			MADE GROUND: Soft silty sandy CLAY (Fill).	2
		3.00		N=3 (1,0/1,0,1,1)	3.00			Soft brown silty sandy CLAY.	3
									4
		4.50		N=6 (1,1/1,2,2,1)					5
					5.30			Clayey SAND.	
		6.00		N=23 (2,3/4,5,6,8)	6.00			Medium dense SAND and GRAVEL.	6
									7
		7.50		N=6 (1,0/1,1,2,2)	7.50			CHALK and flints.	8
									9
		9.00		N=7 (1,2/3,1,1,2)					10
									11
		10.50		N=12 (3,7/3,4,2,3)					12
									13
		12.00		N=10 (2,4/2,1,3,4)					14
									15
		13.50		N=13 (2,2/3,3,3,4)					16
									17
		15.00		N=22 (3,3/4,4,7,7)					18
									19
		16.50		N=41 (5,8/5,11,12,13)					20
									
		18.00		47 (11,11/47 for 225mm)					
									
		20.00		50 (7,9/50 for 225mm)	20.00			End of borehole at 20.00 m	

Remarks

Logged by lead driller.

Borehole Log

Borehole No.

BH102

Sheet 1 of 1

Project Name: Portman Road, Reading

Project No.
46465

Co-ords: -

Hole Type
CP

Location: Portman Road, Reading

Level:

Scale
1:100

Client: Ridgpoint Homes Ltd

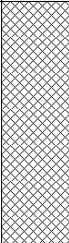
Dates: 26/10/2022 - 26/10/2022

Logged By
GP

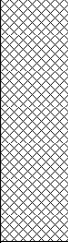
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: MACADAM.	
					0.60			MADE GROUND: Medium dense sandy GRAVEL. Gravel is brick and concrete.	
		1.20		N=5 (1,2/1,2,1,1)				MADE GROUND: Loose sandy GRAVEL. Gravel is flint, chalk brick, concrete, glass and wood.	1
									2
		3.00		N=17 (4,3/4,4,4,5)	2.90			Medium dense SAND and GRAVEL.	3
		4.50		N=12 (3,3/3,3,3,3)					4
									5
		6.00		N=7 (1,1/1,2,2,2)	6.00			CHALK and flints.	6
									7
		7.50		N=11 (9,3/3,2,2,4)					8
									9
		9.00		N=20 (2,3/5,5,5,5)					10
									11
		10.50		N=22 (5,4/6,6,5,5)					12
									13
		12.00		N=47 (4,5/9,9,14,15)					14
									15
		13.50		N=35 (5,6/7,7,10,11)					16
									17
		15.00		N=50 (5,7/8,10,15,17)	15.00			End of borehole at 15.00 m	18
									19
									20

Remarks

Logged by lead driller.

Eastwood CONSULTING ENGINEERS							TrialPit No HP01 Sheet 1 of 1	
Project Name Portman Road, Reading			Project No. 46465		Co-ords: - Level:		Date 24/10/2022	
Location: Portman Road, Reading					Dimensions: 0.40m		Scale 1:25	
Client: Ridgepoint Homes Ltd					Depth: 0.80m		Logged ME	
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
			0.80			MADE GROUND: Brown clayey gravelly SAND. Gravel is fine to coarse subangular flint, red brick, weak concrete and cardboard.		
						Trialpit Complete at 0.800m		
						1		
						2		
						3		
						4		
Remarks:								
Stability:								

Eastwood CONSULTING ENGINEERS							TrialPit No HP02 Sheet 1 of 1	
Project Name Portman Road, Reading			Project No. 46465		Co-ords: - Level:			Date 24/10/2022
Location: Portman Road, Reading					Dimensions: 0.40m			Scale 1:25
Client: Ridgepoint Homes Ltd					Depth: 0.80m			Logged ME
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
			0.30			MADE GROUND: Brown slightly gravelly sandy CLAY. Gravel is fine subangular flint with occasional rootlets.		
						MADE GROUND: Brown clayey gravelly SAND. Gravel is fine to coarse subangular flint, red brick, weak concrete and cardboard.		
						MADE GROUND: CONCRETE. Suspected concrete boulder. Trialpit Complete at 0.800m		
			0.79					
			0.80					
1 2 3 4								
Remarks: Hand pit terminated at 0.8 m bgl due to presence of suspected concrete boulder.								
Stability:								

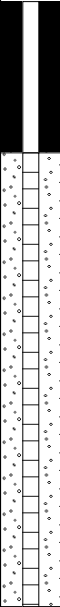
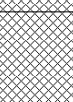
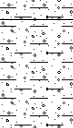
Eastwood CONSULTING ENGINEERS							TrialPit No HP03 Sheet 1 of 1	
Project Name Portman Road, Reading			Project No. 46465		Co-ords: - Level:		Date 24/10/2022	
Location: Portman Road, Reading					Dimensions: 0.40m		Scale 1:25	
Client: Ridgepoint Homes Ltd					Depth: 0.80m		Logged ME	
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
			0.80			MADE GROUND: Brown clayey gravelly SAND. Gravel is fine to coarse subangular flint, red brick, weak concrete and cardboard.		
						Trialpit Complete at 0.800m		
1 2 3 4								
Remarks:								
Stability:								

Project Name Portman Road, Reading	Project No. 46465	Co-ords:	Hole Type WS
Location: Portman Road, Reading		Level:	Scale 1:50
Client: Ridgepoint Homes Ltd		Dates: 24/10/2022	Logged By ME

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			MADE GROUND: MACADAM	
					0.60			MADE GROUND: Brown and light grey gravelly SAND. Gravel is fine to coarse subrounded to subangular limestone, flint, brick and concrete.	
					1.60			MADE GROUND: Dark grey very clayey gravelly SAND. Gravel is fine to coarse subangular flint, brick, concrete, rare glass and tile, wood and slate.	1
					3.00			MADE GROUND: Dark grey gravelly SAND. Gravel is fine to coarse subangular flint, brick, concrete, rare glass and tile, wood, cardboard.	2
					3.80			Firm greenish grey mottled grey CLAY.	3
					4.00			Firm yellowish brown mottled grey CLAY.	4
								End of Borehole at 4.000m	5
									6
									7
									8
									9

Remarks	
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Project Name Portman Road, Reading	Project No. 46465	Co-ords:	Hole Type WS
Location: Portman Road, Reading		Level:	Scale 1:50
Client: Ridgepoint Homes Ltd		Dates: 24/10/2022	Logged By ME

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.20	SPT	N=10 (2,3/3,3,2,2)	0.20			MADE GROUND: MACADAM	
					0.50			MADE GROUND: CONCRETE	
					1.00			MADE GROUND: Brown and light grey gravelly SAND. Gravel is fine to coarse subrounded to subangular limestone, flint, brick and concrete.	1
		2.00	SPT	N=15 (1,2/2,5,4,4)	1.60			MADE GROUND: Medium dense dark grey clayey gravelly SAND. Gravel is fine to coarse subangular flint, brick, concrete, rare glass and tile.	
					2.55			Medium dense dark grey slightly silty SAND. (Wet)	2
		3.00	SPT	N=10 (2,1/2,2,2,4)	2.60			Grey mottled dark grey and yellowish grey slightly silty slightly gravelly SAND. Gravel is fine to medium rounded flint.	
					2.75			Firm brownish grey slightly sandy gravelly CLAY. Gravel is fine to coarse subrounded flint.	3
					3.50			Loose to medium dense grey mottled dark grey and yellowish grey slightly silty slightly gravelly SAND. Gravel is fine to coarse rounded flint.	
		4.00	SPT	N=10 (2,1/2,2,3,3)	4.00			Very weak low density STRUCTURELESS CHALK (possible chalk inclusion) composed of gravelly SILT with occasional nodular flint bands. Gravel is very weak low density fine to medium angular greyish white mottled yellow with rare black specks.	4
								End of Borehole at 4.000m	

Remarks	
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Amended Report

Report No.:	22-41161-2		
Initial Date of Issue:	04-Nov-2022	Date of Re-Issue:	21-Nov-2022
Client	Eastwood & Partners		
Client Address:	St. Andrews House 23 Kingfield Road Sheffield South Yorkshire S11 9AS		
Contact(s):	Melanie Ebling Ruth Noble		
Project	46465 Portman Road		
Quotation No.:		Date Received:	27-Oct-2022
Order No.:		Date Instructed:	27-Oct-2022
No. of Samples:	9		
Turnaround (Wkdays):	16	Results Due:	17-Nov-2022
Date Approved:	21-Nov-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: 46465 Portman Road

Client: Eastwood & Partners	Chemtest Job No.:				22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161
Quotation No.:	Chemtest Sample ID.:				1533169	1533170	1533171	1533172	1533173	1533174	1533175	1533176	1533177
Order No.:	Client Sample Ref.:				MG	MG	MG	MG	MG	MG	MG	MG	MG
	Sample Location:				WSC	WSC	WSB	WSB	WSA	HP02	HP02	HP03	WSA
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.6	1.8	0.3	1.7	1.2	0.6	0.3	0.8	2.8
	Date Sampled:				24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022
	Asbestos Lab:				DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-		-	-	-	-	-	Fibres/Clumps	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Chrysotile	
Asbestos by Gravimetry	U	2192	%	0.001								<0.001	
Total Asbestos	U	2192	%	0.001								<0.001	
Moisture	N	2030	%	0.020	7.3	13	9.3	23	22	10	13	10	16
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones	Stones	Stones and Roots	Stones	Stones	Stones and Roots	Stones and Roots	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH	M	2010		4.0	10.4	8.2	10.2	7.4	8.1	8.6	8.3	8.2	8.0
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.90	0.064	0.82	1.7	0.31	0.025	< 0.010	< 0.010	0.16
Total Sulphur	M	2175	%	0.010	0.31	0.067	0.33	3.0	0.37	0.16	0.078	0.13	0.13
Sulphate (Acid Soluble)	U	2430	%	0.010	0.37	0.017	0.29	0.79	0.12	0.13	0.060	0.052	0.054
Arsenic	M	2455	mg/kg	0.5	8.7	4.7	7.8	15	27	11	14	6.9	3.7
Cadmium	M	2455	mg/kg	0.10	0.12	< 0.10	0.13	0.57	0.97	0.21	0.16	0.17	< 0.10
Chromium	M	2455	mg/kg	0.5	7.9	7.3	10	19	25	14	17	9.0	6.3
Copper	M	2455	mg/kg	0.50	7.9	20	8.6	150	170	73	15	38	6.5
Mercury	M	2455	mg/kg	0.05	< 0.05	0.08	< 0.05	0.64	3.2	0.41	0.12	0.32	0.07
Nickel	M	2455	mg/kg	0.50	7.5	22	8.5	27	47	15	23	12	5.6
Lead	M	2455	mg/kg	0.50	30	36	23	460	1000	370	53	170	37
Selenium	M	2455	mg/kg	0.25	< 0.25	0.29	< 0.25	0.81	1.3	0.54	0.61	0.42	0.33
Zinc	M	2455	mg/kg	0.50	40	40	46	350	440	110	71	88	18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	0.18	2.5	< 0.10	1.1	< 0.10	0.19	< 0.10	0.29	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	0.26	1.1	< 0.10	0.19	< 0.10	0.36	< 0.10	0.57	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	0.96	3.9	< 0.10	6.3	< 0.10	0.87	< 0.10	0.38	< 0.10
Fluorene	M	2800	mg/kg	0.10	0.91	4.9	< 0.10	5.7	< 0.10	1.0	< 0.10	0.43	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	3.5	40	1.6	41	1.8	14	0.64	5.1	< 0.10
Anthracene	M	2800	mg/kg	0.10	1.3	13	0.69	11	0.70	3.0	0.29	1.1	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	5.8	43	3.8	32	3.4	19	2.2	8.4	< 0.10
Pyrene	M	2800	mg/kg	0.10	6.3	37	5.3	27	3.0	14	2.2	7.2	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	3.0	15	2.5	10	2.1	7.6	1.1	3.3	< 0.10
Chrysene	M	2800	mg/kg	0.10	2.7	16	2.3	10	2.4	6.5	1.0	3.7	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	5.0	17	3.1	11	2.7	9.8	2.0	5.1	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	2.1	6.7	0.90	3.3	1.0	2.9	0.62	1.6	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	4.2	17	3.2	9.9	2.7	7.3	1.6	4.5	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	2.3	9.4	< 0.10	4.4	< 0.10	4.4	< 0.10	2.5	< 0.10

Results - Soil

Project: 46465 Portman Road

Client: Eastwood & Partners	Chemtest Job No.:				22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161	22-41161
Quotation No.:	Chemtest Sample ID.:				1533169	1533170	1533171	1533172	1533173	1533174	1533175	1533176	1533177
Order No.:	Client Sample Ref.:				MG	MG	MG	MG	MG	MG	MG	MG	MG
	Sample Location:				WSC	WSC	WSB	WSB	WSA	HP02	HP02	HP03	WSA
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.6	1.8	0.3	1.7	1.2	0.6	0.3	0.8	2.8
	Date Sampled:				24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022
	Asbestos Lab:				DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD									
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.56	1.9	< 0.10	0.60	< 0.10	0.66	< 0.10	0.25	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	2.3	8.9	< 0.10	4.1	< 0.10	5.1	< 0.10	2.7	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	41	240	23	180	20	97	12	47	< 2.0

Results - 2 Stage WAC

Project: 46465 Portman Road

Chemtest Job No: 22-41161							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1533174							Limits			
Sample Ref: MG							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: HP02										
Top Depth(m): 0.6										
Bottom Depth(m):										
Sampling Date: 24-Oct-2022										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				7.4	3	5	6
Loss On Ignition	2610	M	%				7.3	--	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg				< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0	100	--	--
pH	2010	M					8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0020	--	To evaluate	To evaluate			
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1455	U	0.0017	0.0017	0.0033	0.017	0.5	2	25	
Barium	1455	U	0.053	0.023	0.11	0.27	20	100	300	
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5	
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70	
Copper	1455	U	0.028	0.0013	0.056	0.041	2	50	100	
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2	
Molybdenum	1455	U	0.0049	0.0052	0.0097	0.051	0.5	10	30	
Nickel	1455	U	0.043	0.0019	0.085	0.079	0.4	10	40	
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50	
Antimony	1455	U	0.0012	0.0030	0.0024	0.027	0.06	0.7	5	
Selenium	1455	U	0.0012	0.0014	0.0024	0.014	0.1	0.5	7	
Zinc	1455	U	0.007	< 0.003	0.013	0.010	4	50	200	
Chloride	1220	U	4.1	< 1.0	< 10	< 10	800	15000	25000	
Fluoride	1220	U	0.65	1.3	1.3	12	10	150	500	
Sulphate	1220	U	85	25	170	340	1000	20000	50000	
Total Dissolved Solids	1020	N	270	150	530	1600	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	4.5	5.3	< 50	52	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	10

Leachate Test Information	
Leachant volume 1st extract/l	0.330
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.256

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 46465 Portman Road

Chemtest Job No: 22-41161							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1533175							Limits			
Sample Ref: MG							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: HP02										
Top Depth(m): 0.3										
Bottom Depth(m):										
Sampling Date: 24-Oct-2022										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				3.9	3	5	6
Loss On Ignition	2610	M	%				27	--	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg				970	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				8.4	100	--	--
pH	2010	M					8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg				0.0050	--	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1455	U	0.0068	0.0071	0.013	0.071	0.5	2	25	
Barium	1455	U	0.024	0.012	0.048	0.14	20	100	300	
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5	
Chromium	1455	U	0.0025	0.0012	0.0050	0.013	0.5	10	70	
Copper	1455	U	0.012	0.0057	0.023	0.013	2	50	100	
Mercury	1455	U	0.00005	< 0.00005	0.00011	0.00006	0.01	0.2	2	
Molybdenum	1455	U	0.0057	0.0022	0.011	0.026	0.5	10	30	
Nickel	1455	U	0.0048	0.0013	0.0096	0.017	0.4	10	40	
Lead	1455	U	0.0089	0.0077	0.018	0.078	0.5	10	50	
Antimony	1455	U	0.0082	0.0031	0.016	0.037	0.06	0.7	5	
Selenium	1455	U	0.0019	0.0015	0.0038	0.015	0.1	0.5	7	
Zinc	1455	U	0.008	0.005	0.016	0.053	4	50	200	
Chloride	1220	U	1.7	< 1.0	< 10	< 10	800	15000	25000	
Fluoride	1220	U	0.47	0.23	< 1.0	2.6	10	150	500	
Sulphate	1220	U	33	8.2	65	110	1000	20000	50000	
Total Dissolved Solids	1020	N	150	71	300	800	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	11	5.9	< 50	65	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	13

Leachate Test Information	
Leachant volume 1st extract/l	0.323
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.193

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 46465 Portman Road

Chemtest Job No: 22-41161							Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1533176							Limits		
Sample Ref: MG							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:									
Sample Location: HP03									
Top Depth(m): 0.8									
Bottom Depth(m):									
Sampling Date: 24-Oct-2022									
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	M	%				4.5	3	5
Loss On Ignition	2610	M	%				6.8	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--
TPH Total WAC	2670	M	mg/kg				< 10	500	--
Total (Of 17) PAH's	2700	N	mg/kg				69	100	--
pH	2010	M					8.2	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.0040	--	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0055	0.0062	0.011	0.061	0.5	2	25
Barium	1455	U	0.030	0.019	0.059	0.20	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0012	0.0013	0.0024	0.013	0.5	10	70
Copper	1455	U	0.013	0.0076	0.025	0.013	2	50	100
Mercury	1455	U	0.00005	< 0.00005	0.00010	0.00005	0.01	0.2	2
Molybdenum	1455	U	0.011	0.0040	0.022	0.047	0.5	10	30
Nickel	1455	U	0.0050	0.0025	0.010	0.028	0.4	10	40
Lead	1455	U	0.0027	0.0059	0.0053	0.056	0.5	10	50
Antimony	1455	U	0.0094	0.0044	0.019	0.049	0.06	0.7	5
Selenium	1455	U	0.0022	0.0018	0.0043	0.018	0.1	0.5	7
Zinc	1455	U	0.013	0.005	0.026	0.062	4	50	200
Chloride	1220	U	2.5	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.58	0.33	1.2	3.5	10	150	500
Sulphate	1220	U	32	9.6	64	120	1000	20000	50000
Total Dissolved Solids	1020	N	190	90	370	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	12	6.8	< 50	73	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	10

Leachate Test Information	
Leachant volume 1st extract/l	0.330
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.174

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

SITE: Portman Road, Reading	Job No. 46465	Date 14.11.22
SUBJECT: Mean and Maximum Value Test for Benzo[b]fluoranthene in Made Ground from the Grassed Mound	Prepared ME	Checked RAN

Results	Sample	Log x = y		
9.80	ECE HP02 0.6	0.991	Number of results : n =	4
2.00	ECE HP02 0.3	0.301	Mean : X =	4.93
5.10	ECE HP03 0.8	0.708	Standard deviation : s =	3.51
2.80	WDE BH5 1.0	0.447	T value : t =	2.353

Corrected mean (95% confidence)

= X + t * s / n^0.5 = 9.05

Max value = 9.80

log xm = ym = 0.991

Number of results : N = 4

Mean y = 0.612

Standard deviation of y : S = 0.304

T = (ym-ya) / S = 1.249

Tcrit (fom table A1.3) = 1.42

Result probably not an outlier

SITE: Portman Road, Reading	Job No. 46465	Date 14.11.22
SUBJECT: Mean and Maximum Value Test for Benzo[a]pyrene in Made Ground from the Grassed Mound	Prepared ME	Checked RAN

Results	Sample	Log x = y		
7.30	ECE HP02 0.6	0.863	Number of results : n =	4
1.60	ECE HP02 0.3	0.204	Mean : X =	3.90
4.50	ECE HP03 0.8	0.653	Standard deviation : s =	2.59
2.20	WDE BH5 1.0	0.342	T value : t =	2.353

Corrected mean (95% confidence)

= X + t * s / n^{0.5} = 6.95

Max value = 7.30

log xm = ym = 0.863

Number of results : N = 4

Mean y = 0.516

Standard deviation of y : S = 0.298

T = (ym-ya) / S = 1.165

Tcrit (fom table A1.3) = 1.42

Result probably not an outlier

SITE: Portman Road, Reading	Job No. 46465	Date 14.11.22
SUBJECT: Mean and Maximum Value Test for Dibenz(a,h)anthracene in Made Ground from the Grassed Mound	Prepared ME	Checked RAN

Results	Sample	Log x = y		
0.66	ECE HP02 0.6	-0.180	Number of results : n =	4
0.10	ECE HP02 0.3	-1.000	Mean : X =	0.32
0.25	ECE HP03 0.8	-0.602	Standard deviation : s =	0.24
0.28	WDE BH5 1.0	-0.553	T value : t =	2.353

Corrected mean (95% confidence)

$= X + t * s / n^{0.5} =$ **0.60**

Max value = 0.66

log xm = ym = -0.180

Number of results : N = 4

Mean y = -0.584

Standard deviation of y : S = 0.335

T = (ym-ya) / S = 1.203

Tcrit (fom table A1.3) = 1.42

Result probably not an outlier

PROJECT: Portman Road Reading	Job No. 46465	Date 14.11.22
SUBJECT: Mean Value Test for Lead in Made Ground from the Grassed Mou	Prepared ME	Checked RAN

In accordance with appendix A, CLR 7 "Assessment of risk to human health from land contamination : an overview of the development of soil guideline values and related research" produced by the Environment Agency. This method uses the geometric mean rather than the arithmetic mean which is used for other contaminants.

Sample results mg/kg		Log sample results
370	ECE HP02 0.6	2.568
53	ECE HP02 0.3	1.724
170	ECE HP03 0.8	2.230
200	WDE BH5 1.0	2.301

Calculations based on log results

Number of results : n = 4
Mean : $\bar{X}$ = 2.206
Standard deviation : s = 0.353
T value : t = 2.353
Corrected mean (95% confidence) =
= $\bar{X} + t * s / n^{0.5}$ = 2.621

Final results

Mean : $\bar{X}$ = 161 mg/kg

Corrected mean (95% confidence) = 418 mg/kg

PROJECT: Portman Road, Reading	Job No. 46465	Date 10.11.22
SUBJECT: Mean Value Test for Lead in Made Ground across Car Park Area	Prepared ME	Checked RAN

In accordance with appendix A, CLR 7 "Assessment of risk to human health from land contamination : an overview of the development of soil guideline values and related research" produced by the Environment Agency. This method uses the geometric mean rather than the arithmetic mean which is used for other contaminants.

Sample results mg/kg	Sample ref	Log sample results	Calculations based on log results	
30	ECE WSC 0.6	1.477	Number of results : n =	5
23	ECE WSB 0.3	1.362	Mean : X =	2.627
460	ECE WSB 1.7	2.663	Standard deviation : s =	0.902
1000	ECE WSA 1.2	3.000	T value : t =	2.132
2300	WDE BH1 1.5	3.362	Corrected mean (95% confidence) =	
600	WDE BH2 0.6	2.778	= X + t * s / n^0.5 =	3.487
5600	WDE BH3 1.5	3.748		
Final results				
Mean : X =				424 mg/kg
Corrected mean (95% confidence) =				3070 mg/kg

SITE: Portman Road, Reading	Job No. 46465	Date 10.11.22
SUBJECT: Mean and Maximum Value Test for Benzo[a]pyrene in Made Ground Across Car Park Area	Prepared ME	Checked RAN

Results	Sample	Log x = y
4.20	ECE WSC 0.6	0.623
3.20	ECE WSB 0.3	0.505
9.90	ECE WSB 1.7	0.996
2.70	ECE WSA 1.2	0.431
1.30	WDE BH1 1.5	0.114
1.50	WDE BH2 0.6	0.176
0.69	WDE BH3 1.5	-0.161

Number of results : n = 7
Mean : $\bar{X}$ = 3.36
Standard deviation : s = 3.13
T value : t = 1.943

Corrected mean (95% confidence)

$= \bar{X} + t * s / n^{0.5} = 5.65$

Max value = 9.90

log xm = ym = 0.996

Number of results : N = 7
Mean y = 0.383

Standard deviation of y : S = 0.379

T = (ym-ya) / S = 1.615

Tcrit (fom table A1.3) = 1.83

Result probably not an outlier

SITE: Portman Road, Reading	Job No. 46465	Date 10.11.22
SUBJECT: Mean and Maximum Value Test for Dibenz(a,h)anthracene in Made Ground Across Car Park Area	Prepared ME	Checked RAN

Results	Sample	Log x = y
0.56	ECE WSC 0.6	-0.252
0.10	ECE WSB 0.3	-1.000
0.60	ECE WSB 1.7	-0.222
0.10	ECE WSA 1.2	-1.000
0.10	WDE BH1 1.5	-1.000
0.59	WDE BH2 0.6	-0.229
0.15	WDE BH3 1.5	-0.824

Number of results : n = 7
Mean : $\bar{X}$ = 0.31
Standard deviation : s = 0.25
T value : t = 1.943

Corrected mean (95% confidence)

$= \bar{X} + t * s / n^{0.5} = 0.50$

Max value = 0.60

log xm = ym = -0.222

Number of results : N = 7
Mean y = -0.647

Standard deviation of y : S = 0.391

T = (ym-ya) / S = 1.087

Tcrit (fom table A1.3) = 1.83

Result probably not an outlier

Inorganic Compounds	Human Health – Public Open Space Near Housing (mg/kg)
Arsenic	79
Cadmium	120
Chromium (III)	1500
Chromium (VI)	7.7
Lead	270-760
Mercury	16
Nickel	230
Selenium	1100
Copper	12000
Zinc	81000

Organic Compounds	Human Health – Public Open Space Near Housing (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Naphthalene	4900	4900	4900
Acenaphthene	15000	15000	15000
Acenaphthylene	15000	15000	15000
Fluorene	9900	9900	9900
Phenanthrene	3100	3100	3100
Anthracene	74000	74000	74000
Fluoranthene	3100	3100	3100
Pyrene	7400	7400	7400
Benzo(a)anthracene	29	29	29
Chrysene	57	57	57
Benzo(b)fluoranthene	7.1	7.2	7.2
Benzo(k)fluoranthene	190	190	190
Benzo(a)pyrene	5.7	5.7	5.7
Dibenz(a,h)anthracene	0.57	0.57	0.58
Indeno(1,2,3-cd)pyrene	82	82	82
Benzo(g,h,i)perylene	640	640	640
Benzene	72	72	73
Toluene	56000	56000	56000
Ethylbenzene	24000	24000	25000
o-Xylene	41000	42000	43000
m-Xylene	41000	42000	43000
p-Xylene	41000	42000	43000

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Prepared	KS/KDL	Checked	CAT/KE	Date	30/11/2022	Job No	46465
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 St Andrew's House 23 Kingfield Road Sheffield, S11 9AS T: 0114 255 4554 E: mail@eastwoodce.com eastwoodce.com		RIDGEPOINT HOMES PORTMAN ROAD, READING ASSESSMENT CRITERIA – PUBLIC OPEN SPACE NEAR HOUSING
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Contaminant	Phytotoxicity			
	pH 5.0 to 5.5	pH 5.5 to 6.0	pH 6.0 to 7.0	pH >7.0
Arsenic	50			
Cadmium	3			
Chromium	400			
Lead	300			
Mercury	1			
Nickel	50	60	75	110
Copper	80	100	135	200
Zinc	200	200	200	300

The assessment concentration for lead is the Category 4 Screening Level produced by Contaminated Land: Applications in Real Environments (CL:AIRE) and outlined in Appendix H of their report SP1010.

The others have been taken from Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R., and Nathanail, J., 2015, *'The LQM/CIEH S4ULs for Human Health Risk Assessment'*, Land Quality Press, Nottingham. The metals/metalloids are based on a sandy loam soil and 6% soil organic matter. The assessment values are not intended to be applied to individual sample results where materials are similar, as the levels of contaminants will have a natural variability across the site. Instead, the modified mean value should be compared with the assessment concentration.

The assessment values for phytotoxicity are the levels at which plant growth is thought to be affected. They are taken from the maximum permissible and advisable concentrations in soil after application of soil sludge given in the *'The Code of Good Agricultural Practice for the Protection of Soil'*, MAFF, 1998.

The assessment of sulphate, water soluble sulphate, elemental sulphur and sulphide is to determine the aggressive nature of the ground with respect to concrete and consequently the results are compared with BRE Special Digest 1:2005 *'Concrete in Aggressive Ground'*.

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Prepared	KS/KDL	Checked	CAT/KE	Date	30/11/2022	Job No	46465
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 Eastwood CONSULTING ENGINEERS St Andrew's House 23 Kingfield Road Sheffield, S11 9AS T: 0114 255 4554 E: mail@eastwoodce.com eastwoodce.com	RIDGEPOINT HOMES PORTMAN ROAD, READING ASSESSMENT CRITERIA – PUBLIC OPEN SPACE NEAR HOUSING
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TPH Fraction	Intended Land Use Public Open Space Near Housing (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Aliphatic EC 5-6	570000 (304) ^{sol}	590000	600000
Aliphatic EC >6-8	600000	610000	620000
Aliphatic EC >8-10	13000	13000	13000
Aliphatic EC >10-12	13000	13000	13000
Aliphatic EC >12-16	13000	13000	13000
Aliphatic EC >16-35	250000 ^f	250000 ^f	250000 ^f
Aliphatic EC >35-44	250000 ^f	250000 ^f	250000 ^f
Aromatic EC 5-7	56000	56000	56000
Aromatic EC >7-8	56000	56000	56000
Aromatic EC>8-10	5000	5000	5000
Aromatic EC >10-12	5000	5000	5000
Aromatic EC >12-16	5100	5100	5000
Aromatic EC >16-21	3800 ^f	3800 ^f	3800 ^f
Aromatic EC >21-35	3800 ^f	3800 ^f	3800 ^f
Aromatic EC >35-44	3800 ^f	3800 ^f	3800 ^f

^f oral, dermal, and inhalation exposure compared with oral HCV

^{sol} S4UL presented exceeds the solubility saturation limit, which is presented in brackets

The assessment criteria for each of the petroleum hydrocarbon fractions have been taken from Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R., and Nathanail, J., 2015, *'The LQM/CIEH S4ULs for Human Health Risk Assessment'*, Land Quality Press, Nottingham. These are also all based on a sandy loam soil.

Within the Environment Agency Science Report P5-080/TR3, Askari, K. & Pollard, S., 2005 *'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils'* it is stated that the assessment values should not be considered individually; instead the potential additive effects should be calculated. This is achieved by calculating an individual Hazard Quotient (HQ) for each fraction. The HQ is the proportion of the assessment concentration represented by the recorded concentration. The HQs are then added together to form a Hazard Index (HI) and where this exceeds unity a potential significant risk to human health may exist.

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46465 Portman Road, Reading

Date 15.11.2022
Atmospheric Pressure mb 990
Atmos. Pressure Trend Steady

Monitor GFM435
Date of Last Calibration 01.04.2022

Key

Methane	Carbon Dioxide
1.0 to 4.9%	5.0 to 9.9%
5.0 to 19.9%	10.0 to 29.9%
>20.0%	>30.0%

Water within plain pipe section

Hole ID	Methane %		Carbon Dioxide %		Oxygen %		Carbon Monoxide	Hydrogen Sulphide	Flow l/hr1.6		Depth to - Water	Depth to Well Base	Response Zone
	Peak	Steady	Peak	Steady	Peak	Steady	ppm	ppm	Peak	Steady	m	m	m
WSA	3	0	0.1	0	20.5	20.5		0.024	-0.4	-0.3	2.39	3.04	1.00 - 3.00
WSB	1.2	0	0.1	0	20.5	20.5		0.027	-0.1	0	2.7	2.97	1.00 - 3.00
WSC	0	0	1.6	1.6	20.1	11.6		0.033	99.7	-0.2	2.5	4.1	1.00- 4.00
BH101	0	0	0	0	20.5	20.5		0.027	-0.4	-0.3	2.46	5.05	1.00 - 5.00
BH102	0	0	0	0	20.4	20.4		0.009	-0.3	0	2.68	4.76	1.00 - 5.00
Air	0	0	0	0	20.9	20.9		0	0	0	n/a	n/a	n/a

Remarks

All boreholes, once no longer in use for monitoring, should be decommissioned following the Environment Agency guidance laid out in Section 5.5 of the publication "Guidance on the design and installation of groundwater quality monitoring points", Science Report SC020093, January 2006. This is to remove potential preferential pathways for ground gas migration to future receptors which may be created by the wells.

46465 Portman Road, Reading

Date 13.12.22
Atmospheric Pressure mb 1004
Atmos. Pressure Trend Steady

Monitor GFM435
Date of Last Calibration 01.04.2022

Key

Methane	Carbon Dioxide
1.0 to 4.9%	5.0 to 9.9%
5.0 to 19.9%	10.0 to 29.9%
>20.0%	>30.0%

Water within plain pipe section

Hole ID	Methane %		Carbon Dioxide %		Oxygen %		Carbon Monoxide ppm	Hydrogen Sulphide ppm	Flow l/hr1.6		Depth to - Water m	Depth to Well Base m	Response Zone m
	Peak	Steady	Peak	Steady	Peak	Steady			Peak	Steady			
WSA	0	0	9	9	2.1	2.1		0.012	-0.3	-0.2	2.35	3.05	1.00 - 3.00
WSB	0	0	2.8	2.8	16.7	16.7		0.012	-0.6	-0.4	2.62	2.94	1.00 - 3.00
WSC	3	0.5	9.3	9.3		0.1		0.049	-1.2	-0.8	2.62	4	1.00- 4.00
BH101	14.7	14.7	7.2	6.6	6	0.5		0.38	1.2	0	2.41	5	1.00 - 5.00
BH102	0	0	16.3	16.3	5	0.2		0.009	-0.6	-0.4	2.72	4.66	1.00 - 5.00
BH2	0	0	10.7	10.7		5.3		0.015	-0.6	-0.6	2.56	4.62	1.00 - 5.01
Air Start	0	0	0	0	20.5	20.5		0.031	-0.6	-0.4	n/a	n/a	n/a
Air End	0	0	0.1	0.1	19.7	19.7		0.011	-1	-0.9	n/a	n/a	n/a

Remarks	Water sample taken from BH101

All boreholes, once no longer in use for monitoring, should be decommissioned following the Environment Agency guidance laid out in Section 5.5 of the publication "Guidance on the design and installation of groundwater quality monitoring points", Science Report SC020093, January 2006. This is to remove potential preferential pathways for ground gas migration to future receptors which may be created by the wells.

46465 Portman Road, Reading

Date 21.12.22
Atmospheric Pressure mb 1001 to 1003
Atmos. Pressure Trend Rising

Monitor GFM435
Date of Last Calibration 01.04.2022

Key

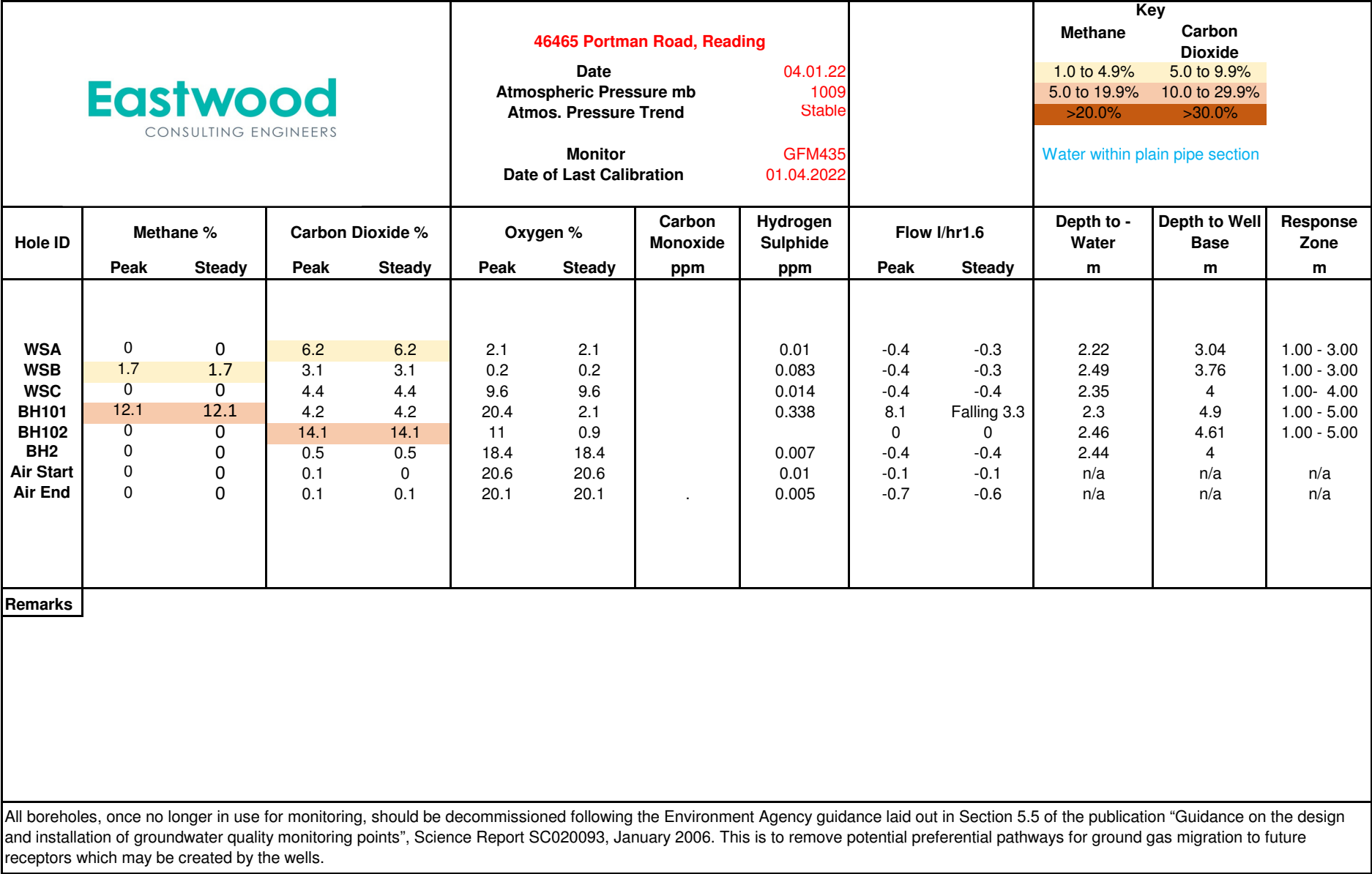
Methane	Carbon Dioxide
1.0 to 4.9%	5.0 to 9.9%
5.0 to 19.9%	10.0 to 29.9%
>20.0%	>30.0%

Water within plain pipe section

Hole ID	Methane %		Carbon Dioxide %		Oxygen %		Carbon Monoxide	Hydrogen Sulphide	Flow l/hr1.6		Depth to - Water	Depth to Well Base	Response Zone
	Peak	Steady	Peak	Steady	Peak	Steady	ppm	ppm	Peak	Steady	m	m	m
WSA	0	0	7.5	7.5	1.2	1.2		0.023	0	0	2.35	3.35	1.00 - 3.00
WSB	0.2	0.2	11.2	11.2	1.1	1.1		0.043	0	0	2.6	2.96	1.00 - 3.00
WSC	0.4	0.1	8.2	8.2	0.2	0.2		0.04	-0.4	-0.3	2.49	4	1.00- 4.00
BH101	15	11.3	0	0	0	0		0.326	3.5	0.3	2.45	4.97	1.00 - 5.00
BH102	0	0	14.9	14.9	0.9	0.9		0.017	0	0	2.6	4.65	1.00 - 5.00
BH2	2.2	2.2	11.8	11.8	0	0		0.102	0.2	0	2.55	4.05	
Air Start	0		0		21.1			0.031			n/a	n/a	n/a
Air End	0	0	0.1	0.1	20.1	20.1		0	-0.6	-0.6	n/a	n/a	n/a

Remarks

All boreholes, once no longer in use for monitoring, should be decommissioned following the Environment Agency guidance laid out in Section 5.5 of the publication "Guidance on the design and installation of groundwater quality monitoring points", Science Report SC020093, January 2006. This is to remove potential preferential pathways for ground gas migration to future receptors which may be created by the wells.



Date	Atmospheric Pressure (mb)	Atmospheric Trend	Relative Humidity (%)	Temp (°C)	Weather
13.11.22	1019	Falling	95	12	Cloudy
14.11.22	1007	Falling	95	14	Cloudy
15.11.22	992	Falling	95	12	Light rain
16.11.22	991	Falling	80	11	Part cloudy
17.11.22	986	Rising	82	11	Cloud/rain
18.11.22	1003	Rising	76	10	Cloud/sun
19.11.22	1015	Rising	76	9	Cloud/sun
20.11.22	1004	Falling	82	9	Cloud/sun/rain
21.11.22	992	Falling	86	9	Cloud/rain
22.11.22	988	Falling	82	9	Cloud/sun
23.11.22	987	Falling	83	11	Cloud/rain
24.11.22	983	Falling	84	11	Cloud/sun/rain
25.11.22	1003	Rising	84	11	Cloudy
26.11.22	1024	Rising	81	13	Cloudy
27.11.22	1015	Falling	86	12	Cloud/rain
28.11.22	1009	Falling	84	10	Cloud/sun
29.11.22	1021	Rising	93	7	Cloudy
30.11.22	1023	Rising	90	9	Cloudy
01.12.22	1019	Falling	87	9	Cloudy
02.12.22	1020	Rising	94	9	Cloudy
03.12.22	1021	Rising	76	7	Cloudy
04.12.22	1017	Falling	82	5	Cloudy
05.12.22	1023	Rising	90	7	Cloudy
06.12.22	1020	Falling	87	7	Cloudy
07.12.22	1010	Falling	86	4	Cloudy
08.12.22	1004	Falling	84	3	Cloud/sun
09.12.22	1011	Rising	83	3	Cloud/sun
10.12.22	1009	Falling	81	3	Cloud/sun
11.12.22	1008	Falling	93	1	Cloudy
12.12.22	1015	Rising	87	2	Cloudy
13.12.22	1014	Falling	80	2	Cloudy
14.12.22	1006	Falling	83	3	Cloudy
15.12.22	998	Falling	81	3	Cloudy
16.12.22	1001	Rising	81	3	Cloud/sun
17.12.22	1021	Rising	80	5	Cloud/sun
18.12.22	1013	Falling	94	9	Cloud/rain
19.12.22	1003	Falling	92	14	Cloud/rain
20.12.22	1002	Falling	84	12	Cloud/rain
21.12.22	1008	Rising	84	7	Cloud/sun
22.12.22	1017	Rising	82	6	Cloud/sun/rain
23.12.22	1019	Rising	88	6	Cloud/sun/rain
24.12.22	1011	Falling	86	11	Cloudy
25.12.22	1008	Falling	88	11	Cloud/sun/rain

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RIDGEPOINT HOMES

PORTMAN ROAD, READING

ATMOSPHERIC CONDITIONS

26.12.22	1020	Rising	76	7	Cloud/sun
27.12.22	1020	Steady	71	11	Cloud/rain
28.12.22	1006	Falling	87	12	Cloud/sun/rain
29.12.22	1000	Falling	86	10	Cloud/sun/rain
30.12.22	995	Falling	83	9	Cloud/sun/rain
31.12.22	1023	Rising	86	9	Cloud/rain
01.01.23	1012	Falling	85	10	Cloud/rain
02.01.23	1014	Rising	87	10	Cloud/rain
03.01.23	1028	Rising	87	10	Cloud/sun/rain
04.01.23	1032	Rising	88	9	Cloud/sun/rain
05.01.23	1020	Falling	87	13	Cloudy
06.01.23	1015	Falling	81	11	Cloudy
07.01.23	998	Falling	90	11	Cloudy
08.01.23	995	Falling	83	9	Cloud/sun/rain
09.01.23	998	Rising	74	9	Cloud/sun
10.01.23	1009	Rising	84	12	Cloud/rain
11.01.23	1009	Steady	78	11	Cloud/rain
12.01.23	998	Falling	85	9	Cloud/sun/rain
13.01.23	1006	Rising	85	8	Cloud/sun/rain
14.01.23	997	Falling	83	11	Cloud/rain
15.01.23	1003	Rising	75	7	Cloud/sun
16.01.23	1003	Steady	77	5	Cloudy
17.01.23	987	Falling	78	4	Cloud/snow
18.01.23	1011	Rising	80	4	Cloud/sun
19.01.23	1024	Rising	82	7	Cloud/rain
20.01.23	1012	Falling	82	9	Cloudy

Taken from BBC Weather website
Highlighted rows denote gas monitoring visits.

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ATMOSPHERIC CONDITIONS



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